California Environmental Protection Agency

Air Resources Board

PUBLIC MEETING AGENDA

September 22, 2011

LOCATION:
Air Resources Board
Byron Sher Auditorium, Second Floor
1001 I Street
Sacramento, California 95814
http://www.calepa.ca.gov/EPAbldg/location.htm

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

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

September 22, 2011
9:00 a.m.

CONSENT CALENDAR:

All items on the consent calendar will be voted on by the Board immediately after the start of the public meeting. Any item may be removed from the consent calendar by a Board member or if someone in the audience wishes to speak on that item. The following item is on the consent calendar:

Consent Item #

11-7-1: Public Hearing to Consider Approval of the Proposed State Implementation Plan Revision for Federal Lead Standard Infrastructure Requirements

Staff will present to the Board for approval the infrastructure State Implementation Plan (SIP) for the federal lead standard that was revised in 2008. The infrastructure SIP specifies the resources and authority the State has in place to address the revised standard.

Attached is the Proposed Resolution for the above consent item. Please go to http://www.arb.ca.gov/board/ma/2011/ma092211.htm **for resolution attachment.**

DISCUSSION ITEMS:

Note: The following agenda items may be heard in a different order at the Board meeting.

Agenda Item #

11-7-2: Public Meeting to Consider the Approval of ARB's 2011 Annual Research Plan

Staff will present the proposed 2011 Annual Research Plan. The proposed plan identifies research concepts for Fiscal Year 2011-2012. Following Board action, approved concepts will be developed into research proposals for review by the ARB Research Screening Committee.

11-7-3: Public Meeting to Hear an Update on San Diego's Sustainable Communities Strategy (SCS), and Update on SCS Development in Other Regions in California

Staff will update the Board on the status of regional actions to develop Sustainable Communities Strategies (SCS), including San Diego's draft SCS.

11-7-4: Public Hearing to Consider Amendments to the Vapor Recovery Certification and Test Procedures for Underground and Aboveground Storage Tanks Including Gasoline Dispensing Facility Hose Regulation

Staff will present to the Board proposed amendments to ARB's regulations for vapor recovery certification and test procedures for underground and aboveground storage tanks used at gasoline dispensing facilities (service stations and similar facilities). The amendments include a proposed new requirement for low permeation hoses at gasoline dispensing facilities.

11-7-5: Public Hearing to Consider Amendments to the Regulation for Mobile Cargo Handling Equipment at Ports and Intermodal Rail Yards

Staff will present to the Board proposed amendments to the current cargo handling equipment regulation. The proposed amendments provide additional compliance flexibility, maintain anticipated emissions reductions, and make clarifying changes.

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 or potential litigation:

Pacific Merchant Shipping Association v. Goldstene, U.S. District Court (E.D. Cal. Sacramento), Case No. 2:09-CV-01151-MCE-EFB.

POET, LLC, et al. v. Goldstene, et al., Superior Court of California (Fresno County), Case No. 09CECG04850.

Rocky Mountain Farmers Union, et al. v. Goldstene, U.S. District Court (E.D. Cal. Fresno), Case No. 1:09–CV–02234–LJO–DLB.

National Petrochemical & Refiners Association, et al. v. Goldstene, et al., U.S. District Court (E.D. Cal. Fresno) Case No. 1:10-CV-00163-AWI-GSA.

Association of Irritated Residents, et al. v. California Air Resources Board, Superior Court of California (San Francisco County), Case No. CPF-09-509562.

Association of Irritated Residents, et al. v. U.S. E.P.A., 2011 WL 310357 (C.A.9), (Feb. 2, 2011).

California Dump Truck Owners Association v. California Air Resources Board, U.S. District Court (E.D. Cal. Sacramento) Case No. 2:11-CV-00384-MCE-GGH.

Engine Manufacturers Association v. California Air Resources Board, Sacramento Superior Court, Case No. 34-2010-00082774.

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 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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NEW FEATURE

You can now sign up online in advance to speak at the Board meeting when you submit an electronic Board item comment. For more information go to http://www.arb.ca.gov/board/online-signup.htm.

IF YOU HAVE ANY QUESTIONS, PLEASE CONTACT THE CLERK OF THE BOARD:
OFFICE: (916) 322-5594
1001 I Street, Floor 23, Sacramento, California 95814
ARB Homepage: www.arb.ca.gov

SPECIAL ACCOMMODATION REQUEST

Special accommodation or language needs can be provided for any of the following:

- An interpreter to be available at the hearing;
- Documents made available in an alternate format (i.e., Braille, large print, etc.) or another language;
- A disability-related reasonable accommodation.

To request these special accommodations or language needs, please contact the Clerk of the Board at (916) 322-5594 or by facsimile at (916) 322-3928 as soon as possible, but no later than 10 business days before the scheduled Board hearing. TTY/TDD/Speech to Speech users may dial 711 for the California Relay Service.

Comodidad especial o necesidad de otro idioma puede ser proveído para alguna de las siguientes:

- Un intérprete que esté disponible en la audiencia.
- Documentos disponibles en un formato alterno (por decir, sistema Braille, o en impresión grande) u otro idioma;
- Una acomodación razonable relacionados con una incapacidad.

Para solicitar estas comodidades especiales o necesidades de otro idioma, por favor llame a la oficina del Consejo al (916) 322-5594 o envíe un fax a (916) 322-3928 lo más pronto posible, pero no menos de 10 días de trabajo antes del día programado para la audiencia del Consejo. TTY/TDD/Personas que necesiten este servicio pueden marcar el 711 para el Servicio de Retransmisión de Mensajes de California.

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

PROPOSED

State of California
AIR RESOURCES BOARD

Resolution 11-28

September 22, 2011

Agenda Item No.: 11-7-1

WHEREAS, the Legislature in Health and Safety Code section 39602 designated the State Air Resources Board (ARB or Board) as the air pollution control agency for all purposes set forth in federal law;

WHEREAS, ARB is responsible for the preparation of the State Implementation Plan (SIP) for attaining and maintaining the national ambient air quality standards (NAAQS) as required by the federal Clean Air Act (CAA; 42 U.S.C. section 7401 *et seq.*) and to this end is directed by Health and Safety Code section 39602 to coordinate the activities of all local and regional air pollution control and air quality management districts (districts) as necessary to comply with the CAA;

WHEREAS, section 39602 of the Health and Safety Code also provides that the SIP shall include only those provisions necessary to meet the requirements of the CAA;

WHEREAS, ARB has primary responsibility for the control of air pollution from vehicular sources, including motor vehicle fuels, as specified in sections 39002, 39500, and part 5 (commencing with section 43000) of the Health and Safety Code, and for ensuring that districts meet their responsibilities under the CAA pursuant to sections 39002, 39500, 39602, 40469, and 41650 of the Health and Safety Code;

WHEREAS, ARB is authorized by Health and Safety Code section 39600 to do such acts as may be necessary for the proper execution of its powers and duties;

WHEREAS, the California Environmental Quality Act (CEQA) requires that no project which may have significant adverse environmental impacts may be adopted as originally proposed if feasible alternatives or mitigation measures are available to reduce or eliminate such impacts, unless specific overriding considerations are identified which outweigh the potential adverse consequences of any unmitigated impacts;

WHEREAS, on October 15, 2008, the United States Environmental Protection Agency (U.S. EPA) promulgated a revised 3-month average lead NAAQS at a level of 0.15 micrograms per cubic meter;

WHEREAS, when U.S. EPA promulgates a NAAQS, CAA section 110(a)(1) requires each state to adopt and submit to the U.S. EPA Administrator, after reasonable notice and public hearing, an Infrastructure SIP that provides for implementation, maintenance, and enforcement of the NAAQS throughout the State;

WHEREAS, the CAA sections 110(a)(2)(A) through (M) set forth the specific elements a state must address in its Infrastructure SIP for the NAAQS;

WHEREAS, the Infrastructure SIP does not contain any proposed control strategy, but instead sets forth the State's and districts' authority and abilities to develop and implement a strategy for attaining and maintaining the NAAQS;

WHEREAS, many of the Infrastructure SIP requirements were addressed in California's comprehensive CAA section 110(a)(2) SIP, which was submitted in response to the CAA of 1970 and approved by U.S. EPA in 1979 in 40 Code of Federal Regulations (CFR) section 52.220;

WHEREAS, the Infrastructure SIP affirms ARB's commitment to comply with CAA section 110(a)(2) requirements, as well as responds to new elements required by the 1990 CAA Amendments and by U.S. EPA's 2008 promulgation of the revised lead NAAQS;

WHEREAS, the Infrastructure SIP for lead must be submitted to U.S. EPA by October 15, 2011, (three years after promulgation of the 2008 lead NAAQS);

WHEREAS, CAA section 110(l) and 40 CFR section 51.102 require one or more public hearings, preceded by at least 30-day notice and opportunity for public review, be conducted prior to the adoption and submittal to U.S. EPA of any SIP revision;

WHEREAS, on August 24, 2011, ARB staff circulated for public review a Staff Report entitled *Proposed State Implementation Plan Revision for Federal Lead Standard Infrastructure Requirements,* which includes a discussion of all elements of the Infrastructure SIP for lead as required under CAA section 110(a)(2);

WHEREAS, the proposed Infrastructure SIP for lead demonstrates ARB and districts' authority and abilities to:

1. establish enforceable emission limits and other control measures and programs that effectively limit lead emissions and establish schedules and timetables for complying with the lead NAAQS;

2. monitor, compile, and analyze ambient lead air quality data and provide the data to U.S. EPA;

3. implement an enforcement program for control measures associated with implementing the lead NAAQS and a permit program regulating the construction and modification of major stationary lead sources;

4. prohibit lead emissions from contributing significantly to nonattainment of the lead NAAQS, interfering with maintenance of the lead NAAQS, or contributing to reduced visibility in another state;

5. provide assurances that the agencies have adequate personnel, funding, and legal authority to carry out provisions in the SIP, that a majority of their board members represent the public interest, and that the state can ensure that the districts can implement provisions in the SIP;

6. require owners and operators of stationary lead sources to install, maintain, and replace equipment for monitoring stationary source lead emissions and to provide periodic reports on these emissions;

7. halt lead emissions that cause or contribute to injury of public health or welfare and have adequate contingency plans to implement their authority;

8. revise their SIP when a NAAQS is revised, new attainment methods become available, or U.S. EPA determines that a current SIP is inadequate to attain the NAAQS or to comply with additional CAA requirements;

9. meet the applicable requirements of the CAA relating to consultation and public notification, and meet the requirements for PSD and visibility protection, as they apply to lead;

10. provide for using air quality models to predict the effect of lead emissions on ambient air quality, and submit the modeling data to U.S. EPA when requested;

11. assess and collect from owners and operators of stationary lead sources, fees sufficient to cover the reasonable costs of reviewing and acting upon a permit application and fees sufficient to cover the reasonable costs of implementing and enforcing the permit, if granted (owners or operators are also required to comply with the fee provisions of Title V sections 501 through 507 of the CAA);

12. consult with and allow for participation by local political subdivisions affected by the Infrastructure SIP for lead;

WHEREAS, the Board finds that:

1. The proposed Infrastructure SIP for lead meets the applicable requirements established by the CAA and U.S. EPA regulations;

2. The Board certifies pursuant to 40 CFR section 51.102 that the proposed Infrastructure SIP for lead meets the notice and public hearing requirements specified in 40 CFR section 51.102;

3. The proposed Infrastructure SIP for lead will not result in any significant adverse environmental impacts because it does not contain any control strategies and is simply a demonstration of ARB's and districts' authority and abilities to implement the lead NAAQS, therefore, the project is exempt from CEQA because there is no possibility that it will have a significant effect on the environment.

NOW, THEREFORE, BE IT RESOLVED, that the Board hereby adopts the Infrastructure SIP for lead, as set forth in Attachment A to this resolution, as a revision to the California State Implementation Plan.

BE IT FURTHER RESOLVED, that the Board directs the Executive Officer to submit the adopted Infrastructure SIP for lead to U.S. EPA for approval, along with other supporting documentation, no later than October 15, 2011;

BE IT FRUTHER RESOLVED, that the Board directs the Executive Officer to work with U.S. EPA and take appropriate action to resolve any completeness on approvability issues that may arise regarding the Infrastructure SIP for lead.

Resolution 11-28

September 22, 2011

Identification of Attachments to the Board Resolution

Attachment A: Proposed State Implementation Plan Revision for Federal Lead Standard Infrastructure Requirements, Released August 24, 2011, including Appendix A, available at: http://www.arb.ca.gov/planning/sip/sip.htm.

California Environmental Protection Agency

Air Resources Board

PUBLIC MEETING AGENDA

LOCATION:
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September 22, 2011

CALIFORNIA AIR RESOURCES BOARD

NOTICE OF PUBLIC HEARING TO CONSIDER APPROVAL OF THE PROPOSED STATE IMPLEMENTATION PLAN REVISION FOR FEDERAL LEAD STANDARD INFRASTRUCTURE REQUIREMENTS

The Air Resources Board (ARB or Board) will conduct a public hearing at the time and place noted below to consider the approval of proposed revisions to the California State Implementation Plan (SIP) for submittal to the United States Environmental Protection Agency (U.S. EPA). The proposed revisions document that California has the resources and programs in place to implement, maintain, and enforce the 2008 revised lead national ambient air quality standard.

DATE: September 22, 2011

TIME: 9:00 a.m.

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

This item may be considered at a one-day meeting of the Board, which will commence at 9:00 a.m., September 22, 2011. This item is scheduled to be heard on the Board's Consent Calendar. All items on the Consent Calendar will be voted on by the Board immediately after the start of the public meeting. Any item may be removed from the Consent Calendar by a Board member or at the request of a Board member or if someone in the audience would like to speak on that item.

BACKGROUND

On October 15, 2008, U.S. EPA adopted a revised national ambient air quality standard for lead. The lead standard was lowered 90 percent, from 1.5 micrograms per cubic meter ($\mu g/m^3$) to 0.15 $\mu g/m^3$. When U.S. EPA adopts a new standard or, as in the case of lead, revises an existing standard, one of the first steps in the planning process is a determination of whether the state has sufficient resources, programs, and authority to implement the standard. The federal Clean Air Act refers to these collectively, as the necessary "infrastructure." The formal documentation is set forth in an Infrastructure SIP and constitutes a revision to California's overall SIP.

Specific Infrastructure SIP requirements are specified in Clean Air Act Section 110. Examples of infrastructure include programs to monitor air quality and authority to adopt, implement, and enforce regulations. The overarching framework or infrastructure for California's air quality programs is well established and has been documented in previous Infrastructure SIP submittals. The proposed Infrastructure SIP for lead is specific to the 2008 federal lead standard and is due to U.S. EPA October 15, 2011.

PROPOSED ACTION

ARB staff prepared a Staff Report entitled, "Proposed State Implementation Plan Revision for Federal Lead Standard Infrastructure Requirements" released August 23, 2011. The Staff Report documents State and district resources, programs, and authority to implement the basic requirements needed to ensure implementation, maintenance, and enforcement of the 2008 federal lead standard. Among the items the Infrastructure SIP addresses are the ability to monitor and report emissions and air quality data, the authority to adopt and enforce regulations and programs designed to protect public health, and provisions to provide opportunity for input and review by affected entities and the public. These items provide the "infrastructure" needed to achieve and maintain healthful air quality.

Most of these Infrastructure SIP elements were addressed in California's comprehensive Infrastructure SIP, submitted in response to the federal Clean Air Act of 1970 and approved by U.S. EPA in 1979 (40 Code of Federal Regulations Part 52.220). This submittal for the 2008 federal lead standard continues to affirm ARB's commitment to comply with the infrastructure requirements. In addition, the lead Infrastructure SIP responds to new elements and commitments required by the 2008 federal lead standard. Changes required for the 2008 lead standard are limited in scope and include affirming our ability to comply with new monitoring and permitting requirements, as well as committing to comply with any future SIP revisions required under the Clean Air Act.

AVAILABILITY OF DOCUMENTS AND CONTACT PERSONS

Copies of the proposed Lead Infrastructure SIP will be available at ARB's Public Information Office,1001 I Street, First Floor, Environmental Services Center, Sacramento, California, 95814, (916) 322-2990 beginning August 23, 2011. The document may also be accessed on ARB's website at:

http://www.arb.ca.gov/planning/sip/sip.htm.

Interested members of the public may present comments orally or in writing at the meeting and comments may be submitted by postal mail or by electronic submittal before the meeting. To be considered by the Board, written comments not physically submitted at the meeting must be received **no later than 12:00 noon, September 21, 2011,** 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

New Feature

You can now sign up online in advance to speak at the Board meeting when you submit an electronic board item comment. For more information go to: http://www.arb.ca.gov/board/online-signup.htm.

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.

ARB requests that written and email statements be filed at least 10 days prior to the meeting so that ARB staff and Board members have time to fully consider each comment. Further inquiries regarding this matter should be directed to Ms. Gayle Sweigert, Manager of the Air Quality Analysis Section at (916) 322-6923 or Ms. Marcella Nystrom, Staff Air Pollution Specialist at (916) 323-8543.

SPECIAL ACCOMMODATION REQUEST

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CALIFORNIA AIR RESOURCES BOARD

James N. Goldstene
Executive Officer

Date: 8/22/11

The energy challenge facing California is real. Every Californian needs to take immediate action to reduce energy consumption. For a list of simple ways you can reduce demand and cut your energy costs, see our website at www.arb.ca.gov.

STATE IMPLEMENTATION PLAN REVISION FOR FEDERAL LEAD STANDARD INFRASTRUCTURE REQUIREMENTS

Release Date: August 23, 2011
Hearing Date: September 22, 2011

California Environmental Protection Agency

Air Resources Board

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OVERVIEW

The purpose of this report is to provide a revision to the infrastructure portion of California's State Implementation Plan (SIP). The revision is required under the federal Clean Air Act (CAA) and is limited to changes that specifically address the national ambient air quality standard for lead (federal lead standard). It contains no changes for any other air pollutant. The following paragraphs provide background on the federal lead standard and requirements for the infrastructure portion of the SIP. The actual language of the SIP revision is provided in Appendix A: State Implementation Plan Revision for Federal Lead Standard Infrastructure Requirements.

INTRODUCTION

On October 15, 2008, the United States Environmental Protection Agency (U.S. EPA) revised the federal lead standard. The revised standard of 0.15 micrograms per cubic meter ($\mu g/m^3$), averaged over a three-month period, is 90 percent more stringent than the former 1.5 $\mu g/m^3$ standard and carries several new requirements with it. When U.S. EPA promulgates a new standard or, as in the case of lead, revises an existing standard, CAA Section 110(a)(1) requires each state to revise their SIP to show they have the authority and programs needed to implement, maintain, and enforce the standard, regardless of designation status. This documentation is submitted to U.S. EPA for approval and is generally referred to as an Infrastructure SIP. States must submit an Infrastructure SIP within three years after a federal standard is adopted or revised. California's Lead Infrastructure SIP is due to U.S. EPA by October 15, 2011.

California has already addressed most of the infrastructure requirements in a comprehensive Infrastructure SIP submitted in response to the CAA of 1970 and approved by U.S. EPA in 1979 (40 Code of Federal Regulations 52.220). The Air Resources Board (ARB or Board) submitted amendments to the Infrastructure SIP to comply with revisions to the federal 8-hour ozone standard and federal PM2.5 standard, but U.S. EPA has not yet acted fully on these revisions. The revision for the 2008 federal lead standard continues to affirm the Board's commitment to comply with CAA requirements. In addition, the revision responds to new elements required by U.S. EPA's 2008 revision of the federal lead standard, including new lead monitoring requirements, stationary source lead permitting requirements, and development of an emergency episode plan for lead.

The specific elements required for the Lead Infrastructure SIP are listed in CAA Section 110(a)(2). Table 1 lists the page number in Appendix A where each element is addressed. As mentioned earlier, the Lead Infrastructure SIP becomes part of the overall statewide SIP.

TABLE 1
REQUIRED INFRASTRUCTURE SIP ELEMENTS

Infrastructure SIP Element	***Clean Air Act Requirement***	***Element Description***
Emission Limits and Other Control Measures	§110(a)(2)(A)	Page A-1
Ambient Air Quality Monitoring/Data System	§110(a)(2)(B)	Page A-2
Programs for Enforcement, PSD, and NSR	§110(a)(2)(C)	Page A-4
Interstate and International Transport Provisions	§110(a)(2)(D)	Page A-6
Adequate Personnel, Funding, and Authority	§110(a)(2)(E)	Page A-7
Stationary Source Monitoring and Reporting	§110(a)(2)(F)	Page A-8
Emergency Episodes	§110(a)(2)(G)	Page A-9
Future SIP Revisions	§110(a)(2)(H)	Page A-10
Consultation with Government Officials, Public Notification, PSD, and Visibility Protection	§110(a)(2)(J)	Page A-11
Air Quality Modeling/Data	§110(a)(2)(K)	Page A-12
Permitting Fees	§110(a)(2)(L)	Page A-13
Consultation/Participation by Affected Local Entities	§110(a)(2)(M)	Page A-13

In addition to the infrastructure requirements, U.S. EPA designates areas as attainment, nonattainment, or unclassifiable to facilitate subsequent planning efforts to attain the federal standards. When a new standard is adopted or an existing standard is revised, states have one year to submit area designation recommendations. ARB submitted area designation recommendations for the revised federal lead standard on October 15, 2009. A copy of the staff report is available on ARB's website at http://www.arb.ca.gov/desig/feddesig.htm. U.S. EPA promulgated final area designations for lead one year later. Only one area in California, the Los Angeles County portion of the South Coast Air Basin, excluding the Channel Islands, is designated as nonattainment for the federal lead standard. A lead nonattainment SIP for this area is due to U.S. EPA on June 30, 2012. All other areas of the State are designated as unclassifiable.

APPENDIX A

STATE IMPLEMENTATION PLAN REVISION FOR FEDERAL LEAD STANDARD INFRASTRUCTURE REQUIREMENTS

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APPENDIX A
State Implementation Plan Revision
for Federal Lead Standard Infrastructure Requirements

Emission Limits and Other Control Measures *[§110(a)(2)(A)]*

This section requires states to establish emission control measures and programs that limit lead emissions.

No additional statewide control measures or programs are needed to comply with the national ambient air quality standard for lead (federal lead standard). However, control measures aimed at reducing lead emissions from large lead processing facilities in the South Coast Air Basin will be part of the South Coast Air Quality Management District's (South Coast District) lead nonattainment SIP that is due to the United States Environmental Protection Agency (U.S. EPA) in June 2012.

Discussion

When U.S. EPA first adopted a lead standard in 1978, it was estimated that over 90 percent of ambient lead concentrations were attributable to the use of lead in gasoline. The phase-out of lead in gasoline began during the 1970s, and Air Resources Board (ARB) regulations (California Code of Regulations (CCR), title 13, section 2253.4) virtually eliminated lead from gasoline sold in California starting January 1, 1992. The Clean Air Act (CAA) Amendments of 1990 mandated the elimination of lead from all U.S. motor fuel by January 1, 1996, specifying the same 0.05 grams of lead per gallon limit as the California regulations. As a result of these State and federal regulations, maximum monthly average lead concentrations measured at ambient population-oriented monitors are now 99 percent lower – about 10 micrograms per cubic meter ($\mu g/m^3$) in the mid-1970s compared with 0.04 $\mu g/m^3$ or less, now. These monthly average concentrations are well below the level of the three-month average specified in the 2008 federal lead standard. The State and federal regulations will continue to provide the basic framework needed to ensure long-term attainment and maintenance of the federal lead standard on a statewide level, with the exception of the Los Angeles County portion of the South Coast Air Basin.

In contrast to the rest of the State, the Los Angeles County portion of the South Coast Air Basin is the only area in California impacted by local, stationary source lead emissions. Furthermore, it is the only area in California designated as nonattainment for the 2008 federal lead standard. The South Coast District has jurisdiction over stationary sources in the nonattainment area and has been proactive in mitigating their impact on ambient lead concentrations. On September 11, 1992, the South Coast District adopted Rule 1420 - Emissions Standard for Lead. Rule 1420 specifies emission limits, control requirements, monitoring requirements, modeling requirements, recordkeeping requirements, and reporting requirements for lead, and it applies to all facilities in the South Coast Air Basin that use or process lead-containing materials. In addition to Rule 1420, the South Coast District adopted Rule 1420.1 on November 5, 2010. Rule 1420.1 applies specifically to large lead-acid battery recycling facilities, which have been identified as the source of the Los Angeles County federal lead standard violations. These rules will be discussed in more detail in the South Coast District lead nonattainment SIP.

Ambient Air Quality Monitoring/Data System *[§110(a)(2)(B)]*

This section requires states to monitor, compile, and analyze ambient lead concentrations and provide the data to U.S. EPA.

Current monitoring requirements for lead include population-oriented or exposure monitoring, source-oriented monitoring, and a pilot program for monitoring lead at general aviation airports where leaded fuel is used. Existing and planned lead monitors in California are sufficient to comply with the population exposure and source-oriented monitoring requirements. U.S. EPA is currently working with five general aviation airports in California as part of the pilot program.

Discussion

ARB, air pollution control and air quality management districts (districts), private contractors, and other government entities (for example, the National Parks Service) maintain a statewide network of monitoring sites. Monitoring instruments at these sites collect data for many air pollutants and a number of meteorological parameters. Current information about California's overall air quality monitoring program, as well as information about individual monitoring sites is available on ARB's website at http://www.arb.ca.gov/aqd/aqmoninca.htm. Data collected at the individual monitoring sites are compiled, analyzed, and reported to U.S. EPA's Air Quality System per the schedule set forth in federal monitoring regulations. These data are also available on ARB's website at http://www.arb.ca.gov/adam. ARB and districts also submit annual air quality monitoring plans to U.S. EPA that describe how the State and districts comply with monitoring requirements. These plans also describe proposed monitoring changes.

As a result of the success of removing lead from gasoline, significant lead emissions now come from just a few industrial sources. Recognizing this, lead monitoring requirements include source-oriented monitoring, as well as population exposure monitoring. With respect to population exposure monitoring, federal regulations require lead monitoring at NCore sites in any Core Based Statistical Area (CBSA) with a population of 500,000 or more. NCore sites form a "National Core" of multi-pollutant monitoring sites. There are currently six NCore sites in California, as shown in Table A-1. Lead monitors are already operating at five of California's six NCore sites, with the remaining monitor to be deployed and operating by the required January 1, 2012, deadline. Lead measurements at the NCore sites are collected using Federal Reference Method (FRM) or Federal Equivalent Method (FEM) lead-total suspended particulate (Pb-TSP) samplers or lead-fine particulate matter (Pb-PM10) samplers. All samplers meet siting and operating parameters as mandated by U.S. EPA for lead in 40 Code of Federal Regulations (CFR) Part 58.

In addition to the NCore sites, Table A-1 shows lead monitors at several other population-oriented sites in California, including Calexico, Riverside (Magnolia location), San Bernardino, and Upland. Lead concentrations at these sites are collected using FRM or FEM Pb-TSP monitors. Although not required, these monitors will continue operating, providing a long-term record for comparison with future lead levels to ensure compliance with the federal lead standard.

TABLE A-1
Population Exposure Lead Monitoring Sites in California

Monitor Location	County	Type of Monitor	Type of Monitor
El Cajon	San Diego	NCore / Population Exposure	Pb-TSP
Fresno	Fresno	NCore / Population Exposure	Pb-TSP
Los Angeles	Los Angeles	NCore / Population Exposure	Pb-TSP&Pb-PM10
Riverside (Rubidoux)	Riverside	NCore / Population Exposure	Pb-TSP&Pb-PM10
Sacramento*	Sacramento	NCore / Population Exposure	Pb-PM10
San Jose	Santa Clara	NCore / Population Exposure	Pb-PM10
Calexico	Imperial	Neighborhood / Population Exposure	Pb-TSP
Riverside (Magnolia)	Riverside	Neighborhood / Population Exposure	Pb-TSP
San Bernardino	San Bernardino	Neighborhood / Population Exposure	Pb-TSP
Upland	San Bernardino	Neighborhood / Population Exposure	Pb-TSP

**Monitor will be deployed and operating by January 1, 2012.*

The revised federal lead standard also requires source-oriented lead monitoring near industrial sources emitting more than 0.5 tons of lead per year. The only qualifying source in California is located in the South Coast Air Basin. The South Coast District maintains a network of source-oriented lead monitors, as described in their 2011 Annual Air Quality Monitoring Network Plan. The Plan is available on the web at http://www.aqmd.gov/tao/AQ-Reports/AQMonitoringNetworkPlan/FinalAMNetworkPlan.pdf. These source-oriented monitors measure concentrations around the South Coast Air Basin's most significant industrial lead-related sources. The South Coast District has monitored lead concentrations around these sources for two decades and is committed to continue operating the monitors, long-term.

U.S. EPA's last lead monitoring requirement defines a 12-month pilot program to monitor lead concentrations near general aviation airports where fuel containing lead could cause elevated lead concentrations. U.S. EPA selected fifteen airports, nationwide, to participate in the pilot program. Five of these fifteen airports are located in California (refer to Table A-2). The airports, districts, and ARB are working with U.S. EPA to develop sites and implement lead monitoring near these airports. Lead data will be collected by FRM or FEM Pb-TSP samplers, so they are comparable with the federal lead standard. Consistent with U.S. EPA requirements, any site measuring a three-month average lead concentration greater than half the level of the 2008 federal lead standard must continue to monitor for lead after the pilot program ends.

TABLE A-2
California Airports Participating in U.S. EPA Pilot Lead Monitoring Study

Airport Name	County
Gillespie Field	San Diego
McClellan-Palomar	San Diego
Palo Alto	Santa Clara
Reid-Hillview	Santa Clara
San Carlos	San Mateo

Programs for Enforcement, PSD, and NSR *[§110(a)(2)(C)]*

This section requires states to enforce control measures associated with attaining and maintaining the federal lead standard and to implement a permitting program to regulate the construction and modification of major stationary sources of lead. In addition, Prevention of Significant Deterioration (PSD) programs must also apply to stationary sources that emit Greenhouse Gases, in accordance with U.S. EPA's Tailoring Rule.

ARB has a comprehensive enforcement program in place, including enforcement of State fuels regulations. No new statewide programs are needed for lead. In California, districts are responsible for permit programs for stationary sources. Each district has developed their own program, resulting in a comprehensive set of applicable rules and regulations. With respect to PSD, five districts have SIP-approved PSD programs. Two districts operate programs with partial SIP-approved authority. PSD programs in the remaining districts are administered by U.S. EPA.

Discussion

ARB's enforcement program covers mobile sources, stationary sources, consumer products, and fuels. Details about the program are available on ARB's website at http://www.arb.ca.gov/enf/enf.htm. In addition to the statewide program, districts implement rules incorporating California Health and Safety Code provisions that grant all district officers and employees the authority to adopt and enforce their own rules and regulations (California Health and Safety Code sections 40001, 40120, 40702, 40752, 40753, and 41510). ARB reviews and audits district enforcement programs as part of its oversight role and in accordance with California Health and Safety Code section 41500. ARB also reviews district rules at their draft, proposed, and adopted stages to ensure the rules meet all applicable State and federal requirements. ARB maintains an online publically accessible district rules database at http://www.arb.ca.gov/drdb/drdb.htm.

California Health and Safety Code section 40000 gives districts the responsibility for controlling air pollution from stationary sources. This includes responsibility for New Source Review (NSR) and PSD. Both NSR and PSD address the construction or modification of major stationary sources so they do not cause or contribute to a violation of federal standards. NSR applies in nonattainment areas. In general, NSR rules in California must meet federal requirements, as well as more stringent State requirements. In contrast to NSR, PSD only applies in areas designated as attainment or unclassifiable for a federal standard. As noted above, various provisions in the California Health and Safety Code grant all district officers and employees authority to adopt and enforce rules and regulations, including stationary source permitting programs.

In terms of the federal lead standard, there is only one nonattainment area in California, the Los Angeles County portion of the South Coast Air Basin. Therefore, NSR applies in this area. The rest of California is designated as unclassifiable for lead, and therefore, PSD requirements apply. PSD requirements are very complex and often change, as evidenced by the new requirements applicable to Greenhouse Gases (GHG). In California, PSD programs are either (1) fully implemented by a district, (2) partially implemented by a district, or (3) wholly implemented by U.S. EPA. Five California districts, all of which are designated as unclassifiable for the 2008 federal lead standard, have authority to fully implement their SIP-approved PSD program. Table A-3 lists these districts, their qualifying rules, and the significant lead emission rate specified in the rules. In addition to criteria pollutants, such as lead, the SIP-approved PSD programs in these districts also apply to GHG emissions, in accordance with U.S. EPA's Tailoring Rule.

TABLE A-3
California Districts with SIP-Approved PSD Lead Rules

District	***Rule Covering Lead***	***Significance Level for Lead***	***SIP Approval Federal Register Citation***
Mendocino County Air Quality Management District	Rule 220	0.6 tons/year	50 FR 30942
Monterey Bay Unified Air Pollution Control District	Rule 207	3.28 pounds/day*	65 FR 5433
North Coast Unified Air Quality Management District	Rule 220	0.6 tons/year	50 FR 30941
Northern Sonoma County Air Pollution Control District	Rule 220	0.6 tons/year	50 FR 30943
Sacramento Metropolitan Air Quality Management District	Rule 202	3.3 pounds/day	50 FR 25417

**3.3 pounds/day is nominally equivalent to 0.6 tons per year*

Two California districts, the Bay Area Air Quality Management District and South Coast Air Quality Management District, operate their PSD and NSR programs with partial SIP-approved authority. Those portions of their PSD and NSR programs that have not been SIP-approved are administered by U.S. EPA. The remaining districts in California are all designated as unclassifiable for the 2008 federal lead standard, and all have PSD programs for both lead and GHG that are wholly administered by U.S. EPA.

Interstate and International Transport Provisions [§110(a)(2)(D)]

This section prohibits the transport of lead emissions from one state to another, where they could contribute significantly to violations of the federal lead standard, interfere with maintenance of the federal lead standard, or contribute to reduced visibility.

Stationary source lead emissions do not have a transport impact unless the source is located very near a state or international boundary. Transport is not an issue in California's only nonattainment area (Los Angeles County portion of the South Coast Air Basin) because stationary lead sources are located more than 100 miles from the nearest state or international border. In addition to transport, U.S. EPA has determined that lead emissions do not impact visibility.

Discussion

Lead is a primary pollutant that does not undergo atmospheric transformation. Furthermore, because lead particles are relatively heavy, they tend to settle out quickly. As a result, lead impacts are very localized. The highest concentrations occur in the immediate vicinity of the emission source, with concentrations dropping off rapidly with distance from the source. Given the characteristics of lead, only states with sources located very near a state or international boundary have the potential to contribute to nonattainment or maintenance of the federal lead standard in another area via transport. In recent guidance, U.S. EPA defined the critical distance as 2 miles.

There are only two sources in California that contribute to violations of the lead NAAQS. Both facilities are located in the Los Angeles County nonattainment area, and both are more than 100 miles from the nearest state or international boundary. Although lead concentrations near the facilities violate the federal standard, lead concentrations at all other sites in the South Coast Air Basin, including nonsource-oriented sites in the Los Angeles County nonattainment area, are well below the level of the federal lead standard (maximum 2005-2007 3-month averages ranged from 0.01 $\mu g/m^3$ to 0.03 $\mu g/m^3$). Based on these data, the large lead facilities in the Los Angeles County nonattainment area do not contribute to lead violations or interfere with maintenance of the federal lead standard, outside the local nonattainment area. Thus, transport is not a concern. Nevertheless, while the South Coast District is developing their lead nonattainment SIP, major stationary lead sources are covered under Appendix S to 40 CFR Part 51. Appendix S sets forth U.S. EPA's Interpretive Ruling on preconstruction review requirements and conditions, insuring that lead emissions from major stationary sources and major stationary source modifications are controlled to the greatest extent possible, that emission offsets are obtained, and that the area continues progress toward attainment.

In addition to transport, U.S. EPA has determined that lead emission sources have an insignificant impact on visibility. Nevertheless, California has a federally-approved Regional Haze Plan in place. The Regional Haze Plan is available on the ARB website at http://www.arb.ca.gov/planning/reghaze/reghaze.htm.

Adequate Personnel, Funding, and Authority *[§110(a)(2)(E)]*

This section requires states and local districts to maintain adequate personnel, funding, and legal authority to implement their SIP and to ensure that a majority of their board members represent the public interest.

A majority of ARB and district budgets go toward meeting CAA mandates. Much of this funding comprises fees collected from regulated emission sources and is dedicated to air pollution control activities. All ARB and district board members must comply with conflict of interest requirements established in State law.

Discussion

Each year, the California State Legislature approves ARB's funding and staff resources for carrying out the programs of the SIP. Similarly, district budgets are approved each year by the district's governing board. The annual budget process provides a periodic update that enables ARB and the districts to adjust funding and personnel needs. Although it is not legally possible for ARB and the districts to provide specific commitments about future-year funding, the annual budget appropriations process undertaken by the California State Legislature enables ARB to present a request for resources required to meet the mandates of the CAA. These mandated programs have received State funding for more than three decades, and there is consistently strong public support in California for providing clean air. Therefore, it is reasonable to assume that implementation of CAA mandates will continue to be funded at an appropriate level.

Over the last several years, more than 80 percent of ARB's budget has gone toward meeting CAA mandates. Furthermore, the majority of ARB's budget comprises dedicated fees collected from regulated emission sources. These funds can only be used for air pollution control activities and are periodically adjusted to maintain the funding necessary for ARB programs. Districts receive funding from fees paid by regulated businesses, motor vehicle registration fees, State and federal grants, and other local revenue sources. Collectively, the 2009-2010 ARB and district budgets totaled $1.2 billion, with 3,422.4 full-time equivalent staff positions. If a district fails to meet its responsibilities, California Health and Safety Code section 39002 grants ARB the overall regulatory authority for districts' air pollution control programs and the power to implement these programs.

California Government Code Sections 87100 through 87105 specify conflict of interest requirements for members of ARB and district boards. These requirements specifically prohibit all state and local public officials from participating in governmental decisions in which they have a financial interest. They also direct ARB and the districts to develop conflict of interest policies to meet these legal requirements. Each year, all ARB Board members and professional staff must complete a conflict of interest statement, which becomes a public document.

***Stationary Source Monitoring and Reporting** [§110(a)(2)(F)]*

This section calls for states to require owners and operators of stationary sources to install, maintain, and replace equipment for monitoring stationary source lead emissions and to provide periodic reports on these emissions.

ARB maintains an emissions inventory for lead that goes beyond what U.S. EPA requires. In addition, existing State and district rules require stationary source owners and operators to determine the amount of lead emitted by their facilities.

Discussion

ARB maintains an emissions inventory with information for more than 14,000 stationary source facilities in California. The inventory includes information on lead emissions. These data are available on the ARB's website at http://www.arb.ca.gov/ei/disclaim.htm. The Federal Air Emissions Reporting Requirements Rule requires states to collect and report lead emissions data for facilities emitting more than 5 tons of lead per year. ARB's "Hot Spots" program for toxic air contaminants is even more stringent, requiring stationary source owners and operators to report lead emissions at levels well below 1 pound (0.0005 tons) per year.

Emissions estimates for stationary sources rely in part, on accurate emissions monitoring data. In addition, emissions monitoring data provide a basis for determining whether facilities meet performance standards established in State and district rules. California Health and Safety Code section 41511 authorizes ARB and districts to adopt rules and regulations requiring any emission source owner or operator to take reasonable steps to determine the amount of emissions released from the source. This would include emissions that contribute to a violation of any ambient air quality standard, including the federal lead standard. In order to determine the amount of emissions coming from a particular source, districts have rules giving the Air Pollution Control Officer authority to request the installation, use, maintenance, and inspection of Continuous Emission Monitoring System (CEMS) equipment. Some district rules that trigger the CEMS requirement are tied to specific source categories and/or emission thresholds. These rules specify performance standards for the monitoring equipment, requirements for recordkeeping and reporting, and requirements for violation and equipment breakdown notification.

Emergency Episodes ***[§110(a)(2)(G)]***

This section requires states to have the authority to halt lead emissions that cause or contribute to injury of public health or welfare and to develop an emergency plan for lead.

State law grants ARB and the districts authority to halt pollutant emissions that could cause a public health emergency or nuisance. Although U.S. EPA has not established a contingency plan or requirements for emergency lead episodes, California includes such a plan in this Infrastructure SIP.

Discussion

Under State law, ARB and districts are authorized to take action to halt pollutant emissions that could cause a public health emergency or nuisance. California Health and Safety Code section 41509 specifies that ARB or other local agency rules cannot infringe upon a district's authority to declare, prohibit, or abate a nuisance. This section also specifically authorizes California's Attorney General to enjoin any pollution or nuisance, at the request of a district or ARB. In addition to State law, U.S. EPA is authorized under the CAA either to bring a lawsuit in federal court or, if such action cannot assure prompt protection of public health or welfare, to issue such orders as may be necessary to protect public health or welfare or the environment. The authority granted to U.S. EPA is vested in ARB and the districts under California Health and Safety Code section 42400, et seq. These sections apply to a range of emission violations and impose penalties that are equivalent to or exceed comparable federal penalties for the same violations.

The requirement for states to provide for adequate contingency plans to implement such authority is intended to establish emergency episode plans for responding to elevated pollutant levels. For nitrogen dioxide, sulfur dioxide, carbon monoxide, ozone, and particulate matter, U.S. EPA regulations include a classification system that identifies areas as Priority 1 (most severe), Priority 2, or Priority 3 (least severe), based on their air quality problem. The most comprehensive emergency episode plan is required for Priority 1 areas, while a less detailed plan is required for Priority II areas, and no plan is required for Priority 3 areas. Emergency episode plans for the Priority I areas must provide for actions to abate emissions, based on "Significant Harm Levels" that U.S. EPA has defined for the specific pollutant in 40 CFR Part 51.151.

U.S. EPA has not defined any significant harm levels for lead, leaving determination of what constitutes an adequate emergency episode plan up to the State. California will use a lead concentration of 0.60 $\mu g/m^3$ averaged over a three-month period to define a Significant Harm Level for lead. This concentration is about four times the level of the federal lead standard, consistent with the average Significant Harm Level for Priority I areas that U.S. EPA has established for other pollutants (refer to 40 CFR part 51.151). Currently available monitoring data do not show ambient concentrations at any site in California approaching the 0.60 $\mu g/m^3$ trigger level, except in the vicinity of large lead-acid battery recycling facilities in the Los Angeles County lead nonattainment area. Existing State authority is sufficient to implement an emergency response for lead if concentrations at any site outside the nonattainment area reach the 0.60 $\mu g/m^3$ trigger level.

To address high lead concentrations in the nonattainment area, the South Coast District adopted Rule 1420.1, which applies to any large lead-acid battery recycling facility in the South Coast Air Basin that processes or has ever processed 50,000 tons or more of lead per year. The South Coast District identified lead emissions from these recycling facilities as the source of the area's violations of the federal lead standard. Rule 1420.1 requires total enclosures for any process associated with the preparation, recovery, refining, and storage of lead-containing material and requires pollution control devices on the enclosures and on lead emission point sources. Rule 1420.1 also includes housekeeping, monitoring, and recordkeeping requirements. The trigger level specified in Rule 1420.1 is 0.15 $\mu g/m^3$ averaged over any consecutive 30-day period. In addition, as of July 1, 2011, any facility exceeding an ambient lead concentration of 0.12 $\mu g/m^3$ averaged over any consecutive 30-day period must submit a Compliance Plan identifying additional lead emission reduction measures, thereby ensuring subsequent compliance with the federal lead standard. The provisions of Rule 1420.1 will be addressed in more detail in the South Coast District lead nonattainment SIP.

Future SIP Revisions ***[§110(a)(2)(H)]***

> *This section requires states to revise their SIP when an air quality standard is promulgated or revised, new attainment methods become available, or U.S. EPA determines a SIP is either inadequate or does not meet revised CAA requirements.*

California has and will continue to submit revisions to its SIP, as mandated by U.S. EPA.

Discussion

Clean air is a priority in California. To help meet this goal, California is submitting this Infrastructure SIP for lead, in compliance with the revised federal lead standard. Only one area in the State, the Los Angeles County portion of the South Coast Air Basin, is designated as nonattainment for lead. CAA Section 110(a)(2)(I) requires states to submit SIP revisions for newly designated nonattainment areas. ARB is working with the South Coast District to develop an approvable SIP for the nonattainment area and will submit the lead nonattainment SIP to U.S. EPA by the June 2012 deadline. ARB maintains a current collection all SIP documents on its website at http://www.arb.ca.gov/planning/sip/sip.htm.

Consultation with Government Officials, Public Notification, PSD and Visibility Protection [§110(a)(2)(J)]

This section requires states to meet requirements of the CAA relating to consultation and public notification and to implement PSD and visibility protection programs for lead.

ARB complies with all federal regulatory requirements, including requirements for consultation, notification, comment, and adoption. Furthermore, ARB has information available on its website about ambient lead concentrations and the health impacts of lead in the ambient air. As addressed earlier, in response to CAA Section 110(a)(2)(C), PSD requirements are addressed at the district level. U.S. EPA has determined that visibility issues do not need to be addressed, with respect to the federal lead standard.

Discussion

CAA Section 121 requires states to provide a satisfactory process for consulting with general purpose local governments, designated organizations of elected local government officials, and any affected federal land manager in carrying out CAA requirements. California Health and Safety Code section 41650, et seq., requires ARB to conduct public hearings and to solicit testimony from districts, air quality planning agencies, and the public when adopting nonattainment plans for inclusion in the SIP. Additionally, the California Administrative Procedures Act, Government Code Section 11340, et seq., requires notification and provision of comment opportunities to all parties affected by proposed regulations.

CAA Section 127 requires states to provide measures that will be effective in notifying the public on a regular basis of instances or areas in which a federal standard was exceeded during the preceding calendar year. This requirement is similar to California Health and Safety Code section 39607, which requires ARB to implement a program for securing air quality data in each air basin and report these data to the public. To fulfill this requirement, ARB maintains air quality data on its website at http://www.arb.ca.gov/aqmis2/aqdselect.php.

CAA Section 127 also requires states to advise the public about the health hazards associated with air pollution and enhance public awareness of measures to prevent violation of a federal standard. In compliance with this requirement, ARB maintains webpages detailing relevant health information (http://www.arb.ca.gov/research/research.htm) and ways of reducing air pollution (http://www.arb.ca.gov/html/cando.htm).

With respect to PSD requirements, several districts in California have fully SIP-approved or partially approved PSD programs that comply with the requirements for lead. PSD programs in the remaining districts are administered by U.S. EPA through a federal stationary source permitting program under enabling authority in 40 CFR Part 52.21. With respect to visibility programs, U.S. EPA guidance concludes that since the visibility protection and regional haze program requirements do not change with the establishment of a new federal primary standard, there are no new applicable visibility protection obligations under CAA Section 110(a)(2)(J) for the 2008 federal lead standard. Nevertheless, California has in place, a Regional Haze Plan that U.S. EPA approved on June 14, 2011. California's Regional Haze Plan is available on the ARB website at http://www.arb.ca.gov/planning/reghaze/reghaze.htm.

Air Quality Modeling/Data *[§110(a)(2)(K)]*

This section requires states to use air quality models to predict the effect of lead emissions on ambient concentrations and to submit the modeling data to U.S. EPA when requested.

ARB is well versed in the use of air quality models to predict the impact of emissions on air quality. ARB modeling complies with U.S. EPA guidance, and ARB works closely with districts that conduct their own modeling to ensure similar compliance. Modeling results are available on request.

Discussion

U.S. EPA anticipates that the predominant type of air quality modeling conducted for implementing the federal lead standard will be source-oriented dispersion modeling, using models such as AERMOD. ARB has an air quality modeling group with extensive experience related to modeling for compliance with the federal standards. Furthermore, ARB's air quality modeling work complies with U.S. EPA's guidance on the use of models in attainment demonstrations. In addition, ARB documents information used when conducting modeling or evaluating the performance of air quality models used for this purpose. Finally, ARB consults and works closely with districts that conduct their own air quality modeling.

ARB provides air quality modeling software and documentation with links to databases and search engines at http://www.arb.ca.gov/html/soft.htm#modeling. This page includes a link to both State-approved and U.S. EPA-approved models and documentation.

***Permitting Fees* [§110(a)(2)(L)]**

This section requires states to assess lead stationary source owners or operators fees to cover the cost of reviewing and acting on a permit application. If a permit is granted, states must also assess fees to cover the cost of implementing and enforcing the permit. Finally, owners or operators must comply with the fee provisions of Title V Sections 501 through 507 of the CAA and pay such fees to the permitting authority.

Districts are responsible for issuing stationary source permits, and each district has rules requiring additional fees subject to Title V requirements.

Discussion

As described previously (Programs for Enforcement, PSD, and NSR Section 110(a)(2)(C)), responsibility for issuing stationary source permits is vested with the districts, and each district in California has adopted rules requiring an additional fee for facilities subject to Title V requirements. Information on district-issued permits is available on the ARB website at http://www.arb.ca.gov/permits/airdisop.htm and http://www.arb.ca.gov/permits/permits.htm. In addition, ARB maintains various email notification lists that provide subscribers with current, on-going email notification about updates and changes to programs related to permitting. Information about subscribing to these email notification lists is available on the ARB website at http://www.arb.ca.gov/permits/permits.htm.

***Consultation/Participation by Affected Local Entities* [§110(a)(2)(M)]**

This section requires states to consult with and allow political subdivisions affected by the lead Infrastructure SIP to participate in the development process.

ARB coordinates on a regular basis with the State's 35 districts. State law requires ARB to conduct a public hearing and solicit input from affected agencies and the public when developing the SIP.

Discussion

California is divided into 35 districts, comprising county or regional local government authorities with responsibility for controlling stationary source emissions. A map of district boundaries is available on ARB's website at http://www.arb.ca.gov/capcoa/dismap.htm. Links to districts' websites are available at http://www.arb.ca.gov/capcoa/roster.htm.

ARB consults and provides liaison with all districts and provides for frequent and regular communication and consultation with management and staff of these districts. Because district boards are composed of local elected officials, this framework provides for regular consultation with and participation by local government entities (cities and counties) affected by the SIP. Furthermore, California Health and Safety Code section 41650, et seq., requires ARB to conduct a public hearing and to solicit testimony from districts, air quality planning agencies, and the public when adopting local nonattainment plans for inclusion in the SIP.

CALIFORNIA AIR RESOURCES BOARD

NOTICE OF PUBLIC MEETING TO CONSIDER THE APPROVAL OF ARB's 2011 ANNUAL RESEARCH PLAN

The Air Resources Board (ARB or Board) will conduct a public meeting at the time and place noted below to consider a draft report, titled *"ARB 2011 Annual Research Plan."*

DATE: September 22, 2011

TIME: 9:00 a.m.

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

This item will be considered at a one-day meeting of the Board, which will commence at 9:00 a.m., September 22, 2011.

The California Health and Safety Code (HSC), sections 39700 and 39703, established the Board's research program. The Board is directed to coordinate and administer all air pollution research that is funded, to any extent, with State funds. To facilitate this process, HSC Section 39705 directs the Board to appoint a Research Screening Committee to give advice and recommendations on all air pollution research projects proposed for funding.

ARB staff will make a presentation on ARB's proposed *2011 Annual Research Plan*. The Plan describes proposed research concepts for funding. After the staff presentation and public testimony, the Board will take action on the proposed plan. Research concepts approved by the Board at this meeting will be developed into full research proposals and brought back to the Board for final consideration and approval.

Copies of the report may be obtained from ARB's Public Information Office, 1001 I Street, First Floor, Environmental Services Center, Sacramento, California, 95814, (916) 322-2990, at least ten days prior to the scheduled meeting. The reports may also be obtained from ARB's website at http://www.arb.ca.gov/research/apr/apr.htm.

Interested members of the public may also present comments orally or in writing at the meeting and may be submitted by postal mail or by electronic submittal before the meeting. To be considered by the Board, written comments submissions not physically submitted at the meeting must be received **no later than 12:00 noon, September 21, 2011,** 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

New Feature

You can now sign up online in advance to speak at the Board meeting when you submit an electronic board item comment. For more information go to: http://www.arb.ca.gov/board/online-signup.htm.

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.

ARB requests that written and e-mail statements be filed at least 10 days prior to the meeting so that ARB staff and Board members have additional time to consider each comment. Further inquiries regarding this matter should be directed to Susan Fischer, Air Resources Engineer, (916) 324-0627, or Annmarie Rodgers, Manager of the Climate Action & Research Planning Section (916) 323-1517, Air Resources Board, 1001 I Street, Sacramento, California, 95814.

SPECIAL ACCOMMODATION REQUEST

Special accommodation or language needs can be provided for any of the following:

- An interpreter to be available at the hearing;
- Documents made available in an alternate format (i.e., Braille, large print, etc.) or another language;
- A disability-related reasonable accommodation.

To request these special accommodations or language needs, please contact the Clerk of the Board at (916) 322-5594 or by facsimile at (916) 322-3928 as soon as possible, but no later than 10 business days before the scheduled Board hearing. TTY/TDD/Speech to Speech users may dial 711 for the California Relay Service.

Comodidad especial o necesidad de otro idioma puede ser proveído para alguna de las siguientes:

- Un intérprete que esté disponible en la audiencia
- Documentos disponibles en un formato alterno (por decir, sistema Braille, o en impresión grande) u otro idioma.
- Una acomodación razonable relacionados con una incapacidad.

Para solicitar estas comodidades especiales o necesidades de otro idioma, por favor

llame a la oficina del Consejo al (916) 322-5594 o envíe un fax a (916) 322-3928 lo más pronto posible, pero no menos de 10 días de trabajo antes del día programado para la audiencia del Consejo. TTY/TDD/Personas que necesiten este servicio pueden marcar el 711 para el Servicio de Retransmisión de Mensajes de California.

CALIFORNIA AIR RESOURCES BOARD

Ly Terry for
James N. Goldstene
Executive Officer

Date: 9/6/11

The energy challenge facing California is real. Every Californian needs to take immediate action to reduce energy consumption. For a list of simple ways you can reduce demand and cut your energy costs, see our website at www.arb.ca.gov.

Proposed 2011 Annual Research Plan

September 2011

California Environmental Protection Agency
Air Resources Board

Table of Contents

INTRODUCTION

The Air Resources Board (ARB or Board) sponsors a comprehensive program of research addressing the causes, effects, and solutions to air pollution problems in California. The goal of the research program is to provide timely scientific and technical information to help the Board, local air districts, and others to take effective actions to meet California's air quality and climate goals. ARB's research program is a collaborative effort with other agencies and research institutions designed to leverage air pollution research funding both nationally and internationally.

This research plan reflects ongoing strategic planning discussions and intensive efforts to identify the most urgent needs of ARB. The forward-looking research plan considers an extended timeframe as it focuses on specific program goals and timelines. Key planning milestones considered in the development of the research plan are 2020, 2030, and 2050. By 2020, California is to meet its greenhouse gas reduction target and have in place advanced technology measures necessary to meet current federal air quality standards. By 2030, California will be implementing plans for updated federal air quality standards and sustainable communities strategies required by State law. The long-term planning milestone for California's climate program is 2050. While these planning horizons reflect specific State and federal air quality and climate program deadlines, California's air quality efforts include many interim program and regulatory milestones. As a result, emissions that form ozone and particulate air pollution are decreasing each year and California's greenhouse gas reduction measures are steadily phasing in.

ARB Research Plan Themes

ARB's 2011 Research Plan reflects new program needs, long-term goals, and builds upon the comprehensiveness of California's existing air quality programs. Foundational studies on the science of air pollution continue to be the primary emphasis of ARB's research program although new topic areas emerge each year. Other themes are California's Clean Energy Future, Sustainable Communities, and Behavior Change.

- **California's Clean Energy Future** – ARB coordinates with California's energy agencies on research to support air quality and clean energy efforts. Integrated air quality and energy policies are essential to meet California's air quality and climate goals.

- **Sustainable Communities** – California's Sustainable Communities and Climate Protection Act (SB 375) is designed to encourage improved land use and transportation planning in ways that reduce greenhouse gas emissions. ARB's research emphasis is to look at ways to maximize the benefits of sustainable planning including reduced air pollution, greater energy efficiency, and cost savings.

- **Behavior Change** – Existing research indicates that the individual decision-making process includes a variety of considerations that influence purchasing patterns, energy conservation, and travel choices. Research in this topic will help focus attention on new opportunities for voluntary actions that reduce greenhouse gases, smog forming pollutants, and toxic air contaminants.

- **Foundational Studies: Air Pollution Science** – The core of ARB's research program is to understand the causes and solutions to California's air pollution problems. The three primary areas of emphasis are: protecting health by reducing exposure to air pollution, attaining air quality standards, and meeting greenhouse gas reduction targets.

Twenty-three projects are recommended totaling approximately $10 million, for which we intend to attain significant co-funding. Allocations for the projects recommended for funding are distributed among key research areas as follows:

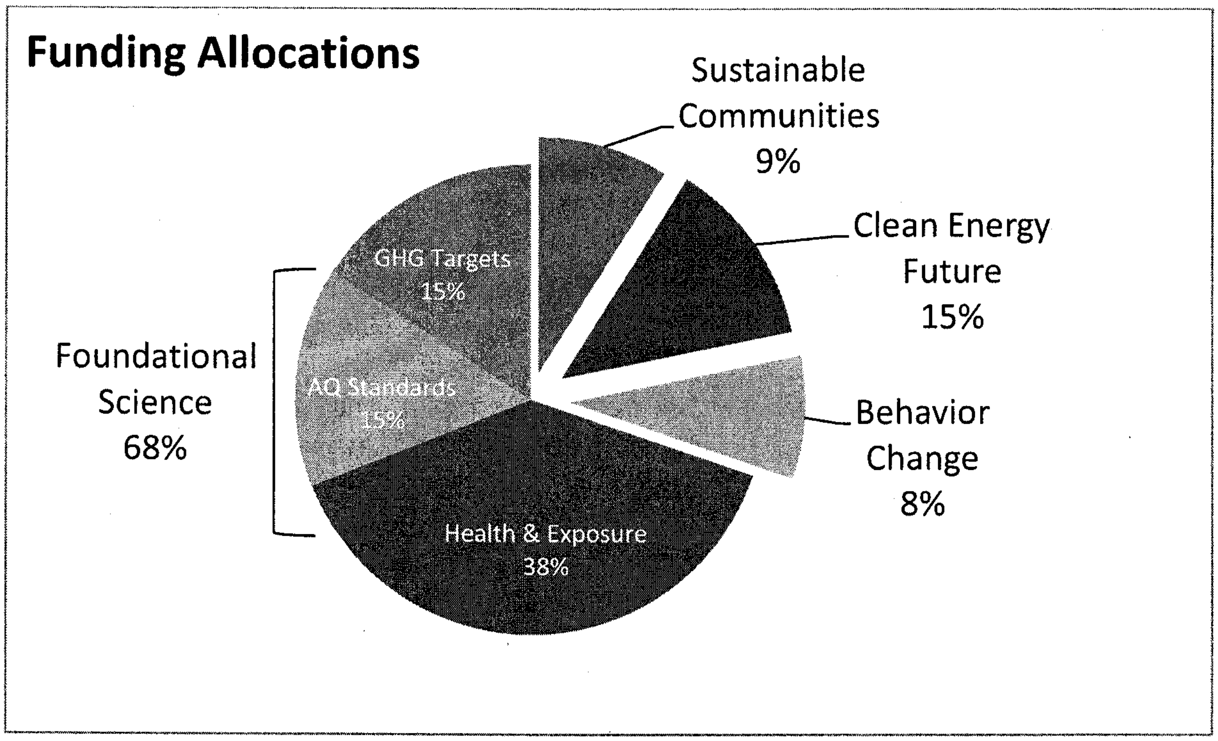

Figure 1

Planning Process

To initiate the planning process, a joint discussion was help between the Board and the Research Screening Committee to consider ARB's evolving mission and the changing context of our work. As in previous years, ARB sent out a public solicitation inviting and encouraging the public to contribute research ideas. In addition, the planning benefited from ongoing discussions with experts from multiple government agencies as well as experts from other institutions with scientific research or regulatory authority in air pollution and related fields. Based on this external input as well as internal dialogue between ARB's divisions, executive office, and the office of the chair, ARB staff prioritized specific program needs, reviewed the submitted proposals, developed additional research concepts to address gaps, and prepared an annual research plan designed to address important information gaps. The research concepts in this plan are ready to be developed into complete proposals to be reviewed by ARB's Research Screening Committee and then returned to the Board for funding approval.

Coordination, Leveraging, & Collaboration

ARB works with other California agencies to ensure that its research portfolio is non-duplicative, to identify opportunities to leverage the State's resources, and to maximize the utility of research results. To foster coordination, information is shared at all stages of the research process, including proposal review, updates on research progress, and final reports. California's Climate Action Team (CAT) has established a working group to coordinate the State's climate change research. The CAT Research Working Group maintains a database of State-funded climate change research.[1] To complement this catalog, ARB is compiling a database of climate change research in California's public and private universities and national laboratories, in collaboration with the California Council of Science and Technology. This tool is designed to identify intellectual resources, in the form of principal investigators, ongoing or complete research, and databases, to help support California's climate program.

ARB also continues to seeking co-funding opportunities and other ways to leverage limited research dollars. This enables ARB to participate in projects and studies outside the reach of ARB's research budget alone. Research collaborations have included the California Energy Commission (CEC), National Oceanic and Atmospheric Administration (NOAA), the National Aeronautics and Space Administration (NASA), South Coast Air Quality Management District, the Coordinating Research Council (CRC), Health Effects Institute (HEI), U.S. Environmental Protection Agency (EPA), California Public Utilities Commission (CPUC), and Next 10.

History and Highlights

The Board's research program was established[2] by the Legislature in 1971 and has formed the basis of ARB's regulatory programs since its inception. ARB's research program identifies and explores questions that are critical to sound policy, including support of ambient air quality standards. Several legislative mandates have expanded and further defined the scope of the program in recent years. For example, ARB's growing research interest in climate change issues is reflected by Assembly Bill 2991 (Nuñez, 2008), which expanded membership of ARB's Research Screening Committee to include two experts on climate change.

ARB's research portfolio comprises collaborative studies involving a variety of scientific disciplines and approaches. Some of these studies are long-term and build on unique data sets, while others address specific implementation or knowledge gaps. ARB funds projects needed

1 http://www.climatechange.ca.gov/research/search.php

2 Health and Safety Code Sections 39700 et seq.

to design and implement effective programs to meet a broad range of statutory mandates. State law directs ARB to work with the University of California system, so where possible, ARB's research program partners with internationally recognized scientists in California.

Over the past 40 years, ARB has carried out innovative research in areas as diverse as health effects of air pollution on vulnerable populations, complex atmospheric chemistry, and greenhouse gas emissions. Although ARB's research budget is modest ARB's impact on the research community is greater than its limited size would suggest. The ARB research program delivers important research results and also provides a mechanism to influence air pollution research funded and carried out by others. Below, a few highlights from ARB's research program[3] are presented.

Children's Health Study

ARB's Children's Health Study was designed to investigate the health impacts of air pollution on California's vulnerable youth population. This study was the first of its kind, with a sample of over 5,000 children followed from 4th to 12th grade under ARB funding, and now into adulthood through the National Institute of Environmental Health Sciences.

This ambitious study has produced more than 100 peer-reviewed scientific publications that found significant, permanent reductions in lung growth from air pollution exposure and implicated air pollution in both the onset and the severity of asthma. Among the policy outcomes of this work was legislation requiring California to reassess its air quality standards to ensure the health of children, to identify toxics that pose particular hazards to children, and to assess children's exposures to pollutants at educational facilities. The study also demonstrated the health benefit of living in communities with cleaner air.

Effectiveness of NO_X Controls

In the 1950s, Dr. Arie Haagen-Smit, ARB's first chairman, revealed the source and nature of Southern California's smog through research conducted from his mobile laboratory. Haagen-Smit's pioneering work was built upon by research at the Statewide Air Pollution Research Center and the establishment of ARB's Research Program. Based on the research of Haagen-Smit and other scientists, ARB was the first agency in the world to pursue NO_X control on automobiles for ozone reduction. The efficacy of ARB's NO_X control efforts was formally recognized by the National Research Council in 1991 with its report "Rethinking the Ozone Problem in Urban and Regional Air Pollution".[4] Over the past twenty years ARB has co-sponsored research projects demonstrating the effectiveness of NO_X control in reducing PM2.5 air pollution.

3 For a more comprehensive catalog of ARB's research program, see: http://www.arb.ca.gov/research/research.htm
4 Available online: http://www.nap.edu/openbook.php?record_id=1889

Reducing High Global Warming Potential Gases

ARB's research program identified the importance and relative cost-effectiveness of reducing emissions of high global warming potential (GWP) gases. Reducing emissions from this group of greenhouse gases is an important component of California's plan to reduce emissions to 1990 levels by 2020. High-GWP account for approximately 15% of the state's carbon footprint and ARB's research program has identified several low-cost opportunities for substantial reductions. ARB has already put in place rules to reduce high-GWP gas emissions from commercial refrigeration and motor vehicle air conditioning systems as well as reduce sulfur hexafluoride from all applications.

Improving Indoor Air Quality

ARB sponsored many pioneering research projects that prompted similar national studies as well as the first legislation in the nation to protect people from some of the most harmful indoor exposures. A study of formaldehyde emissions from building materials and many other products prompted ARB's regulation limiting formaldehyde emissions from compressed wood products. Recent federal legislation requiring the U. S. EPA to develop a national regulation will assure that all Americans are protected from excessive formaldehyde exposures from plywood, particleboard, and other wood-based building materials that are prevalent in modern construction. Similarly, research conducted by ARB staff on purported "air cleaners" that intentionally emit ozone prompted legislation in 2006 (AB 2276, Pavley) directing ARB to regulate ozone emissions from indoor air cleaning devices. ARB now certifies indoor air cleaners under the new regulatory program, and high ozone-emitting devices are prohibited from sale in California. Also, ARB's joint study on air quality in portable classrooms contributed to a number of state and school district policy changes that have improved health conditions in California schools.

Air Quality Field Studies

Multiple air quality field studies carried out in California collected air monitoring data, information on pollutant transport, and emissions data that answered critical questions about the nature and causes of air pollution. Information from such field studies has helped improve air quality modeling and other science assessments essential to California's implementation of the federal Clean Air Act. Most recently, CalNex 2010, a major collaboration with NOAA, is providing vital data on the composition, formation, and transport of air pollution in California. CalNex 2010 is the first California field study to look at both greenhouse gases and smog-forming pollutants. More than 40 ARB-sponsored field studies over several decades have provided data to guide the development of cost-effective control programs that have dramatically improved California's air quality. These studies have been highly leveraged, with ARB funds often matched by more than two to one.

CALIFORNIA'S CLEAN ENERGY FUTURE

ARB's research plan includes several projects that support California's goal of a clean energy future. While California has been very successful in reducing smog forming pollutants, meeting stricter clean air standards while reducing greenhouse gases will require well integrated energy and air quality programs. There are several categories of ARB research encompassed within in the theme of clean energy and air quality. The transportation category includes new vehicle technologies, cleaner fuels, and supporting infrastructure. Renewable energy is another category which will reduce both greenhouse gases and smog forming pollutants. Energy efficiency is a third broad research area with direct benefits to greenhouse gas and air pollutant reduction efforts.

ARB works closely with the California Energy Commission (CEC) and California Public Utilities Commission (CPUC) to align policies and plans for meeting common energy and air quality goals. With the enactment of California's Global Warming Solutions Act, the areas of interagency program collaboration have increased. As California implements cleaner transportation technologies and fuels, new renewable electricity standards, and enhanced energy efficiency programs, coordinated energy and air quality policies are more important than ever. CEC's Public Interest Energy Research (PIER) program is funding transformational demonstrations that emphasize an integrated suite of advanced energy efficiency, renewable energy, and other technologies. ARB research efforts in this arena are designed to complement those of the energy agencies by focusing on the air quality co-benefits of clean energy and improved energy efficiency.

California's long term goal is an 80% reduction in greenhouse gas emissions by 2050 relative to 1990 which will require a comprehensive transition to clean energy. Achieving the new reductions in smog forming pollutants needed by 2020 to meet federal air quality standards will also depend on cleaner energy sources and improved energy efficiency. Long lead times are involved in developing new technologies, infrastructure, and changes in policy, planning, and permitting. Important capital investments will be made over the coming decades, so recognizing the linkage of air quality and energy policies is essential to the success of our programs.

ARB staff solicited research ideas from the academic community, consulted with internal and external experts, and considered what research is currently being funded by other national, state, and local agencies, especially the CEC PIER Program. The four research projects in this plan are focused on ARB needs that complement research efforts by other agencies. Each project has been reviewed by energy agency staff and will be coordinated with their research program in all phases of project development and implementation.

The first project focuses on the air quality co-benefits of clean energy, building on assessments funded by the CEC PIER program. The next project supports clean transportation infrastructure by collecting truck travel data critical for developing for goods movements and air quality policy. The third project focuses on renewable biofuels. The final project addresses the need for consistent tools for life-cycle analysis of transportation fuels and consumer goods and services.

Air Quality Co-Benefits from California's Clean Energy Future

Objective: Transitioning to cleaner energy sources is a core strategy for complying with existing federal air quality deadlines by 2023 and meeting an 80% greenhouse gas emission reduction target by 2050. The objective of this research is to identify the air quality co-benefits of clean energy strategies that reduce greenhouse gas emissions. The research will build on previous and ongoing clean technology assessments.

Concept: Meeting the 2050 target will require innovations beyond what is currently available and affordable. Several portfolios of energy options are being actively explored to offer critical flexibility and spur innovation, given the uncertainty regarding which mix of technologies will prove economically, socially, legally, and logistically viable. In its recent report "California's Clean Energy Future: The Path to 2050", the California Council on Science and Technology concluded that California can achieve a 60% reduction with technologies currently deployed at scale now or demonstrated, emphasizing building efficiency, electrification of the transportation sector, and decarbonization of electricity and fuels. However, their analysis optimistically assumed large-scale deployment of new nuclear plants and carbon capture and storage of CO_2 from coal- and gas-fired utilities and industrial facilities. A more detailed technology assessment for CEC-PIER, led by Lawrence Berkeley National Laboratory, University of California at Berkeley and the University of California at Davis, reached similar conclusions, but with greater emphasis on renewable energy sources. Although traditional air pollutants and greenhouse gases have common sources, both of these assessments focused only on greenhouse gases.

The air quality co-benefits of these clean energy technologies will be assessed. Conversely, ozone and some PM2.5 components (e.g., black carbon) exert a climate impact and these interactions will also be considered. The International Institute for Applied Systems Analysis in Austria has developed integrated assessment models for Europe, Asia, and several countries to identify portfolios of measures that improve air quality and reduce greenhouse gas emissions at least cost. The capabilities of the GAINS (Greenhouse gas – Air pollution Interactions and Synergies) model will be considered for California. The project will also be coordinated with a complementary PIER-funded project using the SWITCH model to assess how the electricity system in the Western U.S. would evolve under different CO_2 policy constraints by simulating renewable sources of energy and potential changes in the seasonal/diurnal profile of electricity demand, and another studying other environmental issues associated with the energy scenarios (e.g., water consumption for biofuels).

Proposed level of funding: $300,000 - $500,000

Improved Characterization of Truck Travel within California's Goods Movement System

Objective: An improved understanding of truck characteristics is needed to develop robust statewide and regional goods movement models for California. The objective of this research is to develop and implement an improved data collection methodology for trucks traveling on the state's highways with the goal of better understanding how characteristics such as truck type, weight, body type, and usage effect emissions.

Concept: The proposed study is part of a broader effort by ARB to develop an improved understanding of freight related emissions in California. ARB is currently funding two other studies with the University of California at Irvine to develop a traffic database and tools to convert measurements from existing roadway sensors into roadway-specific and regional estimates of total VMT, truck flow and speed. However, even with these enhancements, this traffic database does not provide information on truck body classification and the relationship between body size and weight as well as other characteristics influencing emissions from the truck fleet on California's highways.

The proposed research will develop a new methodology for classifying trucks, test its effectiveness through a proof-of-concept deployment at an existing truck scale, and then retrofit a much larger number of traffic detectors. University of California at Irvine will then use the resulting data to update their existing truck traffic model to include truck weight, class (axle) and body type data from which information about seasonality, empty truck movements, and potentially even commodity type movements may be derived.

This project will build upon other goods movement related studies recently completed by the Federal Highway Administration (FHWA), the California Department of Transportation (Caltrans), and the ARB, including development of a first generation California-specific freight model, an analysis of existing goods movement data and data gaps, new databases to support goods movement model development and calibration, and a broader and more comprehensive second generation freight modeling system for California.
Proposed level of funding: $350,000

Assessment of the Emissions and Energy Impacts of Biomass Use in California

Objective: The objective of this research is to assess the emissions and energy balance from waste-to-energy applications and to analyze local infrastructure, integrating distribution and transmission of biogas within the natural gas system. Determining the emissions and energy impacts of waste-derived biogas across a broad range of potential sources will inform both air quality and energy agencies in California.

Concept: Biomass has the potential to provide a significant portion of the energy requirements in California while also addressing air quality and waste disposal issues. While most biomass energy is derived from wood and forest residue, there is a growing trend toward use of municipal solid waste and wastewater refuse to generate electricity and renewable fuels.

Biogas from waste has the potential to provide added net energy benefits, because the feedstock is already available. Anaerobic digestion of organic waste in landfills and wastewater treatment plants also generates biogas, which contains high methane concentrations. A large portion of biogas is still vented, which contributes to nearly 2% of the total greenhouse gases emissions in the U.S. However, this biogas can be utilized as a substitute for natural gas after some compounds are removed from the biogas stream. Using the biogas in any natural gas driven energy conversion device reduces the need for conventional fuel, contributing to energy sustainability while reducing greenhouse gas emissions. Apart from reductions of greenhouse gas emissions and improvements in energy sustainability, biogas use could help reduce criteria pollutant emissions. This is because biogas can be used in stationary fuel cells to produce electricity and hydrogen, which can then be used as a transportation fuel for electric and hydrogen fuel cell vehicles. These vehicle technologies could reduce emissions of nitrogen oxides (NO_X) and particulate matter compared to combustion-based vehicles using gasoline or diesel fuels. Advanced stationary source technologies for distributed generation applications are being developed. ARB funds a low-NO_X dairy manure digester in the San Joaquin Valley while the CEC PIER Program funds an advanced engine technology in the Sacramento Valley that can achieve extremely low levels of NO_X without aftertreatment catalytic converters.

A thorough evaluation of the potential and constraints of neutral carbon electricity and vehicle fuel (i.e., hydrogen and/or biogas) supply will be conducted based on the regional renewable bio-resources in California, but primarily in the South Coast Air Basin and the San Joaquin Valley. These areas include diverse sources for potential biomass based energy such as waste water treatment facilities, landfills, green waste from urban areas, and agricultural and dairy waste. This will include a determination of the impact of implementation of the CEC 2011 Bioenergy Action Plan, including criteria pollutant emissions, such as NO_X.

The CEC has established the California Biomass Collaborative to enhance the sustainable management and development of biomass in California for the production of renewable energy, biofuels, and products. This research proposal will be developed with CEC and the Collaborative to complement their research program, and to utilize findings from its recent and ongoing studies. The results of this research will quantify the available bio-fuel sources and estimate the potential corresponding hydrogen and biogas generation capacity. A full characterization of waste-to-energy applications will provide a scientific basis to support technology options for implementation of ARB's Low Carbon Fuel Standard. The project will be coordinated with CEC PIER and the Biomass Collaborative for a comprehensive assessment of the economics and optimal use of biomass for achieving California's clean energy future. **Proposed level of funding**: $150,000

Improving Life-Cycle Assessment Tools for Carbon Accounting

Objective: Improving the available information on embedded carbon in products manufactured, purchased, consumed, or disposed of in California can help influence purchasing decisions in ways that reduce greenhouse gas emissions. The life-cycle analysis (LCA) tools used to calculate these embedded emissions are uncertain and need to be improved. This research will systematically compare commonly used LCA tools, explore the underlying data and assumptions to understand any major differences, and identify and address the barriers to conducting life-cycle assessments, for example the need for simple-to-use, publicly available tools and procedures.

Concept: While several efforts to address embedded emissions are underway, the variety of LCA tools commonly used have never been systematically compared and reconciled. There is also a need to understand the tradeoffs of using LCA as a policy tool and to provide practical recommendations for the use of LCA. California's Low Carbon Fuel Standard considers the embedded carbon in transport fuels from direct production and indirect land use change, rather than just tailpipe emissions. In addition, several efforts to address embedded emissions in consumer products are underway in California and elsewhere. The CoolCalifornia.org calculator for household carbon footprints includes life-cycle emissions for foods, goods, and services. California's Department of Toxic Substances Control is developing a "Green Chemistry Initiative", which will consider life-cycle emissions (including GHG) to reduce the environmental and public health impact of consumer products sold in California and require the consideration of less toxic alternatives. Life-cycle inventory standards for consumer products are emerging from the United Kingdom Carbon Trust and the World Resources Institute/World Business Council for Sustainable Development.

In California, ARB and the CEC have been the primary funders of relevant research, and the U.S. EPA, the National Renewable Energy Lab, and private foundations and corporations have funded numerous other studies. The first step will be to conduct a joint workshop with the Coordinating Research Council at Argonne National Laboratory to identify existing development and comparison studies for biofuels, catalog ongoing work, and develop research recommendations and the level of interest in jointly funded efforts. If possible, this project should also examine environmental impacts beyond GHG emissions (e.g., energy, water, toxic air contaminants and VOCs) and rebound effects. The results of this research will enable more consistent life-cycle analyses and could be used to identify significant sources of embedded carbon for possible reduction.
Proposed level of funding: $300,000 - $500,000

SUSTAINABLE COMMUNITIES

The Sustainable Communities and Climate Protection Act of 2008 (Senate Bill 375) directs California's metropolitan planning organizations to develop sustainable communities strategies that meet a regional greenhouse gas reduction target through integrated land use, housing and transportation planning. Development of these sustainable communities strategies also provides an opportunity for associated emission reductions that will be needed to attain air quality standards for ozone and particulate matter.

Since the passage of SB 375, ARB staff has been working closely with other state agencies, regional planning organizations, and local air quality agencies to develop methodologies, tools, and resources to support development of sustainable communities strategies. This includes assessing the current literature and identifying areas where additional research may be needed such that available resources are used wisely. A significant amount of research on sustainable communities is currently underway at the federal, state, and local levels although there are a number of areas where more work is needed.

For example, the Partnership for Sustainable Communities, a federal interagency partnership formed in 2009 between the U.S. Environmental Protection Agency, the Department of Housing and Urban Development, and the Department of Transportation, has dedicated more than $2.5 billion to help develop sustainable communities nationwide, including funding relevant research. In September 2010, Virginia Tech's Metropolitan Institute and Center for Housing Research brought together more than 50 national experts to identify top research priorities that would help the Partnership promote more sustainable communities.[5] In the area of green and energy efficient affordable housing research, the experts suggested future research include assessing the co-benefits of energy efficiency improvements, the impact of education and real-time metering on energy savings, and how to maximize the use of energy efficient mortgages and other financing mechanisms for residential energy improvements.

In California, ARB-funded studies are currently underway to assess the role of land use planning in reducing residential energy consumption and to quantify the effect of local government actions on reducing vehicle miles traveled. Other state agencies including the California Energy Commission (CEC), the Governor's Office of Planning and Research (OPR) and the California Department of Transportation (Caltrans) are also funding research on sustainable communities. For example, through their Public Interest Energy Research (PIER) Program, the CEC is funding a team of researchers from UCLA, UC Berkeley, and UC Davis to develop methods and tools to estimate community-scale energy usage and its relationship to socio-economic factors. The PIER Program has also committed $4 million through the UCLA Institute of the Environment and Sustainability to establish the California Center for Sustainable Communities Research (CCSCR) that will serve as a clearinghouse for the synthesis, coordination, and communication of

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5 Dawkins, C., Schilling, J., and Alfonzo, M., Policy Research Priorities for Sustainable Communities, Research Roundtable Final Report, The Metropolitan Institute and the Virginia Center for Housing Policy, Virginia Polytechnic Institute and State University, February 25, 2011.

research related to sustainable energy systems. Much of the focus of the CCSCR will be in helping California meet the goals of SB 375 and AB 32.

The Center for Resource Efficient Communities (CREC) at the University of California at Berkeley has recently released several white papers exploring the links between community design and energy efficiency and providing recommendations for future research on both technical issues, such as thermal comfort analyses, and socio-economic issues, such as permitting and financing processes. Three key research gaps identified by CREC are assessing street design and travel behavior, identifying cool community strategies, and creating new building codes, standards, and visions for more resource efficient communities.[6]

In developing the four research concepts under the topic of sustainable communities, ARB staff considered the research priorities identified by Virginia Tech, the University of California at Berkeley, and other experts as well the research currently being funded by other national, state, and local agencies such as the California Energy Commission. The four research concepts recommended for funding in this plan are: assessing the economic benefits and costs associated with smart growth strategies, quantifying the greenhouse gas co-benefits of energy efficiency improvements in buildings, determining the extent to which complete street conversions encourage increased walking and cycling, and a pilot program to implement and assess improvements to financing programs for existing building retrofits. As ARB staff further develop these research proposals, they will coordinate with their counterparts in other agencies in pursuing co-funding opportunities through collaborations such as the newly established CCSCR.

Analyzing the Economics of Smart Growth Strategies

Objective: This research would provide information to assist local and regional governments in developing sustainable communities strategies under SB 375. The goal for this project is to identify and quantify economic benefits and costs associated with specific smart growth strategies, including impacts on local governments, communities, and individuals.

Concept: Smart growth is an urban planning and transportation concept focused on compact community designs with transit-oriented, walkable, bicycle-friendly land use, including neighborhood schools, complete streets, and mixed-use development with a range of housing choices. Local government officials making land use and transportation planning decisions must balance multiple goals and economic considerations. Although research has been conducted on various aspects of smart growth, including economic impacts, there is a need for a comprehensive assessment, especially related to strategies suitable for California.

The first task is to identify and summarize through literature review and expert consultation, which facets of smart growth have important economic impacts as well as any studies that have already been completed in this area. Factors to be considered range from the regional scale

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6 Eisenstein, W., Building Energy Efficient Communities: A Research Agenda for California, Center for Resource Efficient Communities, UC-Berkeley College of Environmental Design, March 31, 2010.

such as the transportation infrastructure system and labor productivity to the individual scale including housing, transportation and utility costs, medical expenses, health, and livability. The second task will be to quantify the economic benefits and costs of these different factors, especially as they apply to California. This may be done through a combination of surveys, empirical data collection, and modeling assessments. The third task will be to develop robust quantitative results illustrating the potential economic benefits and costs of implementing smart growth policies.
Proposed level of funding: $300,000

Quantifying the Comprehensive Greenhouse Gas Co-Benefits of Green Buildings

Objective: As California moves towards better quantifying greenhouse gas emissions reductions associated with energy efficiency improvements in buildings, research is needed to fully account for the reductions associated with related improvements in the water, waste, and transportation components of building projects. The objective of this research is to expand existing building energy use forecasts and surveys to include non-energy features such that they capture the comprehensive range of energy and greenhouse gas emission benefits associated with all building related improvements.

Concept: Green buildings are not just energy efficient buildings; they are designed, built, operated and maintained to reduce water consumption, solid waste, and transportation-related impacts. These ancillary greenhouse benefits are not typically reflected in the current greenhouse gas emissions reductions estimates for the building sector. There is a statewide energy forecast and a number of existing building surveys utilized to measure energy usage in commercial and residential buildings. The California Energy Demand Forecast published by the California Energy Commission (CEC) provides a baseline of energy consumption by end use for the commercial sector. The Residential Energy Consumption Survey (RECS) is a comprehensive source of national-level data on energy-related information for U.S. households. Additionally, there is a 2009 Residential Appliance Saturation Survey (RASS), administered by the CEC that includes a dataset of energy end use, building characteristics, and appliance usage in 25,000 households across California. The CEC also develops an energy budget to assess compliance of new buildings with the Title 24 Energy Code.

The investigators will examine the energy demand forecast, existing end use surveys, and the energy budget to identify opportunities to expand them to include non-energy features such as water usage, waste generated, and transportation patterns. As part of this research project, investigators will develop a comprehensive end use survey or census of California green buildings. The Green Building Information Gateway (GBIG) Explorer is a beta version online tool that summarizes information on green buildings throughout the United States and includes metrics, maps, and project profiles for LEED certified projects nationwide. The investigators would use GBIG Explorer as a starting point to develop a building census of green buildings in California. The census would be used to quantify the GHG emission reductions of the water, waste, and transportation related components of green buildings. An analysis of additional co-benefits such as a reduction in criteria pollutants would also be completed to compare green buildings to standard buildings. The results of the study would provide current information and

also be used in the future for ongoing assessments of the air quality and other environmental benefits of green buildings.
Proposed level of funding: $200,000

Determining the Benefits of Complete Streets Conversions

Objective: The use and development of complete streets is largely motivated by potential benefits, such as decreased vehicle miles traveled (VMT), improved safety, reduced transportation costs, and enhanced active travel. The objective of this research is to determine the impact of complete street designs on usage of different modes of transportation and to quantify the extent to which specific components of street conversions (e.g. tree planting) contribute to increased walking and cycling.

Concept: A complete street is a roadway designed to enable all types of transportation, including walking and cycling, as well as using private motor vehicles and public transportation. The benefits of complete streets are reduction in VMT and improved public health by active transport (walking and cycling). While the health benefits of increased active transport are well known, the potential usefulness of complete streets in promoting active transport is not as well studied. This study will be designed around natural experiments, in that data will be collected both before and after the conversion of existing corridors to complete streets. The study will examine five or six streets, which will be carefully selected to assure the ability to be able to gather data both before and after the conversion to a complete street. Data will be collected on the changes in cycling and walking, as well as any changes in traffic volume, speeds, vehicle type and characteristics, and other relevant information. In addition, specific attributes of the street conversions (e.g. tree planting, thermal conditions) will be documented and their impacts on transportation mode choice assessed.

The results of this study will help to determine the effectiveness of the complete street conversion and the potential reduction in VMT. This project will also generate information that can be used in the future to help assess personal exposure of motorists, bus riders, bicyclists and pedestrians to air pollutants associated with traffic, especially ultrafine particles and PM2.5, which will provide guidance on how to promote the known benefits of active transport. The results from this project will help the ARB in providing information to urban planners on complete street designs that encourage the usage of active and public transportation.
Proposed level of funding: $200,000

Pilot Program to Assess Improvements to Financing Programs for Building Retrofits

Objective: The goal of this project is to conduct a pilot program to test the effectiveness of potential improvements to financing programs for energy efficiency retrofits to existing homes and commercial buildings. The study is designed to demonstrate ways to increase participation in financing programs and expand the number of energy efficiency building retrofits in California.

Concept: Achieving California's goals to reduce greenhouse gas emissions from the building sector will require a substantial investment in retrofitting the existing building stock. A recent study funded by the California Public Utility Commission (PUC) determined that an annual investment of $4 billion per year is needed to achieve California's energy efficiency goals.[7] Current levels of investment appear to be only half that amount. Additionally, the rate at which building owners are taking advantage of the available financing programs is lower than expected. As a result, both an increase in capital and an increase in the usage of existing funding programs are needed to achieve California's building retrofit goals. This study will expand on the recent analysis completed by the PUC consultants to assess the key finance programs available for the single family residential and commercial building sectors. The research team will work with federal and state initiatives to reduce the interest rates on key finance products available for single family homeowners. The research team would work with energy services/performance contracting (ESCo) providers, debt financing lenders, and the leasing industry to implement changes to the financing options available for the commercial building sector. A pilot study would be completed to test the recommended changes, gather data, and validate the revised approach to improve residential and commercial building financing programs and assess whether and at what cost the changes can be implemented on a larger scale.
Proposed level of funding: $200,000

7 Harcourt Brown & Carey, Inc., Energy Efficiency Financing in California, Needs and Gaps, Preliminary Assessment and Recommendations, Presented to the California Public Utilities Commission, July 8, 2011.

BEHAVIOR CHANGE

Many Californians are making green purchasing decisions, conserving energy at home and at work, and re-thinking their transportation choices to favor options that not only save fuel, but save time and promote health. Current literature indicates a real potential to improve air quality and reduce greenhouse gas emissions through programs that effectively promote environmentally-friendly decisions. However, opportunities are often missed because programs are designed or implemented without accounting for the complexities of human behavior. Research in the fields of behavioral economics, sociology, psychology and neurology has shown that consumers frequently behave in a manner that defies traditional models of rational economic choice. Proven energy-saving technologies that are sound economic investments, for instance, are often adopted at rates that are significantly lower than might be predicted by simple economic models. Conversely, some Californians put solar panels on their house or purchase fuel-efficient vehicles, even if there are more cost-effective strategies to reduce greenhouse gas emissions, in part because these solar panels and hybrid vehicles are very visible indicators of their concern for the environment.[8] Thus, there is also room to encourage "clean" choices through non-economic motivations, such as those that appeal to social norms.

ARB and its partners at UC Berkeley and Next 10 have developed the CoolCalifornia.org web resource to provide free, easy-to-use tools and resources to all Californians with the goal of facilitating voluntary carbon footprint reductions. In support of this effort, ARB has sponsored a variety of research projects, including developing academically rigorous, user-friendly household and small business carbon footprint calculators, and additional research to support the development of local government climate action planning. ARB is also working with the Natural Resources Agency to develop a "funding wizard" for CoolCalifornia.org (currently available as a prototype[9]) which will allow California households, small businesses, local governments, and schools to search for funding to support their carbon footprint reduction projects. And finally, ARB has funded a pilot competition within and among California cities that will incorporate the CoolCalifornia.org household carbon footprint calculator and will test the effectiveness of various types of information delivery and social motivation on carbon footprint results.

To further strengthen and broaden ARB's efforts, research is needed to develop and test non-economic explanations for observed behavior and to leverage both economic and non-economic motivations for "clean" or more environmentally-friendly decisions. Standard economic interventions attempt to close the gap through pricing or information strategies, but these strategies prove ineffective if behavioral factors are not addressed. Several successful efforts to encourage residents to reduce air pollution and greenhouse gas emissions through

8 Griskevicius, V., Tybur, J.J., Van den Bergh, B. Going Green to Be Seen: Status, Reputation, and Conspicuous Conservation. Journal of Personality and Social Psychology, 2010, Vol. 98, No. 3, 392–404

9 www.coolcalifornia.org/funding-wizard-home

appealing to social incentives and accounting for behavioral barriers have already been documented, with quantified reductions in carbon footprints, energy use, electricity, and water consumption ranging from 5 percent to 20 percent.[10] Understanding the nature of consumer choices and decision making can provide critical information for developing policies and programs as California transitions to an energy-efficient and low carbon economy.

The transportation and built environment sectors are of particular interest to ARB since a significant amount of air pollutant and greenhouse gas emissions are heavily influenced by individual actions. To support ARB's mission over the coming decades, research in this area will focus on real-life decision-making in these sectors. Results will improve understanding of behaviors that either prevent regulatory programs from achieving expected results or could significantly expand the effectiveness of programs. Results will also identify potentially replicable strategies to further encourage voluntary emissions reductions.

The Built Environment

Recent studies affirm that behavioral change has the potential to reduce energy consumption in buildings by 20-40 percent.[11] However, substantial reductions of energy consumption in buildings will only be achieved if Californians reduce their plug load, purchase more efficient appliances and products, and generally use less energy. All of these factors will require changes in individuals' habits and purchasing behavior.

Various State and Federal government agencies have or currently are funding recent, relevant research and analyses related to building energy use behavior, including the California Public Utilities Commission, the Energy Commission (through their PIER program), and the U.S. Department of Energy (through ARPA-E). One key resource that has been developed as a result of the Department of Energy and Energy Commission PIER research is Lawrence Berkeley National Lab's web-based Home Energy Saver tool, which allows households to "benchmark" their energy consumption relative to a database of similar households, and to identify actions that are likely to help them reduce their household energy use.[12] ARB also has several research contracts underway to explore energy use behavior in residential and commercial buildings as well as social and behavioral barriers and motivations that influence building energy use. Questions currently being addressed under ARB sponsored projects include:

- What factors play into energy consumption in residential and commercial buildings?
- How do residential consumers respond to information about electricity consumption?
- How do commercial building operators, managers, and occupants respond to advanced visualization of building energy use?
- How do people respond to social incentives regarding electricity consumption?

10 Cool Mass Energy Smackdown

11 e.g., Dietz et al., 2009, Gardner and Stern, 2008, Laitner et al., 2009

12 Home Energy Saver functionality will be incorporated into the CoolCalifornia.org carbon calculator by the end of 2011.

Results from these on-going studies will address the persistent gap between potential and actual energy use and support the Board's efforts in fostering voluntary conservation and GHG emissions reductions. Since several projects are currently underway, no projects will be funded during the 2011-2012 fiscal year in this area.

The Nexus of Transportation and Behavior

The 2050 Vision, prepared in response to the State Alternative Fuels Plan (AB 1007, Pavley, 2005), suggests a future in which Californians spend less time driving fewer miles per year on a per capita basis and choose vehicles (or non-vehicular modes of transit) that are more fuel-efficient and/or rely on lower-carbon fuel sources. These goals are further supported by SB 375 (Steinberg, 2008) which is expected to reduce vehicle miles traveled (VMT) by improving land use and transportation system design, and AB 118 (Nuñez, 2007), which directs State agencies to develop the Alternative and Renewable Fuel and Vehicle Technology Program.

Relatively little published research has addressed transportation behavior in California. The California Energy Commission's PIER Program has supported much of what has been done on transportation behaviors in California, and ARB has co-funded several research projects. At the UC Davis Institute of Transportation Studies, which is widely recognized for its efforts in this area, researchers are working on a variety of transportation behavior projects[13] that include:

- Plug-in Hybrid Electric Vehicle (PHEV) consumer studies (ARB co-funded)
- Consumer response to vehicle instrumentation
- Vehicle choice
- Eco-driving

Several critical research gaps remain pertaining to effective promotion of environmentally-friendly transportation behavior. ARB sponsored research will target specific gaps of particular significance to California, building upon related work and seeking opportunities for co-funding with other agencies and funding sources. The following three transportation-related projects will be funded in the 2011-2012 fiscal year.

Modeling Household Vehicle and Transportation Choice and Usage

Objective: The objective of this research is to develop a model of household vehicle and transportation choice and usage that will allow more rigorous evaluation of policies intended to reduce transportation emissions and to inform sustainable community planning. Identifying the geographic and demographic characteristics of households with very low transportation emissions (especially those with low VMT) and gaining a deeper understanding of the factors that shape their transportation footprint can help inform the development of sustainable communities strategies under SB 375.

Concept: ARB has previously sponsored research related to forecasting new vehicle purchases, but this model (CARBITS) has focused exclusively on the vehicle purchase decision without

13 http://www.its.ucdavis.edu/people/faculty/turrentine/index.php

regard to expected vehicle usage or market factors (beyond fuel prices), and doesn't account for consumer acceptance of advanced vehicles. Previous research into the factors which influence ridership of public transit and use of other alternate transport modes should be incorporated into an improved model. Related work funded by the California Energy Commission, as well as the California Household Travel Survey (and an Energy Commission-funded expansion of this survey), could be leveraged for this research. The investigators will develop a joint vehicle choice and usage model for light-duty vehicles (including zero emission vehicles specific to California's fleet) that more accurately captures how transportation-related choices and market effects influence emissions. This should include a better understanding of households that choose to have low or zero VMT, consumer acceptance of emerging low-emission vehicles, and considerations that affect vehicle purchase choice, such as anticipated or actual vehicle use and market factors (beyond fuel price).

The model will link household vehicle and transportation choices to demographic information that identifies the characteristics of households that have very low transportation emissions and/or VMT. Researchers will investigate what individual-level factors are associated with low-emission transportation behavior, as well as delineate behaviors that typify low-emission transportation choices for various socioeconomic groups. The relative importance of barriers to low-emissions travel, as well as potential leverage points for mitigating these barriers, will be explored. This research will also provide ARB with more realistic projections of future vehicle sales for emissions modeling purposes. The results of this work will be used to evaluate policies intended to promote acceptance of low-emission transportation modes, identify potential incentives to reduce vehicle miles traveled at the household level, help policy-makers understand the barriers to adoption of low emission and sustainable forms of transportation, and help constrain future transportation emissions.
Proposed funding: $300,000

Understanding the Potential Benefits of Interactive Transportation Technologies

Objective: The objective of this research is to identify the potential for in-vehicle feedback systems to reduce transportation-related emissions through changes in driving behavior.

Concept: In-vehicle feedback systems (such as on-board, real-time fuel efficiency display technologies) are available but have only penetrated select, atypical niches of the market place. Providing drivers with appropriate in-vehicle feedback may foster a broader awareness of eco-driving, and encourage not only better fuel economy but possibly also a reduction in vehicle miles traveled (VMT). Observations of impacts associated with the limited penetration of in-vehicle feedback technologies suggest that they may offer a viable, low-cost approach for voluntary greenhouse gas emissions reductions from personal vehicles. Ongoing and recently funded work at UC Davis, UC Riverside and Eaton Corporation should be leveraged and/or expanded upon in this research. The California Household Travel Survey, and a California Energy Commission-funded expansion of this Survey, could be useful for this research.

The investigators will research the fuel economy and VMT impacts of in-vehicle feedback systems in personal vehicles, with a particular emphasis on how to most effectively influence

driver behavior. This research will examine the role that in-vehicle feedback systems play in influencing driver behavior (including fuel economy and VMT), and what features of these systems (e.g., type or layout of feedback, visual vs. auditory vs. pedal push-back) are key to optimizing emissions reductions. The investigators will also examine the long-term fuel use impacts of in-vehicle feedback and driver training, and may explore whether vehicle technology affects driver response to in-vehicle feedback systems. The project will investigate traveler behaviors and quantify potential reductions in transportation emissions. Results will be used to develop policies that foster reduced emissions from transportation through effective use of on-board technologies, and complementary training.
Proposed level of funding: $300,000

Consumer Attitudes to Low-Emission Vehicles

Objective: New advanced vehicle technologies, including those that reduce criteria pollutant and greenhouse gas emissions, continually evolve in response to consumer preferences and other market conditions. Total on-road fleet emissions will therefore depend on consumers' willingness to purchase and use light-duty vehicles integrating those technologies. This study's objective is to collect information about new light-duty vehicle purchases to understand consumer attitudes toward emission-reducing vehicle technologies.

Concept: Consumers ultimately shape light-duty vehicle designs by virtue of their new car and light truck purchases. New vehicle offerings integrate a range of emission-reducing technologies that vary in cost, complexity, and transparency, but it is currently uncertain how these technologies may influence vehicle purchase decisions or how consumer attitudes may evolve over time. While there is a robust literature related to consumer attitudes and willingness-to-pay for alternative fuel and low-emitting vehicles based on both stated and revealed preference surveys, the state of technology continues to progress and previous findings may no longer hold. However, current work at the state and federal levels (CEC, PEVC, DOE) regarding electric vehicle adoption and travel behavior may be able to address certain portions of the market.

This study uses qualitative research techniques to assemble time-series data on the purchasing process and ultimate decisions of new light-duty vehicle buyers over a multi-year period. Interviews will be structured to identify and evaluate factors influencing new-vehicle purchase decisions, with particular focus on consumer awareness of and attitudes toward emission-reducing technologies and alternative-fuel vehicles. The sample will be stratified to ensure sufficient coverage of various geographic locations, vehicle types, and demographic characteristics. These interview findings will be evaluated within the context of broader market conditions and for any trends over time. Study results will be useful to policymakers and vehicle manufacturers seeking to understand the factors that stimulate and constrain sales of low emission and alternative-fuel vehicles.
Proposed level of funding: $250,000

FOUNDATIONAL STUDIES: AIR POLLUTION SCIENCE

Air pollution science is the foundation of efforts to understand and address air quality issues. For more than 40 years, the ARB and the University of California have partnered to make California a center of pioneering research into air pollution science. The scientific and technical knowledge gained through that research, coupled California's comprehensive air pollution control programs, have made possible the dramatic improvement in California's air quality.

Understanding the chemistry which leads to the formation of air pollution was a research goal of Dr. Arie Haagen-Smit, ARB's first chairman. ARB has continued to fund research examining the chemistry occurring in the atmosphere. Air quality field studies provide vital data on the composition, formation and transport of air pollution in California. Knowledge developed from such field studies helps to improve essential analytical tools such as air quality models used to predict atmospheric processes. Over several decades, 40 ARB-sponsored field studies have provided information critical to the design and implementation of California's air pollution control programs. ARB funding has also contributed to the body of scientific knowledge about the health effects of air pollution, especially fine particulate matter (PM2.5) and ozone.

Air pollution studies span a wide variety of academic disciplines. Health studies, air quality field studies, air quality model improvements, refinements to the emissions inventories, development of new emission control technologies, improved measurement methods, and assessments of the effectiveness of new technologies all provide part of the scientific foundation for air pollution control programs. Valuable work in these areas is funded by the United States Environmental Protection Agency (U.S. EPA), National Science Foundation, and Department of Energy, as well as international partners. Although scientists throughout the world work to better understand air pollution and its impacts, ARB's funded research into air pollution science still plays a key role in addressing specific California needs.

ARB shares responsibility for the following ambitious goals:

- ***Protecting Health by Reducing Exposure to Air Pollution:*** Conduct health-based research in support of ambient air quality standards, with special attention to protecting the health of infants and children, and evaluate strategies to reduce public exposure to air pollutants.
- ***Attaining Air Quality Standards:*** In conjunction with air districts develop State Implementation Plans (SIPs) for the ozone and PM2.5 standards that demonstrate attainment by mandated deadlines.
- ***Meeting Greenhouse Gas Reduction Targets:*** Develop and implement a plan to reduce California's greenhouse gas emissions to 1990 levels by 2020 and work to reach the goal of reducing 2050 emissions to 80 percent below the 1990 baseline.

The findings of ARB's research efforts can bridge gaps in scientific knowledge, and guide and support environmental policies and regulatory development. ARB's research program is designed to help California meet the continuing challenge of improving air quality and reducing greenhouse gas emissions.

Protecting Health by Reducing Exposure to Air Pollution

ARB funding has contributed to the body of scientific knowledge about the health effects of air pollutants, particularly PM2.5 and ozone. The most significant ARB-funded contribution has been the Children's Health Study, which has provided the majority of available data on the responses of children to both long- and short-term exposure to air pollution. Other ARB-funded epidemiological contributions have addressed the influence of long-term air pollution exposure on mortality, and short-term air pollution exposures on asthmatic children.

In addition, ARB-funded human and animal exposure studies have made significant contributions to the understanding of the biological pathways and mechanisms through which air pollution exposure leads to clinically relevant health responses in healthy and asthmatic individuals, particularly those pathways involving ozone and particulate matter. For example, ARB studies have investigated how human health responses to particulate matter differ with season, region, and density (i.e., rural vs. urban sites), and have examined the long-term effects of exposures to elevated concentrations of ozone and particulate matter during early childhood.

ARB is also investigating the associations of asthma morbidity with exposure to air pollutants, including primary and secondary organic aerosol, NO_X, NO_2, CO, and ozone, and characterizing emissions and exposure impacts in low-income communities near ports and heavily trafficked roads. Still, a number of research questions remain about the mechanisms that induce adverse health effects from air pollution. While it is beyond the ability of ARB's research program to fund major studies of this type, U.S. EPA and the Health Effects Institute (HEI) are funding valuable mechanistic research on air pollution and health.

The emphasis of ARB's research on health and exposure is to apply the research questions to California conditions. One example is to explore the differences in public exposure at the statewide, regional, and community levels. Another area of research is the monitoring of changes in exposures to air pollution as regulations are put in place or other factors affecting exposure change with time. Research is also needed to better understand factors impacting personal exposure to air pollution, exposures of vulnerable individuals such as asthmatic children, and assess potential mitigation measures.

The three research projects for FY 2011-2012 are focused on identifying current air pollutant exposures in California and evaluating the effectiveness of filtration in reducing those exposures.

Reducing Indoor Exposure to Air Pollution

Objective: Newly constructed homes in California are now required to have mechanical ventilation systems to assure that sufficient outdoor air is brought into the home, but the most economical and widely used mechanical system does not filter the incoming outdoor air at all. The objective of this project is to measure the effectiveness and energy use of combinations of mechanical ventilation systems and filtration systems to identify compatible low-energy systems that are most effective at reducing indoor exposures to indoor, and incoming outdoor, pollutants.

Concept: In part to address indoor air quality issues, new California homes are now required to have mechanical ventilation. Some such systems include filtration, but the most economical (and widely used) low energy systems do not filter the incoming air or filter it poorly. Because new construction often occurs near busy roadways, and because newer land use policies encourage infill developments in urban areas, different mechanical ventilation and high efficiency filtration technologies need to be assessed to examine how much they affect Californians' exposures to ambient pollutants, along with their energy costs, so that the most cost-effective, health-protective systems can be specified for new construction.

Studies have shown that high efficiency filtration (MERV 13-16) can be very effective in reducing particles indoors, but only very limited high efficiency options are available for residences, and there is often an energy cost, especially for those associated with central mechanical systems. Effective methods of filtration of ozone and VOCs for residences are also desirable, but options are very limited for the residential market. Filter manufacturer involvement is needed to provide a better range of options for both particle and VOC filtration. The California Energy Commission has funded has funded two related projects in this area and is expected to be a collaborator. The proposed project would build on the Energy Commission's projects but with a greater focus on the indoor exposure reductions that can be achieved.

The investigators will measure levels of particles and ozone or other VOCs inside and outside of either a test home or newly constructed homes with selected types of mechanical ventilation systems and filtration technologies to determine how these units affect infiltration of, and residents' indoor exposures to, ambient pollutants. The investigators will test combinations of at least four different types of mechanical ventilation systems and six types of filtration devices. The most promising types of mechanical systems and filtration technologies available on the market for California homes will be included in the study, as well as some new models made available by manufacturers. Energy use will also be recorded, so that the most health protective and energy-efficient units can be identified. The use of a test home and/or similar newly constructed homes is required for this study in order to allow proper assessment and comparison of the different technologies. The results of this study will identify mechanical ventilation and filtration systems that are both health-protective and energy-efficient that can be specified for new homes and homes of people with severe asthma or other respiratory conditions.

Proposed level of funding: $1,250,000

Benefits of High Efficiency Filtration to Children with Asthma

Objective: Particulate matter and ozone can cause or exacerbate asthma and other chronic respiratory diseases in sensitive individuals. The objective of this study is to: measure the indoor, outdoor and personal exposures of children with severe asthma or other respiratory conditions; determine whether the use of high efficiency filtration in their homes can effectively reduce their exposures to air pollutants and other asthma triggers; and assess whether their symptoms and health impacts are reduced.

Concept: Studies have been conducted that show associations of estimated exposure to ambient particulate matter (PM) and ozone with the development or exacerbation of asthma. However, little is known regarding the day-to-day personal exposures of sensitive sub-populations to PM and ozone. Additionally, while high efficiency filtration has been shown to significantly reduce indoor concentrations of PM in most cases, the use of high efficiency filters has not been fully explored as a potential mitigation measure to reduce exposures and health impacts from PM and ozone in homes of those with asthma.

Previous studies have largely examined the effectiveness of measures to address long-known triggers such as correcting cockroach and moisture problems, using bed and pillow covers to reduce exposure to house dust mites, and educating family members regarding avoidance of cigarette smoking in the home. The effectiveness of such measures showed mixed results in reducing symptoms across studies. A few studies have included filtration, but typically used portable filtration devices that were not necessarily high efficiency filters. The California Department of Public Health (CDPH) has studied asthma and has developed a substantial asthma reduction program that has included grants to local communities for asthma intervention; CDPH is a likely collaborator for this project.

The investigators will measure personal, indoor and outdoor exposures of 300 children with asthma, chronic bronchitis or other serious respiratory disease to PM, ozone and possibly other pollutants known or suspected of triggering asthma. They will obtain symptom and health status information via questionnaires, interviews, and medical records if available. Investigators will then examine the effectiveness of high efficiency filtration (including ozone removal media plus catalyst) in reducing exposures, symptoms, and health impacts in the study population. This could include retrofitting one-third of the homes with in-duct high efficiency filters; providing one to two high quality, high efficiency portable air cleaners per home in another third of the homes; and providing asthma trigger reduction information but no filtration in the third group of homes.

Personal, indoor and outdoor exposures would be measured again after the intervention for comparison to the pre-mitigation exposure levels, and pre- and post-questionnaires and interviews would be used to assess reductions in symptoms and health impacts. The results of this study will document the extent to which high efficiency filtration can reduce exposure to asthma triggers and the associated symptoms and health impacts. It may also identify ways to reduce medical costs for those with severe asthma or other chronic respiratory conditions.
Proposed level of funding: $2,000,000 - $3,000,000

Reducing Air Pollution Exposure in Passenger Vehicles

Objective: Exposures to vehicle-related pollutants have been linked to premature death and exacerbation of various respiratory and cardiovascular diseases. Some of the highest human exposures to certain pollutants and a large fraction of total daily exposure occur while traveling on roadways for much of the population. The objective of this study is to test different types of high efficiency filters in vehicles and school buses to identify cost-effective techniques to reduce in-cabin particle levels and thus reduce the population's exposure to vehicle-related air pollutants.

Concept: Ultrafine particles inside vehicle passenger cabins have been shown to be 10 times higher than ambient levels and contribute up to 30-50% of total daily exposure for a typical California commuter. This high in-cabin exposure is due to the vehicle's close proximity to relatively undiluted emissions. Among commuters, school children riding in school buses are considered especially vulnerable due to their immature respiratory systems and greater breathing rate per body weight. Tremendous progress has been made in reducing vehicular emissions by tightening emission standards and retrofitting buses, but the potential to further reduce exposure to vehicle-related pollutants by reducing the proportion of on-road pollutants penetrating into vehicle cabins has largely been overlooked. Previous work by various investigators has shown that setting vents on recirculation and the use of cabin filters can reduce in-vehicle particles by 80-95%. However, CO_2 from exhaled breath of passengers can build up quickly and exceed Cal-OSHA personal exposure limits in cars when vents are set on recirculate and windows are closed. Using high efficiency filters is one low cost approach that can reduce exposure when vents must be opened.

Development of cost-effective techniques to reduce on-road exposures is a potential, largely unexplored strategy to reduce these critical population exposures. The investigators will determine the degree of fine and ultrafine particle reduction: 1) inside passenger vehicles equipped with various types of high efficiency cabin air filters; 2) inside school buses equipped with a high efficiency cabin air filter; and 3) inside school buses equipped with a HEPA air purifier.

Twelve passenger vehicles and six school buses will be used for testing along freeways and urban streets. Particle number and size distribution, PM2.5, CO, CO_2, meteorological parameters and traffic activity will be monitored using real-time instruments. The investigators will identify the filters and ventilation system operational conditions that achieve the greatest exposure reduction inside the vehicles. This project will identify the most effective approach to reducing in-cabin exposures to ultrafine and fine particles, which can be incorporated into guidelines or regulations to protect health.

Proposed level of funding: $150,000

Attaining Air Quality Standards

In the coming decades, California must comply with stricter air quality standards as well as ambitious greenhouse gas reduction targets. Although ARB has made significant progress in reducing ground level ozone, PM2.5, and other pollutants, meeting federal and state ambient air quality standards will be challenging. Increasing transport of these pollutants from Asia and other areas will make attainment of more stringent federal air quality standards difficult for both urban and rural areas of California. Understanding the sources of pollution transported across the Pacific Ocean is a challenging research area and one that has been identified for funding this year.

ARB has a long-standing research commitment to support development of State Implementation Plan (SIPs) that show how California will meet federal air quality standards. Efforts continue to improve estimates of emissions and improve air quality modeling, both of which are critical to the design of SIPs and effective regulations. Ongoing research includes developing an accurate biogenic VOC inventory, which is critical to SIP development as air quality impacts of biogenic VOCs relative to those of man-made VOCs are increasing. An important research need identified by the Dairy Committee of the San Joaquin Valley Ag Tech Committee is to more fully understand VOC emissions from dairy silage operations and methods to mitigate them.

Building upon the success of the CalNex 2010 field study, a major collaboration conducted with the National Oceanic and Atmospheric Administration (NOAA), ARB has an existing research contract with NOAA to synthesize the scientific results of the CalNex 2010 to support California's air quality and climate programs. For this year, ARB has identified continued funding for analysis of CalNex 2010 data collected in the South Coast Air Basin and the San Joaquin Valley on the contribution of organic aerosols to PM2.5 pollution, a contribution that is poorly understood and underrepresented in existing air quality models.

Technology has historically played a central role in reducing emissions to meet air quality standards and must support California's transition to a low carbon economy with minimal emissions of smog forming pollutants. It will also be important to monitor and measure the impact of new technologies. An important research area identified this year is to assess the new technologies introduced in the market place in response to ARB regulations on diesel engines.

There are four research projects for FY 2011-12 to improve the scientific foundation that will support future SIP efforts to demonstrate attainment with stricter air quality standards. First, is to improve our understanding of the contribution of long-range transport of air pollutants into California. Second, is to improve dairy silage VOC emission estimates and focus on mitigation options. Third, is to better understand the contribution of organic aerosols to particulate pollution and improve state-of-the-art air quality models. The fourth study will investigate the durability of emissions controls being used for exhaust aftertreatment for newer heavy-duty diesel trucks.

Long Range Transport of Air Pollutants into California

Objective: Pollutant transport from the growing Asian economic region raises background air pollution levels in California potentially affecting the ability to comply with air quality standards. This project will establish a small monitoring network devoted to detecting ozone and particulate pollution arriving over the Pacific Ocean.

Concept: Recent research indicates that air pollution transported from Asia is driving increases in background ozone and PM in California, with the potential to contribute to exceedances of State and Federal 8-hr ozone air quality standards. A field study coupled with modeling is needed to refine understanding of present and future impacts on ozone attainment in California. Aircraft data from ICTC2K2, ARCTAS-CARB, and CalNex 2010 all show Asian pollution, including ozone, arriving over California. Analyses of ground samples have shown widespread and persistent Asian PM in clean rural areas of the State. One study of ozone in far northern California computed as much as 80 percent of springtime ozone (8-hour averages) in the northern Sacramento Valley may be imported with air coming over the Pacific Ocean, which contains ozone from Asia.

ARB-sponsored research has identified specific tracers for Asian PM, detectable even in urban California, which can be used to identify Asian air masses. This project will measure both ozone and related tracers for direct analysis and for comparison with global pollution transport models. A small monitoring program will add instrumentation to existing monitoring facilities and ongoing programs, plus utilize other existing non-ARB data sources, such as NOAA ozonesonde releases. The network will consist of two pairs of stations, one using an upwind site in the North Coast Ranges matched with an existing ARB site in the Sacramento Valley, and one using an upwind site in the Central Coast Ranges matched with an existing SJVAQMD site in the San Joaquin Valley.

Measurements in addition to ozone will include gases and aerosols known to be tracers for long range ozone chemistry and Asian pollution sources. The tracer data will be used to validate transport modeling for both chemistry and source attribution. ARB will work with a high-level global modeling collaborator (NOAA, NASA, or similar). ARB will use the monitoring data in conjunction with global chemical transport models to confirm and refine long range ozone transport chemistry, source attribution, and upwind emission estimates in order to track and predict how Asian emissions growth impacts California air quality.
Proposed level of funding: $500,000

Dairy Feed Management Practices to Reduce Emissions

Objective: Meeting increasingly stringent ambient air quality standards for ozone is a challenge in the San Joaquin Valley (SJV). Silage from dairy operations contributes significantly to ozone and application of effective mitigation efforts would help the San Joaquin Valley meet its air quality goals. This project will characterize emissions during the entire silage process and under the varying conditions of California dairies to identify high-emission conditions and provide the necessary information to focus mitigation efforts.

Concept: Dairy operations are known to be significant emission sources of volatile organic compounds (VOCs) in the SJV. Many of these VOCs contribute to the formation of ground-level ozone, for which the SJV is currently in non-attainment for both state and federal ambient air quality standards. Silage has been identified as one of the primary VOC emission sources within dairy operations, capable of producing significant quantities of ground-level ozone. Previous work has shown the ozone formation potential from corn silage to exceed that of light-duty gasoline vehicles to the SJV. Additional work has identified cattle feed, of which silage is a main component, as having the greatest potential for VOC reductions from dairy operations. An emission model has been developed to estimate the alcohol emissions from silage. However, this model does not address other VOC emissions, may not accurately consider emissions over the entire feeding process and input data is not available for the multitude of silage types in use within California.

The project would examine specifics about the silage process and how it relates to emission of specific VOC species, particularly those with high ozone forming potential. The temporal emission profile of VOC species will be characterized throughout the feeding process. Different sampling approaches (*e.g.,* wind tunnel and flux chamber) will be inter-compared providing insight and context into the accuracy of previous measurement efforts. The results of this study will be used to assess current silage management and feed distribution practices as they relate to VOC emissions and provide information to identify the most effective mitigation measures with the intended outcome of reducing ground-level ozone in the SJV.
Proposed level of funding: $400,000

Contribution of Organic Aerosols as a Component of PM2.5 Pollution

Objective: Although organic aerosols, and specifically secondary organic aerosols (SOA) formed from oxidation of gaseous precursors, constitute a large fraction of the submicron particulate mass and are responsible for significant health and climate effects, a substantial gap remains between predicted and field measurements of SOA concentrations. The objective of this research project is to compare the amount and composition of secondary organic aerosols formed during CalNex, as determined by HR-ToF-AMS, against state-of-the-art SOA models with the aim of improving modeling of the concentration, composition and evolution of SOA in California.

Concept: Recently published results from field studies have suggested that organic aerosols, and in particular, secondarily formed organic aerosols, comprise a large portion of submicron aerosols in the South Coast Air Basin and the San Joaquin valley. State-of-the-art SOA models, however, do a poor job of predicting the sources, evolution and concentrations of this SOA, which greatly limits the ability of regulators to develop effective control strategies. The Jimenez Group has participated in several field experiments in California with the specific goal of characterizing sources, composition and evolution of organic aerosol (OA). During the most recent study in California, CalNex 2010, a hi-resolution Time-of-Flight Aerosol Mass Spectrometer (HR-ToF-AMS) and complementary instrumentation were deployed for four weeks in Pasadena. This work overlapped significantly with broader CalNex 2010 efforts carried out by groups from NOAA and many universities (>30 alone at the Pasadena site), producing extremely comprehensive data sets for both the South Coast Air Basin and the San Joaquin Valley (Bakersfield site).

The proposed study would utilize these measurements in the development of improved SOA models, effectively leveraging several million dollars' worth of data collection and analysis work from the CalNex 2010 study. To test state-of-the-art SOA models, experimental characterization of OA will be combined with measurements of SOA precursors and oxidants carried out by other researchers. The precursor and oxidant data will be input into these models to provide predictions for the concentration, composition and volatility of SOA at the field site; the resulting predictions will be compared against SOA characteristics determined experimentally. Given the scope and the sophistication of the gas-phase and particle-phase measurements carried out during CalNex 2010, the proposed research will test and constrain SOA models at a level of detail that has not been possible before. The results of this study will be used to help identify sources of SOA and improve models that quantitatively predict the evolution of SOA, which will aid in the development of effective strategies to reduce SOA pollution in California and in predictions of future climate change.
Proposed level of funding: $350,000

Investigate the Durability of Diesel Engine Controls

Objective: New emissions standards for heavy-duty vehicles implemented for PM and NO_X in 2007 and 2010 respectively are leading to the introduction of exhaust aftertreatment in diesel trucks. These include diesel particle filters (DPFs) and selective catalytic reduction (SCR). The objective of the current study is to make measurements from a large number of in-use trucks to characterize the effect and durability of these aftertreatment devices.

Concept: DPFs and SCRs drastically lower harmful emissions from heavy-duty diesel trucks. However, since they are relatively new, their durability in the real world are not yet fully known. It is also unknown whether tampering is occurring. Without fully functioning aftertreatment a diesel truck would emit tens to hundreds of times higher emissions, negating the air quality benefit of the new engine standards. ARB fleet rules are accelerating the introduction of DPFs and SCRs in the truck fleets in and around the major ports in the state. Several investigators have used chase vehicles, remote sensing and other methods to characterize a drastic reduction in the overall diesel emissions resulting from this rule. To answer the question about durability of the aftertreatment the existing data can be mined. But since the introduction of the aftertreatment is still a relatively new occurrence it is important to continue the studies already undertaken.

The investigators will use the current dataset to explore the durability issue. The project will also include continued measurement of emissions from heavy-duty trucks. These measurements are envisioned to take place on-road from several thousand trucks each year over a period of several years. While the measurement method is yet to be determined several possibilities exist, such as remote sensing, or collecting a small air-sample containing exhaust from individual vehicles (several methods exist to accomplish this). Data will include measurements of criteria pollutants, such as carbon monoxide, total hydrocarbons, NO_X, and PM as well as nitrogen oxide, nitrogen dioxide, and black carbon at a minimum. Particle number and size distribution would be valuable additional measurements. The results from the study will provide real world data on heavy-duty aftertreatment durability, which will be an important factor in inventory calculations for heavy-duty emissions. If the durability is less than expected the study will also shed light on how to improve the overall effectiveness of aftertreatment and realize the expected emission reductions.
Proposed level of funding: $250,000 – 300,000

Meeting Greenhouse Gas Targets

The emphasis of ARB's foundational research on greenhouse gases is to explore potential new emission reduction strategies, ways to improve emissions estimates, and methods to verify emissions reductions over time.

ARB staff has partnered with the California Energy Commission (CEC) and the Department of Food and Agriculture on a multi- year research effort examining nitrous oxide (N_2O) emissions from the application of fertilizer to agricultural soils. These projects have initially focused on baseline emissions estimates and the validation of models to accurately estimate emissions based on biological, meteorological, crop, and soil specific information. The next step is to examine the emissions reduction impacts of mitigation options for important California crops.

ARB has also partnered with the CEC to improve the state's emissions inventory for methane and other GHGs using tall tower measurements. CEC has been the main supporter of the existing towers to date and with the evolving agency roles ARB will take over that role and coordinate with on-going and future CEC projects. Recent studies show that N_2O emissions inventory may be underestimated by approximately 66% in central California. ARB has identified the importance of continuing the tall tower measurements and recognizes the importance of expanding this capability into the South Coast Air Basin. In addition, the concurrent measurement of VOCs will allow us to attribute greenhouse gas emissions to specific sources. ARB also has sponsored a multi-year research study, *Black Carbon and the Regional Climate Impact of California*, which has shown a 50 percent reduction in black carbon over the past twenty years due mainly to reductions from diesel engines. The study has examined regional climate response to black carbon emissions in the state, to serve as a basis for policy and control strategies. The investigators have proposed the addition of funding to allow analysis of solar radiation data over the same twenty year period to examine the impacts of the reduced black carbon.

The following four research projects for FY 2011-12 will improve the scientific foundation that supports California's efforts to meet near and long-term greenhouse gas emission reduction goals. First, is to improve the understanding of emissions of high-global warming potential gases from waste insulation foams in landfills. Second, is to focus on mitigation options to reduce N_2O emissions from the application of fertilizer to agricultural soils. Third, is to continue supporting tall tower measurements in Northern California, expand this capability to Southern California, and add VOC measurements for better source attribution. Fourth is to augment an existing research contract to analyze solar radiation data to better understand the role of black carbon emissions in California's weather and climate.

Emission of Potent Greenhouse Gases from Appliance and Building Waste in Landfills

Objective: High-global warming potential (high-GWP) greenhouse gases (GHG) contained in landfilled insulating foam may potentially be a significant source of GHG emissions, estimated at 2.6 million metric tonnes of carbon dioxide equivalents ($MMTCO_2E$) in California in 2010, and expected to almost double to 4.8 $MMTCO_2E$ annually by 2020. However, these estimates are theoretical, as no waste foam GHG emissions have been measured from California landfills, and research is necessary to confirm the extent to which waste foam in landfills is biologically attenuated or captured and reduced by landfill gas collection and combustion systems. The objective of this research is to determine the high-GWP GHG emissions from waste insulating foam in landfills.

Concept: Waste insulating foam from refrigerator-freezers and building insulation that has been landfilled is assumed to be a significant source of GHGs because the insulation contains foam expansion agents of chlorofluorocarbons (CFCs), hydrochlorofluorocarbons (HCFCs), and hydrofluorocarbons (HFCs), which have high-GWPs ranging from 700 to 4750. However, previous limited studies suggest that actual foam GHG emissions from landfills may in fact be negligible. Laboratory research in Denmark suggests that much of the CFC foam expansion agent in the landfilled foam is biologically attenuated and reduced prior to emissions (HCFCs and HFCs are not attenuated).[14] Additionally, limited landfill gas studies in Canada suggest that in a landfill with a methane gas collection and combustion system in place, up to 95% of the foam expansion agents are reduced to non-global warming constituents from auto-decomposition at high combustion temperatures (1150 to 1350 °F).[15]

An ARB-funded 2010 study on insulating foam GHG emissions in California confirmed the significant potential of GHG emissions from landfilled foam, but actual emission measurements

14 Scheutz, C., and Kjeldsen, P. Capacity for Biodegradation of CFCs and HCFCs in a Methane Oxidative Counter-Gradient Laboratory System Simulating Landfill Soil Covers. Environmental Science & Technology, Volume 37, No. 22, November 2003, 5143-5149.

15 Environment Canada, Greer, A., and Cianciarelli, D. Characterization of Emissions from a 26 kWe Micro Turbine Fired with Landfill Gas. Shepard Landfill, Calgary, Alberta. Report ERMD 2004-02. January 2005.

from landfills were not part of the scope of work.[16] To address the uncertainty for this potential emissions source, the investigators will measure high-GWP GHG emissions from landfills known to contain waste insulating foam, measuring baseline levels at certain time intervals (to measure the effect of biological attenuation), and measuring landfill gas pre-combustion and post-combustion levels to determine magnitude of foam GHG emissions from a typical California landfill. Findings from this study will help determine if the business-as-usual process of disposing appliance and building waste foam into California landfills is a significant source of high-GWP GHG emissions and whether there is a need for any action to reduce these emissions.

Proposed level of funding: $200,000 - $300,000

Mitigation of N_2O Emissions from Agricultural Soils

Objective: The agricultural sector is the largest contributor of nitrous oxide (N_2O) both globally and in California, accounting for about 60% of anthropogenic N_2O emissions. Mitigation of N_2O from agricultural soils represents a viable opportunity to reduce GHG emissions from agriculture. This project will identify and quantify emission reductions of N_2O from potential mitigation measures for important commodities grown in California.

Concept: N_2O is produced from soil through microbial processes involving nitrogen compounds. Its emissions are thus closely related to soil nitrogen content, but highly variable due to impacts of numerous environmental variables that govern microbial activities such as soil properties, meteorological conditions, and crop management practices. There are five ongoing projects, coordinated among ARB, the California Energy Commission and the California Department of Food and Agriculture, to characterize baseline N_2O emissions from major California crops. Since agricultural systems are highly managed, N_2O emissions may be effectively reduced by adopting practices that increase nitrogen fertilizer efficiency, and consequently reduce nitrogen inputs into agricultural fields.

For example, a USDA study has shown that application of nitrification inhibitors in corn can reduce N_2O emissions by more than 50 percent. Several studies are also being carried out in California to investigate the effects of dripping irrigation, cover crops, and different forms of nitrogen fertilizers on N_2O emissions in tomatoes, almonds, and grapes. However, these are isolated studies in which the practices being tested are not necessarily the most effective ones and in some cases the studies are not focused on N_2O. ARB needs a systematic approach to quantifying reduction potential from the most promising mitigation options for the major crops in the state.

The purpose of this project is to test alternative management practices that hold the most potential for N_2O reductions from agricultural fields and are anticipated to be both economically and technically feasible. Such practices could include the use of slow release

16 Caleb. 2010. Developing a California Inventory for Ozone Depleting Substances (ODS) and Hydrofluorocarbon (HFC) Foam Banks and Emissions from Foams. Prepared for California Air Resources Board (Research Contract 07-312). November 2010.

fertilizers, nitrification inhibitors, cover crops, dripping irrigation, and manure nitrogen. Field monitoring studies will be conducted to measure N_2O fluxes from major California crops managed under these selected practices, and the monitoring results will be analyzed with geochemical modeling to estimate the overall GHG budget. The management practices that are most effective in mitigating N_2O emissions will be identified in consultation with the agricultural stakeholders. This project is expected to provide critical information needed for the development of agricultural offset protocols.
Proposed level of funding: $400,000

Atmospheric Measurement and Inverse Modeling to Improve Greenhouse Gas Estimates

Objective: Although the majority of the greenhouse gas emission inventory (i.e. CO_2 emissions from fossil fuels) is well defined, methane (CH_4) and nitrous oxide (N_2O) emissions make up approximately nine percent of emissions and are still highly uncertain. This project will improve understanding of these potent greenhouse gases by utilizing tall tower measurements at Walnut Grove, Mt. Sutro, and a new site near Riverside and inverse modeling to estimate emissions by region and source type throughout the state. Comparison to ARB's current GHG estimate will identify areas where additional study will yield improved understanding of emission sources and potentially enable targeted mitigation efforts.

Concept: Emission estimates for CH_4 and N_2O are highly uncertain, particularly for agricultural N_2O estimates. Recent studies at tall tower sites show that N_2O emissions inventory may be underestimated by approximately 66% in central California. In addition, a pioneering study by ARB staff applied measurements of CH_4 and CO from a tall tower at Mt. Wilson to estimate CH4 emissions from the Los Angeles area and found agreement with the ARB CH_4 inventory to within ~ 30%. However, other recent airborne measurements and remote sensing of the South Coast area suggest that CH_4 emissions may be twice that of inventory estimates. This suggests that additional sites beyond Mt. Wilson are needed to quantify South Coast emissions. To date, CEC has been the main source of funding for these tall tower measurements but given the evolving agency roles, ARB will provide future funding and ensure coordination with on-going and future CEC projects.

The above results were generated by taking the ambient air measurements at two tall tower sites and converting them to GHG emissions estimates using inverse modeling, which can also provide source type contributions (i.e. fossil fuel or biological based emissions) for the covered areas. This level of comparison will not just point out uncertainties but enable refinement by identifying the sources most likely leading to that uncertainty. California has been on the forefront by utilizing tall towers and inverse modeling to estimate CH_4 and N_2O emissions for the central California area. As mentioned above, the results highlighted potential areas of discrepancies between the measurement data and GHG emissions inventory of 37% and 66% for CH_4 and N_2O, respectively, for central California. Based on this information, ARB can consider inventory refinement for sources within the covered area but the data are limited and a more robust analysis on ARB's continuing measurements will improve our understanding.

The towers and associated inverse modeling would also provide a consistent time series of atmospheric measurement data for evaluating trends as greenhouse gas regulations are put in place. This project will gather measurements of greenhouse gases at three tall tower sites and apply inverse modeling and Bayesian statistical techniques to both those measurements and measurements from ARB's monitoring network throughout the state and estimate GHG emissions by air basin with source specific information. The goal is to construct GHG emission estimates based on atmospheric measurements and compare the results to ARB's GHG inventory. The results of this study will be used to determine regional and source uncertainties in the CH_4 and N_2O inventories in order to improve our GHG estimates and correctly target mitigation options to meet our long term GHG reduction goals. Continued funding of the towers will also provide a consistent time series of atmospheric measurements that could be used to evaluate the impact of greenhouse gas reduction strategies.
Proposed level of funding: $680,000

Using VOC Measurements at Tall Towers to Distinguish Greenhouse Gas Sources

Objective: As California moves forward to reduce greenhouse gases collection of atmospheric measurements can be used to validate the state's greenhouse gas inventory and verify changes in emissions anticipated from the state's greenhouse gas reduction measures. This project will measure a suite of volatile organic compounds (VOC) at the Walnut Grove tall tower to serve as tracers to help distinguish between emission sources of the greenhouse gases already measured at the site. These data, when combined with source apportionment analysis, will provide valuable GHG emission estimates that can be used for improving the inventory, verifying reductions, and planning future mitigation strategies.

Concept: Atmospheric measurements are key to validating the greenhouse gas inventory, verifying the impact of reduction strategies, and identifying sources of greenhouse gas emissions. Gathering atmospheric data at tall towers and using tracer species is one promising method to apportion emissions to sources. California's existing two towers have generated valuable data on emissions but have not been able to provide source specific emission estimates. A recent study during the CalNex project suggests that different sources emit specific mixtures of VOCs along with GHGs, potentially enabling attribution of emissions to a source category. This project will add VOC tracers to the suite of measurements at the Walnut Grove tall tower in an effort to attribute GHG emissions to specific sources (e.g. oil/gas facilities, dairies, and automobiles). These results are valuable in targeting mitigation options, identifying areas in need of inventory improvements, and determining impacts of current GHG reduction strategies.
Proposed level of funding: $250,000

The Role of Black Carbon in Climate Change Mitigation: Analyses of Solar Radiation Data

Objective: The investigators will analyze surface solar radiation flux measurement data to explore the link between policies on diesel emissions and climate mitigation. The project has the potential to verify with observational evidence the total radiation benefit of combined black carbon (BC) and sulfur controls (which is thought to have a counteracting impact to black carbon) for the first time.

Concept: Black carbon particles are part of the total mix of particulate matter (PM) released during incomplete combustion of carbon-based fuel. BC and other PM constituents all contribute to these adverse health effects. Black carbon's high capacity for light absorption and its role in key atmospheric processes link it to a range of climate impacts, including increased temperatures, accelerated ice and snow melt, and disruptions in precipitation patterns. While it is widely recognized that reducing black carbon will have climatic benefits, efforts to evaluate the actual impacts on surface radiation of black carbon reductions have been limited. ARB's research study, *Black Carbon and the Regional Climate Impact of California*, has observed roughly a 50 percent reduction in black carbon measured at IMPROVE sites throughout California over the past twenty years. This agrees with the expected emission reductions associated with California's diesel emissions control program. Given the large uncertainty in model estimates of BC emissions from various sources, their atmospheric concentrations and optical properties, it would be highly advantageous to have empirical data to validate model predictions.

The CIMIS network provides hourly measurements of the surface solar flux at stations distributed throughout California. The investigators will use the CIMIS dataset in conjunction with AERONET measurements to determine long-term trends in surface brightening or dimming. They will adopt a two-pronged approach to separate trends in clear-sky solar flux from the cloudy-sky solar flux. The Coefficient-of-Haze (COH) data provide a direct measurement of the visibility conditions constrained by carbonaceous aerosols. The investigators will also compare 20-year trends in COH and solar flux in each of the California basins to provide a direct link between the expected surface brightening, observed solar flux, and reduction in BC emissions in California. The results of this study will provide insights on the role of BC aerosols in California's weather and climate, and could help remove barriers to decision-making involving BC and climate change policy.
Proposed level of funding: $25,000

CALIFORNIA AIR RESOURCES BOARD

NOTICE OF PUBLIC MEETING TO HEAR AN UPDATE ON SAN DIEGO'S SUSTAINABLE COMMUNITIES STRATEGY (SCS), AND UPDATE ON SCS DEVELOPMENT IN OTHER REGIONS IN CALIFORNIA

The Air Resources Board (ARB or Board) will conduct a public meeting at the time and place noted below to hear an informational update on San Diego's Draft Sustainable Communities Strategy, prepared pursuant to the Sustainable Communities and Climate Protection Act of 2008.

DATE: September 22, 2011

TIME: 9:00 a.m.

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

This item will be considered at a one-day meeting of the Board, which will commence at 9:00 a.m., September 22, 2011. Please consult the agenda for the meeting, which will be available at least 10 days before September 22, 2011, to determine the day on which this item will be considered.

California State law (the Sustainable Communities and Climate Protection Act of 2008, Sustainable Communities or SB 375, Statutes of 2008) requires each of the State's 18 Metropolitan Planning Organizations (MPO) to prepare either a Sustainable Communities Strategy or an Alternative Planning Strategy to meet the regional greenhouse gas emission reduction targets for 2020 and 2035, set by the Board in September 2010. The statute also requires ARB to review each MPO's strategy to determine whether it would, if implemented, achieve the greenhouse gas emission reduction targets.

San Diego is the first region to develop a Sustainable Communities Strategy, as part of its 2050 Regional Transportation Plan. At the meeting ARB staff will present an informational report to the Board on its technical evaluation of the San Diego region's draft Sustainable Communities Strategy. Staff's evaluation of the greenhouse gas emissions from San Diego's Sustainable Communities Strategy focuses on the technical aspects of the region's travel modeling and supporting analyses that underlie the strategy's greenhouse gas reduction quantification. ARB outlined the technical methodology for its evaluation in a document released July, 2011, available at: http://www.arb.ca.gov/cc/sb375/sb375.htm.

Interested members of the public may present comments orally or in writing at the meeting and may be submitted by postal mail or by electronic submittal before the meeting. To be considered by the Board, written comments not physically submitted at the meeting must be received **no later than 12:00 noon, September 21, 2011**, 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

New Feature

You can now sign up online in advance to speak at the Board meeting when you submit an electronic board item comment. For more information go to: http://www.arb.ca.gov/board/online-signup.htm.

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.

ARB requests that written and email statements on this item be filed at least 10 days prior to the meeting so that ARB staff and Board members have additional time to consider each comment. Further inquiries regarding this matter should be directed to Ms. Lucille van Ommering, Manager, SIP and Local Government Strategies Section, at (916) 322-0285.

SPECIAL ACCOMMODATION REQUEST

Special accommodation or language needs can be provided for any of the following:

- An interpreter to be available at the hearing;
- Documents made available in an alternate format (i.e., Braille, large print, etc.) or another language;
- A disability-related reasonable accommodation.

To request these special accommodations or language needs, please contact the Clerk of the Board at (916) 322-5594 or by facsimile at 916) 322-3928 as soon as possible, but no later than 10 business days before the scheduled Board hearing. TTY/TDD/Speech to Speech users may dial 711 for the California Relay Service.

Comodidad especial o necesidad de otro idioma puede ser proveído para alguna de las siguientes:

- Un intérprete que esté disponible en la audiencia.

- Documentos disponibles en un formato alterno (por decir, sistema Braille, o en impresión grande) u otro idioma.
- Una acomodación razonable relacionados con una incapacidad.

Para solicitar estas comodidades especiales o necesidades de otro idioma, por favor llame a la oficina del Consejo al (916) 322-5594 o envíe un fax a (916) 322-3928 lo más pronto posible, pero no menos de 10 días de trabajo antes del día programado para la audiencia del Consejo. TTY/TDD/Personas que necesiten este servicio pueden marcar el 711 para el Servicio de Retransmisión de Mensajes de California.

CALIFORNIA AIR RESOURCES BOARD

James N. Goldstene
Executive Officer

Date: September 12, 2011

The energy challenge facing California is real. Every Californian needs to take immediate action to reduce energy consumption. For a list of simple ways you can reduce demand and cut your energy costs, see our website at www.arb.ca.gov.

TITLE 17. CALIFORNIA AIR RESOURCES BOARD

NOTICE OF PUBLIC HEARING TO CONSIDER ADOPTION OF AMENDMENTS TO VAPOR RECOVERY CERTIFICATION AND TEST PROCEDURES FOR UNDERGROUND AND ABOVEGROUND STORAGE TANKS INCLUDING GASOLINE DISPENSING FACILITY HOSE REGULATION

The Air Resources Board (ARB or Board) will conduct a public hearing at the time and place noted below to consider the adoption of amendments to regulations for vapor recovery certification and test procedures for underground and aboveground storage tanks used at gasoline dispensing facilities (service stations and similar facilities); and adoption of a gasoline dispensing facility dispensing hose regulation.

DATE: September 22, 2011

TIME: 9:00 a.m.

PLACE: California Environmental Protection Agency
Air Resources Board
Byron Sher Auditorium
Sacramento, CA 95814

This item will be considered at a two-day meeting of the ARB, which will commence at 9:00 a.m., September 22, 2011, and may continue at 8:30 a.m., September 23, 2011. Please consult the agenda for the meeting, which will be available at least ten days before September 22, 2011, to determine the time when this item will be considered.

INFORMATIVE DIGEST OF PROPOSED ACTION AND POLICY STATEMENT OVERVIEW

Sections Affected: Proposed amendments to sections 94010, 94011, 94016, 94150, and 94168, title 17, California Code of Regulations (CCR), which incorporate by reference vapor recovery definitions, certification procedures, and test procedures. The following documents are referenced in the regulations: *Definitions for Vapor Recovery Procedures*, D-200, last amended May 2, 2008; *Certification Procedure for Vapor Recovery Systems at Gasoline Dispensing Facilities*, CP-201, last amended May 25, 2006; *Certification Procedure for Vapor Recovery Systems at Gasoline Dispensing Facilities Using Aboveground Storage Tanks*, CP-206, adopted May 2, 2008; *Volumetric Efficiency for Phase I Vapor Recovery Systems*, TP-201.1, last amended October 8, 2003; *Efficiency and Emission Factor for Phase II Systems*, TP-201.2, last amended May 2, 2008; *Determination of the Vehicle Matrix for Phase II* Systems, TP-201.2A, last amended February 1, 2001; *Test Procedure for In-Station Diagnostic* Systems, TP-201.2I, last amended May 25, 2006; *Pressure Drop Bench Testing of Vapor Recovery* Components, TP-201.2J, adopted October 8, 2003; *Determination of 2 Inch WC Static Pressure performance of Vapor Recovery Systems of Dispensing Facilities*, TP-201.3, last amended March 17, 1999; and *Determination of Static Pressure Performance of Vapor*

Recovery Systems at Gasoline Dispensing Facilities with Aboveground Storage Tanks, TP-206.3, adopted May 2, 2008.

Background: ARB authorizes the sale, installation, and use of vapor recovery equipment at service stations, also referred to as gasoline dispensing facilities (GDF), through a certification program. Vapor recovery is a necessary element in reducing smog-forming hydrocarbon emissions (gasoline vapor) and mitigating exposure to benzene, a constituent of gasoline vapor that ARB has identified as a toxic air contaminant. These reductions and controls play an important role in protecting public health and achieving clean air.

In March 2000, ARB approved Enhanced Vapor Recovery (EVR) regulations for vapor recovery equipment used for underground storage tanks (UST). EVR regulations established new performance standards and specifications for vapor recovery systems to further reduce emissions during storage and transfer of gasoline at GDFs. EVR regulations were subsequently amended by the Board in 2001, 2002, 2004, and 2006 in part to update the regulations in response to new vapor recovery control technology, and to improve the applicability and accuracy of test procedures used for certifying vapor recovery equipment and for compliance determination on in-use equipment.

In June 2007, ARB approved EVR regulations for aboveground storage tanks (AST). These regulations established new performance standards and specifications for vapor recovery systems for AST, which further reduce emissions during the storage and transfer of gasoline. AST EVR regulations generally mirrored EVR regulations for USTs with a few exceptions.

Staff's Proposal:

New Definition of Effective Date for Starting "The Four Year Clock" – ARB staff worked with the California Independent Oil Marketers Association (CIOMA) and other industry representatives to develop revised language clarifying a statutory provision providing owners of existing GDFs four years to replace their current equipment when new or amended standards and specifications become effective. In the past, there was some confusion when no system was certified to meet a new performance standard by an actual calendar date specified in the regulations – the effective date. At the time of adoption of the regulations, that date represented ARB staff's best available estimate for certification of the first system. In actuality, unexpected delays in the development and certification of compliant systems meant that new and modified GDFs could not meet the regulatory requirements by the effective date specified in the regulations. This led to ambiguity and forced ARB to repeatedly revise and delay the effective date, first through administrative actions by the Executive Officer and then by Board approval of the Executive Officer's action through a formal rulemaking process. Therefore, to address this situation, staff is proposing changes to CP-201 and CP-206 to clarify that the "*effective date*" is now the date when the first system meeting the applicable new performance standards is certified by ARB, and this new effective date starts the "*four-year clock*" provision for affected GDFs. Additionally, staff is proposing to add a provision that allows the public to petition the Executive Officer to exempt certain subgroups of facilities where the first certified system is incompatible.

Amendments, Revisions, and Other General Editorial Improvements - ARB staff is also proposing a number of amendments to D-200 (*Vapor Recovery Definitions*),
CP-201 (*Certification Procedure for Vapor Recovery Systems at Gasoline Dispensing Facilities*),
CP-206 (*Certification Procedure for Vapor Recovery Systems at Gasoline Dispensing Facilities Using Aboveground Storage Tanks)*, and the following test procedures to improve their clarity and readability.

1. *Volumetric Efficiency for Phase I Vapor Recovery Systems*, TP-201.1,
2. *Efficiency and Emission Factor for Phase II Systems*, TP-201.2,
3. *Determination of the Vehicle Matrix for Phase II* Systems, TP-201.2A,
4. *Test Procedure for In-Station Diagnostic* Systems, TP-201.2I,
5. *Pressure Drop Bench Testing of Vapor Recovery* Components, TP-201.2J,
6. *Determination of 2 Inch WC Static Pressure performance of Vapor Recovery Systems of Dispensing Facilities*, TP-201.3, and
7. *Determination of Static Pressure Performance of Vapor Recovery Systems at Gasoline Dispensing Facilities with Aboveground Storage Tanks*, TP-206.3.

New Evaporative Emission Standard for Fuel Hoses - Lastly, ARB staff is proposing a new performance standard for GDF fuel dispensing hoses that would limit the permeation rate of gasoline to no more than ten grams per square meter per day as determined per Underwriters Laboratory standards (UL 330, 7th Ed. - Standard for Hose and Hose Assemblies for Dispensing Flammable Liquids). The proposed standard applies to fuel hoses which carry liquid gasoline against the outermost hose wall. This proposal is expected to reduce gasoline permeation by 96 percent using technology that has been demonstrated in other applications by several hose manufacturers. The proposed standard applies to about 70 percent of GDFs in operation in California and will generate net savings to California consumers from gasoline fuel saved.

The "effective date" provision for this new hose emission standard and the "four year clock" for affected GDFs apply as described above. That is, the "effective date" for the affected GDF is the date when the first hose meeting the new performance standard is certified by ARB. All affected GDFs will have four years to comply from the "effective date." Exceptions to the "four-year clock" provision include new installations that are permitted after the "effective date" and existing facilities undergoing a major modification. In both cases, compliance with the new hose requirements is expected upon completion of installation or facility modifications. In addition, any affected facility would be required to comply if a hose or hoses are replaced after the "effective date."

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. California certification is also sought after for international applications.

AVAILABILITY OF DOCUMENTS AND AGENCY CONTACT PERSONS

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: "Hearing Notice and Staff Report: Initial Statement of Reasons for Proposed Rulemaking, Public Hearing to Consider Adoption of Amendments to Vapor Recovery Certification and Test Procedures for Underground and Aboveground Storage Tanks Used at Gasoline Dispensing Facilities Including Gasoline Dispensing Facility Hose Regulation."

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 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, First Floor, Sacramento, California 95814, (916) 322-2990, on August 3, 2011. 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. Inquiries concerning the substance of the proposed regulation may be directed to the designated agency contact persons, Mr. Scott Bacon at (916) 322-8949, Mr. Jason McPhee at (916) 322-8116, or Mr. George Lew, Monitoring and Laboratory Division at (916) 327-0900.

Further, the agency representative and designated back-up contact persons, to whom nonsubstantive inquiries concerning the proposed administrative action may be directed, are Ms. Lori Andreoni, Manager, Board Administration and Regulatory Coordination Unit at (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, ISOR and all subsequent regulatory documents, including FSOR, when completed, are available on ARB's website for this rulemaking at:

http://www.arb.ca.gov/regact/2011/evr11/evr11.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.

In developing this regulatory proposal, ARB staff evaluated the potential economic impacts on representative private persons and businesses. The ARB is not aware of any cost impacts that a representative private person or business would necessarily incur, in reasonable compliance with the proposed action. Although not quantifiable, cost savings may be realized by GDF owners and vapor recovery equipment manufacturers from the following:

1) Proposed changes to the certification procedures for vapor recovery systems of underground and aboveground storage tank facilities, ensuring a full four years for existing GDFs to replace their existing equipment once a system is certified, which is consistent with the intent of the four year clock for equipment replacement.
2) Proposed changes to the certification and test procedures will improve clarity and readability.

In addition, adoption of GDF hose regulation results in a small, quantifiable net cost saving to California consumers from fuel waste avoided by the hose regulation. A detailed assessment of the economic impacts of the proposed regulatory action can be found in the ISOR.

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 impose a mandate on state agencies, local agencies, and school districts that operate GDF's subject to the proposed fuel hose permeation requirements. However, the proposed regulatory action would not create costs or savings to any State agency or in federal funding to the State, costs 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. The Executive Officer has also determined, pursuant to CCR, title 1, section 4, that the proposed regulatory action affects small businesses.

In accordance with Government Code section 11346.3, the Executive Officer has determined that the proposed regulatory action does 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.

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

Interested members of the public may also present comments orally or in writing at the meeting and comments may be submitted by postal mail or by electronic submittal before the meeting. The public comment period for this regulatory action will begin on **August 8, 2011**. To be considered by the Board, written comments, not physically submitted at the meeting, must be submitted on or after **August 8, 2011,** and received **no later than 12:00 noon on September 21, 2011**, and must be 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

New Feature

You can now sign up online in advance to speak at the Board meeting when you submit an electronic board item comment. For more information go to:
http://www.arb.ca.gov/board/online-signup.htm.

Please note that under the California Public Records Act (Gov. Code, § 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.

ARB requests that written and email statements on this item be filed at least ten days prior to the hearing so that ARB staff and Board members have additional time to 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.

Additionally, the Board requests but does not require that persons who submit written comments to the Board reference the title of the proposal in their comments to facilitate review.

STATUTORY AUTHORITY AND REFERENCES

This regulatory action is proposed under the authority granted to ARB in Health and Safety Code, sections 25290.1.2, 39600, 39601, 39607, and 41954. This action is proposed to implement, interpret, or make specific Health and Safety Code, sections 25290.1.2, 39515, 41952, 41954, 41956.1, 41959, 41960, and 41960.2.

HEARING PROCEDURES

The public hearing will be conducted in accordance with the California Administrative Procedure Act, Government Code, title 2, division 3, part 1, chapter 3.5 (commencing with section 11340).

Following the public hearing, the Board may adopt the regulatory language as originally proposed or with nonsubstantial or grammatical modifications. The Board may also adopt the proposed regulatory language with other modifications if the text as modified is sufficiently related to the originally proposed text that the public was adequately placed on notice and 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 ARB's Public Information Office, Air Resources Board, 1001 I Street, Visitors and Environmental Services Center, First Floor, Sacramento, California 95814, (916) 322-2990.

SPECIAL ACCOMMODATION REQUEST

Special accommodation or language needs can be provided for any of the following:

- An interpreter to be available at the hearing;
- Documents made available in an alternate format (i.e., Braille, large print, etc.) or another language;
- A disability-related reasonable accommodation.

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- Un intérprete que esté disponible en la audiencia.
- Documentos disponibles en un formato alterno (por decir, sistema Braille, o en impresión grande) u otro idioma.

- Una acomodación razonable relacionados con una incapacidad.

Para solicitar estas comodidades especiales o necesidades de otro idioma, por favor llame a la oficina del Consejo al (916) 322-5594 o envíe un fax a (916) 322-3928 lo más pronto posible, pero no menos de 10 días de trabajo antes del día programado para la audiencia del Consejo. TTY/TDD/Personas que necesiten este servicio pueden marcar el 711 para el Servicio de Retransmisión de Mensajes de California.

CALIFORNIA AIR RESOURCES BOARD

James N. Goldstene
Executive Officer

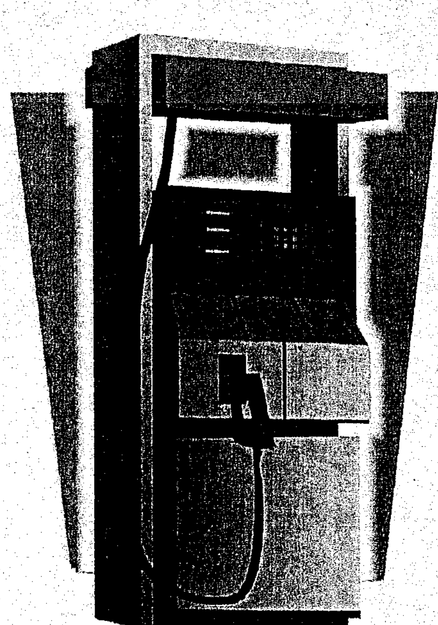
Date: July 26, 2011

California Environmental Protection Agency

Air Resources Board

HEARING NOTICE AND STAFF REPORT

INITIAL STATEMENT OF REASONS FOR PROPOSED RULEMAKING, PUBLIC HEARING TO CONSIDER THE PROPOSED ADOPTION OF AMENDMENTS TO VAPOR RECOVERY CERTIFICATION AND TEST PROCEDURES FOR UNDERGROUND AND ABOVEGROUND STORAGE TANKS USED AT GASOLINE DISPENSING FACILITIES INCLUDING GASOLINE DISPENSING FACILITY HOSE REGULATION



August 3, 2011

TITLE 17. CALIFORNIA AIR RESOURCES BOARD

NOTICE OF PUBLIC HEARING TO CONSIDER ADOPTION OF AMENDMENTS TO VAPOR RECOVERY CERTIFICATION AND TEST PROCEDURES FOR UNDERGROUND AND ABOVEGROUND STORAGE TANKS INCLUDING GASOLINE DISPENSING FACILITY HOSE REGULATION

The Air Resources Board (ARB or Board) will conduct a public hearing at the time and place noted below to consider the adoption of amendments to regulations for vapor recovery certification and test procedures for underground and aboveground storage tanks used at gasoline dispensing facilities (service stations and similar facilities); and adoption of a gasoline dispensing facility dispensing hose regulation.

DATE: September 22, 2011

TIME: 9:00 a.m.

PLACE: California Environmental Protection Agency
Air Resources Board
Byron Sher Auditorium
Sacramento, CA 95814

This item will be considered at a two-day meeting of the ARB, which will commence at 9:00 a.m., September 22, 2011, and may continue at 8:30 a.m., September 23, 2011. Please consult the agenda for the meeting, which will be available at least ten days before September 22, 2011, to determine the time when this item will be considered.

<u>INFORMATIVE DIGEST OF PROPOSED ACTION AND POLICY STATEMENT OVERVIEW</u>

<u>Sections Affected:</u> Proposed amendments to sections 94010, 94011, 94016, 94150, and 94168, title 17, California Code of Regulations (CCR), which incorporate by reference vapor recovery definitions, certification procedures, and test procedures. The following documents are referenced in the regulations: *Definitions for Vapor Recovery Procedures*, D-200, last amended May 2, 2008; *Certification Procedure for Vapor Recovery Systems at Gasoline Dispensing Facilities*, CP-201, last amended May 25, 2006; *Certification Procedure for Vapor Recovery Systems at Gasoline Dispensing Facilities Using Aboveground Storage Tanks*, CP-206, adopted May 2, 2008; *Volumetric Efficiency for Phase I Vapor Recovery Systems*, TP-201.1, last amended October 8, 2003; *Efficiency and Emission Factor for Phase II Systems*, TP-201.2, last amended May 2, 2008; *Determination of the Vehicle Matrix for Phase II* Systems, TP-201.2A, last amended February 1, 2001; *Test Procedure for In-Station Diagnostic* Systems, TP-201.2I, last amended May 25, 2006; *Pressure Drop Bench Testing of Vapor Recovery* Components, TP-201.2J, adopted October 8, 2003; *Determination of 2 Inch WC Static Pressure performance of Vapor Recovery Systems of Dispensing Facilities*, TP-201.3, last amended March 17, 1999; and *Determination of Static Pressure Performance of Vapor*

Recovery Systems at Gasoline Dispensing Facilities with Aboveground Storage Tanks, TP-206.3, adopted May 2, 2008.

Background: ARB authorizes the sale, installation, and use of vapor recovery equipment at service stations, also referred to as gasoline dispensing facilities (GDF), through a certification program. Vapor recovery is a necessary element in reducing smog-forming hydrocarbon emissions (gasoline vapor) and mitigating exposure to benzene, a constituent of gasoline vapor that ARB has identified as a toxic air contaminant. These reductions and controls play an important role in protecting public health and achieving clean air.

In March 2000, ARB approved Enhanced Vapor Recovery (EVR) regulations for vapor recovery equipment used for underground storage tanks (UST). EVR regulations established new performance standards and specifications for vapor recovery systems to further reduce emissions during storage and transfer of gasoline at GDFs. EVR regulations were subsequently amended by the Board in 2001, 2002, 2004, and 2006 in part to update the regulations in response to new vapor recovery control technology, and to improve the applicability and accuracy of test procedures used for certifying vapor recovery equipment and for compliance determination on in-use equipment.

In June 2007, ARB approved EVR regulations for aboveground storage tanks (AST). These regulations established new performance standards and specifications for vapor recovery systems for AST, which further reduce emissions during the storage and transfer of gasoline. AST EVR regulations generally mirrored EVR regulations for USTs with a few exceptions.

Staff's Proposal:

New Definition of Effective Date for Starting "The Four Year Clock" – ARB staff worked with the California Independent Oil Marketers Association (CIOMA) and other industry representatives to develop revised language clarifying a statutory provision providing owners of existing GDFs four years to replace their current equipment when new or amended standards and specifications become effective. In the past, there was some confusion when no system was certified to meet a new performance standard by an actual calendar date specified in the regulations – the effective date. At the time of adoption of the regulations, that date represented ARB staff's best available estimate for certification of the first system. In actuality, unexpected delays in the development and certification of compliant systems meant that new and modified GDFs could not meet the regulatory requirements by the effective date specified in the regulations. This led to ambiguity and forced ARB to repeatedly revise and delay the effective date, first through administrative actions by the Executive Officer and then by Board approval of the Executive Officer's action through a formal rulemaking process. Therefore, to address this situation, staff is proposing changes to CP-201 and CP-206 to clarify that the "*effective date*" is now the date when the first system meeting the applicable new performance standards is certified by ARB, and this new effective date starts the "*four-year clock*" provision for affected GDFs. Additionally, staff is proposing to add a provision that allows the public to petition the Executive Officer to exempt certain subgroups of facilities where the first certified system is incompatible.

Amendments, Revisions, and Other General Editorial Improvements - ARB staff is also proposing a number of amendments to D-200 (*Vapor Recovery Definitions*),
CP-201 (*Certification Procedure for Vapor Recovery Systems at Gasoline Dispensing Facilities*),
CP-206 (*Certification Procedure for Vapor Recovery Systems at Gasoline Dispensing Facilities Using Aboveground Storage Tanks)*, and the following test procedures to improve their clarity and readability.

1. *Volumetric Efficiency for Phase I Vapor Recovery Systems*, TP-201.1,
2. *Efficiency and Emission Factor for Phase II Systems*, TP-201.2,
3. *Determination of the Vehicle Matrix for Phase II* Systems, TP-201.2A,
4. *Test Procedure for In-Station Diagnostic* Systems, TP-201.2I,
5. *Pressure Drop Bench Testing of Vapor Recovery* Components, TP-201.2J,
6. *Determination of 2 Inch WC Static Pressure performance of Vapor Recovery Systems of Dispensing Facilities*, TP-201.3, and
7. *Determination of Static Pressure Performance of Vapor Recovery Systems at Gasoline Dispensing Facilities with Aboveground Storage Tanks*, TP-206.3.

New Evaporative Emission Standard for Fuel Hoses - Lastly, ARB staff is proposing a new performance standard for GDF fuel dispensing hoses that would limit the permeation rate of gasoline to no more than ten grams per square meter per day as determined per Underwriters Laboratory standards (UL 330, 7th Ed. - Standard for Hose and Hose Assemblies for Dispensing Flammable Liquids). The proposed standard applies to fuel hoses which carry liquid gasoline against the outermost hose wall. This proposal is expected to reduce gasoline permeation by 96 percent using technology that has been demonstrated in other applications by several hose manufacturers. The proposed standard applies to about 70 percent of GDFs in operation in California and will generate net savings to California consumers from gasoline fuel saved.

The "effective date" provision for this new hose emission standard and the "four year clock" for affected GDFs apply as described above. That is, the "effective date" for the affected GDF is the date when the first hose meeting the new performance standard is certified by ARB. All affected GDFs will have four years to comply from the "effective date." Exceptions to the "four-year clock" provision include new installations that are permitted after the "effective date" and existing facilities undergoing a major modification. In both cases, compliance with the new hose requirements is expected upon completion of installation or facility modifications. In addition, any affected facility would be required to comply if a hose or hoses are replaced after the "effective date."

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. California certification is also sought after for international applications.

AVAILABILITY OF DOCUMENTS AND AGENCY CONTACT PERSONS

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: "Hearing Notice and Staff Report: Initial Statement of Reasons for Proposed Rulemaking, Public Hearing to Consider Adoption of Amendments to Vapor Recovery Certification and Test Procedures for Underground and Aboveground Storage Tanks Used at Gasoline Dispensing Facilities Including Gasoline Dispensing Facility Hose Regulation."

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 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, First Floor, Sacramento, California 95814, (916) 322-2990, on August 3, 2011. 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. Inquiries concerning the substance of the proposed regulation may be directed to the designated agency contact persons, Mr. Scott Bacon at (916) 322-8949, Mr. Jason McPhee at (916) 322-8116, or Mr. George Lew, Monitoring and Laboratory Division at (916) 327-0900.

Further, the agency representative and designated back-up contact persons, to whom nonsubstantive inquiries concerning the proposed administrative action may be directed, are Ms. Lori Andreoni, Manager, Board Administration and Regulatory Coordination Unit at (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, ISOR and all subsequent regulatory documents, including FSOR, when completed, are available on ARB's website for this rulemaking at:

http://www.arb.ca.gov/regact/2011/evr11/evr11.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.

In developing this regulatory proposal, ARB staff evaluated the potential economic impacts on representative private persons and businesses. The ARB is not aware of any cost impacts that a representative private person or business would necessarily incur, in reasonable compliance with the proposed action. Although not quantifiable, cost savings may be realized by GDF owners and vapor recovery equipment manufacturers from the following:

1) Proposed changes to the certification procedures for vapor recovery systems of underground and aboveground storage tank facilities, ensuring a full four years for existing GDFs to replace their existing equipment once a system is certified, which is consistent with the intent of the four year clock for equipment replacement.
2) Proposed changes to the certification and test procedures will improve clarity and readability.

In addition, adoption of GDF hose regulation results in a small, quantifiable net cost saving to California consumers from fuel waste avoided by the hose regulation. A detailed assessment of the economic impacts of the proposed regulatory action can be found in the ISOR.

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 impose a mandate on state agencies, local agencies, and school districts that operate GDF's subject to the proposed fuel hose permeation requirements. However, the proposed regulatory action would not create costs or savings to any State agency or in federal funding to the State, costs 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. The Executive Officer has also determined, pursuant to CCR, title 1, section 4, that the proposed regulatory action affects small businesses.

In accordance with Government Code section 11346.3, the Executive Officer has determined that the proposed regulatory action does 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.

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

Interested members of the public may also present comments orally or in writing at the meeting and comments may be submitted by postal mail or by electronic submittal before the meeting. The public comment period for this regulatory action will begin on **August 8, 2011**. To be considered by the Board, written comments, not physically submitted at the meeting, must be submitted on or after **August 8, 2011,** and received **no later than 12:00 noon on September 21, 2011**, and must be addressed to the following:

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1001 I Street, Sacramento, California 95814

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New Feature

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ARB requests that written and email statements on this item be filed at least ten days prior to the hearing so that ARB staff and Board members have additional time to 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.

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STATUTORY AUTHORITY AND REFERENCES

This regulatory action is proposed under the authority granted to ARB in Health and Safety Code, sections 25290.1.2, 39600, 39601, 39607, and 41954. This action is proposed to implement, interpret, or make specific Health and Safety Code, sections 25290.1.2, 39515, 41952, 41954, 41956.1, 41959, 41960, and 41960.2.

HEARING PROCEDURES

The public hearing will be conducted in accordance with the California Administrative Procedure Act, Government Code, title 2, division 3, part 1, chapter 3.5 (commencing with section 11340).

Following the public hearing, the Board may adopt the regulatory language as originally proposed or with nonsubstantial or grammatical modifications. The Board may also adopt the proposed regulatory language with other modifications if the text as modified is sufficiently related to the originally proposed text that the public was adequately placed on notice and 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.

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CALIFORNIA AIR RESOURCES BOARD

James N. Goldstene
Executive Officer

Date: July 26, 2011

California Environmental Protection Agency

Air Resources Board

STAFF REPORT:
INITIAL STATEMENT OF REASONS FOR PROPOSED RULEMAKING,
PUBLIC HEARING TO CONSIDER THE PROPOSED ADOPTION OF AMENDMENTS TO VAPOR RECOVERY CERTIFICATION AND TEST PROCEDURES FOR UNDERGROUND AND ABOVEGROUND STORAGE TANKS USED AT GASOLINE DISPENSING FACILITIES INCLUDING GASOLINE DISPENSING FACILITY HOSE REGULATION

Date of Release: August 3, 2011

Scheduled for Consideration: September 22, 2011

Location: California Environmental Protection Agency (Cal-EPA)
Headquarters Building
Byron Sher Auditorium, Second Floor
1001 I Street
Sacramento, CA 95814

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

ACKNOWLEDGEMENTS

Staff wishes to acknowledge the participation and assistance of the following organizations and companies in providing comments on the Vapor Recovery amendments:

California Air Pollution Control Districts
California Air Pollution Control Officers Association (CAPCOA) Vapor Recovery Committee
California Independent Oil Marketers Association
Western States Petroleum Association
Underwriters Laboratories

Table of Contents

I. EXECUTIVE SUMMARY AND STAFF RECOMMENDATIONS

A. Background

On March 23, 2000, the Air Resources Board (ARB or Board) approved Enhanced Vapor Recovery (EVR) regulations. The EVR regulations established new performance standards for vapor recovery systems to reduce evaporative emissions during storage and transfer of gasoline at gasoline dispensing facilities (GDF) or service stations with underground storage tanks and to increase the reliability of such systems. Control of air pollutants from GDFs is necessary to reduce hydrocarbons (gasoline vapor or reactive organic gases (ROG)) that are ozone precursors and to control benzene, a constituent of gasoline vapor that ARB has identified as a toxic air contaminant (TAC). Identification of a TAC requires the development and implementation of a control measure to manage the risk of human exposure. Vapor recovery controls are one important element in the risk management measure for benzene.

EVR standards apply to both new and existing facilities and were phased in from 2001 to 2010*. Some EVR performance standards, such as underground storage tank pressure limits, were technology forcing. EVR regulations were updated in 2001, 2002, 2004, and 2006. These updates added new test procedures or modified existing test procedures in response to new vapor recovery technologies. Staff is now proposing additional amendments to the regulations to clarify certification procedures and address administrative and technical issues that have arisen during the implementation of EVR regulations. This proposal would reduce approximately one ton per day (tpd) of reactive organic gas (ROG) evaporative emissions by requiring the use of low permeation fuel hoses at affected GDFs.

B. Staff Proposal

New Definition of Effective Date for Starting "The Four-Year Clock"

ARB staff worked with the California Independent Oil Marketers Association (CIOMA) and other industry representatives to develop the proposed revised language clarifying a statutory provision providing owners of existing GDFs four years to replace their current equipment when new or amended standards and specifications become effective. In the past, there was some confusion when no system was certified to meet a new performance standard by an actual calendar date specified in the regulations – the effective date. At the time of adoption of the regulations, that date represented the ARB staff's best available estimate for certification of the first system. In actuality, unexpected delays in the development and certification of compliant systems meant that affected GDFs could not meet the regulatory requirements by the effective date specified in the regulations. This forced repeated revision of the effective date, first through administrative actions by the Executive Officer and then by Board approval of the Executive Officer's action through a formal rulemaking process. To remedy this

* Existing facilities located in some counties were not required to comply with EVR requirements until 2011 due to changes in ozone attainment status made in 2007 or a statute enacted in 2008.

situation, staff is proposing to clarify that the "*effective date*" is the date when the first system meeting the applicable new performance standards is certified by ARB and this new effective date starts the "*four-year clock*" provision for affected GDFs. Additionally, staff is proposing to add a provision that allows the public to petition the Executive Officer to exempt certain subgroups of facilities deemed incompatible with the first certified system.

Amendments, Revisions, and Other General Editorial Improvements

Staff proposes reorganization of, and amendments to, the underground storage tank Certification Procedure for Vapor Recovery Systems at Gasoline Dispensing Facilities (CP-201) and the Certification Procedure for Vapor Recovery Systems at Gasoline Dispensing Facilities Using Aboveground Storage Tanks (CP-206) to improve clarity and readability, and amendments to the definitions in D-200 to clarify and add terms used in the vapor recovery certification and test procedures. Minor technical and editorial revisions are also proposed to some of the existing test procedures used by ARB staff to certify EVR equipment.

New Evaporative Emission Standard for Fuel Hoses

Staff also proposes a new certification performance standard for GDF hoses, limiting permeation to no more than 10.0 grams per square meter per day ($g/m^2/day$) as determined by UL 330 (Seventh Edition) - Underwriters Laboratories' Standard for Hose and Hose Assemblies for Dispensing Flammable Liquids (UL, 2009). This standard will apply to hoses which carry liquid gasoline against the outermost hose wall (see Section II.B. for a discussion of vapor recovery systems affected by this proposal).

The adoption of a new fuel hose permeation standard will affect about 70 percent of GDFs in California. The effective date provision for this new hose permeation standard and the "four year clock" for affected existing GDFs apply as described above. That is, the date for applicability of the new low permeation hose limit is four years from the "effective date," which is established when the first system is certified to meet the proposed new performance standard. Existing and affected GDFs will have up to four years from the effective date to comply. Exceptions to the "four year clock" provision are as follows. First, in the event that existing and affected GDFs undergo a major modification* after the effective date, the four year clock provision does not apply and the applicable new hose standards must be met upon completion of facility modifications. Second, in the event that an affected GDF has the need to replace a hose(s) after the effective date, the GDF is required to install a fuel hose meeting the new proposed low permeation emission standard. Third, all new and affected GDF installations that are permitted after the effective date are required to install fuel hoses meeting the new low permeation standard.

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* Major modification of a Phase II system is defined as the addition, replacement, or removal of 50 percent or more of the buried vapor piping or the replacement of fuel dispensers. The replacement of a dispenser is not a major modification when done for reasons of vandalism or damages that are beyond the reasonable control of the GDF operators.

The proposed new GDF low permeation hose standard would reduce emissions about 96 percent from current uncontrolled levels and save California consumers approximately $396,000 per year from 112,000 gallons of avoided gasoline loss. The low permeation fuel hose standard is technology forcing since there currently are no requirements within the United States limiting permeation emissions from GDF hoses but such low emitting technology exists already in other sectors.

C. Staff Recommendations

Staff recommends that the Board adopt the following:

1. Amendments to the California Code of Regulations that incorporate by reference the proposed amended and adopted certification and test procedures (Appendix 1); and

2. Amendments to the referenced vapor recovery certification and test procedures (Appendix 2).

Adoption of the above will accomplish the following:

1. Re-define the "effective date" in the regulation to be the date when the first system complying with applicable performance standards is certified by ARB.

2. Specify that the "four-year clock" provision of the statute begins on the new effective date.

3. Add a provision which allows the public to petition the Executive Officer to exempt certain subgroups of facilities that are found to be incompatible with the first certified system.

4. Clarify, update, and remove redundant provisions in the existing certification and test procedures which are incorporated by reference in the regulations.

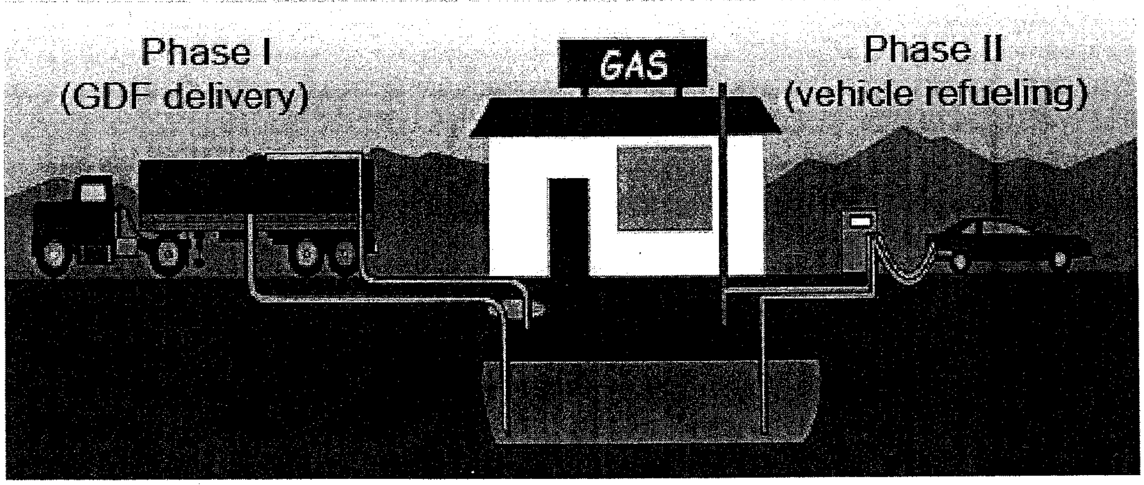
5. Establish a new low permeation emission standard for GDF hoses, resulting in approximately one tpd of ROG emission reductions at a net cost savings to California consumers.

II. BACKGROUND

A. California's Gasoline Vapor Recovery Program

Gasoline vapor emissions are controlled during two types of gasoline transfer operations at dispensing facilities (Figure II-1). Phase I vapor recovery collects vapors when a tanker truck fills the service station underground tank. Phase II vapor recovery collects vapors during vehicle refueling and controls those vapors during the storage of gasoline at the GDF. The vapor recovery collection efficiency during both of these transfers is determined through certification of vapor recovery systems.

Figure II-1. Phase I and Phase II Vapor Recovery Systems at Service Stations



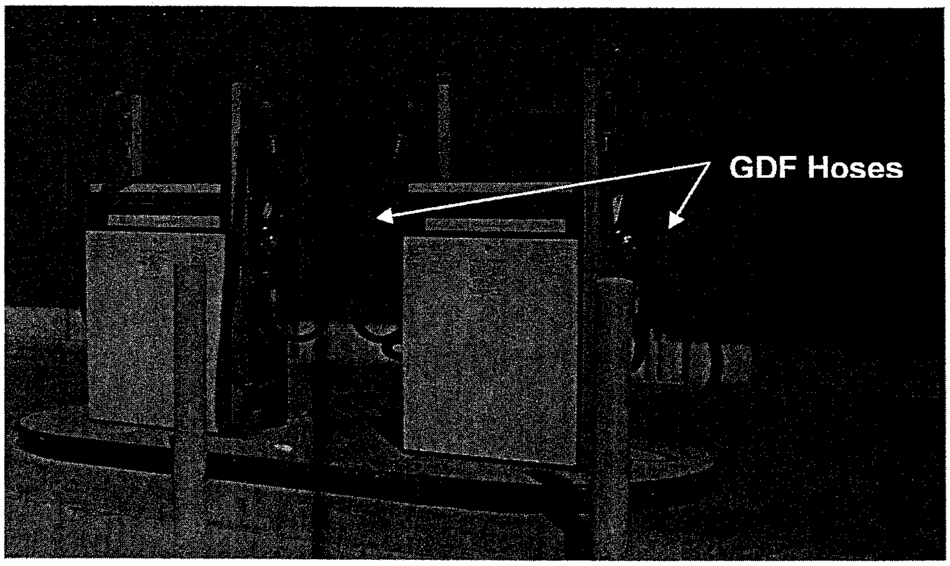
ARB and the air pollution control and management districts (districts) share responsibility in implementing the vapor recovery program. ARB establishes performance standards for vapor recovery systems and determines when they must be used by the affected GDFs. As part of this program, ARB staff certifies prototype Phase I and Phase II vapor recovery systems in accordance with procedures adopted by ARB. State law requires that only ARB certified systems are offered for sale, are sold, and are installed throughout California. District staff inspects and tests the vapor recovery system upon installation during the permitting process and conducts regular inspections to check function and operation of in-use systems.

The vapor recovery requirements applicable to fuel marketing in California reduce emissions, help with the fight for clean air, and affect a multitude of stakeholders. Those impacted include the vapor recovery equipment manufacturers, gasoline marketers who purchase this equipment, contractors who install and maintain vapor recovery systems and districts who enforce vapor recovery rules. California's efforts on vapor recovery benefit others as California certified systems are required by several other U.S. states and many countries.

B. GDF Fuel Hose Permeation Emissions

GDF hoses and hose assemblies dispense gasoline to automobiles and equipment at GDFs (Figure II-2). Gasoline vapor emissions from GDF hoses are the result of permeation of gasoline's constituent molecules through thermoplastic or rubber materials. The rate of permeation emissions from GDF hoses is affected by a variety of factors including: temperature, concentration gradient across the hose wall, fuel type, hose material, and construction. There is currently no state or federal regulation restricting permeation emissions from GDF fuel hoses.

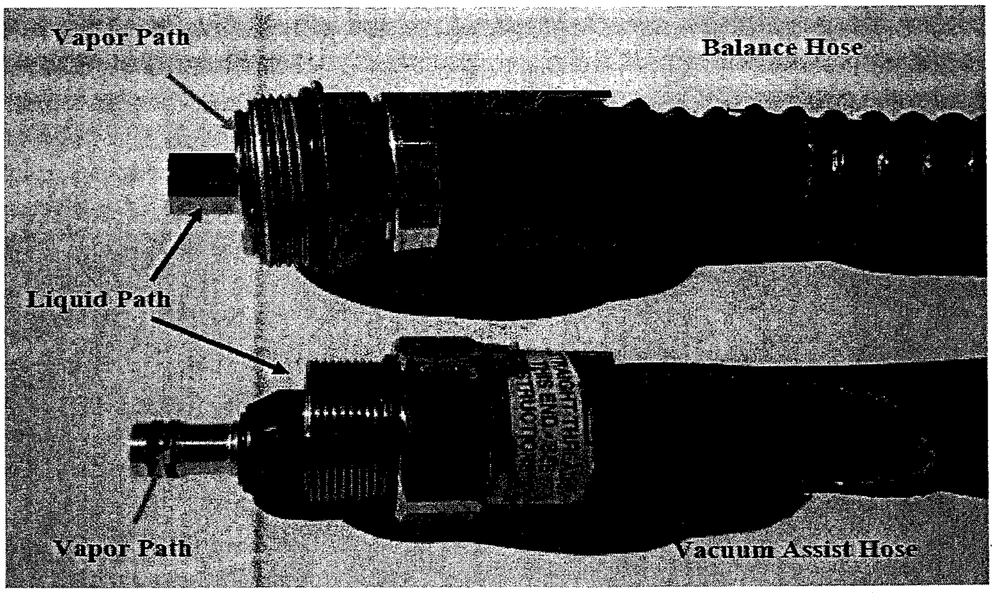
Figure II-2. GDF Fuel Hoses



Depending upon the facility design, GDF hoses can range in length from approximately 8 to 18 feet and vary in size with inner diameters ranging from approximately 0.75 to 1.5 inches. Hoses are generally made from rubber or thermoplastic materials and are commonly reinforced internally with metal braiding, which also provides electrical conductivity for safety.

Most GDF fuel hoses used in California are part of ARB certified vapor recovery systems. Vapor recovery hoses have two distinct fluid flow paths: one for fuel delivery and the other for return of hydrocarbon vapor from a vehicle's gasoline tank. There are two different types of vapor recovery hoses: vacuum assist and balance. Vacuum assist hoses are similar to non-vapor recovery (or conventional) GDF hoses in that the liquid fuel is carried against the inside of the outer hose wall. Balance hoses are different, carrying fuel vapor (rather than liquid fuel) against the outer hose wall (Figure II-3). This is a very important distinction and a determining factor for emissions because the rate of permeation is a function of hose type. The proposed regulatory language addresses these hose type distinctions. Specifically, this proposal would establish new low permeation limits only for hoses currently identified as "vacuum assist" and "conventional;" again these are hoses which carry liquid gasoline against the outer wall. Hoses currently identified as "balance" have negligible permeation by virtue of the fact that the outer hose wall contains vapor and not liquid fuel. Thus, the staff's proposal exempts balance type hoses from the new permeation limit.

Figure II-3. Cutaways of Vapor Recovery GDF Hose Assemblies Showing Vapor and Liquid Paths



C. Brief History of Vapor Recovery Rulemaking

In 1975, ARB adopted the first vapor recovery regulations in response to a new state law, which directed ARB to implement a certification program for systems to control gasoline vapor emissions from gasoline marketing operations. These regulations established performance standards and specifications, which included procedures for certifying and testing vapor recovery systems installed at various gasoline marketing operations such as dispensing facilities, bulk plants, terminals, and cargo tanks. Since inception of the original vapor recovery regulations, ARB has routinely updated these regulations in response to the emergence of new vapor recovery technology.

On March 23, 2000, with the Board's approval of the EVR regulations, new and more stringent evaporative emission standards for vapor recovery systems were set to reduce emissions during the storage and transfer of gasoline at GDFs with underground storage tanks and to improve system reliability. In addition, the Board approved new performance standards for in-station diagnostics (ISD), which is similar to "the check engine light" or on-board diagnostics installed on all modern motor vehicles. ISD continuously monitors critical vapor recovery system components for proper performance and alerts the GDF operator of failures so that corrective actions can be taken promptly to prevent excess emissions.

On October 25, 2001, the Board approved the amendment of five certification and test procedures, and the addition of two new test procedures for vapor recovery equipment. These actions were part of the Board's ongoing effort to provide the most up-to-date and accurate certification and test procedures. The amended procedures also supported emissions measurement and verification of proper operation of installed systems.

On December 12, 2002, the Board approved the amendment of ten certification and test procedures and adopted five new test procedures. In addition, the Board found that all performance standards and specifications, except for one approved in 2000, were feasible and modified the EVR compliance dates.

On July 22, 2004, the Board approved an amendment to section 4.11 of Certification Procedure 201 (CP-201) to allow modifying vapor piping in dispensers without triggering the "unihose dispenser" (same nozzle for all gasoline grade) requirement. One EVR requirement calls for all existing vapor recovery systems to be compatible with vehicles equipped with an on-board refueling vapor recovery (ORVR) system by 2005 (see section IV.A., Efficiency and Emission Factor Testing, of this report for a detailed discussion of ORVR). To comply with this requirement, most vacuum-assist GDF owner/operators chose to convert to a balance system, which is ORVR compatible. If the Board did not approve this amendment, vacuum-assist stations with multi-product dispensers or "six pack dispensers" (individual nozzles for each grade of gasoline) would have been required to install "unihose dispensers" at a considerable additional and unnecessary expense.

On November 18, 2004, the Board approved an amendment to the regulations to establish a phase-in ORVR compatibility deadline for existing GDF and extended the Phase II EVR and ISD compliance dates to be consistent with earlier actions by the Executive Officer.

On May 25, 2006, the Board approved additional amendments to the vapor recovery certification and test procedures. These amendments clarified certain procedural provisions and established new performance specifications. The Board again extended the compliance dates for the Phase II and ISD requirements to make them consistent with administrative actions taken by the Executive Officer.

On June 21, 2007, the Board approved new performance standards and specifications for aboveground storage tanks or AST. These standards and specifications generally mirrored the EVR regulations for underground storage tanks with a few exceptions.

D. EVR Implementation Schedule

The EVR standards are phased in over several years for both new and existing facilities. New facilities or existing facilities undergoing major modifications are required to meet EVR requirements in effect at the time of installation. State law allows existing facilities to use equipment installed prior to the effective date of an amended standard for a period of up to four years after the effective date (Health and Safety Code section 41956.1). This is commonly referred to as the "four-year clock."

Figure II-4 shows the EVR implementation timeline between 2001 and 2010 for GDFs with underground storage tanks (UST). Figure II-5 shows the current EVR implementation timeline for GDFs with aboveground storage tanks (AST). The beginning of each solid bar shows the date when new stations must comply. The final compliance date for all facilities to meet an applicable standard is the date at the end of the solid bar. For UST stations with multiple-product dispensers installed before April 1, 2003, there is no deadline to convert to "unihose" dispensers. This is designated by an arrow on Figure II-4. The same designation is also used in Figure II-5 for multi-product dispensers installed on AST before April 1, 2009.

The two EVR timelines reflect administrative changes made by the Executive Officer when a certified system is unavailable by the date specified in the regulation – the effective date. As shown in Figure II-4, the "four-year clock" for Phase II EVR and ISD started on April 1, 2005 and September 1, 2005, respectively. These dates reflect when the first Phase II EVR and ISD systems were certified, when they were first established administratively by the Executive Officer, and then when they were subsequently adopted by the Board on May 26, 2006.

E. Legal Authority

Section 41954 of the Health and Safety Code (Appendix 3) requires ARB to adopt procedures and performance standards for controlling gasoline vapor emissions from gasoline marketing operations, including transfer and storage operations to achieve and maintain ambient air quality standards. This section also authorizes ARB, in cooperation with districts, to certify vapor recovery systems that meet the performance standards and specifications. Section 39607(d) of the Health and Safety Code requires ARB to adopt test procedures to determine compliance with ARB's and districts' non-vehicular standards. State law (Health and Safety Code section 41954) requires districts to use ARB test procedures for determining compliance with performance standards and specifications established by ARB.

To comply with state law, the Board since 1975 has adopted the certification and test procedures for controlling gasoline vapor emissions. These certification and test procedures are incorporated by reference in title 17, California Code of Regulations (CCR), sections 94010 to 94016, 94148 to 94160, and 94162 to 94168, respectively. Test procedures used for certifying vapor recovery systems are also used by districts for compliance verification.

F. State Implementation Plan

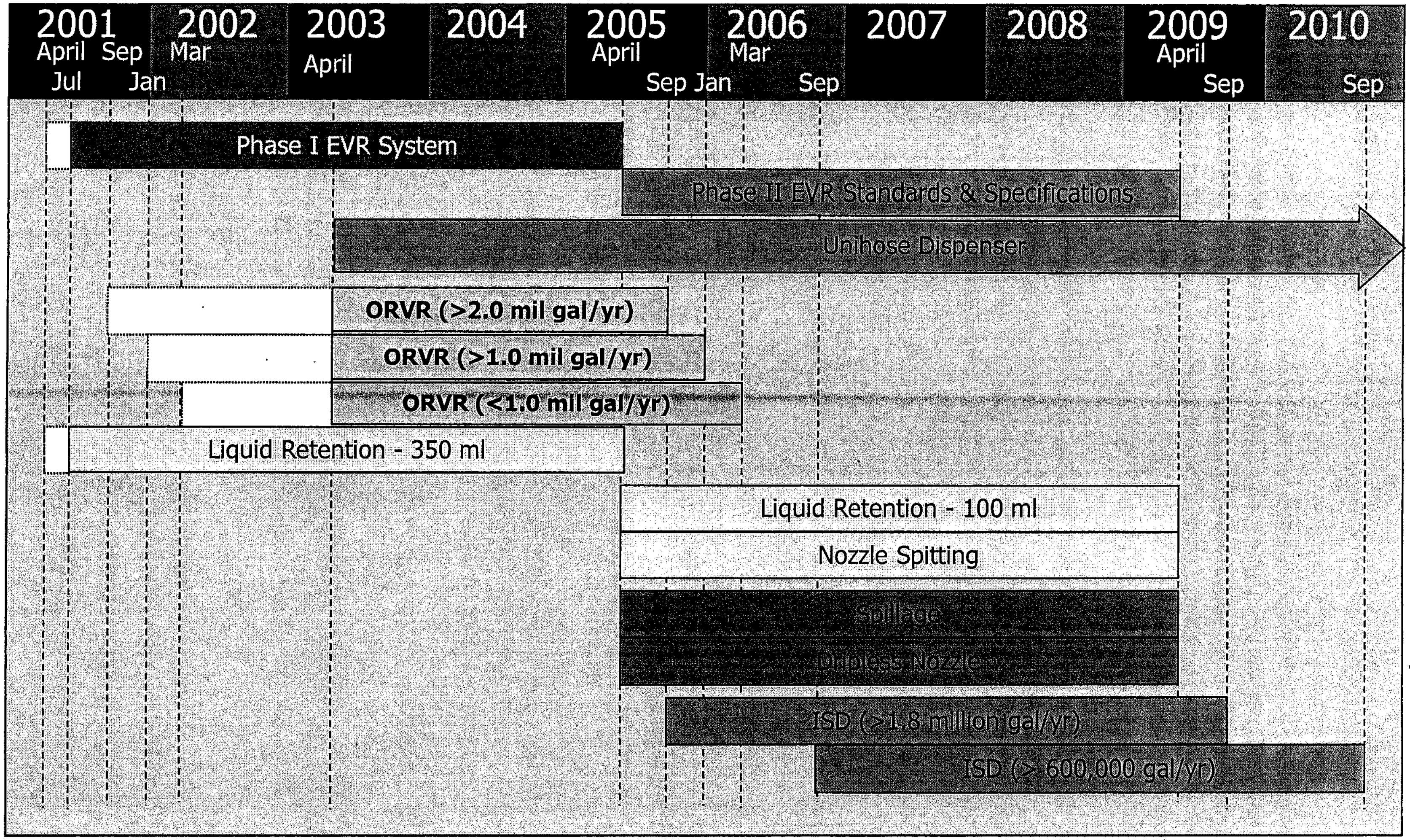
All geographic areas in California that are designated non-attainment of the National Ambient Air Quality Standards (NAAQS) are required by the federal Clean Air Act to prepare a State Implementation Plan (SIP) containing strategies to improve air quality and achieve the NAAQS. In 2007, ARB adopted the California SIP for ozone (CARB, 2007b). The 2007 SIP includes State measures to control evaporative emissions from a wide variety of off-road sources. In particular, the 2007 SIP proposes the establishment of a permeation standard for GDF hoses to reduce ROG emissions by 70 to 98 percent, depending on technology use. The percent reduction range was based on previous standards for low permeation vehicle fuel hoses and initial ARB and industry testing results. The 2007 SIP did not quantify the emission reductions for this measure because the emissions inventory for this category was under evaluation at the time. The proposed hose standard meets this stated commitment in the 2007 Ozone SIP.

G. Comparable Federal Regulations

There are no comparable federal regulations that certify gasoline vapor recovery systems for service stations; however, changes to ARB vapor recovery certification regulations may have a national impact. ARB certification is required by several states that mandate the installation of vapor recovery systems in gasoline dispensing facilities.

Figure II-4

UST EVR Timeline



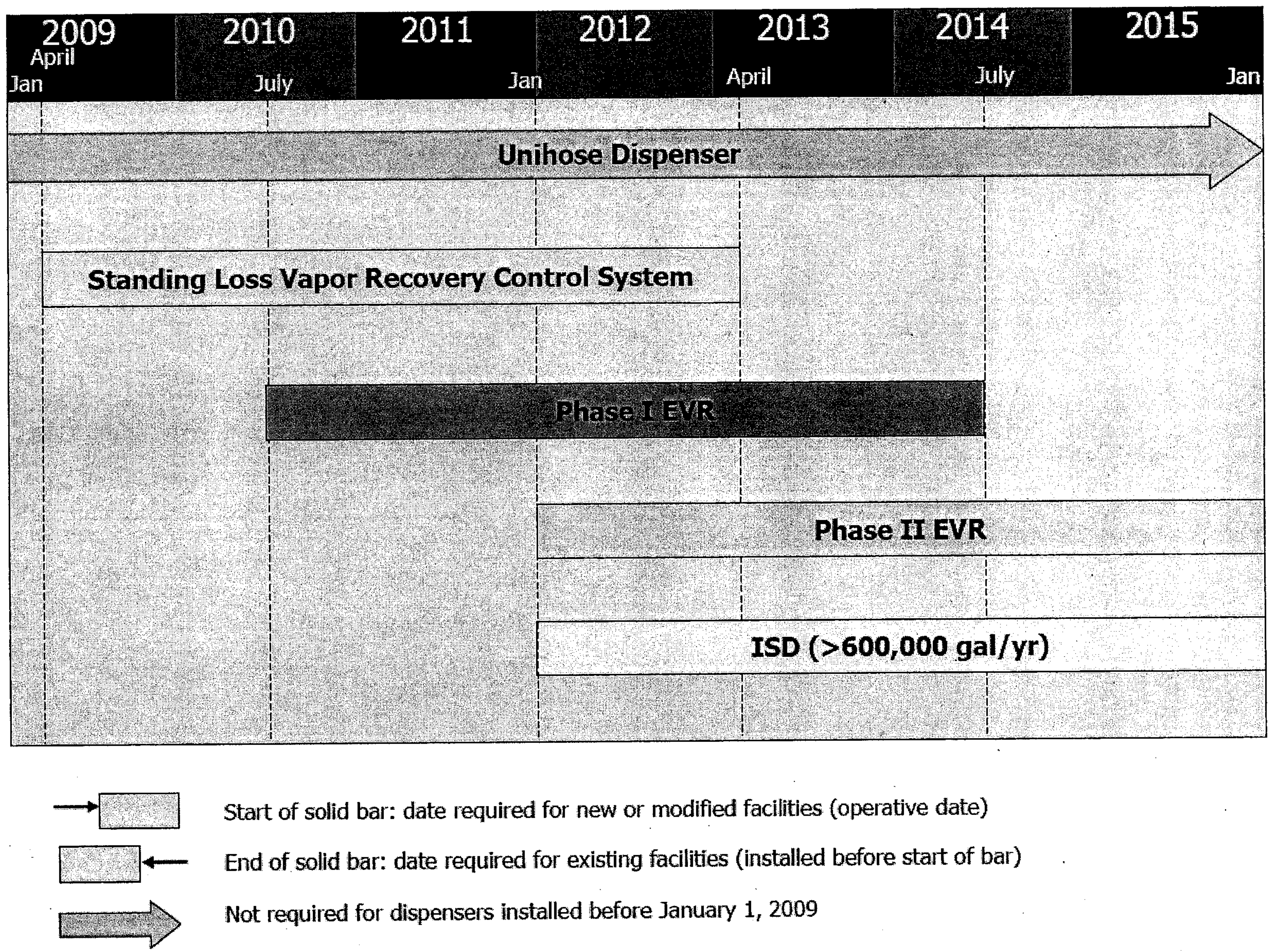
Time between start of 4-year clock and operative date (see next item for definition of operative date)

Start of solid bar: date required for new or modified facilities (operative date)

End of solid bar: date required for existing facilities (installed before start of bar)

Not required for dispensers installed before April 2003

Figure II-5
AST EVR Timeline



III. RULE DEVELOPMENT PROCESS AND PUBLIC OUTREACH EFFORTS

Public participation in rule development from vapor recovery stakeholders was sought through workshops, individual meetings, letters to equipment manufacturers, and announcements via ARB's vapor recovery web page (www.arb.ca.gov/vapor/vapor.htm), a vapor recovery list serve, and by postal mail.

A. Workshops

Staff conducted public workshops regarding the current proposal in Sacramento on March 2, 2010, and July 1, 2010. Furthermore, staff conducted three previous workshops, which specifically addressed the new low permeation hose standard included in this proposal. These workshops were held on November 13, 2003, September 28, 2006, and July 2, 2008. Attendees included representatives from petroleum marketers, gasoline dispensing facility service contractors, vapor recovery equipment manufacturers, and air pollution control agencies. The presentations made at these workshops were made available on the web in advance of the workshops and wider participation was facilitated via teleconference.

B. Meetings

Staff met with representatives from the Vapor Recovery Subcommittee of the California Air Pollution Control Officers Association (CAPCOA) on July 22, 2010, to discuss the proposed regulations presented at the public workshops in March and July, 2010.

ARB staff worked with stakeholders and Underwriters Laboratories (UL) toward the development of a permeation test procedure for GDF fuel hoses. The test procedure was completed and incorporated into the seventh addition of UL 330, UL's safety standard for Hose and Hose Assemblies for Dispensing Flammable Liquids. The Task Group responsible for the development of this procedure was a working body chaired by ARB staff. The Task Group participants included GDF hose manufacturers, material suppliers, UL, and the U.S. EPA. The use of UL 330 test procedure provides a standardized mechanism for certification of low permeation GDF fuel hoses by ARB and any other regulatory bodies. The Task Group conducted multiple tests of low permeation GDF fuel hoses toward the development of the final permeation test procedure. The Task Group began its work in April 2007 and since then has held more than 20 meetings. These Task Group meetings have offered participating stakeholders a regular forum to offer comments and ask questions regarding ARB staff's progress on the development of the proposed new hose emissions standard.

C. Internet and Mail

Stakeholders were notified of workshops by electronic mail (e-mail) notifications via ARB's vapor recovery list serve and by postal mail. The workshop notices, agendas, and presentations were all available on the ARB vapor recovery webpage (www.arb.ca.gov/vapor/vapor.htm). Stakeholders were encouraged to submit comments to staff by letter or e-mail.

D. Potential Stakeholder Concerns and Responses

During ARB workshops, CAPCOA meetings, and UL Task Group meetings, details of the proposed regulation and emission test results were presented to the stakeholders for review and comment. Staff accepted comments and recommendations from various stakeholders, identified specific issues of concern and addressed those issues to the extent possible. In addition, ARB staff has attempted to address any foreseeable stakeholder concerns as well. A list of frequently asked questions and responses regarding the low hose permeation proposal is contained in Appendix 6.

IV. REASONS FOR, AND SUMMARY OF, PROPOSED AMENDMENTS TO THE CERTIFICATION AND TEST PROCEDURES

A. Proposed Amendments to CP-201 "Certification Procedure for Vapor Recovery Systems at Gasoline Dispensing Facilities"

CP-201 defines standards and specification for Phase I and Phase II vapor recovery systems used at gasoline dispensing facilities (GDFs) with underground storage tanks. CP-201 also describes the procedure for evaluating and certifying the performance of equipment designed to meet those standards and specifications, including references to various test procedures (TP) used to determine compliance with the certification standards and specifications. Staff proposes changing the following subsections of CP-201.

Four-Year Clock Provision

Section 2.4.5 is added to specify that the effective date of new vapor recovery performance standards or specifications is the date when the system or component is certified. The "effective date" is very important to a regulated GDF because it determines the start of the "four-year clock." This is the four-year time period when all existing and affected GDFs must replace current equipment with equipment meeting the new standards and specifications. This four-year timeframe for replacing existing equipment is established in California Health and Safety Code, section 41956.1(a), which reads as follows:

> "Whenever the state board ... revises performance or certification standards or revokes a certification, any systems or any system components certified under procedures in effect prior to the adoption of revised standards or the revocation of the certification and installed prior to the effective date of the revised standards or revocation may continue to be used in gasoline marketing operations for a period

of four years after the effective date of the revised standards or the revocation of the certification."

Statutory language and existing language within CP-201 are sufficiently clear on the "four-year clock" in cases where certified equipment is available to meet new standards and specifications prior to the effective date. Unfortunately, the existing language does not address what action is required by an affected GDF when there is no certified equipment. Effective dates established in CP-201 are actual calendar dates set by ARB in anticipation of certified systems being available by that stated date. In the past, there have been unexpected delays with development and certification of systems to meet new standards and specifications. This has forced ARB to delay effective dates, often repeatedly, first through administrative actions by the Executive Officer, and then later by Board approval of the Executive Officer's action through a formal rulemaking process. Although ARB has made efforts to promptly revise effective dates as appropriate, the process has led to lack of clear direction and some uncertainty on the part of the regulated community.

The addition of section 2.4.5 to CP-201 re-defining the "effective date" will provide needed clarity and improve the program by ensuring that, in all cases, facilities have adequate time to plan for required vapor recovery equipment upgrades. By clearly establishing that the effective date will be automatically triggered only when a new system is certified by ARB will provide certainty and clarity to the regulated community. The provisions also streamline the administrative actions by the Executive Officer.

Provisions in the current sections 2.4.5 through 2.4.7 are renumbered to accommodate the addition of the new section 2.4.5.

Section 2.4.9 is also added to provide a clear process for addressing situations where the first system certified to meet a new standard or specification cannot be used for technical reasons on certain types of existing gasoline dispensing facilities. As discussed below, in the past there were cases where an approved EVR system could not be installed on certain types of GDF. Thus, in such cases, it is impractical to require those GDF owners to install this equipment. Section 2.4.9 provides a formal mechanism for owners to request a technical review of incompatibility between their GDF type and the certified system. If the Executive Officer determines that such incompatibility exists, the incompatible GDF type will not be subject to the effective date until a system is certified that is fully compatible. As provided by proposed section 2.4.5, the incompatible GDF type would have four years from the date when a compatible system is certified to comply.

A recent example of GDF incompatibility with certified EVR systems involves GDFs that serve the dual role of fueling vehicles and also filling bulk tanker trucks. Because those GDFs fuel vehicles, they may be required to comply with Phase II EVR requirements. However, there is no system that has been certified to meet Phase II EVR standards and specifications when the GDF system also serves to load bulk tanker trucks. Lack of a certified system means that existing GDFs that fuel both vehicles and bulk tanker trucks are in a situation where they cannot comply with Phase II EVR. In 2008, the Executive Officer postponed the effective date for GDFs serving dual roles for three years. In 2011, the Executive Officer further postponed the effective date for such facilities for another four years. Even with the issuance of those Executive Orders, industry is uncertain whether further extensions will be needed if no equipment is available or that these facilities will be provided four years to comply. Adding section 2.4.9 will provide a formal mechanism for requesting further extension, and will ensure a full four years for existing GDFs to replace their existing equipment once a system is certified. This is helpful for planning on the part of GDF owners and is consistent with the intent of the "four-year clock" for equipment replacement established in California Health and Safety Code, section 41956.1(a).

Subsections 2.4.9(a)-(f) outline the information that a petitioner must submit when requesting the Executive Officer to review whether a certified system is incompatible with a specific type of GDF. It is impossible to predict what standards and specification may be adopted in the future, what equipment may be developed to satisfy those future standards and specifications, and what type of GDFs may exist in the future. It is therefore impossible to predict the specific ways that future vapor recovery systems may potentially be incompatible with GDF types, so it would be impractical to outline within CP-201 exactly how the Executive Officer's review of the request will be conducted. However, including this list of minimum required information will serve as a general guideline of the type of information the Executive Officer will consider when making a determination.

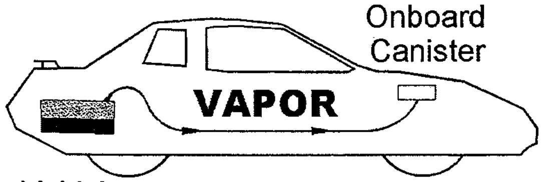
<u>Collection Efficiency and Emission Factor Determined by Certification Testing</u>

Section 4.1.1 has been amended to specify that Phase II EVR system emission factor and collection efficiency shall be determined by testing the refueling process of 100 vehicles not equipped with On-board Refueling Vapor Recovery (ORVR) rather than a mix of 200 vehicles with and without ORVR. This change is necessary for the following reasons:

1. ORVR vehicles use on-board canisters to process hydrocarbon vapors that previously were collected by the Phase II vapor recovery system during refueling (Figure IV-1). For ORVR vehicles, hydrocarbon concentrations in the vapor return path of the vapor recovery system are extremely low.
2. Because ORVR vehicles process gasoline vapors on board, measurements of vapor collection efficiency are only meaningful when fueling conventional (non-ORVR) vehicles.
3. Including ORVR vehicles in the test will introduce a low bias in the collection efficiency measurements for subsequent conventional vehicles, an issue that is growing as ORVR vehicles make up a larger percentage of California's vehicle

population.

Figure IV-1. ORVR Diagram



The first ORVR vehicles were sold beginning with the 1998 model year. Presently, both ARB and U.S. EPA require that vehicles with a gross vehicle weight rating of less than 10,000 pounds be equipped with ORVR. As the population of ORVR vehicle increases, the amount of gasoline dispensed into ORVR vehicles will increase proportionally* (Figure IV-2). Fueling a mixed population of ORVR-equipped and conventional (non-ORVR) vehicles alters vapor collection efficiency measurements. An artifact of the test procedure can result in under reporting for a conventional vehicle and produce unrepresentative results. Test results obtained by ARB staff indicate that the vapor recovery system collection efficiency during refueling for a conventional vehicle can be under reported by nearly 30 percent if this vehicle was preceded by refueling of an ORVR vehicle (CARB, 2008). Therefore, to avoid this confounding effect identified for tests that include a mix fleet of vehicles staff is proposing, through amendments of Section 4.1.1, that certification testing to determine Phase II EVR collection efficiency and emission factor be based on conventional vehicles only. The amendments provide the additional benefit of halving the total number of test vehicles required, which may result in shorter test duration.

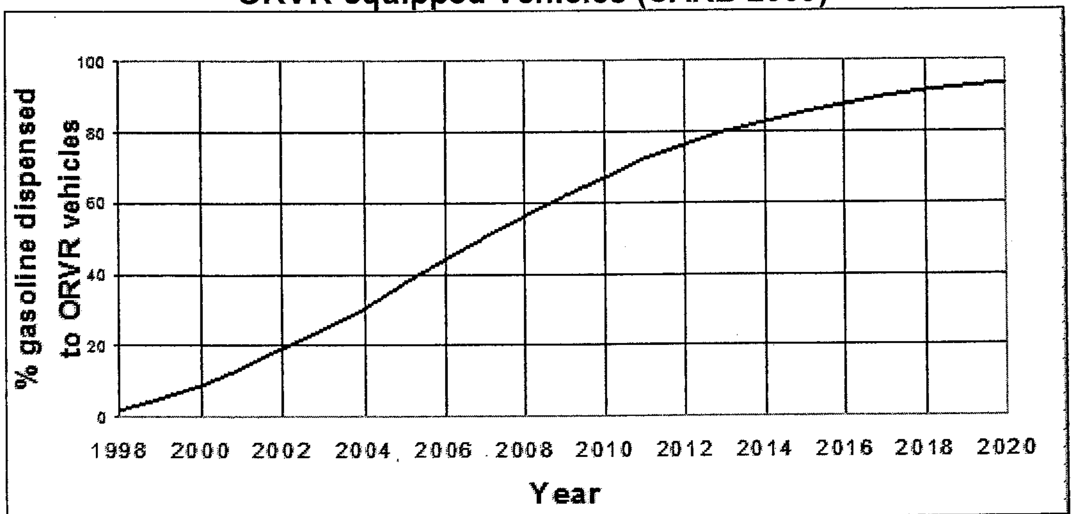
Section 4.4 is amended to omit the requirement for testing of ORVR vehicles to be consistent with the proposal that only non-ORVR vehicles be tested. To determine ORVR compatibility it was necessary to simulate an ORVR vehicle population of 80 percent, which was necessary in the early 2000's when the ORVR vehicle population was small. Currently, testing to determine compatibility is not necessary since recent Phase II systems proposed for certification are inherently ORVR compatible. Therefore, staff is proposing to require the applicant to develop a test protocol to demonstrate ORVR compatibility only when requested by the Executive Officer. The request would be made only in the instance where existing data are not available to demonstrate ORVR compatibility.

* The projection of gasoline dispensed to ORVR vehicles would increase further if ARB later this adopts regulations requiring ORVR on vehicles with a gross vehicles weight rating of 10,000 pounds or greater.

Other Amendments to CP-201

Section 11.9 is amended to address the fact that most certified EVR systems are comprised of components from multiple manufacturers. Although a single manufacturer may serve as the primary applicant and ARB contact for a given EVR system, each manufacturer whose components are part of the system has a vested interest in any subsequent additions or changes to the Executive Order for that system. The proposal would require the applicant requesting subsequent additions or changes to notify all manufacturers of components of the system when changes are made.

Figure IV-2. Projected Gasoline Dispensed to ORVR-equipped Vehicles (CARB 2009)



Note: Beyond 2020, the percent of gasoline dispensed to ORVR vehicles would be greater, if the Board adopts regulations in late 2011 requiring ORVR for heavy-duty gasoline engines.

Sections 13.5.1 and 13.5.2 are deleted because they are redundant to the pressure integrity testing requirements that are clearly spelled out in TP 201.1 and TP 201.2 for Phase I and Phase II systems, respectively.

Sections 13.6, 13.6.5, and 13.6.6. are amended, and section 13.6.2 is deleted to reflect the amendment to section 4.1, which has been changed to specify that the vehicle matrix described in TP-201.2A consist of 100 vehicles without ORVR rather than a mix of 200 vehicles with and without ORVR. The rationale for changing from 200 vehicles with and without ORVR to 100 non-ORVR vehicles is discussed above in section IV.

Addition of Low Permeation Hose Requirements

Table 2-1 of Section 2.4.1 is modified to establish a new low permeation emission hose performance standard of 10 grams per square meter per day (g/m^2/day) as determined by UL 330. This standard will apply to hoses for vacuum-assist systems and conventional systems (where gasoline is carried against hose outer wall). The date for applicability of this new low permeation hose limit for existing and affected GDFs is four years from the "effective date," which is established when the first system for each type is certified to meet the proposed new performance standard. Exceptions to the "four year clock" provision are as follows. First, in the event that existing and affected GDFs undergo a major modification* after the effective date, the four year clock provision does not apply and the applicable new hose standards must be met upon completion of facility modifications. Second, in the event that an affected GDF has the need to replace a hose(s) after the effective date, it is then required to install only a fuel hose meeting the new proposed low permeation emission standard. Third, all new and affected GDF installations that are permitted after the effective date are required to install only fuel hoses meeting the new low permeation standard.

For vacuum-assist and conventional hoses, gasoline vapor emissions are the result of permeation of gasoline through thermoplastic or rubber materials used for construction. The rate of permeation emissions is affected by a variety of factors including: temperature, concentration gradient across the hose wall, fuel type and hose material, and construction. The proposal will reduce the emissions from affected hoses by 96 percent from uncontrolled emissions. Staff estimates that current vacuum-assist and conventional hoses permeate at an average rate of 74.8 $g/m^2/day$ at 71.0°F. For a typical vacuum-assist GDF, this means that every 17 days one gallon of gasoline permeates unchecked into the environment (based on the assumption of twelve hoses per GDF and the hose length is ten feet). There is no regulation restricting permeation emissions from GDF hoses at these levels. A permeation standard will dramatically reduce this source of emissions. Furthermore, this regulation will result in cost savings due to fuel saved in preventing emissions. For more information on the emissions reductions and fuel savings associated with this regulation, see Section V., Environmental and Economic Impacts.

Section 20 has been added to describe the certification requirements for hoses at applicable GDFs. Section 20 specifies that the required permeation rate is only applicable to vacuum-assist and conventional hoses. Balance hoses are exempt from this new limit. The reason for this requirement is that staff expects that increasing ORVR vehicle populations will dilute the concentration of vapors returned to the GDF via the hose during fueling (CARB, 2011a). Hoses carrying this vapor against the outermost was will experience a lowering of the concentration gradient across the hose wall, thereby reducing permeation rates. As ORVR vehicles continue to become a greater percent of the overall California vehicle fleet, permeation from these types of hoses will be reduced. Additional discussion is found in section VI., Alternatives Considered.

* Major modification of a Phase II system is defined as the addition, replacement, or removal of 50 percent or more of the buried vapor piping or the replacement of fuel dispensers. The replacement of a dispenser is not a major modification when done for reasons of vandalism or damages that are beyond the reasonable control of the GDF operators.

Section 20 also specifies that the permeation rate shall be determined by UL 330, the only current permeation test standard specifically designed for GDF hoses. This standard and the associated test procedure were developed by a UL task group that was chaired by ARB staff. The task group included experts from UL, the U.S.EPA, and leading hose and materials manufacturers. The procedure was introduced into the UL 330 hose standard through a consensus process which involved approval by a standards technical panel that included both ARB and U.S. EPA representation.

Section 20.1 is added to describe the information an applicant must submit when requesting ARB certification for a low permeation GDF hose. It specifies that ARB must be made a beneficiary of UL test data. Access to UL test data satisfies the statutory requirement* that ARB must directly test or contract for testing of vapor recovery components.

Sections 20.1.2 through 20.1.8 are added so that the application requirements for ARB certification of low permeation GDF hoses are consistent with the existing application requirements for other vapor recovery system components, found in sections 11 through 11.7.

B. Proposed Amendments to CP-206 "Certification Procedure for Vapor Recovery Systems at Aboveground Storage Tank Facilities"

CP-206 defines standards and specification for Standing Loss Control, Phase I and Phase II vapor recovery systems used at GDF with aboveground storage tanks. Standing Loss Control is the control of vapor from the fuel during storage. CP-206 also describes the procedure for evaluating and certifying the performance of equipment designed to meet those standards and specifications, including references to various test procedures (TP) used to determine compliance with the certification standards and specifications. Staff proposes amendments to CP-206 that closely mirror the amendments proposed to CP-201. The proposed amendments are described in the following sections.

Four-Year Clock Provision

Section 2.4.5 of CP-206 is added in an identical manner as section 2.4.5 of CP-201. Refer to the Four-Year Clock Provision of section IV. A. for a full explanation.

Section 2.4.9 of CP-206 is added in an identical manner as section 2.4.9 of CP-201. Refer to the Four-Year Clock Provision of section IV. B. for a full explanation.

It should be noted that, while EVR has already been fully implemented for GDFs with

* California Health and Safety Code, Division 26, Part 41`, Chapter 2, section 41954(d)

underground storage tanks, there are several new standards and specifications for aboveground storage tank systems that have yet to go into effect. There are currently several aboveground storage tank EVR performance standards and specifications for which no certified system exists. Therefore, the four-year clock provision added to sections 2.4.5 and 2.4.9 of CP-206 will provide much needed clarity and relief.

Provisions in the current sections 2.4.5 through 2.4.7 are renumbered to accommodate the addition of the new section 2.4.5.

Staff is proposing to change the dates in Table 2-1 (section 2 of CP-206) to be consistent with the Executive Officer's administrative actions which established April 1, 2009 and July 1, 2010, as the effective date for Standing Loss Control and Phase I, respectively. This means the "four year clock" has started for Standing Loss Control and Phase I for AST. Since the effective date for Phase II AST has not started, ARB staff proposed to change the effective date in Table 2-1 to be the date when the first system is certified to be consistent with the "four year clock" proposal.

Collection Efficiency and Emission Factor Determined by Certification Testing

Section 5.1.1 has been amended to specify that Phase II EVR system emission factor and collection efficiency shall be determined by testing of 30 vehicles without ORVR rather than a mix of 20 vehicles with and without ORVR. The reason has been given in section IV. A., Collection Efficiency and Emission Factor Determined by Certification Testing for a full explanation.

Section 5.4 is amended for the same reason as Section 4.4 of CP-201 is amended. The reason for the change is discussed in section IV. A., Collection Efficiency and Emission Factor Determined by Certification Testing for a full explanation.

Other Amendments to CP-206

Section 4.8 currently requires that all ASTs include a dedicated gauging port with drop tube so that the quantity of gasoline in the tank can be determined manually with a gauging stick. For many existing ASTs, the gasoline quantity is determined either by a mechanical or an electronic gauging system, which performs the same function as the gauging stick. For these ASTs, the number of ports is limited and often does not have two ports, one for manual determination and the other for either mechanical or electronic determination. Therefore, staff is proposing to amend section 4.8 to allow for the use of manual, mechanical, or electronic gauging. The proposal would eliminate the need to install duplicative equipment and would reduce the cost of compliance.

Section 12.9 is amended to address the same notification issue as section 11.9 of CP-201. Refer to section IV. A., "Other Amendments to CP-201" for a full explanation.

Section 14.3.1 is amended to clarify that a minimum of 9,000 gallons must be dispensed from the GDF system over the course of the operation test period of at least 180 days. Section 14.1.1 already specifies that an acceptable test facility must have a minimum throughput of 1,500 gallons per month. By combining the minimum test period and throughput, it follows that there should be a minimum of 9,000 gallons of throughput over the course of the 180-day evaluation. (1,500 gallons per month x 6 months = 9,000 gallons) The amendment to section 14.3.1 is intended to address the unlikely situation where a test facility whose throughput is typically greater than 1,500 gallons per month prior to certification testing but for some reason experience lower throughput during the certification test. This amendment allows for the test period to be extended beyond 180 days until the required 9,000 gallon throughput is met and is consistent with similar provisions in CP-201.

Sections 14.6, 14.6.5, and 14.6.6 are amended, and section 14.6.2 is deleted to reflect the amendment to CP-206, section 5.1, which has been changed to specify that the vehicle matrix described in TP-201.2A consist of only vehicles without ORVR rather than a mix of vehicles with and without ORVR. The rationale for changing from a mix of vehicles with and without ORVR to a test of only vehicles without ORVR was given in section IV. B., Collection Efficiency and Emission Factor Determined by Certification Testing.

Addition of Low Permeation Hose Requirements

Table 2-1 of Section 2 was added to specify the performance standard for low permeation hoses and to establish the "effective date" similarly as described previously in Section IV.A as the date when the first hose of each system type is certified.

Section 21 has been added to specify low permeation requirements for GDF hoses. The reasons for these amendments are given in sections 2.4.1. and 20 of CP-201. The reader is referred to the portion of section IV. A. pertaining to the new low permeation hose requirements.

C. Proposed Amendments to Definitions for Vapor Recovery Systems (D-200)

D-200 provides definitions and acronyms for terms used throughout the vapor recovery certification and test procedures. The following minor amendments to D-200 are proposed in order to improve clarity.

The definition of "Fugitive Emissions" is deleted. This definition is redundant since there is also a definition of the term "pressure related fugitive emissions" within D-200.

The definition of "Liquid Retain" is amended. The term "Liquid Retention" is used rather than "Liquid Retain" throughout certification and test procedures, so the term was changed to "Liquid Retention" within D-200. The definition was amended to include liquid contained within the nozzle liquid path because the test procedure used to determine the volume of liquid retention within a nozzle (TP-201.2E) includes liquid retained in both the vapor path and the liquid path on the atmospheric side of the product valve.

The definition of "pressure-related fugitive emissions" is amended to refer to the fugitive emission value calculated as described in TP-201.2F – "Pressure-Related Fugitive Emissions." The term "pressure-related fugitive emissions" is commonly used within the community of regulators, manufacturers, and technical personnel working with gasoline vapor recovery equipment. Although the term is commonly used, there is not always agreement on what specific emission points are included in the term. By referring directly to TP-201.2F in the D-200 definition of this term, this clarifies what emission points are included in, and excluded from, the term.

A new definition of "Low Permeation Hose" is added to mean hoses to dispense gasoline and complies with low permeation standard as determined by UL 330 (seventh edition).

D. Proposed Amendments to Test Procedures

ARB staff uses various test procedures when evaluating new and modified vapor recovery equipment for certification. The following amendments are proposed to the current test procedures:

1. TP-201.1 - "Volumetric Efficiency for Phase I Vapor Recovery Systems"
   Section 8.6 is added to the test procedure to require a static pressure integrity test (i.e., leak test) after conclusion of the bulk delivery of fuel to the GDF. The method of determining Phase I volumetric efficiency described in TP-201.1 is based on the assumption that the GDF system is free from leaks. Section 6.2 currently requires a leak test to be conducted prior to the bulk drop to establish that the system is free from leaks. Since the inception of the EVR program, ARB staff has also run a leak test after the bulk drop in order to further validate that the system was free from leaks during the bulk drop. Adding the section 8.6 requirement for a leak test after the bulk drop simply formalizes the testing that staff was already doing, and validates the quality of the volumetric efficiency calculations of TP 201.1.

2. TP-201.2 – "Efficiency and Emission Factor for Phase II Systems"
   Several amendments are proposed for TP 201.2 to allow for alternative equipment and procedures. These alternatives to equipment and procedures have been determined by the ARB Chief of the Monitoring and Laboratory Division, under authority delegated by the Executive Officer, to be equivalent to the current requirements of TP-201.2 (CARB, 2007a).

   The Chief of the Monitoring and Laboratory Division is delegated by the ARB

Executive Officer, under authority granted in ARB Executive Order P-07-001, to approve use of alternative or modified vapor recovery test procedures listed in section 94011 et. seq., Title 17, CCR. Under this authority, ARB staff has performed testing in accordance with the procedures described in the August 28, 2007 memo for four years. The amendments proposed will merely incorporate those alternative procedures into TP-201.2. The following is a brief explanation of each proposed amendment.

- Proposed changes to section 5.1.2 would allow the use of non-dispersive infrared (NDIR) detectors in addition to flame ionization detectors (FID). Engineering evaluation and experience gained from field application of this test procedure have shown NDIR detectors to be equivalent to FID for the purposes of TP-201.2.

- Proposed changes to section 5.6.1 would address the problems that arise when field conditions preclude installation of a liquid trap in the vapor line. In this situation, the use of transparent tubing allows test staff to visually determine when liquid has accumulated in the vapor return line. While use of a liquid trap is still preferred, visual monitoring of clear tubing by staff can effectively prevent excessive liquid from collecting in the line and inhibiting vapor flow to the point that it adversely affects test results.

- Proposed changes to section 5.6.3 would make the installation of isolation valves optional. Isolation valves are installed by staff performing certification tests to isolate the underground storage tank from the atmosphere in the event sampling equipment is removed for maintenance or replaced. However, it is extremely rare that sampling equipment is replaced at this location, making use of these valves unnecessary. Space constraints are also a consideration, as the valves compete with equipment necessary to perform efficiency testing for the limited space within the dispenser housing.

- Proposed changes to section 5.7.1 would require a minimum sample sweep rate of 1 cubic foot per minute (cfm) instead of the presently specified sample sweep rate of 20 cfm. A sampling rate of 20 cfm is not practical with pumps currently employed for vapor recovery testing. With Phase II EVR systems, the lower operating pressures means the hydrocarbon concentrations released at the pressure/vacuum (P/V) valve are also reduced. The sample sweep rate of 1 to 2 cfm allows the sampling equipment to capture hydrocarbon vapor emitted from the P/V valve without diluting the sample to below the hydrocarbon analyzer's limit of detection.

- Proposed changes to sections 5.8.1 and 7.4.5.1 would clarify that measuring vapor processor inlet volume and concentration is only required when the processor employs a destructive principle. For non-destructive processors all of the data needed to accurately calculate emissions can be obtained from monitoring the processor outlet directly, so processor inlet monitoring is not required.

- Proposed changes to section 7.3 would remove the partial instructions on how to conduct a pressure integrity test in accordance with TP-201.3. All necessary instruction for the pressure integrity test is contained in TP-201.3, so including partial instructions within this section is redundant and unnecessary.

- Proposed changes to sections 7.6 and 11.1 would include directions on when to conduct a leak integrity test of the facility before and after running TP-201.2. TP-201.2 procedures for determining vapor recovery system emission factor and efficiency are premised on the assumption that the facility being tested is free of leaks as determined by successfully passing a leak integrity test per TP-201.3. Since the inception of the EVR program, ARB staff has run the leak integrity test as close as practical to the beginning of data collection for TP-201.2. However, staff availability and facility operational concerns must be taken into consideration when scheduling a leak integrity test. The amendment to section 7.6 provides test staff with some flexibility while still adequately ensuring that the system is free of leaks when data collection for TP 201.2 begins.

- Proposed changes to section 8.2.3 would specify that a calibration gas standard is used for documenting nozzle sleeve response time. This provides greater precision and repeatability of the nozzle response time determination, and verifies that the hydrocarbon sampling equipment is not contaminated with excessively rich vapor or liquid.

- Section 8.3, which requires performing a sampling system bias check prior to each day of vapor recovery system efficiency testing, has been relocated to section 7.9 as a pre-test requirement to be performed prior to initiating the efficiency test. System bias checks are intended to evaluate the effects water vapor and sample conditioning have on water soluble compounds in a combustion gas matrix. ARB staff believes daily bias checks do not affect the confidence level of the test results, based on the relative absence of water vapor in the sample matrix and that sample system components are leak checked and constructed from materials that do not provide a source or sink for hydrocarbon vapors, as specified in TP-201.2. ARB staff believes this modification maintains data quality while improving the efficiency of the process by increasing the fraction of each test day that can be dedicated to measuring vapor recovery system performance.

- Proposed changes to section 9.4.3 would reduce the possibility of under reporting emissions occurring at nozzle shut off. The current procedure may result in a loss of this emission data, which could introduce high bias to system efficiency and low bias to system emission factor. Section 9.4.3 is further amended to require the nozzle sleeve to be removed from the nozzle before replacing the nozzle in the dispenser. This change will extend the service life of the nozzle sleeve and reduce the potential for bias from spillage during replacement.

- Section 10.1, which requires performing a sampling system bias check at the conclusion of each day of efficiency testing, has been relocated to section 11.1 as a post-test requirement to be performed at the conclusion of the efficiency test. The basis for this amendment is identical to that described for the relocation of section 8.3 to section 7.9.

- Sections 11.1 through 11.4 are renumbered to accommodate the relocation of section 10.1 to section 11.1.

- Proposed changes to section 12.1 would remove vehicles with ORVR from the emission factor calculation, in order to be consistent with proposed changes to CP-201 and CP-206. The rationale for changing this test to include only vehicles without ORVR is covered in section IV.A., Efficiency and Emission Factor Testing.

3. <u>TP-201.2A – "Determination of the Vehicle Matrix for Phase II Systems"</u>
Proposed changes to this test procedure would implement the proposed amendment to CP-201, section 4.1, which would specify that the vehicle matrix described in TP-201.2A consist of 100 vehicles without ORVR rather than a mix of 200 vehicles with and without ORVR. The rationale for changing from 200 vehicles with and without ORVR to 100 vehicles without ORVR is covered in section IV.A., Collection Efficiency and Emission Factor Determined by Certification Testing.

   Although there are many changes to the specific text of TP-201.2A, the basic procedure for establishing a vehicle matrix representative of California's vehicle fleet remains the same. There are no changes to the source of data for California's vehicle population by year, make, and model, or to the source of estimates for California's vehicle miles traveled. Furthermore, the methods for converting that source data into a vehicle matrix are fundamentally unchanged apart from the exclusion of ORVR vehicles.

4. <u>TP-201.2I "Test Procedure for In-Station Diagnostic Systems"</u>
Sections 8.6 and 8.7 are amended to correct several errors where the test criteria did not match with a corresponding ISD monitoring or alarm specification.

   The UST Ullage Pressure Degradation action criteria and borderline values, found in sections 8.6 and 8.7 respectively, have been changed to be consistent with the requirements found in section 9.2.4(c) of CP-201, which specify 25 percent of time above 0.5 inches WC rather than the five percent of time currently shown in the Test Procedure. The phrase "assuming no deliveries or other events require exclusion of data..." has been deleted from the UST Ullage Pressure Degradation portion of section 8.7 since there is no provision in CP-201 or section 8.6 of TP-201.2I that allows excluding delivery data from the borderline calculation for this test.

Sections 8.6 and 8.7 have been amended to remove the UST Ullage Pressure Phase I Overpressure test criterion and borderline values. There is currently no corresponding Phase I Overpressure ISD alarm or monitoring requirement in CP-201. The requirement for Phase I Overpressure monitoring previously existed, but was removed from CP-201 via rulemaking on October 8, 2003.

Section 8.7 has been amended to correct a typographical error in the UST Ullage Pressure - Pressure Integrity Failure (Leakage) language.

5. <u>TP-201.2J – "Pressure Drop Bench Testing of Vapor Recovery Components"</u>
Proposed changes to section 5.1 would require that all components be tested individually, eliminating the option of testing multiple components as an assembly. Since the inception of the EVR program, ARB staff has never tested or been asked to test multiple components as an assembly. Testing components individually provides a more accurate and reliable measurement of pressure drop. Furthermore, there have been cases where manufacturers have requested that their components be certified as interchangeable with other manufacturers' components. In order for ARB staff to assess compatibility of various manufacturers' components, it is necessary to establish a pressure drop value for each individual component rather than an assembly.

   Proposed changes to section 5.5 would allow for the use of any rigid piping material with a smooth bore, rather than specifying PVC piping. This change does not alter the performance of the test equipment in any way, but allows greater flexibility in selecting materials when constructing the test apparatus.

6. <u>TP-201.3 –Determination of 2 Inch WC Static Pressure Performance of Vapor Recovery Systems of Dispensing Facilities</u>
Proposed change to section 9.3 would correct a conversion factor to calculate the minimum time required to pressurize the vapor space in the tank from zero to two inches water column (WC) gauge pressure. The current test procedure uses a conversion factor of 1980, which incorrectly overestimates the required pressurization time. The correct conversion factor is 1522. This calculation provides an estimate on the amount of nitrogen needed and is not used as criteria to determine whether the GDF will pass or fail the test. Therefore, the proposed amendment does not alter pass/fail criteria or call into question any test results

conducted using the previous conversion factor.

7. TP-206.3 – Determination of Static Pressure Performance of Vapor Recovery Systems at Gasoline Dispensing Facilities with Aboveground Storage Tanks
   Proposed change to section 7.3 would delete the sentence, "...If leaks are noted, components shall be replaced prior to continuing with this test procedure." Test procedures should not require replacement components.

E. Changes without Regulatory Effect

In addition to the proposed changes previously discussed in this Staff Report, minor editorial corrections are proposed to revise dates, grammar, and terminology throughout the certification and test procedures. These editorial corrections do not have any substantive effect on certification and test procedures.

V. ENVIRONMENTAL AND ECONOMIC IMPACTS

The environmental and economic impacts from this regulation stem from the proposed new requirement of the use of low permeation hoses. All other amendments being put forth within this proposal are administrative in nature, as described in section IV, and therefore, would not result in any significant adverse environmental impacts. They also should not impose any new costs to the existing program. The low permeation hose proposal will have no adverse environmental impact. Rather, the new permeation standard will have air quality and cost benefits associated with avoiding unnecessary fuel losses and the reduction of ROG emissions from GDFs. The Environmental Impact and Economic Impact of low permeation hoses are discussed in the next two sections.

Since the "effective date" for this new proposed standard is defined as the date when the first hose of each type is certified, the calculations in the following sections will assume full compliance by 2017 for the purpose of determine the environmental and economic impacts of the proposal. This date is consistent with the statute that allows a four-year compliance window as discussed in the Four-Year Clock portion of this regulatory proposal. A detailed description of the calculations and assumptions used in determining the economic and fiscal impacts discussed in this section can be found in Appendix 5.

A. Environmental Impacts

The California Environmental Quality Act (CEQA) and ARB regulations require an analysis to determine the potential environmental impacts of proposed regulations. Because ARB's program involving the adoption of regulations has been certified by the Secretary of Resources pursuant to Public Resources Code (PRC) section 21080.5, the CEQA environmental analysis requirements may be included in the Initial Statement of Reasons (ISOR) for this rulemaking. In the ISOR, ARB staff prepared a "functionally equivalent" analysis for this rulemaking, rather than adhering to the format described in CEQA of an Initial Study, a Negative Declaration, and an Environmental Impact Report. Staff will respond to all significant environmental issues raised by the public during the public review period or at the Board public hearing in the Final Statement of Reasons for the proposed amendments.

PRC section 21159 requires that the environmental impact analysis conducted by ARB include the following:

- an analysis of reasonably foreseeable environmental impacts of the methods of compliance;
- an analysis of reasonably foreseeable feasible mitigation measures; and
- an analysis of reasonably foreseeable alternative means of compliance with the control measure.

Reasonably Foreseeable Methods of Compliance and Impacts

The goal of the proposed regulation is to require the use of ARB certified low permeation hoses on GDFs with vacuum-assist vapor recovery systems and conventional systems. The requirement of this regulation as it affects existing and new applicable GDF is discussed in section IV.A., Addition of Low Permeation Hose section.

As mentioned in Appendix 5, a vapor recovery hose has typical life of two years. Thus, it is expected that most existing affected GDFs will be using low permeation hoses well in advance of the compliance date (four years from the date when the first low permeation hose is certified by ARB).

The potential environment impacts associated with the reasonably foreseeable methods of compliance is determined by considering the GDF hose population and air quality benefits associated with use of low permeation hoses. In addition, discussions of environmental justice and climate change issues are included.

GDF Hose Population

In October 2010, ARB staff conducted an analysis of GDF population data gathered from districts to determine and characterize the population of fueling points at permitted GDFs (CARB, 2011b). This analysis suggests that there are approximately 95,000 fueling points using vapor recovery hoses at permitted GDFs in California. Approximately 65,000 of these hoses are vacuum-assist type hoses and the remaining approximately 30,000 are balance-type hoses. Additionally, staff estimates that there are approximately 1,000 fueling points using conventional hoses at facilities exempted from Phase II vapor recovery requirements due to servicing fleets which consist of predominately ORVR-equipped vehicles. The stations exempt from Phase II would be subject to the low permeation hose requirement.

Baseline Emissions

Staff estimates that uncontrolled emissions from vacuum-assist and conventional hoses affected by this regulation in 2017 will be about 1.0 tpd of ROG statewide. In contrast, 2017 uncontrolled emissions from balance hoses, which are not subject to this proposed regulation, will be about 0.15 tpd of ROG. A detailed description of the calculations that staff used to determine baseline emissions can be found in Appendix 4.

Emission Reductions

The staff proposed permeation limit will reduce ROG emissions from vacuum assist and conventional GDF hoses by 0.96 tpd in 2017, a reduction of about 96 percent. Staff is not proposing to establish a permeation standard for balance hoses at this time for reasons discussed in the Section VI., Alternatives Considered. A detailed description of the calculations that staff used to determine baseline emissions can be found in Appendix 4. Air quality is expected to improve as a result of the installation and use of low permeation hoses, thus ARB staff finds that the proposed regulations would not result in adverse impacts to this source area.

Other Potential Impacts Considered and Found to have No Potential Adverse Impact

Since compliance with the proposed regulation will be accomplished by installing low permeation hoses that are manufactured outside of California, no new facilities, expansion of existing facilities, or changes in operations from the status quo are likely to occur due to the proposed regulation. Therefore, ARB staff finds that it is not reasonably foreseeable that there will be any adverse impacts on aesthetics, land-use/planning, population and housing, transportation, agricultural and forestry resources, cultural resources, hazards and hazardous materials, mineral resources, public services, utility and service systems, geology and soils, hydrology and water quality, or recreation.

Because there are no significant adverse environmental impacts identified with the proposed regulation, no mitigation measures need to be identified nor is an analysis of feasible alternatives to the proposed regulation required under CEQA (CCR section 60006).

Environmental Justice

State law defines environmental justice as the fair treatment of people of all races, cultures, and incomes with respect to the development, adoption, implementation, and enforcement of environmental laws, rules, and policies (Senate Bill 115, Solis; Stats 1999, Ch. 690; Government Code § 65040.12(e)). The Board has established a framework for incorporating environmental justice into ARB programs consistent with the directives of State law.

The policies developed apply to all communities in California, but recognize that environmental justice issues have been raised more often in the context of low income and minority communities, which sometimes experience higher exposures to some pollutants. Higher exposures result from cumulative impacts of air pollution from mobile, commercial, industrial, area wide, and other sources. Over the past twenty years, local, state, and federal air pollution control programs have made substantial progress towards improving air quality in California. Despite this progress, some communities continue to experience disproportionately higher exposures than others. Since the same ambient air quality standards apply to all regions of the State, all communities, including environmental justice communities, will benefit from the air quality benefits associated with this proposal. Alternatives to the proposed recommendations, such as not implementing the proposal, would affect all communities throughout the State.

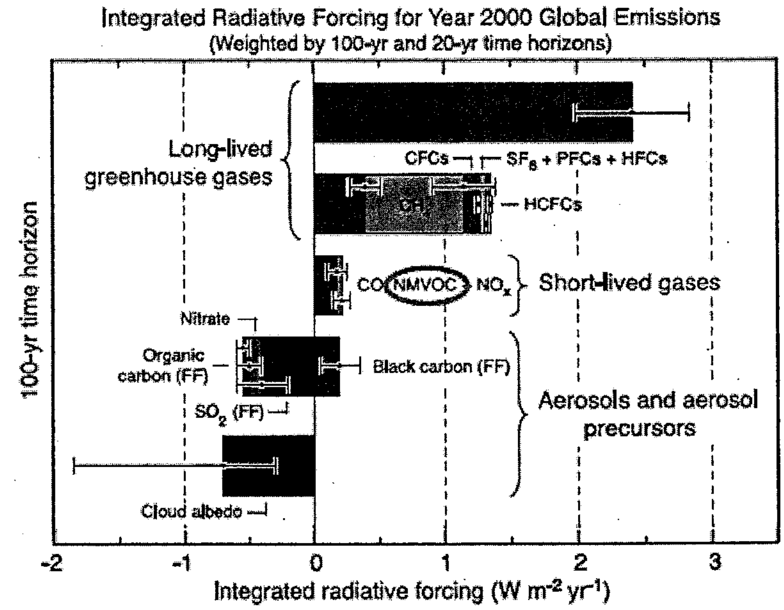
Climate Change Considerations

Staff evaluated the climate change impact of the proposed regulation. ROGs can absorb infrared radiation contributing to global warming (Collins, Derwent, Johnson, and Stevenson, 2002). ROGs are generally regarded as net climate warmers as indicated in Figure V-1. However, ROGs are not a single species. Rather, they are many different types of compounds with different behaviors in the atmosphere, making quantifying their warming impact difficult. ROGs influence climate through indirect effects via their production of secondary organic aerosols and their involvement in photochemistry (i.e., production of ozone, and in the prolonging the life of methane in the atmosphere, although the effect varies depending on local air quality). Typically, the indirect effect is the dominant path by which ROGs contribute to global warming. Overall, strategies for reducing ROG emissions are beneficial for climate change. The Intergovernmental Panel on Climate Change (IPCC, 2007) has reported global warming potentials for a relative small set of ROG species, so it is not possible to quantify the exact climate change benefit of this regulation. However, qualitatively reducing ROG emissions, as this proposal will do, will help alleviate climate change related warming.

B. Economic Impact

This section discusses the economic impact of the proposed action, which includes cost savings from preventing fuel losses due to hose permeation, costs of complying with the proposed performance standard, cost effectiveness, and fiscal impacts to the State. To be consistent with economic impacts of other ARB regulations, the economic impact, cost effectiveness costs and benefits of the regulation are calculated over a five year period (levelized cost). The details of this analysis can be found in Appendix 5.

Figure V-1. Chart showing NMVOCs (similar to ROG) as net warmers (IPCC, 2007)



Impacts on California Businesses

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 regulations. The assessment shall include consideration of the impact of the proposed regulation on California jobs, business expansion, elimination or creation, and the ability of California business to compete.

Staff has determined the proposed regulation will not impose a significant cost burden on retail businesses located in California. Manufacturers are located outside California and are currently providing low permeation hoses for other applications that are subject to similar performance standards. The following sections discuss the projected impact on California businesses.

Compliance Costs

Staff has determined that annual compliance costs will average \$11 per affected GDF for small businesses and about \$54 per affected GDF for large businesses. The levelized annual compliance cost spread across all affected GDFs is approximately \$334,000. It is anticipated that there will be no additional compliance or permitting costs to districts with respect to the proposed regulation. Districts are already verifying, during periodic inspections conducted under existing programs, that the GDF hoses have been certified by ARB. A detailed description of the calculations that staff used to determine compliance costs can be found in Appendix 5.

Cost Savings from Preventing Fuel Losses

Staff estimates the annual gasoline loss due to permeation from a vacuum-assist or conventional GDF hose to be 1.76 gallons. This results an annual statewide fuel loss of approximately 117,000 gallons per year. Reducing these emissions by 96 percent or about 1.68 gallons per fueling point will result in an annual statewide fuel savings of 112,000 gallons. At an estimated 2017 gasoline price of $3.80 per gallon, the annual gross cost savings associated with the fuel saved is about $6.38 per fueling point and $424,000 statewide. Applying the savings over a five year period, staff determined the levelized annual value of gasoline saved for the regulation to be $396,000. Because fuel savings occur at the hose, after it has passed the meter at the dispenser, these cost savings will occur to the consumer of the fuel. In the case where the fleet being fueled is owned by the operator of the GDF, as with some rental car or government fleets, these cost savings will directly offset the estimated annual compliance costs of approximately $5.38 resulting in a net savings of $1.00 per fueling point. The methodology used to estimate the cost savings associated with these recovered losses is detailed in Appendix 5.

Cost Effectiveness

The statewide levelized annual compliance cost from the proposed regulation is estimated to be $334,000. ARB staff estimates over a five year period that the proposed regulation will result in a reduction of approximately 699,000 pounds of ROG per year. Therefore, the cost effectiveness of this proposal will be about $0.48 per pound of ROG reduced. The proposal is also expected to save about 112,000 gallons of gasoline annually valued at $396,000. Thus, when including the full savings the proposal will result in a cost savings of about $0.09 per pound of ROG reduced. A detailed description of the calculations that staff used to determine cost effectiveness can be found in Appendix 5 and is summarized in Table V-1.

Table V-1. Cost Effectiveness of Proposed Regulation

Yearly Cost and Cost-Savings of Low Permeation GDF Hoses					
Compliance Cost	Cost Savings ($3.80/gal)	Net Cost ($)	Statewide Annual ROG Reduced (lbs)	Cost Effectiveness ($/lb ROG)	
				Without Factoring the Cost of Gasoline Saved	Factoring the Cost of Gasoline Saved
$334,000	$396,000	-$62,000	699,000	$0.48	-$0.09

Economic Impacts of Alternatives

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 rule. A major rule is defined as a rule that will have a potential cost to California business enterprises in an amount exceeding ten million dollars in any single year. The proposed regulation does not exceed this threshold.

Staff investigated the economic impact for the alternatives including not requiring low permeation hoses and requiring low permeation balance hoses in addition to low permeation vacuum-assist and conventional hoses. Staff rejected these alternatives for reasons discussed in Section VI., Alternatives Considered. A detailed description of the calculations that staff used to determine these potential economic impacts can be found in Appendix 5.

Were ARB not to require low permeation hoses, a technology widely available and in use in other applications, California motorist would continue to needlessly waste approximately 112,000 gallons of fuel with a levelized annual value of $396,000 while not improving air quality.

Fiscal Impacts – Costs to State and Local Agencies

Section 11346.5 of the Government Code requires State agencies to estimate the cost or savings to any State agency, local agency, or 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.

Staff does not expect the proposed regulation to impose any significant cost on affected GDFs operated by state or local government. As described above, staff estimates that affected government operated GDFs will experience an annual cost savings of approximately $1.00 per fueling point. A detailed description of the calculations that staff used to determine fiscal impacts can be found in Appendix 5.

VI. ALTERNATIVES CONSIDERED

In accordance with Government Code section 11346.5, subdivision (a)(13), ARB must determine that no reasonable alternative it considered or that has otherwise been identified and brought to ARB's attention would be more effective in carrying out the purpose of the proposed regulation or would be as effective and less burdensome to affected private persons than the proposed regulation. This section of the staff report discusses alternatives to the proposed regulation.

A. Four-Year Clock Provision

Staff has considered the following alternatives to the "four-year clock" amendments found in sections 2.4.5 and 2.4.9 of both CP-201 and CP-206.

Option 1: No change to current provision is implemented

ARB declines to make any changes to the current certification procedures (CP-201 and CP-206) regarding effective dates. The Executive Officer continues to use administrative authority to extend the effective date as appropriate in the cases when equipment is not certified by the effective date.

Pro:

- No action needed on the part of ARB.

Con:

- Confusion persists and the uncertainty about the “effective date” and the “four-year clock” would remain, requiring regulatory revisions when the certification of the first system occurs later than expected.
- ARB becomes unresponsive to industry concerns and repeated requests for changes concerning the “effective date” and the “four-year clock.”
- Unnecessary administrative burden for ARB and local district staff continues.
- Opportunity to streamline and improve the program is missed.

Option 2: Continue current program based on adoption of an actual calendar date as the “effective date,” but add a new provision that allows this effective date to be reset in the event that no system becomes certified by this effective date

This option would continue the current practice of establishing an actual calendar date by regulation and the proposal as the “effective date.” However, in the event that the first system is not certified by the effective date, the effective date will default to the date when the first system is certified to meet a given standard or specification. In all cases the “four-year clock” provision applies, giving existing GDFs four years from the effective date to comply.

Pro:

- Would eliminate the need to change the current practice of updating the “effective date” administratively and then later by regulation in the event there no certified system by the effective date.
- Preserves current practice of relying on an actual calendar date as the compliance date.
- Allows for a streamlined, less administratively burdensome mechanism for updating the effective date if necessary.

Con:

- Continued reliance on a pre-determined, fixed calendar date by regulation as the effective date will cause confusion and uncertainty in the event a system is not certified by this date.
- Forces the program to continue to rely on anticipated dates for first-system certification, dates which history shows can be very uncertain.
- Fixing the effective date is not meaningful since delays are caused by factors that are unanticipated at the time of rule adoption.
- Results in additional potentially confusing scenarios where effective dates for systems could include firm calendar dates as well as dates to be determined by future first-system certification.

Option 3: Staff proposal

Staff believes that its proposal that redefines the "effective date" in the regulation as the date when the first system meeting the new performance standard is certified and adds new language which clearly states that the "four-year clock" begins on this redefined "effective date" best addresses all concerns expressed by industry and other stakeholders and preserves the Board's air quality goals for the vapor recovery program.

Pro:

- Improves program implementation by ARB and program enforcement by local districts.
- Provide clarity as to when the "four-year clock" starts for an affected GDF.
- Fully resolves the issues and burden associated with the actions needed to change the effective date administratively and then later by regulation in the event the effective date is not met.
- Fully addresses industry's repeated concerns about the confusion resulting from lack of clarify of effective dates.

Con:

- None.

<u>B. Low Permeation GDF Hose Requirement</u>

Staff has considered several alternatives to the low permeation GDF hose proposal found in section 20 of CP-201 and section 21 of CP-206. The alternative approaches to the current proposal which staff considered include: no action by ARB, requiring balance EVR hoses to incorporate low permeation technology in addition to the other hoses covered in the current proposal, and requiring a different permeation limit than that required in the current proposal.

Option 1: Take no action

There currently exists no state or federal regulation designed to reduce emissions from GDF hoses. Yet, improved hoses exist and are used in other applications.

Pro:

- No action needed on the part of ARB.
- No additional requirement imposed on the affected industry.
- No additional costs of compliance.

Con:

- Unnecessary waste of gasoline fuel by GDF activity in California goes unabated.
- Savings from fuel saved, offsetting compliance costs, are unrealized.
- An opportunity to reduce smog-forming emissions cost-effectively is missed.
- California does not meet its stated commitment for emission reductions specified in the 2007 Ozone SIP.
- Air quality suffers unnecessarily by not taking an action that reduces emissions and saves California motorists money.

Option 2: Implement low permeation standards for all GDF hoses (including balance-type hoses)

Staff considered requiring balance-type EVR hoses to incorporate the same low permeation technology as the vacuum-assist and conventional hoses covered in the current staff proposal. This option was rejected because permeation emissions from balance hoses are much lower than from other types of hoses, and will continue to decrease as the number of ORVR equipped vehicles increases. Therefore, this regulatory action for balance hoses is not justified.

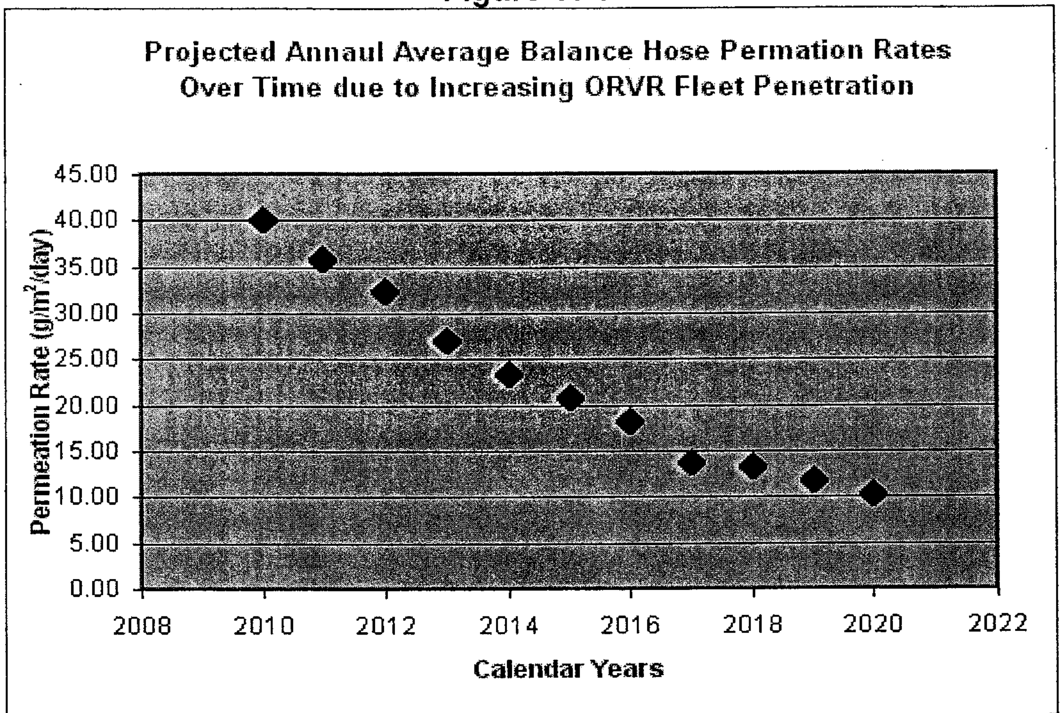
Pro:

- Provides additional emission reduction.
- Simplifies program implementation and enforcement.

Con:

- Diminishing potential for emission reductions in the future since the rate of permeation for balance hoses will decrease due to increasing ORVR-equipped vehicle penetration (Figure VI-1).
- Permeation control technology for balance hoses is unproven at present time.

Figure VI-1



Data taken from ARB's 2011 analysis of GDF balance hose vapor quality (CARB, 2011a).

Option 3: Require a more aggressive permeation limit than the 10 g/m^2/day proposed limit

Staff initially considered adoption of a lower permeation limit than the current proposal of 10 g/m^2/day at 100 °F (38 °C) as tested in accordance with UL 330. This option was rejected for the reasons stated below.

Pro:

- Provides for additional emission reduction.
- Forces hose technology towards greater improvement.

Con:

- A lower permeation limit would provide little additional emission reduction.
- Added technology challenge.
- Lacks the merits of a consensus standard developed by hose manufacturers, material manufacturers, Underwriter's Laboratories, ARB, and the U.S. EPA.

Option 4: Staff Proposal

Staff has determined that adopting the proposed permeation limit of 10 $g/m^2/day$ for GDF hoses that carry liquid fuel against the outer hose wall achieves significant savings to the consumer while at the same time reducing emissions by 96 percent.

Pro:

- Air quality benefits from reduction of smog-forming emissions.
- Prevents unnecessary waste of gasoline fuel.
- Offers savings to California motorists by avoiding paying for fuel that was wasted.
- Consensus standard agreed upon by hose manufacturers, material manufacturers, Underwriters Laboratories, U.S. EPA, and ARB staff.
- Savings fully offset increased costs of compliance.

Con:

- Increase cost of compliance.

VII. CONCLUSION

The proposed amendments will serve to improve the existing EVR program by addressing confusion about the "four-year clock" provision in the regulation and by incorporating necessary but minor improvements and clarifications to certification and test procedures. The amendments will also establish a new permeation limit for GDF hoses, resulting in approximately one tpd of ROG emission reductions and savings to California consumers.

Staff recommends that the Board adopt the following which incorporate the proposal:

1. Amendments to the California Code of Regulations that incorporate by reference the proposed amended and adopted certification and test procedures (Appendix 1); and

2. Amendments to the referenced vapor recovery certification and test procedures (Appendix 2).

IX. REFERENCES

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Appendix 1

Proposed Amendments to California Code of Regulations

PROPOSED REGULATION ORDER

Note: ~~Strikeout~~ indicates deleted text; <u>underline</u> indicates inserted text.

Amend Section 94010, Article 1, Subchapter 8, Chapter 1, Division 3, Title 17 California Code of Regulations (CCR) to read:

§ 94010. Definitions.

The definitions of common terms and acronyms used in the certification and test procedures specified in Sections 94011, 94012, 94013, 94014, 94015, and 94016 are listed in D-200, "Definitions for Vapor Recovery Procedures", adopted April 12, 1996, as last amended ~~May 2, 2008~~ <u>[*Insert amendment date*]</u>, 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.

Amend Section 94011, Article 1, Subchapter 8, Chapter 1, Division 3, Title 17 CCR to read:

§ 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~~ <u>[*Insert amendment date*]).</u>

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~~ <u>[*Insert amendment date*])</u>

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 amendment date*])

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

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~~ [*Insert amendment date*])

TP-201.2J – "Pressure Drop Bench Testing of Vapor Recovery Components" (Adopted: October 8, 2003, as last amended [*Insert amendment date*])

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~~ [*Insert amendment date*])

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.

Amend Section 94016, Article 1, Subchapter 8, Chapter 1, Division 3, Title 17 CCR to read:

§ 94016. Certification of Vapor Recovery Systems at Gasoline Dispensing Facilities Using Aboveground Storage Tanks.

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 May 2, 2008, as last amended [*Insert amendment 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: May 2, 2008)

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: May 2, 2008)

TP-206.3 - "Determination of Static Pressure Performance of Vapor Recovery Systems at Gasoline Dispensing Facilities with Aboveground Storage Tanks" (Adopted: May 2, 2008 as last amended on [*Insert amendment 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-201.2G, 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.

Amend Section 94150, Article 2, Subchapter 8, Chapter 1, Division 3, Title 17 CCR to read:

§ 94150. Test Method for Determining 2 Inch WC Static Pressure Performance of Phase II Vapor Recovery Systems for Dispensing Facilities.

The test method for determining the 2 Inch WC static pressure of Phase II vapor recovery system of dispensing facilities is set forth in the Air Resources Board's TP-201.3, "Determination of 2 Inch WC Static Pressure Performance of Vapor Recovery Systems of Dispensing Facilities" which is incorporated herein by reference. (Adopted: April 12, 1996, as last amended ~~March 17, 1999~~ [*Insert amendment date*])

Note: Sections 39600, 39601, 39607 and 41954, Health and Safety Code. Reference: Sections 39515, 39516, 39605, 40001 and 41954, Health and Safety Code.

Amend Section 94168, Article 2, Subchapter 8, Chapter `, Division 3, Title 17 CCR to read:

§ 94168. Test Method for Determining 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 of Phase II vapor recovery system 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 is incorporated herein by reference. <u>(Adopted: May 2, 2008, as last amended [*Insert amendment date*])</u>

Note: Sections 39600, 39601, 39607 and 41954, Health and Safety Code. Reference: Sections 39515, 39516, 39605, 40001 and 41954, Health and Safety Code.

Appendix 2

Proposed Amendments of Vapor Recovery Certification and Test Procedures

D-200 – "Definitions for Vapor Recovery Procedures" (Adopted April 12, 1996, as last amended ~~May 8, 2008~~ [*Insert amendment date*])

CP-201 – "Certification Procedure for Vapor Recovery Systems at Gasoline Dispensing Facilities" (Adopted December 9, 1975, as last amended ~~May 25, 2006~~ [*Insert amendment date*])

CP-206 – "Certification Procedures for Vapor Recovery Systems at Gasoline Dispensing Facilities Using Aboveground Storage Tanks" (Adopted May 2, 2008, as last amended [*Insert amendment date*])

TP-201.1 – "Volumetric Efficiency for Phase I Systems" (Adopted: April 12, 1996, as last amended ~~October 8, 2003~~ [*Insert amendment date*])

TP-201.2 – "Efficiency and Emission Factor for Phase II Systems" (Adopted: April 12, 1996, as last amended ~~May 2, 2008~~ [*Insert amendment date*])

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

TP-201.2I – "Test Procedure for In-Station Diagnostic Systems" (Adopted: October 8, 2003, as last amended ~~May 25, 2006~~ [*Insert amendment date*])

TP-201.2J – "Pressure Drop Bench Testing of Vapor Recovery Components" (Adopted: October 8, 2003, as last amended October 8, 2003 [*Insert amendment date*])

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~~ [*Insert amendment date*])

TP-206.3 – "Determination of Static Pressure Performance of Vapor Recovery Systems of at Gasoline Dispensing Facilities with Aboveground Storage Tanks" (Adopted: May 2, 2008, as last amended [*Insert amendment date*])

California Environmental Protection Agency

Air Resources Board

PROPOSED

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: May 2, 2008
Amended: [insert amendment date]

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 amendment.

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, 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.

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~~ retention
any liquid gasoline retained in the nozzle's liquid path or the vapor passage of the nozzle/hose assembly, on the atmospheric side of the vapor check valve, that is subject to potential spillage or evaporation.

low permeation hose
a hose that is used to dispense gasoline and complies with the permeation performance standard as determined by UL 330 (seventh edition).

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.

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.

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 Procedure CP-201 or CP-206, or a gasoline dispensing facility constructed as of the operative date of the latest amendments to Certification Procedure 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, as determined using the procedures outlined in TP-201.2F. These emissions do not include transfer emissions at the nozzle/fillpipe interface, ~~nor~~ emissions from the processor, 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.

standing loss control
the control of vapors from ASTs when no Phase I or Phase II gasoline transfers are occurring.

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.

temperature attenuation
a standing loss control for aboveground storage tanks that controls the effects of diurnal ambient temperature or solar radiation on fuel surface temperature.

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

Vapor Recovery Certification Procedure

CP - 201

Certification Procedure for Vapor Recovery Systems at Gasoline Dispensing Facilities

Adopted: December 9, 1975
Amended: March 30, 1976
Amended: August 9, 1978
Amended: December 4, 1981
Amended: September 1, 1982
Amended: April 12, 1996
Amended: April 28, 2000
Amended: February 1, 2001
Amended: June 1, 2001
Amended: July 25, 2001
Amended: July 3, 2002
Amended: March 7, 2003
Amended: July 1, 2003
Amended: October 8, 2003
Amended: August 6, 2004
Amended: February 9, 2005
Amended: May 25, 2006
Amended: [Insert Amendment Date]

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 amendment.

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Air Resources Board

Vapor Recovery Certification Procedure

CP-201

Certification Procedure for Vapor Recovery Systems at Gasoline Dispensing Facilities

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 or CARB" 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 Phase I and Phase II vapor recovery systems, and components, used at Gasoline Dispensing Facilities (GDF) with underground storage tanks. 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-201, is adopted pursuant to Section 41954 of the California Health and Safety Code (CH&SC) and is applicable to vapor recovery systems installed at gasoline dispensing facilities for controlling gasoline vapors emitted during the fueling of storage tanks (Phase I) and the refueling of vehicle fuel tanks (Phase II). Vapor recovery systems are complete systems and shall include all associated dispensers, piping, nozzles, couplers, processing units, underground tanks and any other equipment or components necessary for the control of gasoline vapors during Phase I or Phase II refueling operations at GDF.

1.1 Legislative and Regulatory Requirements of Other State Agencies

As required pursuant to Sections 25290.1.2, 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 Marshall (SFM)

1.1.3 Department of Industrial Relations, Division of Occupational Safety and Health (DOSH)

1.1.4 State Water Resources Control Board (SWRCB)
Division of Water Quality

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, DOSH, and a determination by the SWRCB shall be a precondition to certification by ARB. The applicant is responsible for providing documentation of these approvals and determinations 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, and safety codes and regulations.

2. PERFORMANCE STANDARDS AND SPECIFICATIONS

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-201. 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-201, 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-201. 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 19 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 17.

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. Upon the operative date of 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 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-201, 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 **Any performance standard or specification with an effective date of January 1, 2012 or later shall become effective on the date when the first system is certified to meet the performance standard or specification. The Executive Officer shall maintain, and make available to the public, a current list of effective and operative dates for all standards and specifications.**

2.4.~~5~~6 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 with 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~~7 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 9, inclusive, with the exception of the requirement for compatibility with vehicles that are equipped with Onboard Refueling Vapor Recovery (ORVR) systems as specified in subsection 4.4. 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 from attainment to non-attainment, the facilities will have four years to comply.

2.4.~~7~~8 The gasoline dispensing facility's gasoline throughput for calendar year 2003 shall be used for determining compliance with the Onboard Refueling Vapor Recovery (ORVR) requirements in Table 2-1.

2.4.9 Any person can petition the Executive Officer for an engineering evaluation to determine whether the first system certified to meet a standard or specification cannot be installed and/or operated, or is otherwise incompatible with a specific type or subgroup of GDF. The petitioner shall submit the following information to the Executive Officer:

- **a) The Executive Order and specific EVR component(s) that is claimed to be incompatible,**
- **b) The specific type or subgroup of GDF that is claimed to be incompatible with the specified EVR component(s),**
- **c) A detailed technical explanation of the claimed incompatibility, supported by test data if applicable,**
- **d) An estimate of how many GDFs in California are subject to the claimed incompatibility,**
- **e) An estimate of the cost to modify a typical GDF of the affected type or subgroup so that it would no longer be subject to the claimed incompatibility.**

f) Any other information that the Executive Officer deems reasonable and necessary in conducting the engineering evaluation.

The Executive Officer shall conduct an engineering evaluation and if incompatibility is found, the Executive Officer shall issue an executive order stating the incompatibility between the certified system and the GDF type or subgroup which was the subject of the evaluation. In this event, such GDF type or subgroup is not subject to the standard or specification until such date when the first system is certified that is compatible with that GDF type or subgroup. This provision applies to any standard or specification with an effective date on or after January 1, 2012.

Table 2-1
Effective and Operative Dates for Phase I and Phase II Vapor Recovery Performance Standards and Specifications

Performance Type	Requirement	Sec.	Effective Date	Operative Date
P/V Vent Valve	As specified in Table 3-1	3.5	Not applicable	July 1, 2007
All other Phase I Standards and Specifications	As specified in Table 3-1	3	April 1, 2001	July 1, 2001
ORVR Compatibility for GDF > 2.0 million gal/yr throughput[1]	As specified in section 2.4.7 and section 4.4	4.4	September 1, 2001	April 1, 2003
ORVR Compatibility for GDF ≥ 1.0 million gal/yr throughput[1]	As specified in section 2.4.7 and section 4.4	4.4	January 1, 2002	April 1, 2003
ORVR Compatibility for GDF < 1.0 million gal/yr throughput[1]	As specified in section 2.4.7 and section 4.4	4.4	March 1, 2002	April 1, 2003
Nozzle Criteria	Post-Refueling Drips ≤ 3 drop/refueling	4.7	April 1, 2005	April 1, 2005
Liquid Retention	≤ 350 ml/1,000 gals.	4.8	April 1, 2001	July 1, 2001
Liquid Retention Nozzle Spitting	≤ 100 ml/1,000 gals. ≤ 1.0 ml /nozzle/fueling	4.8	April 1, 2005	April 1, 2005
Spillage (including	≤ 0.24 pounds/1,000 gallons	4.3	April 1, 2005	April 1, 2005

[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).

Performance Type	Requirement	Sec.	Effective Date	Operative Date
drips from spout)				
For GDF > 1.8 mil. gal/yr.	ISD Requirements	9	September 1, 2005	September 1, 2005
For GDF > 600,000 gal/yr.[2]	ISD Requirements	9.1	September 1, 2006	September 1, 2006
Unihose	One Hose/Nozzle per Dispenser Side	4.10	Not applicable	April 1, 2003
All other Phase II Standards and Specifications	As specified in Tables 4-1 through 8-2.	4,5, 6,7,8	April 1, 2005	April 1, 2005
Low Permeation Hoses	**Permeation rate ≤ 10.0 g/m^2/day as determined by UL 330**	**20.1**	**Date when the first applicable low permeation hose is certified**	**Same as the effective date**

[2] GDF ≤ 600,000 gal/yr are exempted from ISD requirements.

3. PHASE I PERFORMANCE STANDARDS AND SPECIFICATIONS

Table 3-1 summarizes the Phase I Performance Standards and Specifications applicable to all Phase I vapor recovery systems.

Table 3-1
Phase I Performance Standards and Specifications
APPLICABLE TO ALL PHASE I VAPOR RECOVERY SYSTEMS

Performance Type	Requirement	Sec.	Std. Spec.	Test Procedure
Phase I Efficiency	$\geq$ 98.0%	3.1	Std.	TP-201.1 TP-201.1A
Phase I Emission Factor	HC $\leq$ 0.15 pounds/1,000 gallons	3.1	Std.	TP-201.1A
Static Pressure Performance	In accordance with section 3.2	3.2	Std.	TP-201.3
Pressure Integrity of Drop-Tube with Overfill Prevention	$\leq$ 0.17 CFH at 2.0 inches H_2O	3.3	Spec.	TP-201.1D
Phase I Product and Vapor Adaptor/Delivery Elbow Connections	Rotatable 360°, or equivalent	3.4	Spec.	TP-201.1B and Eng. Eval.
Phase I Product Adaptor Cam and Groove	As shown in Figure 3A	3.4	Spec.	Micrometer
Phase I Vapor Recovery Adaptor Cam and Groove	CID A-A-59326 (As shown in Figure 3B)	3.4	Spec.	Micrometer
Phase I Vapor Adaptor	Poppetted	3.4	Spec.	Testing and Eng. Eval.
Phase I Vapor Adaptor	No Indication of Leaks Using Liquid Leak Detection Solution (LDS) or Bagging	3.4	Spec.	LDS or Bagging
Phase I Product and Vapor Adaptors	$\leq$ 108 pound-inch (9 pound-foot) Static Torque	3.4	Spec.	TP-201.1B

Table 3-1 (continued)
Phase I Performance Standards and Specifications
APPLICABLE TO ALL PHASE I VAPOR RECOVERY SYSTEMS

Performance Type	Requirement	Sec.	Std. Spec.	Test Procedure
UST Vent Pipe Pressure/Vacuum Valves	Pressure Settings 2.5 to 6.0 inches H_2O Positive Pressure 6.0 to 10.0 inches H_2O Negative Pressure Leakrate at +2.0 inches $H_2O \leq 0.17$ CFH Leakrate at -4.0 inches $H_2O \leq 0.63$ CFH	3.5	Spec.	TP-201.1E CERT
Spill Container Drain Valves	Leakrate ≤ 0.17 CFH at +2.0 inches H_2O	3.6	Spec.	TP-201.2B TP-201.1C TP-201.1D
Vapor Connectors and Fittings	No Indication of Leaks Using Liquid Leak Detection Solution (LDS) or Bagging	3.7	Spec.	LDS or Bagging
Compatibility with Fuel Blends	Materials shall be compatible with approved fuel blends	3.8	Spec.	Testing and Eng. Eval.

3.1 Phase I Efficiency/Emission Factor

3.1.1 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 Systems at Dispensing Facilities).

3.1.2 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).

3.2 Static Pressure Performance

The static pressure performance of Phase I vapor recovery systems not associated with Phase II systems shall be determined in accordance with TP-201.3 (Determination of 2 Inch WC Static Pressure Performance of Vapor Recovery Systems of Dispensing Facilities).

3.2.1 All Phase I systems shall be capable of meeting the performance standard in accordance with Equation 3-1.

3.2.2 The minimum allowable five-minute final pressure, with an initial pressure of two (2.00) inches H_2O, shall be calculated as follows:

[Equation 3-1]

$$P_f = 2e^{\frac{-500.887}{V}}$$

Where:

P_f	=	The minimum allowable five-minute final pressure, inches H_2O
V	=	The total ullage affected by the test, gallons
e	=	A dimensionless constant approximately equal to 2.718
2	=	The initial starting pressure, inches H_2O

3.3 Phase I Drop-Tubes with Over-Fill Prevention Devices

Phase I drop-tube over-fill prevention devices 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 prevention device shall not leak.

3.4 Phase I Vapor Recovery and Product Adaptors

3.4.1 The vapor recovery and product adaptors shall not leak. The vapor recovery and product adaptors, and the method of connection with the delivery elbow, shall be designed so as to prevent the over-tightening or loosening of fittings during normal delivery operations. This may be accomplished by installing a swivel connection on either the storage tank (rotatable adaptor) or delivery elbow side of the equipment, or by anchoring the product and vapor adaptors in such a way that they are not rotated during deliveries, provided the anchoring mechanism does not contribute undue stress to other tank connections. If a delivery elbow with a swivel connection is the preferred method, only cargo tank trucks with those elbows shall deliver to the facility. _The adaptors at such a facility shall be incompatible with a delivery elbow that does not have a swivel.

3.4.2 Phase I product adaptors shall be manufactured in accordance with the cam and groove specification as shown in Figure 3A. Phase I vapor recovery adaptors shall be manufactured in accordance with the cam and groove specification as specified in the Commercial Item Description CID A-A-59326 (shown in Figure 3B). These specifications shall be applicable only to new adaptors and shall not be applied to in-use adaptors.

3.4.3 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 commercial liquid leak detection solution, or by bagging, when the vapor containment space of the underground storage tank is subjected to a non-zero gauge pressure. (Note: leak detection solution will detect leaks only when positive gauge pressure exists.)

3.4.4 The static torque of product and vapor recovery adaptors shall not exceed 108 pound-inch (9 pound-foot) when measured in accordance with TP-201.1B.

3.5 Pressure/Vacuum Vent Valves

The Executive Officer shall certify only those vapor recovery systems equipped with a pressure/vacuum (P/V) valve(s) on the underground storage tank vent pipe(s). Verification of the P/V valve requirements set forth below shall be determined by TP-201.1E CERT, (Leak Rate and Cracking Pressure of Pressure/Vacuum Vent Valves).

3.5.1 The pressure specifications for P/V valves shall be:

Positive pressure setting of 2.5 to 6.0 inches H_2O.
Negative pressure setting of 6.0 to 10.0 inches H_2O.

3.5.2 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.

3.5.3 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.

3.5.4 Phase I Certification test sites shall be configured with a minimum of three P/V valves (i.e., for representativeness), each P/V valve to be configured with an associated ball valve.

3.6 Spill Containers

3.6.1 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 than the UST 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 and Spill Container Drain Valves), whichever is applicable.

3.6.2 Drain valves shall not be allowed in spill containers used exclusively for Phase I vapor connections unless required by other applicable regulations.

3.6.3 Spill Containers shall be maintained in accordance with all applicable requirements.

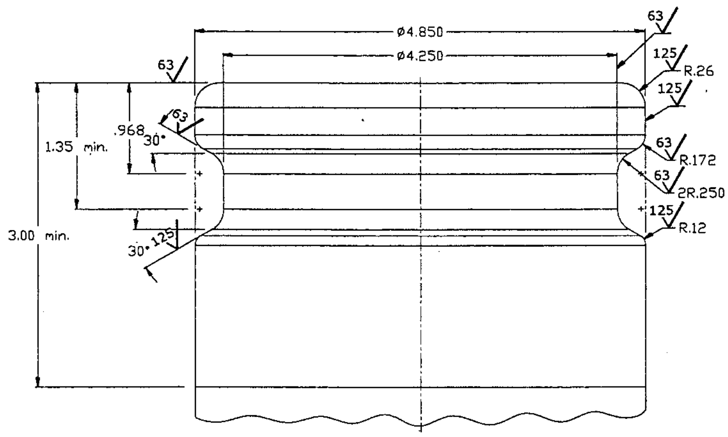
3.7 Vapor Connections and Fittings

All vapor connections and fittings not specifically certified with an allowable leakrate shall not leak. The absence of vapor leaks may be verified by the use of commercial liquid leak detection solution, or by bagging individual components, when the vapor containment space of the underground 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.

3.8 Materials Compatibility with Fuel Blends

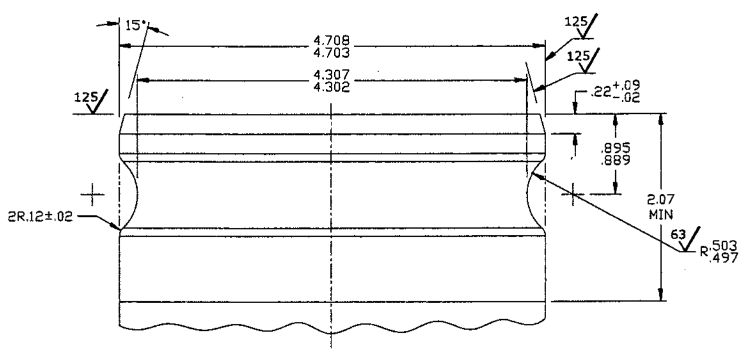
Vapor recovery systems and components shall be compatible with any and all fuel blends in common use in California, including seasonal changes, and approved for use as specified in title 13, CCR, section 2260 et seq. Applicants for certification may request limited certification for use with only specified fuel blends. Such fuel-specific certifications shall clearly specify the limits and restrictions of the certification.

Figure 3A
Phase I Product Adaptor Cam and Groove Specification



UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON DECIMALS
.XXX ± .005
.XX ± .01
ANGLES ± 0.5°

Figure 3B
Phase I Vapor Recovery Adaptor Cam and Groove Specification



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

4. PHASE II PERFORMANCE STANDARDS AND SPECIFICATIONS APPLICABLE TO ALL PHASE II VAPOR RECOVERY SYSTEMS

Table 4-1 summarizes the Phase II Performance Standards and Specifications applicable to all Phase II vapor recovery systems. Phase II vapor recovery systems shall be certified only in facilities equipped with a certified Phase I system.

Table 4-1
Phase II Performance Standards and Specifications
APPLICABLE TO ALL PHASE II VAPOR RECOVERY SYSTEMS

Performance Type	Requirement	Sec.	Std Spec.	Test Procedure
Phase II Emission Factor Includes: Refueling and Vent Emissions Pressure-Related Fugitives	Summer Fuel: 95% Efficiency and HC ≤ 0.38 pounds/1,000 gallons Winter Fuel: 95% Efficiency or HC ≤ 0.38 pounds/1,000 gallons	4.1	Std.	TP-201.2 TP-201.2A TP-201.2F
Static Pressure Performance	In accordance with Section 4.2	4.2	Std.	TP-201.3
Spillage Including Drips from Spout	≤ 0.24 pounds/1,000 gallons	4.3	Std.	TP-201.2C
ORVR Compatibility	~~Interaction when Refueling ORVR Vehicles Shall Meet the applicable Efficiency or Emission Standard, Including ORVR Penetrations to 80%~~ Applicant shall develop a test procedure to demonstrate ORVR compatibility when requested by the Executive Officer.	~~4.1~~ 4.4	Std.	Approved Test Procedure Developed by Mfg.
Liquid Retention Nozzle "Spitting"	≤ 100 ml/1,000 gallons ≤ 1.0 ml per nozzle per test	4.8	Std.	TP-201.2E
ISD	See Section 9	9	Std.	TP-201.2I
Low Permeation Hoses	Permeation Rate ≤ 10.0 g/m^2/day as Determined by UL 330	20	Std.	UL 330 (7th ed)
Phase II Compatibility with Phase I Systems	See Section 4.5	4.5	Spec.	Testing and Eng. Eval.
UST Pressure Criteria (30 day rolling average)	Daily Average Pressure ≤ +0.25 in. H_2O Daily High Pressure ≤ +1.50 in. H_2O	4.6	Spec.	TP-201.7
Nozzle Criteria Each Phase II Nozzle Shall:	Post-Refueling Drips ≤ 3 Drops/Refueling Comply with dimensions specified in section 4.7.3. ~~Have an OD ≤ 0.840 inches for 2.5 inches~~ Be capable of fueling any vehicle that can be fueled with a conventional nozzle	4.7	Spec.	TP-201.2D Engineering Evaluation

Table 4-1 (continued)
Phase II Performance Standards and Specifications
APPLICABLE TO ALL PHASE II VAPOR RECOVERY SYSTEMS

Performance Type	Requirement	Sec.	Std Spec.	Test Procedure
Nozzle/Dispenser Compatibility	Vapor Check Valve Closed When Hung Hold-open Latch Disengaged When Hung	4.9	Spec.	Testing and Eng. Eval.
Unihose MPD Configuration	One Hose/Nozzle per Dispenser Side	4.10	Spec.	Testing and Eng. Eval.
Phase II Vapor Riser	Minimum 1 Inch Nominal ID	4.11	Spec.	Testing and Eng. Eval.
Vapor Return Piping	No Liquid or Fixed Blockage Minimum 3 Inch Nominal ID after First Manifold Recommended Slope ¼ Inch Per Foot Minimum Slope 1/8 Inch Per Foot	4.11	Spec.	Testing and Eng. Eval.
Vapor Return Piping Rigidity	Rigid Piping, or Equivalent Bend Radius Exceeds 6 feet	4.11	Spec.	TP-201.2G
Vapor Return Pipe Runs	~~The~~ Maximum Allowable Lengths of Pipe Runs Shall Be Established During the Certification Process	4.11	Spec.	Testing and Eng. Eval.
Liquid Condensate Traps	Shall have Automatic Evacuation System	4.12	Spec.	Testing and Eng. Eval.
Connectors and Fittings	No Indication of Vapor Leaks with Liquid Leak Detection Solution (LDS) or Bagging	4.13	Spec.	LDS or Bagging

4.1 Phase II Emission Factor/Efficiency

4.1.1 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.

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.

<u>Compliance with the</u> ~~The~~ emission factor **<u>and the efficiency standards</u>** shall **<u>be</u>** demonstrated ~~compliance with the standard~~ when calculated for **<u>a test population consisting of 100 non-ORVR vehicles, selected according to TP-201.2A.</u>** ~~each of these test populations:~~

~~The entire population of 200 vehicles as defined in TP-201.2A~~
~~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."~~

4.1.2 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, underground storage tank vent emissions and pressure-related fugitive emissions. Pressure-related fugitive emissions shall be determined in accordance with TP-201.2F (Pressure-Related Fugitive Emissions). Phase II systems that have underground storage tank (UST) pressures sufficient to cause potential fugitive emissions that exceed fifty percent (50%) of the maximum allowable emission factor shall not be certified.

4.2 Static Pressure Performance

The static pressure performance of Phase II systems, including the associated Phase I system, shall be determined in accordance with TP-201.3 (Determination of 2 Inch WC Static Pressure Performance of Vapor Recovery Systems of Dispensing Facilities).

4.2.1 All Phase II vapor recovery systems shall be capable of meeting the performance standard in accordance with Equation 4-1 or 4-2.

4.2.2 For Phase II Balance Systems, the minimum allowable five-minute final pressure, with an initial pressure of two (2.0) inches H_2O, shall be calculated as follows:

[Equation 4-1]

$$P_f = 2e^{\frac{-760.490}{V}} \quad \text{if } N = 1\text{-}6$$

$$P_f = 2e^{\frac{-792.196}{V}} \quad \text{if } N = 7\text{-}12$$

$$P_f = 2e^{\frac{-824.023}{V}} \quad \text{if } N = 13\text{-}18$$

$$P_f = 2e^{\frac{-855.974}{V}} \quad \text{if } N = 19\text{-}24$$

$$P_f = 2e^{\frac{-888.047}{V}} \quad \text{if } N > 24$$

Where:

N = The number of affected nozzles. For manifolded systems, N equals the total number of nozzles. For dedicated plumbing configurations, N equals the number of nozzles serviced by the tank being tested.
P_f = The minimum allowable five-minute final pressure, inches H_2O
V = The total ullage affected by the test, gallons
e = A dimensionless constant approximately equal to 2.718
2 = The initial starting pressure, inches H_2O

4.2.3 For Phase II Vacuum Assist Systems, the minimum allowable five-minute final pressure, with an initial pressure of two (2.0) inches H_2O, shall be calculated as follows:

[Equation 4-2]

$$P_f = 2e^{\frac{-500.887}{V}} \quad \text{if N = 1-6}$$
$$P_f = 2e^{\frac{-531.614}{V}} \quad \text{if N = 7-12}$$
$$P_f = 2e^{\frac{-562.455}{V}} \quad \text{if N = 13-18}$$
$$P_f = 2e^{\frac{-593.412}{V}} \quad \text{if N = 19-24}$$
$$P_f = 2e^{\frac{-624.483}{V}} \quad \text{if N} > 24$$

Where:

N = The number of affected nozzles. For manifolded systems, N equals the total number of nozzles. For dedicated plumbing configurations, N equals the number of nozzles serviced by the tank being tested.
P_f = The minimum allowable five-minute final pressure, inches H_2O
V = The total ullage affected by the test, gallons
e = A dimensionless constant approximately equal to 2.718
2 = The initial starting pressure, inches H_2O

4.2.4 Under no circumstances shall Phase II components be partially or completely immersed in water to check for pressure integrity.

4.3 Spillage

The Executive Officer shall not certify vapor recovery systems that cause excessive spillage.

4.3.1 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:
All refueling events;

Refueling operations terminated before activation of the primary shutoff; and
Refueling events terminated by activation of the primary shutoff.

4.3.2 The number of self-service refueling operations observed during certification testing of any system for spillage shall be not less than:

1,000 refueling operations [not including topoffs]; and
400 fill-ups [terminated by full tank shut-off, not including topoffs].

4.3.3 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.

4.4 Compatibility of Phase II Systems with Vehicles Equipped with ORVR Systems

~~4.4.1 When refueling vehicles equipped with onboard refueling vapor recovery (ORVR), the Phase II system shall meet the criteria as specified in section 4.1.~~

~~4.4.2 Compatibility shall be demonstrated for typical and worst case situations and vehicle populations, up to and including 80% ORVR-equipped vehicles. 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.~~

~~4.4.3~~ The applicant, when requested by the Executive Officer, ~~system manufacturer~~ shall develop ~~be responsible for developing~~ a test procedure by which ORVR compatibility can be demonstrated. This procedure is subject to an engineering evaluation by the Executive Officer. ~~; if it is deemed inadequate and/or unusable, the certification application shall be deemed unacceptable.~~

4.5 Compatibility of Phase II Systems with Phase I Systems

4.5.1 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 3, and tested pursuant to Section 13.

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 13 as well as an evaluation of the UST pressure profiles generated during the certification tests. 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 ARB 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).

Repeated component test failures may lead to a determination of incompatibility during the 180-day operational test.

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 ARB.

4.5.2 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.

4.6 Underground Storage Tank Pressure Criteria

Phase II systems that have underground storage tank (UST) pressures sufficient to cause potential fugitive emissions that exceed fifty percent (50%) of the maximum allowable emission factor shall not be certified. In addition, the following criteria shall apply to all Phase II systems.

4.6.1 The vapor recovery system pressure data shall be evaluated so that periods during which system pressure changes directly attributable to Phase I equipment or operations that do not comply with Sections 4.1.2 and/or 4.1.3 of CP-204 are not used to determine failure of the Phase II system to meet the system pressure criteria.

4.6.2 If the vapor recovery system pressure does not deviate from atmospheric pressure except for those excursions attributable to Phase I operations, the integrity of the vapor recovery system shall be presumed to be inadequate.

4.6.3 The daily average pressure shall be computed as follows:

Zero and negative pressure shall be computed as zero pressure; and
Time at positive and zero pressures shall be included in the calculation.
(Example: 6 hours at +1.0 inches H_2O and 18 hours at -1.0inches H_2O yields an average daily pressure of 0.25 inches H_2O.)

4.6.4 The daily high pressure shall be computed as follows:

Zero and negative pressure shall be computed as zero pressure;
Time at positive and zero pressures shall be included in the calculation;
The average positive pressure for each hour shall be calculated; and
The highest hour is the daily high pressure for the day.

4.6.5 A rolling 30 day average of the daily average pressures and the daily high pressures for each day shall be calculated by averaging the most current daily value with the appropriate values for the previous 29 days. These 30-day rolling averages shall meet the following criteria:

The daily average pressure shall not exceed +0.25 inches H_2O.
The daily high pressure shall not exceed +1.5 inches H_2O.

4.6.6 Pressure readings shall be taken in accordance with TP-201.7 (Continuous Pressure Monitoring). Other methods of data collection and analysis may be used with prior approval of the Executive Officer.

4.7 Nozzle Criteria

4.7.1 Each vapor recovery nozzle shall be capable of refueling any vehicle that complies with the fillpipe specifications and can be fueled by a conventional nozzle.

4.7.2 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).

4.7.3 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.

4.7.4 Additional nozzle criteria are contained in Sections 5 and 6.

4.7.5 A minimum of 10 nozzles must be tested for determination of post fueling drips.

4.8 Liquid Retention

4.8.1 Liquid retention in the nozzle and vapor path on the atmospheric pressure 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).

4.8.2 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).

4.8.3 The number of self-service refueling operations observed during certification testing of any system for liquid retention **and spitting** shall be not less than:

10 refueling operations per nozzle (not including topoffs); and
4 fill-ups (terminated by automatic shut-off, not including topoffs).

4.8.4 A minimum of 10 nozzles must be tested for determination of liquid retention **and spitting**.

4.9 Nozzle/Dispenser Compatibility

The nozzle and dispenser shall be compatible as follows:

4.9.1 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.

4.9.2 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.

4.10 Unihose Multi-Product Dispenser (MPD) Configuration

There shall be only one hose and nozzle for dispensing gasoline on each side of an unihose ~~multi-product dispenser (~~MPD~~)~~. This shall not apply to facilities installed prior to April 1, 2003 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.

4.11 Vapor Return Piping

The requirements of Sections 4.11.1 through 4.12.2 for the vapor return piping and, if applicable, condensate traps, from the dispenser riser to the underground storage tank, shall apply to any facility installed after April 1, 2003.

4.11.1 The vapor return piping from any fueling point to the underground storage tank shall be free of liquid or fixed blockage.

4.11.2 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.

4.11.3 All new 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, including the float vent valve, if applicable. Facilities permitted by a local district prior to the adoption date of this procedure 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.

4.11.4 Wherever feasible, the recommended minimum slope of the vapor return piping, from the dispensers to the tank, shall be at least one-fourth (1/4) inch per foot of run. The minimum slope, in all cases, shall be at least one-eighth (1/8) inch per foot of run.

4.11.5 ~~v~~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), 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 (Bend Radius Determination for Underground Storage Tank Vapor Return Piping).

4.11.6 The Executive Officer shall determine, by testing and/or engineering evaluation, the maximum allowable length of vapor return piping for the system.

4.12 Liquid Condensate Traps

Liquid condensate traps (also known as knockout pots and thief ports) are used to keep the vapor return piping clear of liquid when it is not possible to achieve the necessary slope from the dispenser to the underground storage tank.

4.12.1 Liquid condensate traps shall be used only when the minimum slope requirements of 1/8" per foot of run cannot be met due to the topography.

4.12.2 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.

4.13 Connections and Fittings

All connections, fittings, or components not specifically certified with an allowable leakrate shall not leak. Vapor leaks may be determined by the use of commercial leak detection solution, or by bagging individual components, when the vapor containment space of the underground storage tank is subjected to a non-zero gauge pressure. (Note: leak detection solution will detect vapor leaks only when a positive gauge pressure exists). The absence of liquid leaks may be verified by visual inspection for seepage or drips.

5. PHASE II PERFORMANCE STANDARDS AND SPECIFICATIONS APPLICABLE TO BALANCE VAPOR RECOVERY SYSTEMS

Table 5-1 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 and 4, and the applicable requirements in Sections 7 and 8.

Table 5-1
Phase II Performance Standards and Specifications
APPLICABLE TO PHASE II BALANCE VAPOR RECOVERY SYSTEMS

Performance Type	Requirement	Sec.	Std Spec.	Test Procedure
Nozzle Criteria Each Balance Nozzle Shall:	Have an Insertion Interlock Be Equipped with a Vapor Valve	5.1	Spec.	Testing and Eng. Eval.
Insertion Interlock	Verification of No Liquid Flow Prior to Bellows Compression	5.1	Spec.	Testing and Eng. Eval.
Vapor Check Valve Leakrate	$\leq$ 0.07 CFH at 2.0 inches H_2O	5.1	Spec.	TP-201.2B
Bellows Insertion Force	Pounds (force) to Retaining Device Specified by Applicant and Verified During Certification Testing	5.1	Spec.	Testing and Eng. Eval.
Nozzle Pressure Drop	ΔP at 60 CFH of $N_2 \leq$ 0.08 inches H_2O	5.2	Std.	TP-201.2J
Hose Pressure Drop [Including Whip Hose]	ΔP at 60 CFH of $N_2 \leq$ 0.09 inches H_2O	5.2	Std.	TP-201.2J
Breakaway Pressure Drop	ΔP at 60 CFH of $N_2 \leq$ 0.04 inches H_2O	5.2	Std.	TP-201.2J
Dispenser Pressure Drop	ΔP at 60 CFH of $N_2 \leq$ 0.08 inches H_2O	5.2	Std.	TP-201.2J
Swivel Pressure Drop	ΔP at 60 CFH of $N_2 \leq$ 0.01 inches H_2O	5.2	Std.	TP-201.2J
Pressure Drop Phase II Riser to Tank [Including Vapor Return Line Impact Valve)	ΔP at 60 CFH of $N_2 \leq$ 0.05 inches H_2O	5.2	Std.	TP-201.4
Pressure Drop from Nozzle to UST	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	5.2	Std.	TP-201.4
Liquid Removal Systems	Capable of Removing 5 ml/ gal. (average)	5.3	Std.	TP-201.6

5.1 Balance Nozzle Criteria

Nozzles for use with balance systems shall comply with all of the criteria in Section 4.7, as well as all the criteria below.

5.1.1 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.

5.1.2 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.

5.1.3 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 bellows compression force in the certification application. This procedure is subject to engineering evaluation and approval by the Executive Officer.

5.2 Dynamic Pressure Drop Criteria for Balance Systems

5.2.1 The dynamic pressure drop for balance systems shall be established in accordance with TP-201.4 (Dynamic Back Pressure). The dynamic pressure drop standards from the tip of the nozzle spout to the underground 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.

5.2.2 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

The dynamic pressure drop for the balance system vapor return line, including the impact valve, shall not exceed the following:

Phase II Riser to UST:	0.05 inches H_2O

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.

5.3 Liquid Removal Systems

Liquid removal systems shall be required in configurations that would otherwise be subject to liquid blockage.

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.

6.0 PHASE II PERFORMANCE STANDARDS AND SPECIFICATIONS APPLICABLE TO ALL ASSIST VAPOR RECOVERY SYSTEMS

Table 6-1 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, 4 and the applicable requirements in Sections 7 and 8.

Table 6-1
Phase II Performance Standards and Specifications
APPLICABLE TO ALL PHASE II VACUUM ASSIST SYSTEMS

Performance Type	Requirement	Sec.	Std. Spec.	Test Procedure
Nozzle Criteria Each Assist Nozzle Shall:	Possess a Mini-Boot Have an Integral Vapor Valve	6.1	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	6.1	Spec.	TP-201.2B
Nozzle Pressure Drop Specifications ΔP at Specified Vacuum Level	Specified by Applicant and Verified During the Certification Process	6.1	Spec.	TP-201.2J
Maximum Air to Liquid Ratio	1.00 (without processor) 1.30 (with processor)	6.2	Std.	TP-201.5
Air to Liquid Ratio Range	Specified by Applicant and Verified During the Certification Process	6.2	Spec.	TP-201.5

6.1 Nozzle Criteria

6.1.1 Nozzles for use with assist systems shall comply with all of the criteria in Section 4.7, as well as all the criteria below.

6.1.2 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.

6.1.3 Each assist nozzle shall be equipped with a vapor valve. The leakrate for the vapor valve shall not exceed the following:

0.038 CFH at a pressure of +2.0 inches H_2O; and
0.10 CFH at a vacuum of −100 inches H_2O.

6.1.4 The nozzle pressure drop shall be specified by the applicant and verified during the certification process.

6.2 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); and
1.30 (with processor).

7. PHASE II PERFORMANCE STANDARDS AND SPECIFICATIONS APPLICABLE TO ASSIST SYSTEMS UTILIZING A CENTRAL VACUUM UNIT

Table 7-1 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, 6 and, if applicable, Section 8.

Table 7-1
Phase II Performance Standards and Specifications
APPLICABLE TO ALL PHASE II ASSIST SYSTEMS UTILIZING A CENTRAL VACUUM UNIT

Performance Type	Requirement	Sec.	Std. Spec.	Test Procedure
Specification of Minimum and Maximum Vacuum Levels	Specified by Applicant and Verified During the Certification Process	7.1	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	7.2	Spec.	TP-201.5

7.1 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.

7.2 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).

8. PHASE II PERFORMANCE STANDARDS AND SPECIFICATIONS APPLICABLE TO SYSTEMS UTILIZING A DESTRUCTIVE OR NON-DESTRUCTIVE PROCESSOR

Tables 8-1 and 8-2 summarize the performance standards and specifications specifically applicable to Phase II vapor recovery systems utilizing a processor. These systems are also subject to all of the standards and specifications in Sections 3 and 4 and, the applicable provisions of Sections 5, 6, and 7.

Table 8-1
Phase II Performance Standards and Specifications
APPLICABLE TO ALL PHASE II SYSTEMS UTILIZING A DESTRUCTIVE PROCESSOR

Performance Type	Requirement	Sec.	Std. 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	8.1, 8.2	Std.	TP-201.2H
Maximum HC Rate from Processor	≤ 5.7 lb/1,000 gallons (in breakdown mode)	8.3	Spec.	Testing and Eng. Eval.
Typical Load on Processor	Specified by Applicant and Verified during the Certification Process	8.4	Spec.	Testing and Eng. Eval.
Processor Operation Time	Specified by Applicant and Verified during the Certification Process	8.5	Spec.	Testing and Eng. Eval.

Table 8-2
Phase II Performance Standards and Specifications
APPLICABLE TO ALL PHASE II SYSTEMS
UTILIZING A NON-DESTRUCTIVE PROCESSOR

Performance Type	Requirement	Sec.	Std. Spec.	Test Procedure
Maximum HC Rate from Processor	≤ 5.7 lb/1,000 gallons (in breakdown mode)	8.3	Spec.	Testing and Eng. Eval.
Typical Load on Processor	Specified by Applicant and Verified during the Certification Process	8.4	Spec.	Testing and Eng. Eval.
Processor Operation Time	Specified by Applicant and Verified during the Certification Process	8.5	Spec.	Testing and Eng. Eval.

8.1 Processor Emission Factors

The emission factors shall be established in accordance with TP-201.2 (Efficiency and Emission Factor for Phase II Systems).

8.2 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).

8.3 Maximum Hydrocarbon Feedrate from the Processor

The maximum Hydrocarbon feedrate from the processor, in breakdown mode, shall not exceed 5.7 pounds per 1,000 gallons.

8.4 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.

8.5 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.

9. IN-STATION DIAGNOSTIC SYSTEMS

9.1 General Requirements

9.1.1 All GDF vapor recovery systems, unless specifically exempted, shall be equipped with an In-Station Diagnostic (ISD) system. Gasoline dispensing facilities that dispense less than or equal to 600,000 gallons per year are exempted from ISD requirements.

9.1.2 All GDF vapor recovery systems shall be equipped with an ISD system or device that has the capability to automatically prohibit the dispensing of fuel and has the capability to automatically inform the station operator in the event of either a malfunction, failure, or degradation of the system as defined below in Section 9.2.

9.1.3 All ISD systems shall be equipped with an RS232 port to remotely access ISD status information using standardized software.

9.1.4 The ISD manufacturer shall provide a means of testing and calibrating the sensors or devices installed on the GDF vapor recovery ISD system, including procedures for verifying that the ISD system operates properly. The means of testing and calibration shall be verified and subjected to challenge mode testing during the certification process.

9.1.5 Personnel trained and certified by the Executive Order certification holder, ISD manufacturers, or California Contractors State License Board shall test and calibrate the installed vapor recovery ISD system sensors or devices annually, at a minimum, with test equipment calibrated to National Institute of Standards and Technology-traceable standards. The minimum annual calibration frequency requirement may be waived and replaced with a frequency to be determined during certification testing if the ISD system manufacturer demonstrates equivalent self testing and automatic calibration features. All vapor recovery ISD system sensors or devices not performing in conformance with the manufacturer's specifications shall be promptly repaired or replaced.

9.1.6 Subject to the Executive Officer approval, other monitoring strategies may be used provided the manufacturer provides a description of the strategy and supporting data showing such strategy is equivalent to these requirements. Information such as monitoring, reliability, and timeliness shall be included.

9.1.7 The vapor recovery ISD system shall include self-testing including the ISD system and sensors that will be verified during the certification process.

9.1.8 The ISD system shall maintain an electronic archive of monthly reports for a period of 12 months and an archive of daily reports for the last rolling 365 days.

9.1.9 The vapor recovery ISD system shall be operational a minimum of ninety five percent (95%) of the time, based on an annual basis or prorated thereof, and shall record the percentage of ISD up-time on a daily basis.

9.1.10 The Executive Officer shall, during certification testing, verify that the system is capable of detecting failures (of a size defined in each subsection, below) with at least a 95% probability while operating at no more than a 1% probability of false alarms. A false alarm occurs when the ISD system issues an alarm, but the vapor recovery system is functioning normally; i.e., the vapor recovery system is operating within the parameter limits required by CP-201 and specified in its Executive Orders.

9.1.11 Certification testing shall be performed in accordance with TP-201.2I (Test Procedure for In-Station Diagnostic Systems).

9.2 Monitoring Requirements

9.2.1 Air/Liquid (A/L) Ratio Vapor Collection Monitoring

(a) Requirement

The GDF vapor recovery ISD system shall monitor the Air to Liquid (A/L) ratio for vapor recovery systems which have A/L limits required by Section 6 and specified in their Executive Orders.

(b) Malfunction Criteria – Gross Failure

The GDF vapor recovery ISD system shall assess, on a daily basis, based on a minimum of 15 non-ORVR dispensing events, when the A/L ratio is at least 75% below the lower certified A/L ratio or at least 75% above the upper certified A/L ratio, shall activate a warning alarm, and shall record the event. This condition must be detected with a probability of 95%. If fewer than 15 non-ORVR dispensing events occur in a day, the ISD system may accumulate events over an additional day or days until a minimum of 15 non-ORVR events is reached. When two such consecutive failed assessments occur, the ISD system shall activate a failure alarm, record that event, and prohibit fuel dispensing from the affected fueling point(s). The ISD system shall have the capability of re-enabling dispensing, and shall record that event.

For example, for a vapor recovery system that is certified to operate with an A/L ratio between 0.9 and 1.0, a failed assessment shall occur if the daily A/L ratio is less than or equal to .22 (25% of .9) or if the daily ratio is greater than or equal to 1.75 (75% more than 1.0). When the ISD system assesses two consecutive failures, the ISD system shall activate an alarm.

(c) Malfunction Criteria - Degradation

The GDF vapor recovery ISD system shall assess, on a weekly basis, based on a minimum of 30 non-ORVR dispensing events, when the A/L ratio is at least 25% below the lower certified A/L ratio or at least 25% above the upper certified A/L ratio, shall activate a warning alarm, and shall record the event. This condition must be detected with a probability of 95%. If fewer than 30 non-ORVR dispensing events occur in a week, the ISD system may accumulate events over an additional day or days until a minimum of 30 non-ORVR events is reached. When two such consecutive failed assessments occur, the ISD system shall activate a failure alarm, record that event, and prohibit fuel dispensing from the affected fueling point(s). The ISD system shall have the capability of re-enabling dispensing, and shall record that event.

For example, for a vapor recovery system that is certified to operate with an A/L ratio between 0.9 and 1.0, a failed assessment shall occur if the weekly A/L ratio is less than or equal to .68 (75% of .9) or if the weekly ratio is greater than or equal to 1.25 (25% more than 1.0). When the ISD system assesses two consecutive failures, the ISD system shall activate an alarm.

9.2.2 Balance Performance Vapor Collection Monitoring

(a) Requirement

The GDF vapor recovery ISD system shall monitor vapor collection performance for balance vapor recovery systems. Vapor collection performance is defined as the amount of vapor collected relative to fuel dispensed to a non-ORVR vehicle. The baseline vapor collection performance is established during certification as described in TP-201.2I.

(b) Malfunction Criteria

The GDF vapor recovery ISD system shall assess, on a daily basis, based on a minimum of 15 non-ORVR dispensing events, when the vapor collection performance is less than 50%, shall activate a warning alarm, and shall record the event. The vapor collection performance can be monitored using flowmeters, pressure transducers, liquid sensors or any other means that indicates a 50% vapor collection decrease from the baseline. This condition must be detected with a probability of 95%. If fewer than 15 non-ORVR dispensing events occur in a day, the ISD system may accumulate events over an additional day or days until a minimum of 15 non-ORVR events is reached. When two such consecutive failed assessments occur, the ISD system shall activate a failure alarm, record that event, and prohibit fuel dispensing from the affected fueling point(s). The ISD system shall have the capability of re-enabling dispensing, and shall record that event.

9.2.3 Central Vacuum Unit Monitoring

(a) Requirement

The GDF vapor recovery ISD system shall verify that the central vacuum unit is operating within the specified range by measuring and recording the vacuum at a minimum of one reading every minute.

(b) Malfunction Criteria

The GDF vapor recovery ISD system shall assess, on a continuous rolling 20 minute basis, when a vacuum failure occurs as determined by the Executive Officer for each Phase II system, shall activate a failure alarm, record the event, and prohibit fuel dispensing from the affected fueling point(s). This condition must be detected with a probability of 95%. The ISD system shall have the capability of re-enabling dispensing and will disable the central vacuum unit monitoring for 24 hours, and shall record that event.

9.2.4 Ullage Pressure Vapor Containment Monitoring

(a) Requirement

The GDF vapor recovery ISD system shall measure and record the pressure of each UST ullage at a minimum of one reading every minute. One pressure monitoring device may be used for multiple USTs that have common vapor recovery piping.

(b) Malfunction Criteria – Gross Failure

The GDF vapor recovery ISD system shall assess, on a weekly basis, when the UST ullage pressure exceeds 1.5" wcg for at least 5% of the time, shall activate a warning alarm, and shall record the event. This condition must be detected with a probability of 95%. When two such consecutive failed assessments occur, the ISD system shall activate a failure alarm, record that event, and prohibit fuel dispensing from the affected fueling point(s). The ISD system shall have the capability of re-enabling dispensing, and shall record that event.

(c) Malfunction Criteria – Degradation

The GDF vapor recovery ISD system shall assess, on a monthly basis, when the UST ullage pressure exceeds 0.50" wcg for at least 25% of the time, shall activate a warning alarm, and shall record the event. This condition must be detected with a probability of 95%. When two such consecutive failed assessments occur, the ISD system shall activate a failure alarm, record that event, and prohibit fuel dispensing from the affected fueling point(s). The ISD system shall have the capability of re-enabling dispensing, and shall record that event.

(d) Malfunction Criteria – Pressure Integrity

The ISD system shall detect the potential for excessive rates of vapor leakage from the UST system. The ISD system shall assess, on a weekly basis, when the vapor recovery system leaks at a rate which is at least 2 times the rate allowed in section 4.2, shall activate a warning alarm, and shall record the event. This condition must be detected with a probability of 95%. When two such consecutive failed assessments occur, the ISD system shall activate a failure alarm, record that event, and prohibit fuel dispensing from the affected fueling point(s). The ISD system shall have the capability of re-enabling dispensing, and shall record that event.

9.2.5 Vapor Processing Monitoring

(a) Requirement

The GDF vapor recovery ISD system shall verify that the processor is functioning properly as specified in Section 8 and the Executive Order.

(b) Malfunction Criteria

The GDF vapor recovery ISD system shall assess, on a daily basis, when the vapor processor is malfunctioning as defined in the Executive Order, shall activate a warning alarm, and shall record the event. When two such consecutive failed assessments occur, the ISD system shall activate a failure alarm, record that event, and prohibit fuel dispensing from the affected fueling point(s). The ISD system shall have the capability of re-enabling dispensing, and shall record that event.

9.3 Records

9.3.1 The GDF vapor recovery ISD system shall generate a monthly report which includes the following:

(a) ISD operational time (as a percentage);
(b) Vapor Recovery system's operating requirements;
(c) Vapor recovery system pass time (as a percentage);
(d) ISD monitoring requirements;
(e) Warnings - this shall include the time and date;
(f) Failures - this shall include the time and;
(g) Event log describing re-enabling action taken - this shall include the time and date; and the time and date the ISD system clock was adjusted.

9.3.2 The GDF vapor recovery ISD system shall generate a monthly printout version on demand which includes the following:

(a) ISD operational time (as a percentage);
(b) Vapor recovery system pass time (as a percentage);
(c) Warnings - this shall include the time and date of the last ten warnings in the selected month;
(d) Failures - this shall include the time and date of the last ten failures in the selected month;
(e) Event Log - this shall include the time and date of the last ten logged exception events in the selected month including re-enabling actions taken and any ISD system clock adjustments.

9.3.3 The GDF vapor recovery ISD system shall generate a daily report which includes the following:

(a) Record of the percentage of ISD up-time on a daily basis;
(b) Highest ullage pressure;
(c) Lowest ullage pressure;
(d) 75th percentile ullage pressure;
(e) 95th percentile ullage pressure;
(f) Daily measured values of each fueling point; and
(g) Daily pass or fail assessment for each fueling point, and
(h) Processor Assessment.

9.3.4 Daily reports (as outlined in Section 9~~10~~.3.3) and monthly printout versions (as outlined in Section 9~~10~~.3.2) shall be available for printing, on demand, at the GDF site from the integral ISD printer. Daily reports shall be available for printing for the previous 30 days. Monthly printout versions shall be available for printing for the previous 12 months.

9.3.5 The ISD system shall store the electronic records of the monthly reports, monthly printout versions, and daily reports, such that the records are maintained despite loss of power to the ISD system.

9.4 Tampering Protection

The GDF vapor recovery ISD system sensors or devices shall be designed and installed in a manner designed to resist unauthorized tampering and to clearly show by visual inspection if tampering has occurred. The ISD system shall be designed and installed so that the station can not dispense fuel unless the ISD system is operating. The manufacturer shall include measures to prevent tampering of the GDF vapor recovery ISD system in the application. All tampering features are subject to Executive Officer approval.

9.5 Readiness/Function Code

The GDF vapor recovery ISD system shall store a code upon first completing a full diagnostic check of all monitored components and systems. This is applicable when the GDF vapor recovery ISD system is initially installed or when power is restored.

9.6 Stored Vapor Recovery System Conditions

Upon detection of a vapor recovery component or system failure the GDF vapor recovery system conditions shall be stored in computer memory. Subject to Executive Officer approval, stored GDF vapor recovery system conditions shall include, but are not limited to, the time, date, which fueling point was shut down (if applicable), and the fault code.

9.7 Challenge Mode Testing

The Executive Officer shall conduct, or shall contract for and observe, challenge mode testing using test procedures to verify that the ISD system can detect various types of failures, record the incidence of such failures, and respond accordingly with alarms and/or by prohibiting fuel dispensing, as applicable. The ISD system shall have the capability of re-enabling dispensing, and shall record that event. Challenge mode testing shall include verification that interaction with ORVR-equipped vehicles will not cause the ISD to inappropriately identify a failure condition. ISD systems with false positive determinations in excess of one percent (1%) shall not be certified.

9.8 Electronic Access

The monthly and daily reports shall be made available on demand through an RS-232 serial port on a standardized data link connector. All ISD reports shall be electronically accessible with standardized software.

10. 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 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 11
(b)	Evaluation of the Application	Section 12
(c)	Vapor Recovery System Certification Testing	Section 13
(d)	Alternate Test and Inspection Procedures	Section 14
(e)	Documentation of Certification	Section 15
(f)	Duration and Conditions of Certification	Section 16
(g)	Certification Renewal	Section 17
(h)	Amendments to Executive Orders	Section 18

10.1 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.

11. 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 Phase I or Phase II vapor recovery system 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 complies, and demonstrate that the proposed system meets the primary performance standard(s) or specification(s) required by sections 3 through 9 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 50 vehicles demonstrating adequate collection, and for at least 200 observations of spillage (including at least 40 percent fill~~s~~-ups), or equivalent verification that the system is capable of meeting the performance standards and specifications.

The system, 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 for certification testing. If the preliminary application is deemed unacceptable, applicants will 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 manufacturer shall demonstrate, to the satisfaction of the Executive Officer, that the GDF vapor recovery ISD system complies with the performance standards under actual field conditions and simulated failures. Such demonstrations shall include the submission of test results with the certification application.

Estimated timelines for evaluation of certification applications are provided below.

Table 11-1
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	Notification of Deficiencies
Application Resubmitted	30 days	Acceptable	Preliminary Re-Application Accepted Test site Approval Granted
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 (§11.1)
(b) Description of In-Station Diagnostics System (§11.2)
(c) Materials Compatibility with Fuels (§11.3)
(d) Evidence of Compatibility of the System (§11.3)
(e) Evidence of Reliability of the System (§11.4)
(f) Installation and Maintenance Requirements of the System (§11.5)
(g) Evidence of Financial Responsibility of the Applicant (§11.6)
(h) A C~~c~~opy of the W~~w~~arranty (§11.7)
(i) Request for and I~~i~~nformation about P~~p~~roposed T~~t~~est S~~s~~tation (§11.8)
(j) Notification of System Certification Holder, if applicable (§11.9)
(k) Equipment Defect Identification and Test Protocols (§11.10)
(l) Challenge Modes and Test Protocols (§11.11)
(m) Other Information (§11.12)

11.1 Description of Vapor Recovery System

The application shall include a complete description of the system concept, design and operation, including, but not limited to, the following items.

11.1.1 Identification of critical system operating parameters. An engineering evaluation of the system will be performed by ARB to evaluate any proposed specifications and to establish additional performance specifications if required.

11.1.2 Engineering drawings of system, components, and underground piping and tank configurations for which certification is requested.

11.1.3 Engineering parameters for dispenser vapor system control boards and/or all vapor piping, pumps, nozzles, hanging hardware, vapor processor, etc.

11.1.4 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.

11.1.5 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.

11.1.6 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.

11.1.7 If the application is for an innovative system, the applicant shall identify the performance standard(s) or specification(s) with which the system does not comply. The applicant shall supply any necessary alternative test procedures, and the results of tests demonstrating that the system complies with the emission factor/efficiency. The applicant shall also supply test results demonstrating that the emission benefits of the innovation are greater than the consequences of failing to meet the identified performance standard or specification.

11.1.8 Any additional specifications of the system including, but not limited to, underground pipe sizes, lengths, fittings, volumes, material(s), etc.

11.1.9 Estimated retail price of the system.

11.1.10 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.

11.2 Description of In-Station Diagnostics (ISD)

The applicant shall include the following documentation with the certification application.

11.2.1 A written description of the functional operation of the GDF vapor recovery ISD system.

11.2.2 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.

11.2.3 A logic flowchart describing the general method of detecting malfunctions for each monitored emission-related component or system.

11.2.4 A written detailed description of the recommended inspection and Maintenance procedures, including inspection intervals that will be provided to the gasoline dispensing facility operator.

11.2.5 A written detailed description of the training plan to train and certify system testers, repairers, installers, and rebuilders.

11.2.6 A written description of the manufacturer's recommended quality control checks.

11.2.7 A written description of calibration and diagnostic checks.

11.2.8 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.

11.3 Compatibility

11.3.1 The applicant shall submit evidence of system compatibility, including the following:

11.3.2 A procedure developed by the applicant for demonstrating compatibility between the Phase II vapor recovery system and ORVR-equipped vehicles shall be submitted, along with the test results demonstrating compatibility. The procedure shall comply with the provisions in Section 4.4.

11.3.3 Evidence demonstrating the compatibility of the Phase II system with any type of Phase I system with which the applicant wishes the Phase II system to be certified, as specified in Section 4.5. Continuous recordings of pressure readings in the underground storage tank, as well as challenge mode tests, may be used for this demonstration.

11.3.4 Evidence that the system can fuel any vehicle meeting state and federal fillpipe specifications and capable of being fueled by a non-vapor-recovery nozzle.

11.3.5 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 3.8. 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.

11.4 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:

11.4.1 The expected life of system and components.

11.4.2 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.

11.4.3 Identification of and emission impact of possible failures of system, including component failures

11.4.4 Procedure and criteria for factory testing (integrity, pressure drop, etc.)

11.5 Installation, Operation, and Maintenance of the System

The installation, operation, and maintenance plan shall be submitted, and shall include at least the following items:

11.5.1 Installation, operation, and maintenance manuals of the system, including the ISD.

11.5.2 A plan for training installers in the proper installation of the system.

11.5.3 A replacement parts program.

11.5.4 The estimated installation costs and yearly maintenance costs.

11.6 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 16 and to demonstrate the ability to pay for certification tests.

11.7 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 16.

11.8 Test Station

11.8.1 The vapor recovery system shall be installed and tested in an operating gasoline dispensing facility for the purpose of certification testing.

11.8.2 The applicant shall make arrangements for the vapor recovery system to be installed in an operating gasoline dispensing facility meeting the requirements of Section 13.1.

11.8.3 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.

11.8.4 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, 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 clearly identifying underground components.

11.9 Notification of Certified System Component Manufacturers ~~Certification Holder~~

If the applicant is not the manufacturer of all system components, the applicant shall include evidence that the applicant has notified ~~the~~ **all** 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.

~~11.9.1 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.~~

~~11.9.2 When the applicant is requesting certification of one or more components as part of a new system, the applicant shall notify all manufacturers.~~

11.10 Equipment Defect Identification and Test Protocols

The application shall identify where failure of system components may result in an equipment defect as defined by section 94006, Title 17, CCR (Vapor recovery equipment defect, VRED). 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. These protocols are subject to engineering evaluation and approval by the Executive Officer.

11.11 Challenge Modes and Test Protocols

The application shall identify potential challenge modes, as described in Section 13.4. 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. These protocols are subject to engineering evaluation and approval by the Executive Officer.

11.12 Other Information

11.12.1 The applicant shall provide any other information that the Executive Officer reasonably deems necessary.

11.12.2 For a balance type system, the applicant shall provide a specification for the bellows insertion force as specified in Section 5.1. 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.

11.12.3 For an assist system, the applicant shall provide specifications for the nozzle pressure drop as specified in Section 6.1 and for the air to liquid ratio as specified in Section 6.2.

11.12.4 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 7.1 and 7.2, respectively.

11.12.5 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 8.4 and 8.5 respectively.

12. EVALUATION OF THE APPLICATION

The application for certification of all systems and components shall be subjected to an evaluation by the Executive Officer

The evaluation of the application shall include, but is not limited to, subsections 12.1 through 12.7.

12.1 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 9 of this Procedure.

12.2 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 9 of this Procedure. The evaluation shall include a determination of necessary verification testing.

12.3 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.

12.4 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 3.8. This review shall include consideration of the variations in gasoline formulations for octane differences and summer fuel and winter fuel.

12.5 Installation, Operation and Maintenance Manuals

The installation, operation and maintenance manuals for the system and components shall be reviewed for completeness (see Section 16.6). Routine maintenance procedures shall be reviewed to ensure adequacy and determine that the procedures are not unreasonable (see Section 16.6).

12.6 Equipment Defect Identification

The engineering evaluation shall identify where failure of system components may result in a vapor recovery equipment defect (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 13.4.1. The ARB Executive Officer may, for good cause, require modification of, and/or testing in addition to, VRED testing proposed by the applicant.

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.

12.7 Challenge Mode Determination

The applicant may propose, and the Executive Officer shall determine, whether additional testing is needed to ensure the system will meet the applicable standards and specifications under various typical operating parameters. Proposed test protocols may be developed by the applicant to determine if the component or system meets the applicable standards and specifications under such conditions. These test protocols, after engineering evaluation and upon approval of the Executive Officer, are applied during certification testing as provided in section 13.4.2. The ARB Executive Officer may, for good cause, require modification of, and/or testing in addition to, challenge mode testing proposed by the applicant.

13. VAPOR RECOVERY SYSTEM CERTIFICATION TESTING

The Executive Officer shall conduct, or shall contract for and observe, testing of vapor recovery systems conducted for the purpose of certification. Except as otherwise specified in Section 14 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 9 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 systems and/or system components over time. Except as otherwise provided in Sections 18 and 19 of this procedure, only complete systems shall be certified.

Failure of any component during testing of a Phase I or Phase II system shall be cause for termination of the certification test, except as noted below. Any 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 time 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.

As specified in Section 4, Phase II vapor recovery systems shall be certified only in facilities equipped with a certified Phase I system. During Phase II system certifications, the associated Phase I system shall be subject to all of the standards and specifications in Section 3. Monitoring of Phase I system performance shall be conducted for the purpose of demonstrating compatibility, as required by Section 4.5, as well as to insure that the Phase I system is functioning properly during the Phase II certification test. Any Phase I 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 system test failure shall be evaluated for validity.

During Phase II system certifications, failures of any Phase I 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 component is identified as having performance deficiencies, then a more thorough investigation of the Phase I component/system performance will be initiated by the Executive Officer.

During Phase II system certifications, any Phase I 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 Section 4.5.

Any applicant or representative of an applicant found to have performed unauthorized maintenance, or to have attempted to conceal or falsify information, including test results and/or equipment failures, may be subject to civil and criminal penalties and testing of the system or component shall be terminated.

13.1 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 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.

13.1.1 The test station shall have a minimum gasoline throughput of 150,000 gallons/month, as demonstrated over a consecutive six-month period. The minimum allowable monthly throughput for each of the six months is 150,000 gallons/month. The throughput data submitted in the certification application, as specified in Section 11, shall be the most current data available. The test site throughput shall also be shown to comply with this criteria for the six months prior to the start of 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.

13.1.2 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.

13.1.3 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.

13.1.4 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.

13.1.5 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 pressure monitoring data, shall be submitted in bimonthly increments within 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.

13.1.6 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 research and development test site shall be subject to all of the above conditions with the exception of 13.1.1 and 13.1.2.

13.1.7 For testing conducted pursuant to Section 18, Phase I certification test sites configured with fewer than three P/V valves may be approved by the Executive Officer.

13.1.8 Phase II certification test sites will be configured with one to three P/V vent valves, each with an associated ball valve.

13.2 Bench Testing of Components

Components identified by the engineering evaluation as requiring bench testing to verify performance standards and specifications 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.

13.3 Operational Test of at Least 180 Days

13.3.1 All vapor recovery systems shall be subjected to an operational test. The duration of the test shall be for a minimum of 180 days, and for a minimum of 900,000 gallons of gasoline throughput, except as otherwise provided in Sections 18 and 19.

13.3.2 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 notification of 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.

13.3.3 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.

13.3.4 For the purpose of certification, the pressure in the underground storage tank (UST) shall be monitored and recorded continuously throughout the operational test in accordance with TP-201.7 (Continuous Pressure Monitoring). Testing in accordance with the procedures specified in TP-201.3, to verify the pressure integrity of the test station, shall be conducted throughout the operational test period, at intervals not to exceed thirty days. Only data collected during periods of pressure integrity shall be deemed valid. No less than three thirty-consecutive-day periods of valid UST pressure data shall be used to verify that the system meets the standard, as specified in Section 4. All valid pressure data shall be used to make this determination. If the system fails to meet the standard, the data may be examined, and the Executive Officer may exclude pressure excursions directly attributable to noncompliant cargo tank deliveries.

13.3.5 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.

13.4 Equipment Defect and Challenge Mode Testing

13.4.1 Equipment Defect Testing

Testing to determine vapor recovery equipment defects as defined by section 94006 of title 17, California Code of Regulations, 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 conducting the testing does not affect the normal operation of the system.

13.4.2 Challenge Mode Testing

Testing to verify that the system meets 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 conducting the testing does not affect the normal operation of the system.

13.5 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 or Section 4 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.

~~13.5.1 **Phase I Systems**. A test of the static pressure integrity of the Phase I system may be conducted, in accordance with TP-201.3, 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.~~

~~13.5.2 **Phase II Systems**. A test of the static pressure integrity of the Phase II system shall be conducted, in accordance with TP-201.3, 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.~~

13.6 Vehicle Matrix

A representative matrix of ~~200~~ **<u>100</u>** 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).

13.6.1 Vehicles will be tested as they enter the dispensing facility ("first in" basis) until a specific matrix block of the distribution is filled.

~~13.6.2 The vehicle matrix shall include a population of ORVR-equipped vehicles consistent with the distribution of ORVR-equipped vehicles in the State of California.~~

13.3.~~3~~**<u>2</u>** 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).

13.6.~~4~~3 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.

13.6.~~5~~4 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 ~~200~~ **100** 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.

13.6.~~6~~5 A matrix of fewer than ~~200~~ **100** vehicles may be made by deleting up to a maximum of three vehicles by reducing the representation in any cell or combination of cells of the vehicle matrix as specified by TP-201.2A, 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 4.1.
(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.

14. 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.

14.1 Alternate Test Procedures for Certification Testing

The Executive Officer shall approve, as required, those procedures necessary to verify the proper performance of the system.

14.2 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.

14.3 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, the 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.

14.4 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.

14.5 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.

14.6 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 ARB, 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.

15. 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.

15.1 Executive Order

The certification Executive Order shall include the following items.

15.1.1 A list of components certified for use with the system.

15.1.2 Applicable Performance Standards, Performance Specifications and Test Procedures.

15.1.3 Applicable Operating Parameters and Limitations.

15.1.4 Warranty period(s).

15.1.5 Factory testing requirements, if applicable.

15.2 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 including but not limited to the following: 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.

16. DURATION AND CONDITIONS OF CERTIFICATION

Vapor recovery system certifications shall specify the duration and conditions of certification.

16.1 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 17.

16.2 One Vapor Recovery System per UST System

No more than one certified Phase II vapor recovery system may be installed on each underground storage tank (UST) system unless the Phase II systems have been specifically certified to be used in combination. For facilities with dedicated vapor piping, each underground storage tank and associated dispensing points shall be considered a UST system, and different UST 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

UST system, and only one certified Phase II vapor recovery system may be installed in conjunction with that UST system.

16.3 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 19 of this procedure.

16.4 Financial Responsibility

The adequacy of the (1) methods of distribution, (2) replacement parts program, (3) financial responsibility of the 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 of the operative date of the standard, a manufacturing plan with scheduled 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.

16.5 Warranty

The requirements of this section 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:

16.5.1 The applicant and/or manufacturer of 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 manufacturer may specify that the warranty is contingent upon the use of trained installers.

16.5.2 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.

16.5.3 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.

16.5.4 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.

16.6 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 be responsible for developing manual(s) for all installation, operation and maintenance procedures and shall be submitted with the application as provided by Section 11.5. 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).

16.6.1 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.

16.6.2 No changes shall be made to ARB Approved Manuals without the Executive Officer's prior written approval.

16.7 Identification of System Components

16.7.1 All components for vapor recovery systems shall be permanently identified with the manufacturer's name, part number, and 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.

16.7.2 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 by the Executive Officer prior to certification.

16.8 Revocation of Certifications

The certification of any system determined not to be achieving the applicable performance standards and specifications listed in CP-201 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 19. Systems with revoked certifications shall not be installed on new installations or major modification of existing installations.

17. CERTIFICATION RENEWAL

At least eighteen months prior to the 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 certifications, for up to one year, 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 17.1
(b) Review of the Request	Section 17.2
(c) Evaluation of System Deficiencies	Section 17.3
(d) Letter of Intent	Section 17.4
(e) Renewal of Executive Order	Section 17.5

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. Table 17-1 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 10 for more information on Fee Payment.

17.1 Request for Renewal

The request for renewal shall be written and signed by an authorized representative, and shall include the items listed below:

17.1.1 The Executive Order Number to be renewed;
17.1.2 Identification of any system or component deficiencies through warranty claims or other information such as;
   (a) User feedback
   (b) Contractors/Testers
   (c) Distributors
17.1.3 Amendments to the Executive Order such as:
   (a) Warranty information
   (b) Installation, Operations, and Maintenance Manual
   (c) System or component drawings
   (d) Component modifications
17.1.4 Updates to the training program;
17.1.5 Factory Testing Requirements;
17.1.6 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
17.1.7 Other information such as the Executive Officer may reasonably require.

17.2 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.

17.3 Evaluation of System Deficiencies

In addition to the information provided in Section 17.1, 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), 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-201. If potential deficiencies are noted, an evaluation will be conducted to determine if:

17.3.1 The deficiency has been or is in the process of being resolved;
17.3.2 System/component modification(s) are necessary;
17.3.3 Executive Order modifications are necessary;
17.3.4 Additional testing is required.

17.4 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 17.1, 17.2 and 17.3. 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 up to a 1-year extension if:

17.4.1 resolution is likely but renewal time is insufficient; or
17.4.2 additional time is necessary to gather and evaluate information.

17.5 Renewal of Executive Order

Executive Orders approved for renewal shall be valid for a period of four years.

Table 17-1
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
If testing will be required		
Draft Testing protocol and site identification	ARB/Applicant	14 months
Seal site/start test	ARB	12 months
End testing	ARB	11 to 6 months
Administrative		
Letter of Intent and draft Executive Order	ARB	3 months
Final Executive Order	ARB	0 months

17.6 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-201 fail to be met. Non-renewed systems may remain in use for the remainder of their useful life or for up to four years after the expiration date, whichever is shorter, provided the requirements of Section 19 are met.

18. 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.

(a) Request for Amendment	Section 18.1
(b) Review of the Request	Section 18.2
(c) Testing	Section 18.3
(d) Letter of Intent	Section 18.4
(e) Issuance of Executive Order	Section 18.5

18.1 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:

18.1.1 Executive Order to be amended;
18.1.2 Description of change;
18.1.3 Changes to the Executive Order such as:
- (a) System or component drawings
- (b) Installation, Operations, and Maintenance Manual
- (c) Fuel and System Compatibility

18.1.4 Agency approvals or determinations (to be submitted prior to approval of EO amendment, see Section 1.1);
18.1.5 Updates to the training program;
18.1.6 Applicable information specified in Section 11 ; and
18.1.7 Other information such as the Executive Officer may reasonably require.

18.2 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, 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.

18.2.1 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.

18.2.2 Transfer of Components from Another Certified System

Components certified with a system may subsequently be considered for use with another certified system of similar 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. Abbreviated tests will only be allowed for components whose performance is not expected to change or degrade over the longer test period.

18.2.3 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.

18.2.4 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. 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. An engineering evaluation shall be conducted to document that the change will not affect the performance of the vapor recovery system.

18.2.5 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.

18.3 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 18.2. Normally, full operational testing of at least 180 days 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 13.1. The applicant shall submit sufficient information to demonstrate that the requirements of Section 11.8 are met.

18.4 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.

18.5 Issuance of Executive Order

The original expiration date shall be maintained for all Executive Order amendments unless a renewal, as described in Section 17, is specifically requested and approved.

Previous versions of the Executive Order are superseded, as discussed in Section 19.

19. REPLACEMENT OF COMPONENTS OR PARTS OF A SYSTEM WITH A TERMINATED, REVOKED, SUPERSEDED 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 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 17, may remain in use for up to four years after the expiration date of the Executive Order, provided they comply with all of the specifications of Section 19.

19.1 Component and Replacement Parts

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 specifications 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.

19.2 Component or Replacement Part Not Meeting Specifications

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.

19.3 Component or Part Not Certified with System and Not Meeting Specifications

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.

19.4 Procedure for Approval of Replacement Parts

~~Approval of replacement parts shall be requested, evaluated, and granted as follows:~~

19.4.1 A request shall be submitted to the Executive Officer.

19.4.2 The request shall include the information outlined in Section 18.1 and information demonstrating that the component is compatible with the system.

19.4.3 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.

19.4.4 The Executive Officer shall issue an approval letter to authorize the use of the approved replacement part and to detail any modification(s) to the Executive Order for which the part is approved. Requests not granted shall be documented with a disapproval letter.

20. REQUIREMENTS FOR, AND CERTIFICATION OF, LOW PERMEATION HOSES

All hoses which carry liquid fuel against the outermost hose wall shall permeate at a rate of no more than 10.0 grams per square meters per day ($g/m^2/day$) as determined by UL 330 (Seventh Edition) - Underwriters Laboratories' Standard for Hose and Hose Assemblies for Dispensing Flammable Liquids.

The UL 330 testing results shall comprise all of the certification testing for certification as a low permeation hose.

20.1 Request for Certification

If UL 330 testing is not conducted by the Executive Officer, then the Executive Officer shall be made a beneficiary of the data within the contract of the applicant and the testing facility. All data and documentation relevant to determining the permeation rate of the hose, as described in section 15 of UL 330, shall be transmitted to the Executive Officer by the testing facility, concurrently when transmitted to the applicant.

The request for certification shall be written and signed by an authorized representative of the applicant, and shall include the items listed below:

20.1.1 The applicant shall submit evidence that the hose is compatible with all hardware that it will be connected to when in use within the gasoline dispensing system.

20.1.2 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 3.8. 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.

20.1.3 The applicant shall state the expected useful life of the hose.

20.1.4 All applications shall include detailed engineering drawings of the hose and hose fittings. These drawing must provide all hose and fitting dimensions, including thicknesses of each individual hose material layer. Further, all hose, fitting and gasket materials must be identified.

20.1.5 Hose installation instructions shall be included with the application.

20.1.6 The applicant shall submit evidence of financial responsibility to ensure adequate protection to the end-user of the product as specified in Section 16.4 and to demonstrate the ability to pay for certification tests and cost.

20.1.7 The applicant shall comply with the warranty requirements of Section 16.5 and shall submit a copy of the warranty for the hose and samples of component tags.

20.1.8 All applications shall include the estimated retail price of the hose.

20.2 Hose Lengths

Once a hose of a particular construction has been determined to comply with the low permeation hose standard per section 20, the Executive Officer shall specify the length of the hose as a condition of certification after considering other applicable performance standards or specifications.

20.3 Identification of Certified Hose

Certified low permeation hoses shall comply with the marking and identification requirements of section 16.7

California Environmental Protection Agency

Air Resources Board

PROPOSED

Vapor Recovery Certification Procedure

CP - 206

Certification Procedure for
Vapor Recovery Systems at
Gasoline Dispensing Facilities Using
Aboveground Storage Tanks

Adopted: May 2, 2008
Amended: [insert amendment date]

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 amendment.

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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 or CARB" 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**	**Low Permeation Hose[1]**	**Section(s)**
X				n/a
X	X			4.9 and 12.3
X	X	X	X	4.9, 5.5, 5.6, ~~and~~ 12.3, and 21

[1] May apply to hoses that are not part of a Phase II system

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~~ April 1, 2009	~~January 1, 2009~~ Same as effective date
All Phase I Standards and Specifications	As specified in Table 4-1	4	~~January 1, 2009~~ July 1, 2010	~~January 1, 2009~~ Same as effective date
ORVR Compatibility(1)	As specified in Section 5.4	5.4	~~January 1, 2009~~ Date when first ORVR Compatible System is certified	~~January 1, 2009~~ Same as effective date
Nozzle Criteria	Post Refueling Drips: ≤ 3 drops/refueling	5.7	~~January 1, 2009~~ Date when first nozzle is certified	~~January 1, 2009~~ Same as effective date
Liquid Retention Nozzle Spitting	≤ 100 ml/1,000 gals. dispensed ≤ 1.0 ml/nozzle/~~fueling~~ test	5.8	~~January 1, 2009~~ Date when first nozzle is certified	~~January 1, 2009~~ Same as effective date
Spillage (including drips from spout)	≤ 0.24 pounds/1,000 gals dispensed	5.3	~~January 1, 2009~~ Date when first nozzle is certified	~~January 1, 2009~~ Same as effective date
In-Station Diagnostics (ISD)	For GDF > 600,000gal/yr.(2)	10	~~January 1, 2009~~ Date when first ISD system is certified	~~January 1, 2009~~ Same as effective date
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~~ Date when first Phase II system is certified	~~January 1, 2009~~ Same as effective date
Low Permeation Hoses	Permeation rate ≤ 10.0 g/m^2/day as determined by UL 330	21	Date when the first low permeation hose is certified	Same as effective date

~~(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) GDFs ≤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 **<u>Any performance standard or specification with an effective date of January 1, 2012 or later shall become effective on the date when the first system is certified to meet the performance standard or specification. The Executive Officer shall maintain, and make available to the public, a current list of effective and operative dates for all standards and specifications.</u>**

2.4.~~5~~<u>6</u> 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~~<u>7</u> 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.

2.4.8 Any person can petition the Executive Officer for an engineering evaluation to determine whether the first system certified to meet a standard or specification cannot be installed and/or operated, or is otherwise incompatible with a specific type or subgroup of GDF. The petitioner shall submit the following information to the Executive Officer:

a) The Executive Order and specific EVR component(s) that is claimed to be incompatible,
b) The specific type or subgroup of GDF that is claimed to be incompatible with the specified EVR component(s),
c) A detailed technical explanation of the claimed incompatibility, supported by test data if applicable,
d) An estimate of how many GDFs in California are subject to the claimed incompatibility,
e) An estimate of the cost to modify a typical GDF of the affected type or subgroup so that it would no longer be subject to the claimed incompatibility.
f) Any other information that the Executive Officer deems reasonable and necessary in conducting the engineering evaluation.

The Executive Officer shall conduct an engineering evaluation and if incompatibility is found, the Executive Officer shall issue an executive order stating the incompatibility between the certified system and the GDF type or subgroup which was the subject of the evaluation. In this event, such GDF type or subgroup is not subject to the standard or specification until such date when the first system is certified that is compatible with that GDF type or subgroup. This provision applies to any standard or specification with an effective date on or after January 1, 2012.

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	Component(s)			
(lbs/1000 gallon ullage/day)	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/1000 gallon ullage~~tank volume~~/day or
1.34 pounds/1000 gallon ullage~~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.

$$EF = EF_{Af}$$

Where:

EF is the 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:

$$EF = EF_{HC}$$

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 cubic feet per hour (CFH) at +2.0 inches H_2O
0.63 CFH at -4.0 inches H_2O

3.6.3 The total leak rate 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	Leak rate ≤ 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
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
Spill Container Drain Valve	Leak rate ≤ 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

Performance Type	Requirement	Sec.	Std. or Spec.	Test Procedure
Emergency Vent	No Indication of Vapor Leaks	4.6	Std.	LDS or Bagging~~,~~
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 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 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 leak rate shall not leak. The absence of vapor leaks may be verified by the use of 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 gauging port for determining the amount of gasoline. This determination shall be accomplished either manually ~~tank gauging~~ (measuring gasoline levels using a gauging stick), mechanically, or electronically. If the determination is accomplished manually, the ~~The manual gauging~~ port shall have a drop tube which has the discharge opening entirely submerged when the liquid level is ~~6~~ six inches above ~~from~~ the bottom of the tank. The gauging port shall be permanently identified ~~on the tank~~. The gauging port shall not leak when no manual gauging is occurring or at any time when mechanical or electronic components are used.

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.

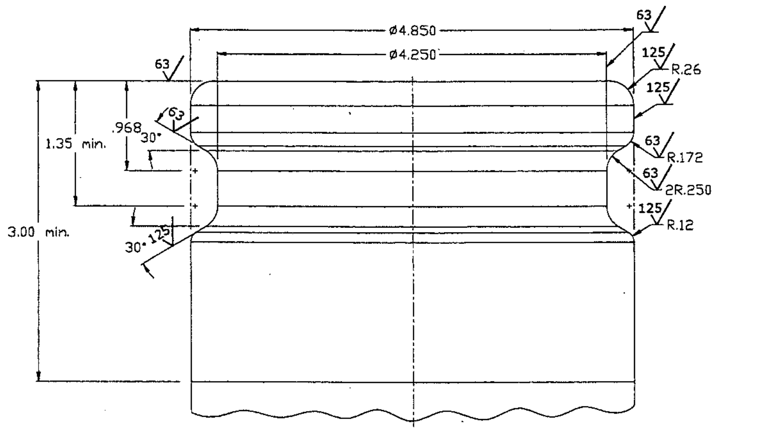
(a) Compatibility of the proposed Phase I system with the certified Standing Loss Control system installed at the certification test site shall be determined by use of all data collected as part of the monitoring described in Section 14. Failure of any Standing Loss Control system tests conducted during 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.

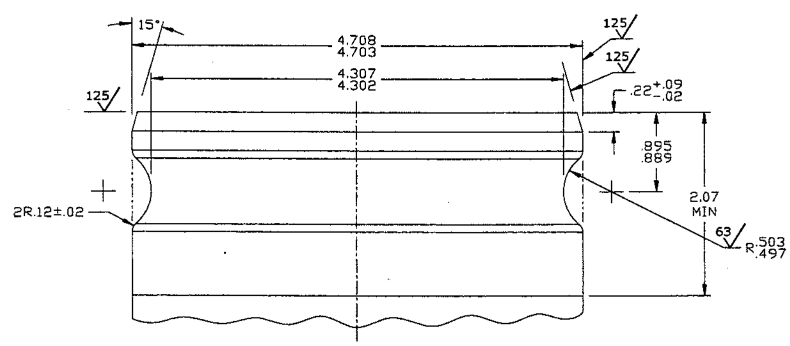
4.9.2 Applicants for certification may as a performance specification, limit the type of equipment with which their system is compatible. Any such specification shall become a condition of certification.

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 AST 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 $\leq$ 0.38 pounds/1,000 gallons dispensed Winter Fuel: 95% Efficiency or HC $\leq$ 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	$\leq$ 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%~~Applicant shall develop a procedure to demonstrate ORVR compatibility when requested by the Executive Officer.	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	See Section 5.6	5.6	Spec.	Testing and Eng. Eval.

Performance Type	Requirement	Sec.	Std. or Spec.	Test Procedure
Control Systems				
Nozzle Criteria Each Phase II Nozzle Shall:	Post-Refueling Drips ≤ 3 Drops/Refueling Comply with dimensions specified in section 5.7.3.~~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.
Low Permeation Hoses	Permeation rate ≤ 10.0 g/m^2/day as determined by UL 330	21	Std.	UL 330 (7th ed)
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	Shall have Automatic Evacuation System	5.13	Spec.	Testing and Eng. Eval.

Performance Type	Requirement	Sec.	Std. or Spec.	Test Procedure
Traps				
Connectors and Fittings	No Indication of Vapor Leaks	5.14	Std.	LDS or Bagging

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.

Compliance with t~~T~~he emission factor **and the efficiency standards** shall be demonstrated ~~compliance with the standard~~ when calculated for **a test population consisting of 30 non-ORVR vehicles, selected according to TP-201.2A.** ~~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, when requested by the Executive Officer, shall develop ~~be responsible for developing~~ a procedure by which ORVR 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 fill pipe 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 pressure 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 and spitting 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 Multi-Product Dispenser (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 leak rate shall not leak. The absence of vapor leaks may be verified by the use of 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

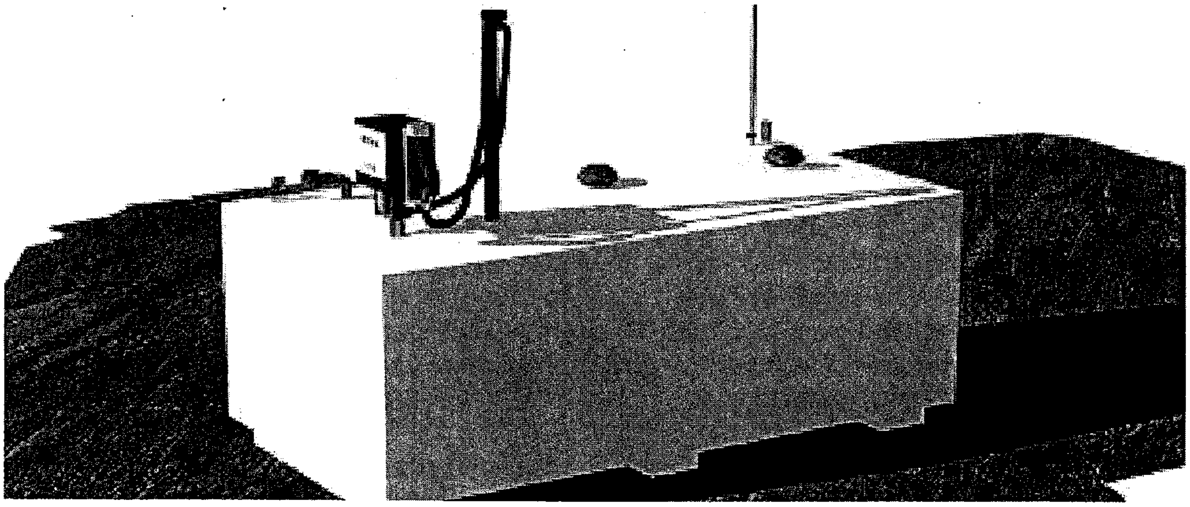


Figure 5B
End-Mount Dispenser for Aboveground Tank with Phase II Vapor Recovery System

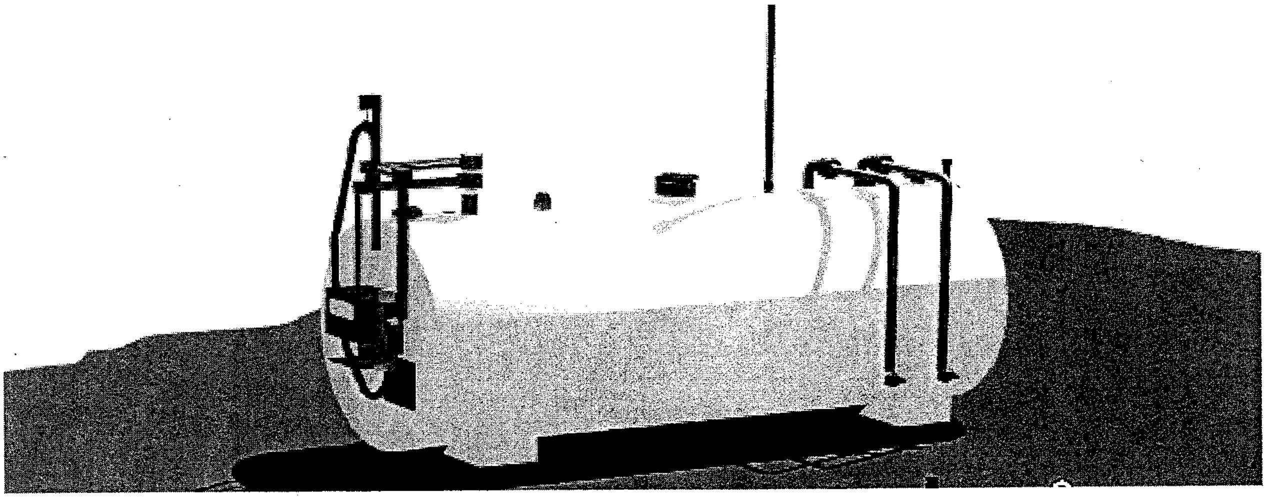
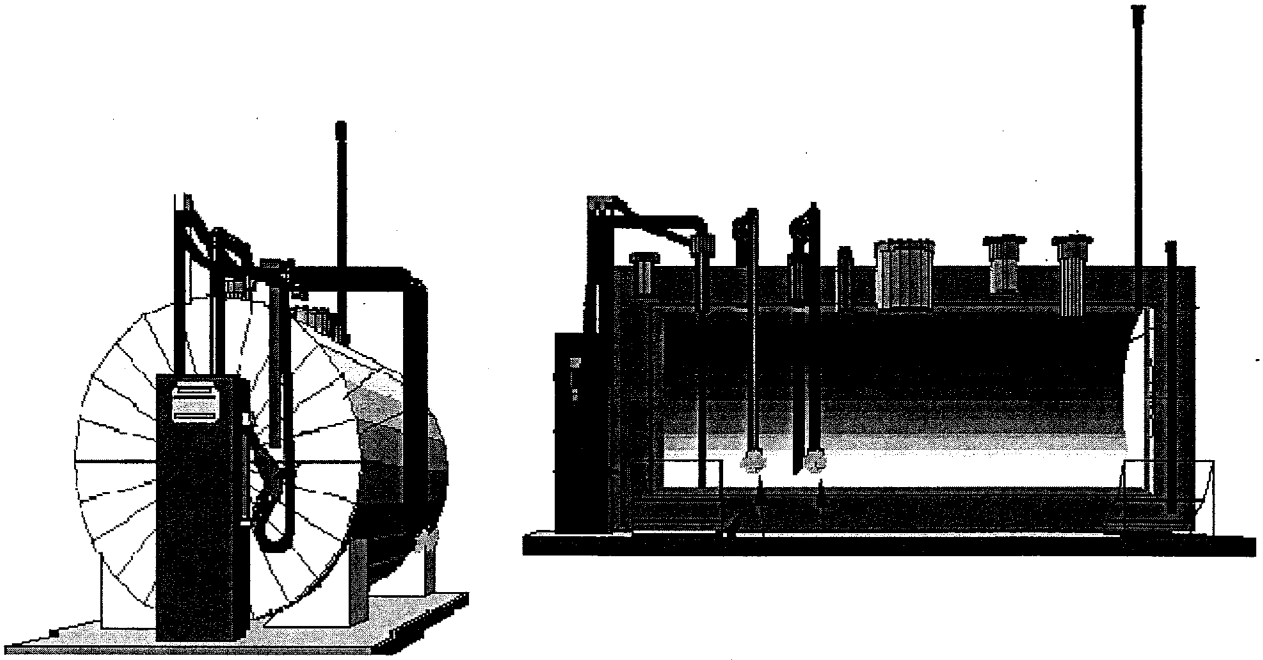


Figure 5C
Tank with Ground-Mount Dispenser and High-Hang Hose for Aboveground Storage Tank with Phase II Vapor Recovery System



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 Leak rate	$\leq$ 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
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 fill pipe (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 leak rate 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 flow rate of 60 CFH of Nitrogen; and
0.62 inches H_2O at a flow rate 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 Leak rate	≤ 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 fill pipe during a spitback event.

7.1.2 Each assist nozzle shall be equipped with a vapor valve. The leak rate 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) Number of configurations (Section 12.12)
(n) If applicable; Bellows Insertion Force Specification and Test Procedure (Section 12.13)
(o) Other Information such as the Executive Officer may reasonably require. (Section 12.13)

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 fill pipe 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

12.4.4 Procedure 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 Standing loss control shall be installed and tested on an AST that does not transfer gasoline. Phase I and Phase I/II vapor recovery systems shall be installed and tested at an operating gasoline dispensing facility for the purpose of certification testing. If the applicant can demonstrate that the vapor recovery system would be subject to the same use at a non-operating GDF as an operating GDF, then the use of a non-operating GDF may be allowed during the certification if approved by the Executive Officer.

12.8.2 The applicant shall make arrangements for the installation of standing loss control on an aboveground storage tank or the vapor recovery system in a 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 aboveground storage tank or 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 Certified System Component Manufacturers ~~Certification Holder~~

If the applicant is not the manufacturer of all system components, the applicant shall include evidence that the applicant has notified all ~~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 Number of Configurations

The applicant shall identify the number of configurations (aboveground storage tanks (in terms of capacity (gallon) and area (square feet) including vapor recovery systems, if applicable) for which certification is requested. For certification testing, the applicant shall specify and provide reasons in the application those configurations which represent a worst case scenario from an emission standpoint.

12.13 Other Information

12.13.1 The applicant shall provide any other information that the Executive Officer reasonably deems necessary

12.13.2 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.

12.13.3 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.

12.13.4 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.

12.13.5 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.

13.8 Number of Configuration Determination

The Executive Officer shall determine whether the applicant's configuration selection represents a worst case scenario from an emission standpoint. Based on the engineering evaluation, the Executive Officer may concur with the applicant's selection or select additional configurations for certification testing.

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 standing loss control (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 appropriate vapor recovery system to be installed on one or more ASTs that do not transfer gasoline for standing loss control certification testing, or on one or more GDFs for Phase I or II system certification testing. The applicant shall request, in writing, approval of the AST or 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 For the purposes of evaluating Phase I or Phase II vapor recovery system, the test site 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 unihose configuration, the minimum throughput requirement shall apply to the gasoline grade with the highest throughput.

14.1.2 The aboveground storage tank or test 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 aboveground storage tank or 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, **and for a minimum of 9000 gallons of gasoline throughput,** 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 result 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~~ **<u>30 non-ORVR</u>** 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~~**<u>2</u>**The Executive Officer may exclude any vehicle that fails to comply with the vehicle fill pipe specifications ("Specifications for Fill Pipes and Openings of Motor Vehicle Fuel Tanks" incorporated by reference in title 13, CCR, Section 2235).

14.6.~~4~~**<u>3</u>**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~~**<u>4</u>**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~~ **<u>30 non-ORVR</u>** 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~~5A matrix of fewer than ~~20~~ **30 non-ORVR** ~~(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, (December 29, 1992). 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) Distributors

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 Component and Replacement Parts

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 Component or Replacement Part Not Meeting Specifications

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 Component or Part Not Certified with System and Not Meeting Specifications

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 Procedure for Approval of Replacement Parts

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.

21. REQUIREMENTS FOR, AND CERTIFICATION OF, LOW PERMEATION HOSES

All hoses which carry liquid fuel against the outermost hose wall shall permeate at a rate of no more than 10.0 grams per square meters per day (g/m^2/day) as determined by UL 330 (Seventh Edition) - Underwriters Laboratories' Standard for Hose and Hose Assemblies for Dispensing Flammable Liquids. Use of a low permeation hose certified per CP-201 will satisfy the testing portion of this section.

The UL 330 testing results shall comprise all of the certification testing for certification as a low permeation hose.

21.1 Request for Certification

If UL 330 testing is not conducted by the Executive Officer, then the Executive Officer shall be made a beneficiary of the data within the contract of the applicant and the testing facility. All data and documentation relevant to determining the permeation rate of the hose, as described in section 15 of UL 330, shall be transmitted to the Executive Officer by the testing facility, concurrently when transmitted to the applicant.

The request for certification shall be written and signed by an authorized representative of the applicant, and shall include the items listed below:

21.1.1 The applicant shall submit evidence that the hose is compatible with all system hardware that it will be connected to when in use within the gasoline dispensing system.

21.1.2 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.

21.1.3 The applicant shall state the expected useful life of the hose.

21.1.4 All applications shall include detailed engineering drawings of the hose and hose fittings. These drawing must provide all hose and fitting dimensions, including thicknesses of each individual hose material layer. Further, all hose, fitting and gasket materials must be identified.

21.1.5 Hose installation instructions shall be included with the application.

21.1.6 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 and to demonstrate the ability to pay for certification tests.

21.1.7 The applicant shall comply with the warranty requirements of section 17.5 and shall submit a copy of the warranty for the hose and samples of component tags.

21.1.8 All applications shall include the estimated retail price of the hose.

21.2 Hose Lengths

Once a hose of a particular construction has been certified to comply with low permeation hose standard per section 21, the Executive Officer shall specify the length of the hose as a condition of certification after considering other applicable performance standards or specifications.

21.3 Identification of Certified Hose

Certified low permeation hoses shall comply with the marking and identification requirements of section 17.7.1

California Environmental Protection Agency

Air Resources Board

PROPOSED

Vapor Recovery Test Procedure

TP-201.1

Volumetric Efficiency for Phase I Vapor Recovery Systems

Adopted: April 12, 1996
Amended: February 1, 2001
Amended: October 8, 2003
Amended: [Insert Amendment Date]

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 amendment.

California Environmental Protection Agency
Air Resources Board

Vapor Recovery Test Procedure

TP-201.1

Volumetric Efficiency of Phase I Vapor Recovery Systems

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 or CARB" refers to the ~~State of~~ California Air Resources Board, and the term "Executive Officer" refers to the CARB Executive Officer, or his or her authorized representative or designate.

1. PURPOSE AND APPLICABILITY

The purpose of this procedure is to quantify the transfer efficiency when a bulk gasoline delivery between a cargo tank and underground storage tank is made. This procedure is used to determine compliance with Phase I performance standard specified in Certification Procedure 201 (CP-201).

2. PRINCIPLE AND SUMMARY OF TEST PROCEDURE

During a gasoline delivery, the cargo tank and gasoline dispensing facility (GDF) are instrumented with test equipment in order to determine the amount of vapor returned to the cargo tank and the amount of vapor discharged through the GDF vent pipe. From these parameters the Phase I volumetric efficiency is determined. This procedure provides for determining efficiency by way of either direct measurement or calculation.

If a Phase I system fails to meet the volumetric efficiency as required by CP-201, the cargo tank shall be tested for compliance with the daily standards established for cargo tanks as specified in CP-204 to determine if the failure can be attributed to the cargo tank.

3. BIASES AND INTERFERENCES

3.1 Any vapor leaks exceeding 100% of the Lower Explosive Limit (LEL) during the gasoline bulk delivery precludes the use of this method.

3.2 Gasoline cargo tanks exceeding the allowable daily pressure-decay standards as defined in CP-204 preclude the use of this method.

3.3 The presence of vapor leaks in the GDF, greater than the allowable leak decay limits specified in Section 3.2 of CP-201 preclude use of this method.

3.4 Unusually large cargo tank headspace volumes may cause low volumetric efficiency under certain conditions. Conversely, unusually small cargo tank headspace volumes may result in unusually high efficiency. During the Certification Process for a Phase I system, the cargo tank headspace volumes should be between 3.0 and 10.0 percent of the total cargo tank capacity prior to the delivery.

4. SENSITIVITY, PRECISION AND RANGE

4.1 Mechanical Pressure Gauge. The minimum readability shall be 1.00 inches H_2O with a maximum full-scale range of 30 inches H_2O and minimum accuracy of three percent of full scale. Pressure gauges with a higher resolution and higher accuracy may be deemed acceptable with prior approval by the Executive Officer.

4.2 Electronic Pressure Gauge. The maximum full-scale range of the device shall not exceed 20 inches H_2O with minimum sensitivity of 1.00 inches H_2O and minimum accuracy of 0.5 percent of full scale. Electronic pressure gauges shall be calibrated as described in Section 5 of this procedure.

4.3 Volume Meter, Vapor Return. Minimum full-scale range shall be 5,000 CFH with a maximum rated back pressure less than 1.10 in H_2O. The meter shall have an internal diameter of 3 inches, equal to that of a cargo tank vapor return hose.

4.4 Volume Meter, Vent Pipe. Minimum full-scale range shall be 800 CFH with a maximum rated back pressure less than 0.26 in H_2O. The meter shall have an internal diameter of 2 inches, equal to that of a GDF vent pipe.

4.5 Temperature. Maximum range of 0 to 150°F and accurate to within 2°F.

4.6 Barometric Pressure. Minimum accuracy of .08 inches of mercury (1.0 inch H_2O or 2.7 millibar).

5. EQUIPMENT

5.1 Vapor Return Meter(s). Use a volume meter with minimum specifications described in Section 4 to measure the amount of vapor returned to the cargo tank from the underground storage tank. The meter shall be equipped with a pressure gauge and temperature device as described in Section 4 on the inlet side. The meter shall be connected to the GDF in a fashion as to maintain intrinsic safety, see Figure 3.

5.2 Vent Pipe Meter. Use a volume meter with minimum specifications described in Section 4 to measure the amount of vapor discharged through the vent pipe(s). The meter shall be equipped with a pressure gauge and temperature device as described in Section 4 on the inlet side. The meter shall be connected to the GDF in a fashion as to maintain intrinsic safety, see Figure 3.

5.3 Cargo Tank Back Pressure Assembly. When testing Phase I efficiency without the use of volume meters, use OPW® 633-F and 633-D couplers, or equivalent, as shown in Figure 1. The assembly shall be equipped with a pressure gauge capable of measuring up to 30 inches H_2O back pressure at the gasoline cargo tank vapor coupler. Temperature may be measured at this point as an alternate to, or in addition to 5.1.

5.4 Storage Tank Pressure Assembly. When testing Phase I efficiency with the cargo tank back pressure assembly and the test facility uses a two point Phase I system with storage tanks manifolded underground, use OPW® 634-B cap(s) or equivalent, equipped with a pressure gauge and center probe as shown in Figure 2

5.5 Combustible Gas Detector. Use a Bacharach Instrument Company Model 0023-7356®, or equivalent, to quantify any vapor leaks occurring during the gasoline bulk drop.

5.6 Barometer. Use a mercury, aneroid, or equivalent barometer with minimum specifications described in Section 4 to measure the barometric pressure during testing. The result shall be used to correct the volume of vapor returned or discharged.

5.7 Temperature. Use a minimum of three thermometers, Thermocouples™, or equivalent, to measure the vapor temperature at each meter. The results shall be used to correct the volume of vapor returned or discharged.

5.8 Stopwatch. Use a stopwatch accurate to within 0.1 seconds to time the delivery rate.

6. PRE-TEST PROCEDURES

6.1 The volume meter(s) shall be proofed against a standard reference meter prior to its initial use in the field or at intervals not to exceed 180 days. Calibration shall be performed at a minimum of three flowrates representing 25, 50 and 75 percent of rated capacity. An official statement of proofing is required.

6.2 The GDF shall be pre-tested for leak integrity as described in TP-201.3 at least 24 hours prior, and no longer than 7-days before testing. If a manifold is to be used at the vent pipe, the manifold shall be installed prior to conducting leak integrity testing.

6.3 No product dispensing shall occur for a minimum of 30 minutes prior to testing.

6.4 Taking caution to avoid venting the storage tanks, connect the vent pipe meter(s) to the appropriate storage tank vent pipe(s) with the inlet side attached to the vent pipe. Use a metal ball valve if required to avoid venting. Attach the PV valve(s) to the outlet side of the meter(s) using a threaded nipple or equivalent. A temporary manifold may be constructed of steel where all vent pipes are connected to a single outlet and a single meter is installed.

6.5 Taking caution to avoid venting the storage tanks, connect the vapor return meter(s) to the appropriate Phase I vapor connection(s) using metal fittings in order to maintain intrinsic safety. Use a metal vapor poppet if required to avoid venting. Connect the cargo tank vapor return hose to the outlet side of the meter. The meter will be in line between the Phase I connection and the cargo tank vapor return hose.

6.6 With no product dispensing, record the product grade, tank capacity, tank temperature and ambient conditions on the data sheet where provided.

6.7 If used, connect the Cargo Tank Back Pressure Assembly to the vapor coupler on the cargo tank. This assembly will be in line with the cargo tank vapor recovery hose. If the cargo tank vapor coupler is equipped with a poppet, use a pressure assembly with center probe.

6.8 If the cargo tank back pressure assembly is being used, install a Storage Tank Pressure Assembly on each Phase I vapor connection of those tanks not receiving product. During each bulk drop, record the maximum pressure in those tanks.

6.9 Record the product quantities to be delivered during each bulk drop. Also record the cargo tank CARB decal number and delivery company name on the data sheet where provided.

6.10 Stabilization. Open the corresponding cargo tank internal vapor valve(s) prior to delivering product. Once the vapor valve(s) is opened, wait a period of at least 1-minute to allow for pressure stabilization between the UST and cargo tank.

7. TESTING

7.1 Record the stabilized, vapor return and vent pipe meter reading(s) on the data sheet where provided.

7.2 Start the gasoline bulk drop. Using the stopwatch, time each gasoline drop to determine the delivery rate for each compartment.

7.3 At minimum, record the following parameters for each gasoline bulk drop:

7.3.1 Initial and final meter readings for each vapor return meter

7.3.2 Average vapor return pressure

7.3.3 Average vapor return temperature

7.4 Repeat Sections 7.1 through 7.3 for each gasoline delivery. For deliveries using different Phase I connections (i.e., different storage tanks), relocate the vapor return meter(s) to the appropriate storage as specified in Section 6.7.

7.5 At conclusion of all gasoline deliveries, ensure that each of the cargo tank internal vapor valve is closed prior to disconnecting. Disconnect the vapor return meter(s) from the storage tank(s) taking care to avoid venting pressure. Disconnect the vapor return hose from the outlet side of the vapor return meter.

7.6 Continue to monitor the vent pipe meter for a minimum of 15 minutes. If the UST pressure is less than 1.00 inches H_2O, testing may be concluded. In the event that the station UST pressure is greater than 1.00 inches H_2O, continue to monitor the vent pipe meter for an additional 45 minutes (1-hour total). These measurements are to be included in the Phase I efficiency calculation.

8. POST TEST PROCEDURES

8.1 At conclusion of the bulk delivery, ensure that each of the cargo tank internal vapor valves is closed prior to removing connections.

8.2 Remove the Cargo Tank Back Pressure Assembly, if used, from the cargo tank vapor return coupler.

8.3 Remove the Storage Tank Pressure Assembly, if used, from each storage tank where installed.

8.4 Remove the temporary manifold (if constructed) and disconnect all instrumentation from the vent pipe area. Replace the PV valve(s) on the vent pipe(s).

8.5 Verify the quantity of gasoline delivered to each storage tank using the facility tank gauge monitor or with use of a tank gauging stick.

8.6 The static pressure integrity of the vapor recovery system shall be verified as described in TP 201.3 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 test results unless the Executive Officer determines that the integrity failure did not result in any significant unmeasured emissions.

9. CALCULATING RESULTS

9.1 The measured volume of vapor passed through the vapor return to the cargo tank and vent pipe shall be corrected to standard conditions as follows:

$$V_{corr} = \frac{(V_{vi})(528)[Pb + \Delta h/13.6]}{(T_{vi})(29.92)} \qquad \textbf{Equation 9.1}$$

Where:

V_{corr}	=	Volume of vapor, corrected to 68^{0}F (528^{0}R) and 29.92" Hg
Pb	=	Barometric Pressure, inches Hg
V_{vi}	=	Uncorrected volume of vapor (raw meter reading)
T_{vi}	=	Average or venting temperature at vent meter, ^{0}R
Δh	=	Average or venting pressure at vent meter, inches H_2O
13.6	=	Inches of water per inch of mercury
528	=	Standard ambient temperature, 68^{0}F converted to degrees Rankine

9.2 If a cargo tank back pressure assembly was used to conduct testing, the volume of vapor returned to the cargo tank shall be calculated to standard conditions as follows:

$$V_t = \left[\frac{(0.1337)(G_t)\left(528\left(P_b + \frac{\Delta h}{13.6}\right)\right)}{(T_t)(29.92)} \right]$$ **Equation 9.2**

Where:

V_t	=	Calculated volume of vapor returned to cargo tank corrected to 68^0F (528^0R) and 29.92" Hg
G_t	=	Volume of gasoline delivered, gallons
Δh	=	Final gauge pressure at cargo tank, in. H_2O
T_t	=	Average temperature of vapor returned to cargo tank, ^oR
P_b	=	Barometric pressure, inches Hg
13.6	=	Inches of water per inch of mercury
528	=	Standard ambient temperature, 68^oF converted to degrees Rankine

9.3 The collection efficiency shall be calculated as follows:

$$E = (100)\left[\frac{V_{returned} - V_{vent}}{V_{returned}}\right]$$ **Equation 9.3**

Where:

E	=	Phase I Volumetric Efficiency, percent
$V_{returned}$	=	Vapor Return: From 9.1(V_{corr}) or 9.2(V_t)
V_{vent}	=	Corrected Vent Pipe Discharge: From 9.1(V_{corr})

10. REPORTING RESULTS

10.1 Results shall be reported as shown on the data sheets where provided. Districts may require the use of alternate data sheets provided they include, at minimum, the same parameters identified on Form 1.

11. ALTERNATE PROCEDURES

11.1 This procedure shall be conducted as specified. Modifications to this test procedure shall not be used to determine compliance unless prior written approval has been obtained from the ARB Executive Officer, pursuant to Section 14 of Certification Procedure CP-201.

FORM 1
ARB TP-201.1

Test Date: ____________ Observations By: ____________

Facility Name: ____________

Address: ____________

System Description: ____________

Time: ________ Ambient Temp: ________ deg F Barometric: ________ Hpa

Wind: ________ mph Altitude: ________ ft Other: ____________

Cargo Tank Company: ____________

Cargo Tank Decal #(s): Truck: ____________ Trailer: ____________

Compartment #1

Pre-Delivery Observations		Delivery Observations	
________	________	Tank Orientation:	________
Initial UST Product Temerature:	deg F	Delivered Product Temperature:	deg F
UST Size:	gal	Avg Vapor Return Pressure:	inWC
Amount To Deliver (BOL):	gal	Avg Vapor Return Temp:	deg F
Grade: ________ Loading Temp (BOL):	________	Fuel RVP (BOL):	________
Initial Meter Reading:	ft^3	**Final Meter Reading:**	ft^3

Compartment #2

Pre-Delivery Observations		Delivery Observations	
________	________	Tank Orientation:	________
Initial UST Product Temerature:	deg F	Delivered Product Temperature:	deg F
UST Size:	gal	Avg Vapor Return Pressure:	inWC
Amount To Deliver (BOL):	gal	Avg Vapor Return Temp:	deg F
Grade: ________ Loading Temp (BOL):	________	Fuel RVP (BOL):	________
Initial Meter Reading:	ft^3	**Final Meter Reading:**	ft^3

Compartment #3

Pre-Delivery Observations		Delivery Observations	
________	________	Tank Orientation:	________
Initial UST Product Temerature:	deg F	Delivered Product Temperature:	deg F
UST Size:	gal	Avg Vapor Return Pressure:	inWC

Compartment #4

Pre-Delivery Observations

Initial UST Product Temerature: ______ deg F

UST Size: ______ gal

Amount To Deliver (BOL): ______ gal

Grade: ______ Loading Temp (BOL): ______

Initial Meter Reading: ______ ft^3

Delivery Observations

Tank Orientation: ______

Delivered Product Temperature: ______ deg F

Avg Vapor Return Pressure: ______ inWC

Avg Vapor Return Temp: ______ deg F

Fuel RVP (BOL): ______

Final Meter Reading: ______ ft^3

Compartment #5

Pre-Delivery Observations

Initial UST Product Temerature: ______ deg F

UST Size: ______ gal

Amount To Deliver (BOL): ______ gal

Grade: ______ Loading Temp (BOL): ______

Initial Meter Reading: ______ ft^3

Delivery Observations

Tank Orientation: ______

Delivered Product Temperature: ______ deg F

Avg Vapor Return Pressure: ______ inWC

Avg Vapor Return Temp: ______ deg F

Fuel RVP (BOL): ______

Final Meter Reading: ______ ft^3

Vent Pipe Discharge

Delivery Observations

Initial Vent Pressure: ______ inWC

Initial Vent Temperature: ______ deg F

Initial Meter Reading: ______ ft^3

Stack Venting Pressure: ______ inWC

Stack Venting Temperature: ______ deg F

Post Delivery Observations

Post Observation Time: ______

Remarks: ______

Final Vent Pressure: ______ inWC

Final Vent Temperature: ______ deg F

Final Meter Reading: ______ ft^3

Figure 1 - Cargo Tank Back Pressure Assembly

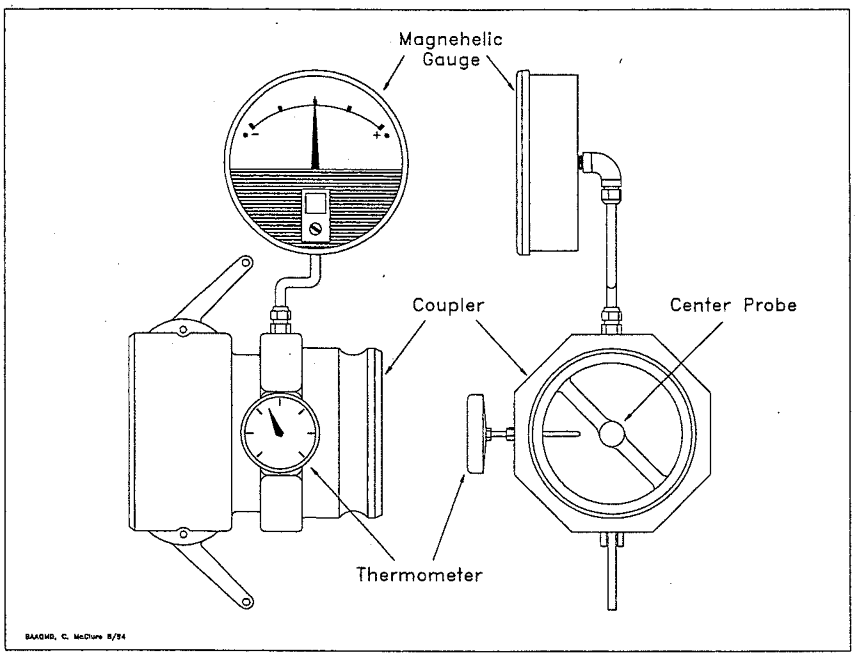


Figure 2 - Storage Tank Pressure Assembly

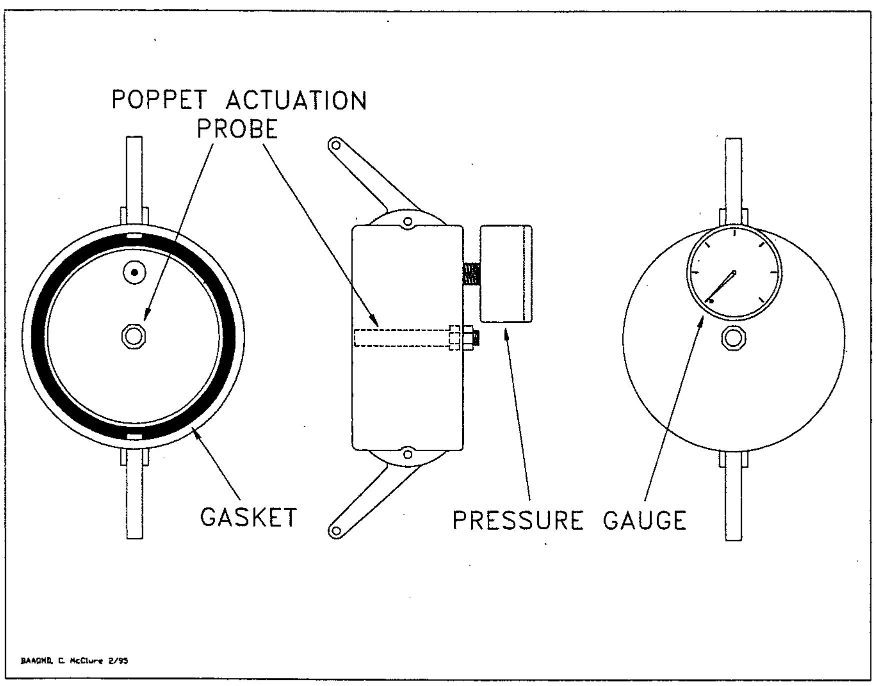


Figure 3 - Vent Pipe and Vapor Return Meter Arrangement

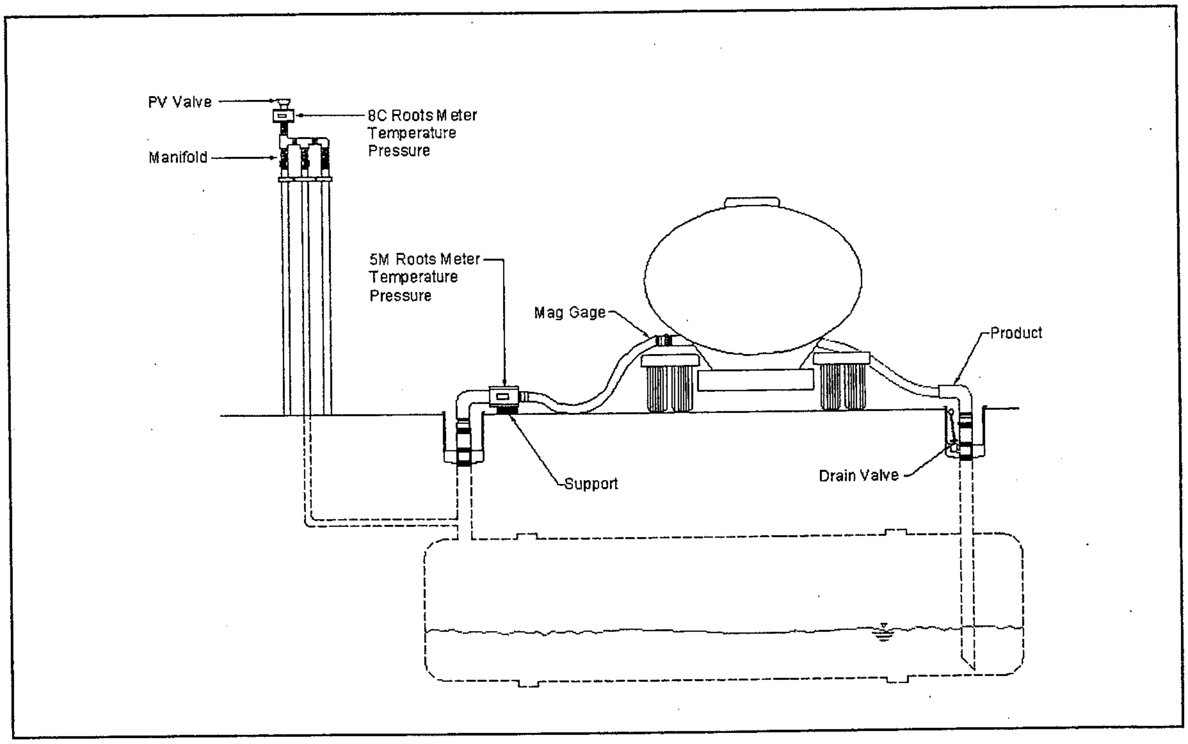
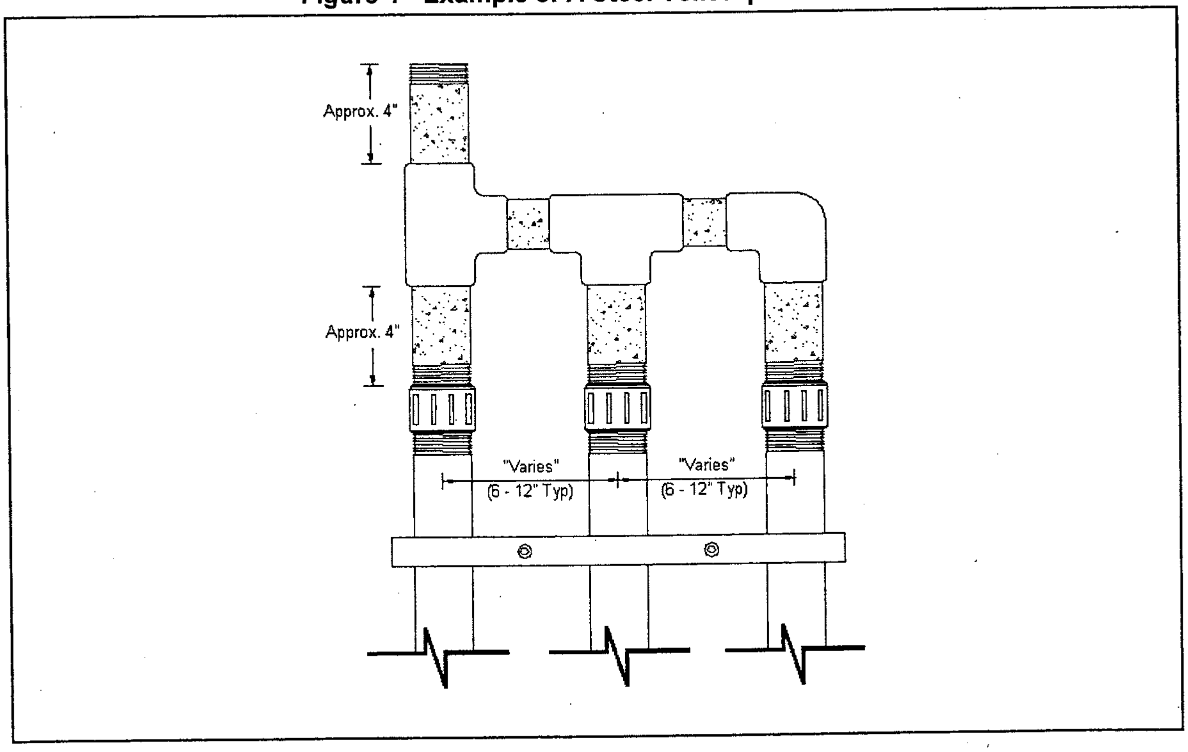


Figure 4 - Example of A Steel Vent Pipe Manifold



California Environmental Protection Agency

Air Resources Board

PROPOSED

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: May 2, 2008
Amended: (insert amendment date)

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 amendment.

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 for Vapor Recovery Procedures

For the purpose of this procedure, the term "CARB or ARB " refers to the ~~State of~~ California Air Resources Board, and the term "~~ARB~~ Executive Officer" refers to the ARB 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 ~~C~~ARB 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 Procedures (CP-201 and CP-206).

2. PRINCIPLE AND SUMMARY OF TEST PROCEDURE

While fueling 100~~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 ~~C~~ARB 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 **either** a destructive detection principle, such as a flame ionization detector (FID) **or a non-destructive detection principle, such as non-dispersive infrared (NDIR).** 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 or NDIR	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 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%
4_{inlet}	NDIR	0 to 10.0% 0 to 50.0%	1% to 9.5% 5% to 47.5%
4_{outlet}	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%
	CO and CO_2 Measurements for Destructive Processor	Ranges	Usable Concentration Range
4_{outlet}	NDIR~~CO~~	0 to 500 ppm (CO)	50 to 475 ppm (CO)
4_{outlet}	NDIR~~CO_2~~	0 to 5.0% (CO_2) 0 to 10.0% (CO_2)	5,000 ppm to 4.75% (CO_2) 1.0% to 9.5% (CO_2)

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 Back ~~p~~Pressure ~~l~~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: **When the configuration of the vapor return line allows it, a** ~~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. **In cases where the configuration of the vapor return line does not allow for the installation of a transparent liquid trap as described in this section, transparent tubing shall be used to connect the volume meter to the test dispenser.**

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: **Optionally, a** ~~Non~~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~~ sweep rate of ~~20~~ between one (1) and two (2) 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 ±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 ±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. **<u>This equipment is only required for vapor processors employing a destructive principle such as thermal oxidation.</u>**

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. **Processor inlet sampling is only required for vapor processors employing a destructive principle such as thermal oxidation.**

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. **The leak test shall occur at least 24 hours prior, and no longer than seven-days before testing.** Corrective action shall be taken as necessary until facility meets TP-201.3 requirements.

7.7 Test Point 5 - Fugitive Emissions: See Figure 1. 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.

7.9 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

<u>R = analyzer range</u>

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 **hydrocarbon gas calibration standard** ~~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 **hydrocarbon gas calibration standard** ~~vapor source~~ to the time that 90% of the **selected analyzer range or** 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.~~

$$\cancel{\text{Bias} = \left[\frac{(Ca - Cb)}{R}\right] x100}$$

~~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~~ **8.3** Initiate Test Documentation:

~~8.4.1~~ **8.3.1** 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~~ **8.3.2** 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~~ 8.4 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 **sleeve shall be removed and the nozzle** ~~with the sleeve~~ shall be hung on the dispenser. Data shall continue to be collected from the termination of dispensing **until the nozzle sleeve hydrocarbon analyzer concentration is less than 100 ppmv as propane, or** for **a time**

period of at least the nozzle sleeve response time determined in Section 8.2**, whichever is longer**. 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~~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 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~~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.~~4~~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.~~5~~4 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 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.

$$Bias = \frac{(C_a - C_{fb})}{R} x100$$

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**

~~11.1~~ **11.2** Prior to dismantling test equipment, conduct a pressure decay test as specified in TP-201.3. **This test shall be conducted as soon as possible, but not more than 48-hours, after completion of the TP-201.2 test. Failure of the prethis test pressure decay 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.**

~~11.2~~ **11.3** Dismantle equipment. Remove testing apparatus and carefully reconnect system plumbing to original configuration.

~~11.3~~ **11.4** 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^oR 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.

$$EFF = 1 - \frac{(M_1 + M_3 + M_4 + M_5)}{(M_1 + M_2)} \times 100$$

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 or Section 15 of Certification Procedure CP-206.

FIGURE 1
TP-201.2 TEST POINTS

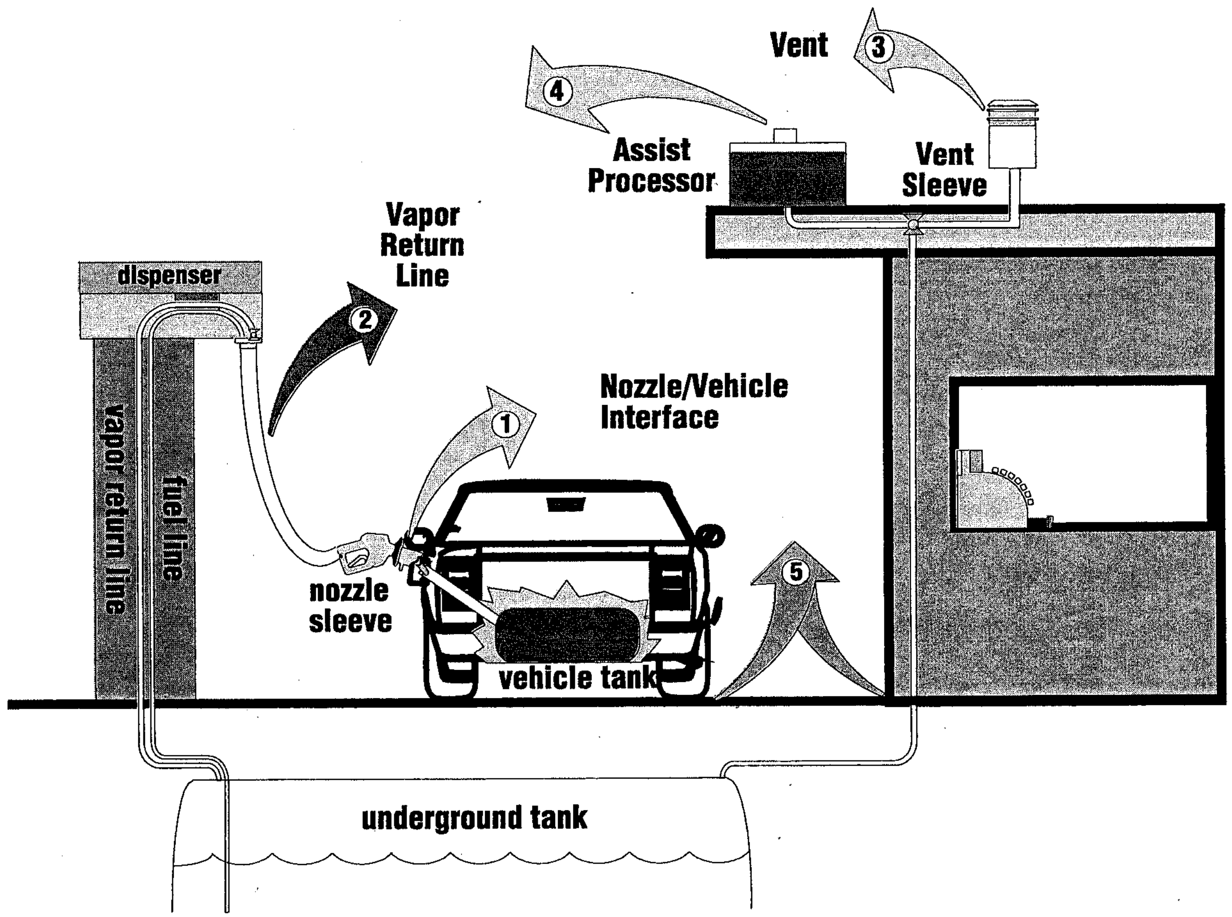


FIGURE 2
VEHICLE LEAK CHECK PROCEDURE (NITROGEN FLOW PRESSURIZATION)

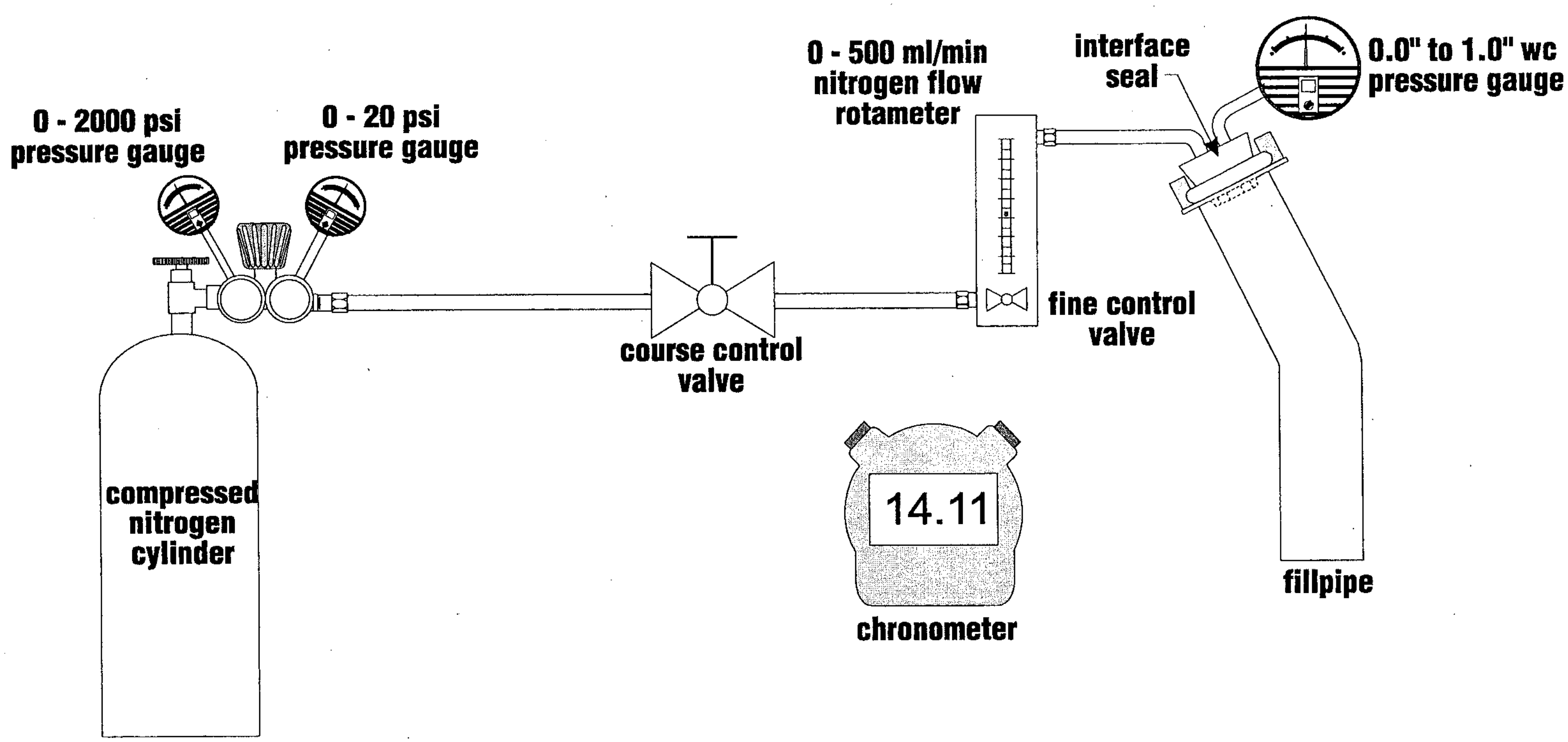
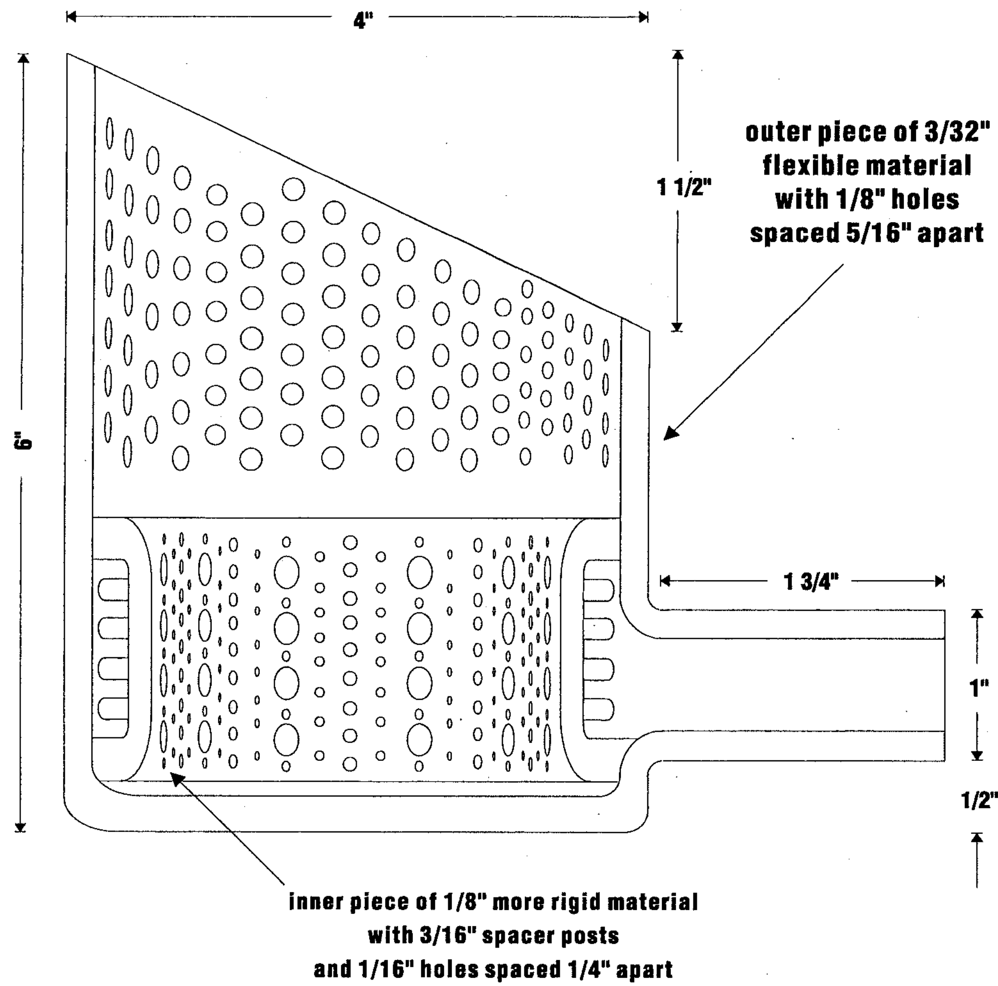
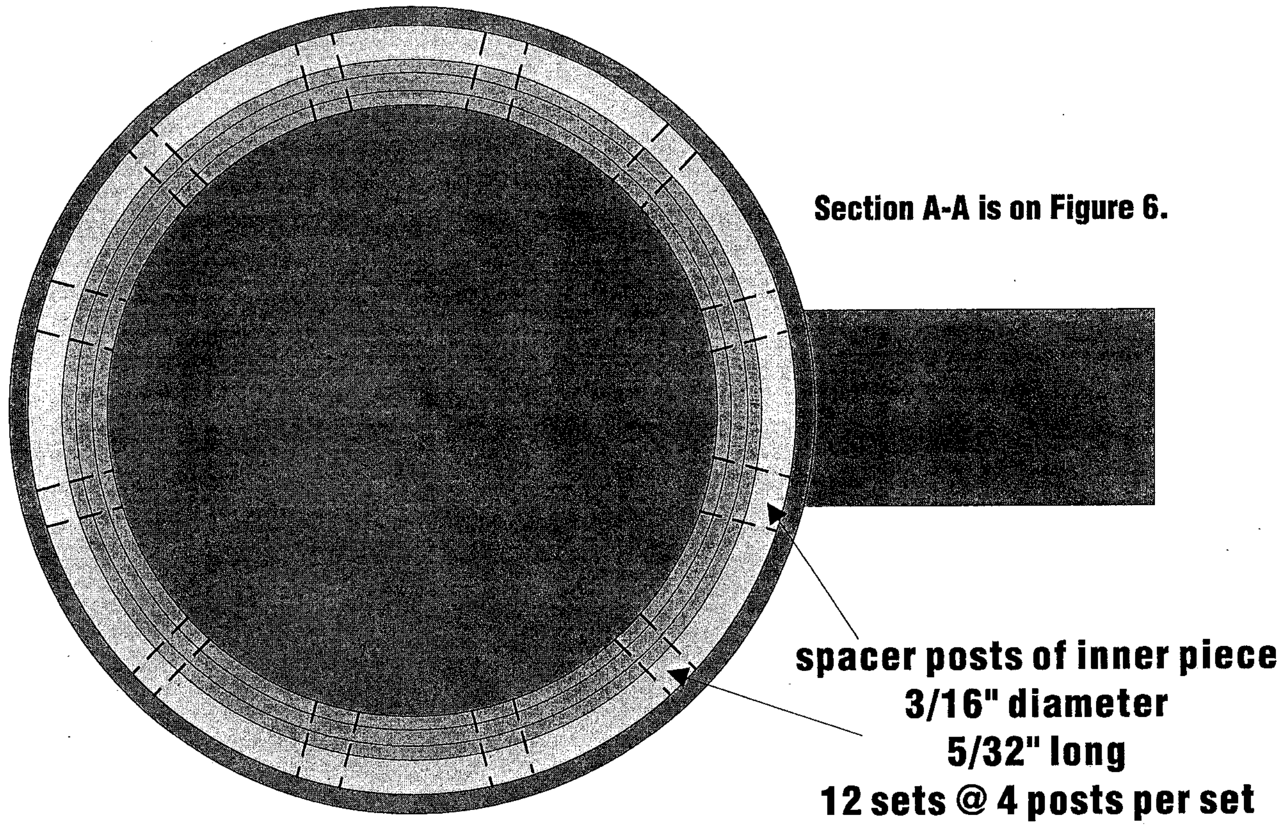


FIGURE 3
NOZZLE SLEEVE ASSEMBLY (SECTIONAL VIEW)



these dimensions are for example, and are not specifications

FIGURE 4
NOZZLE SLEEVE ASSEMBLY (AXIAL VIEW)



Materials must be resistant to breakdown by fuels and additives and easily bonded and repaired.

FIGURE 5
NOZZLE SLEEVE ASSEMBLY INSTALLED ON DISPENSING NOZZLE AT TEST POINT 1

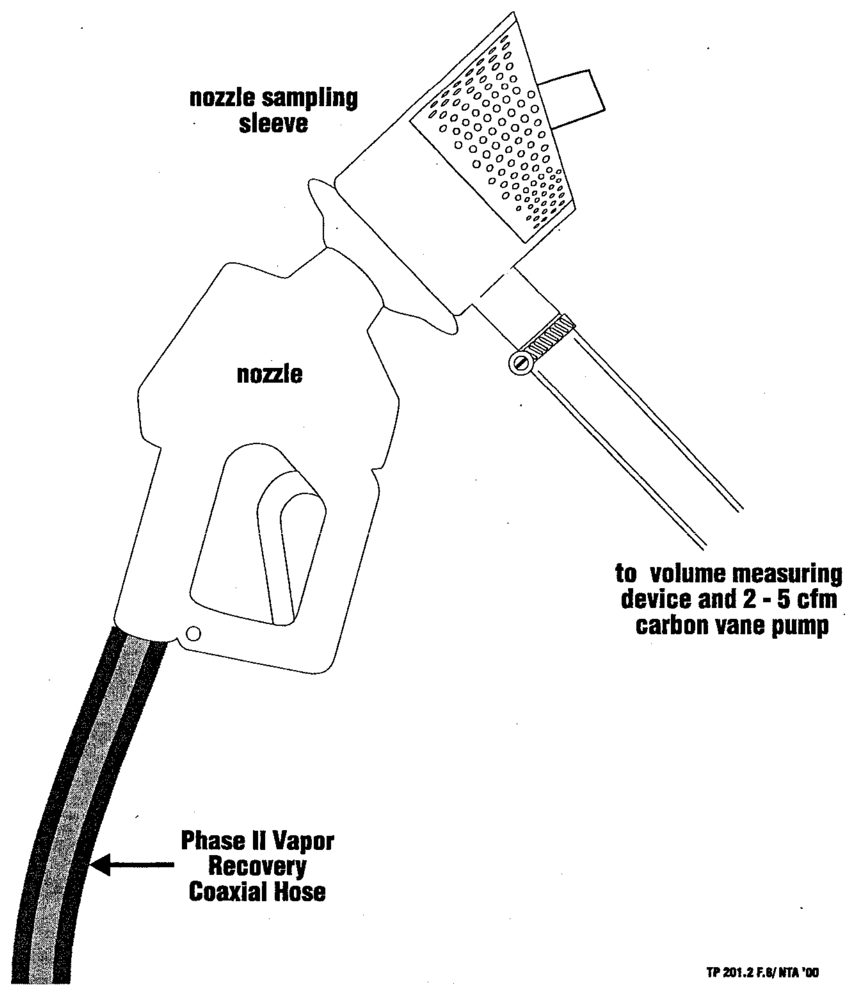


FIGURE 6
COMBUSTIBLE GAS DETECTOR USED FOR SLEEVE LEAK CHECKS

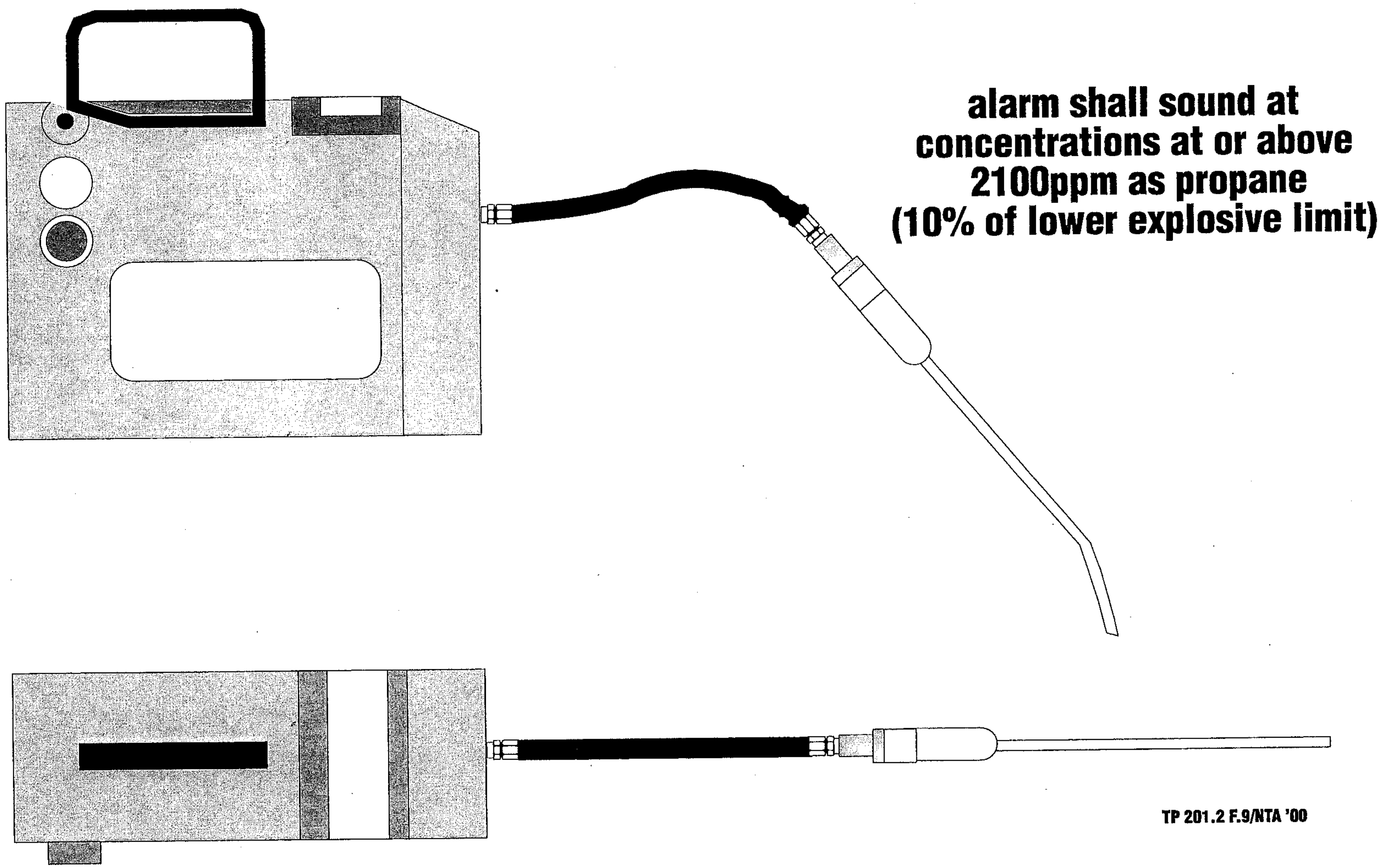


FIGURE 7
COMBUSTIBLE GAS DETECTOR IN USE DURING NOZZLE SLEEVE LEAK CHECK

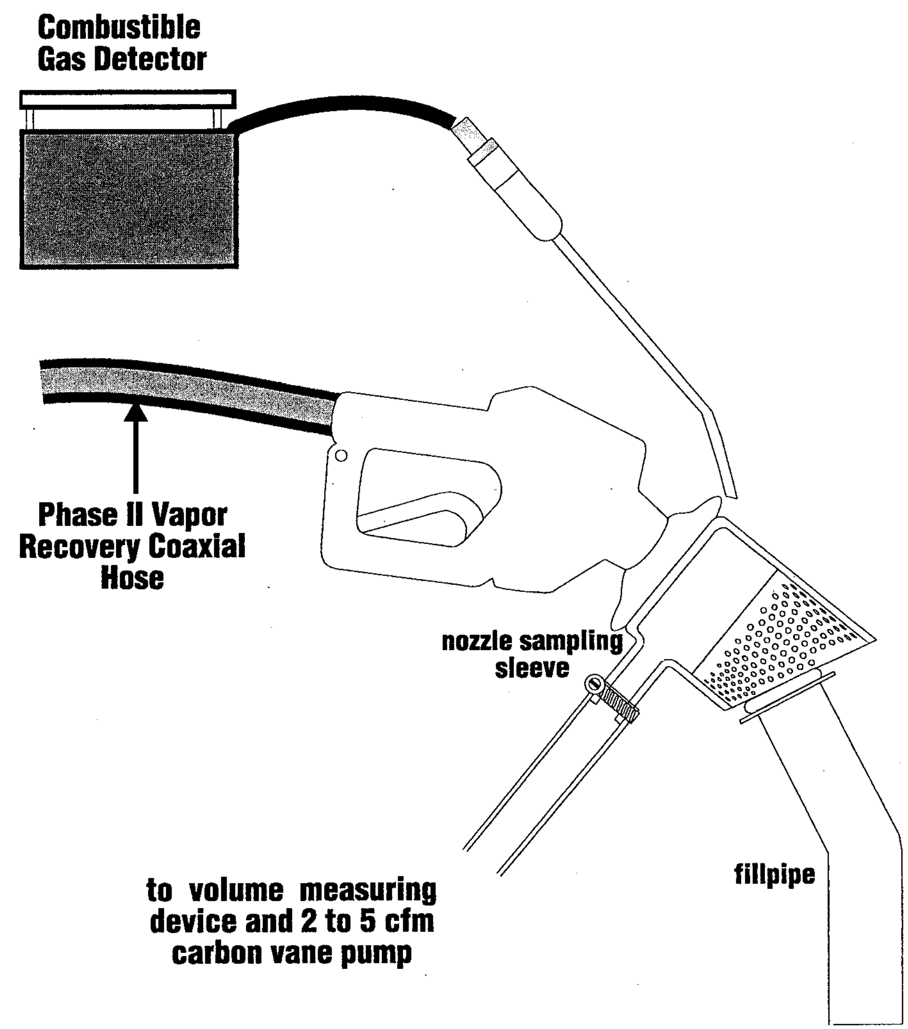


FIGURE 8
VAPOR RETURN LINE VOLUME MEASUREMENTS

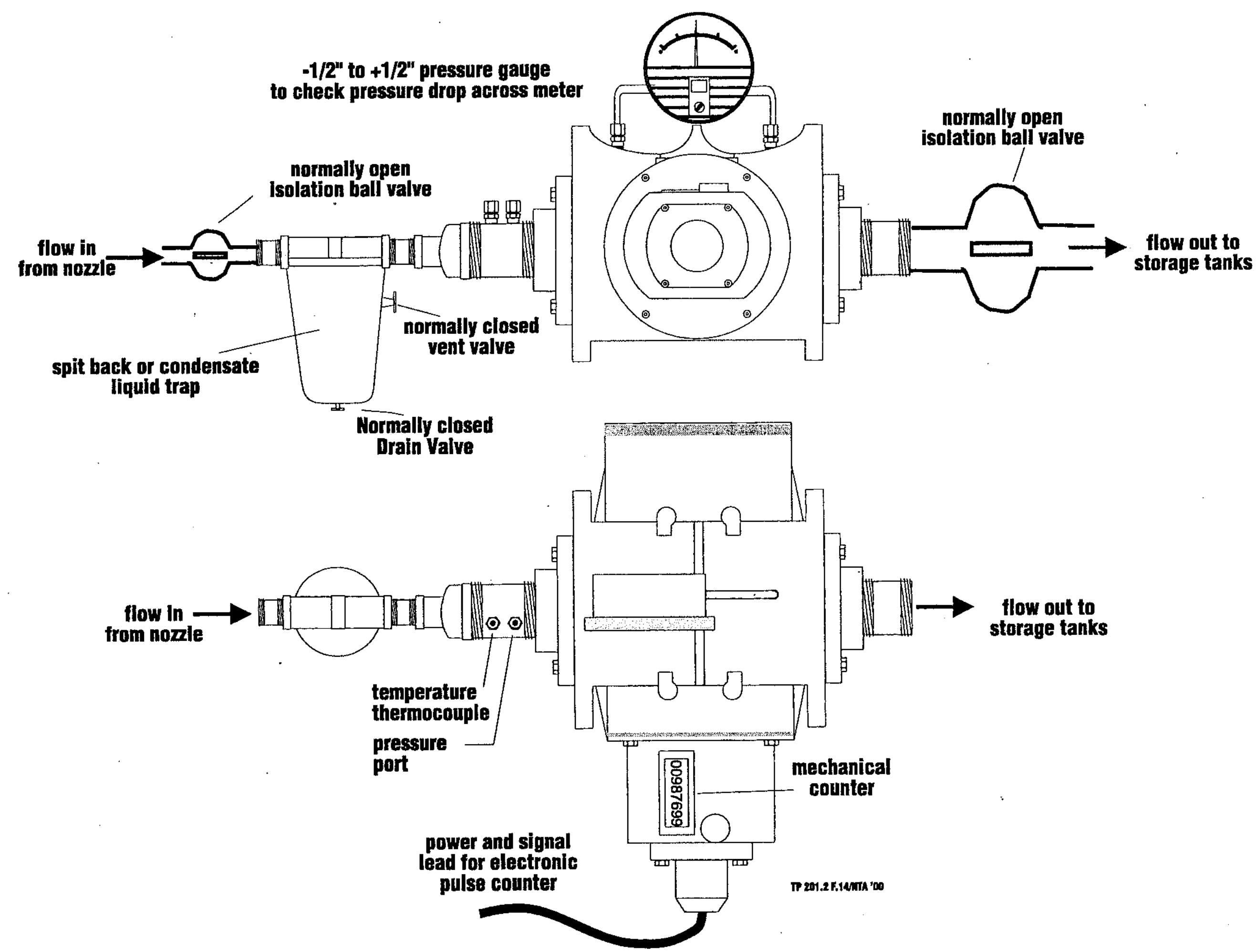


FIGURE 9
VAPOR RETURN LINE VOLUME MEASUREMENTS (SINGLE VR LINE)

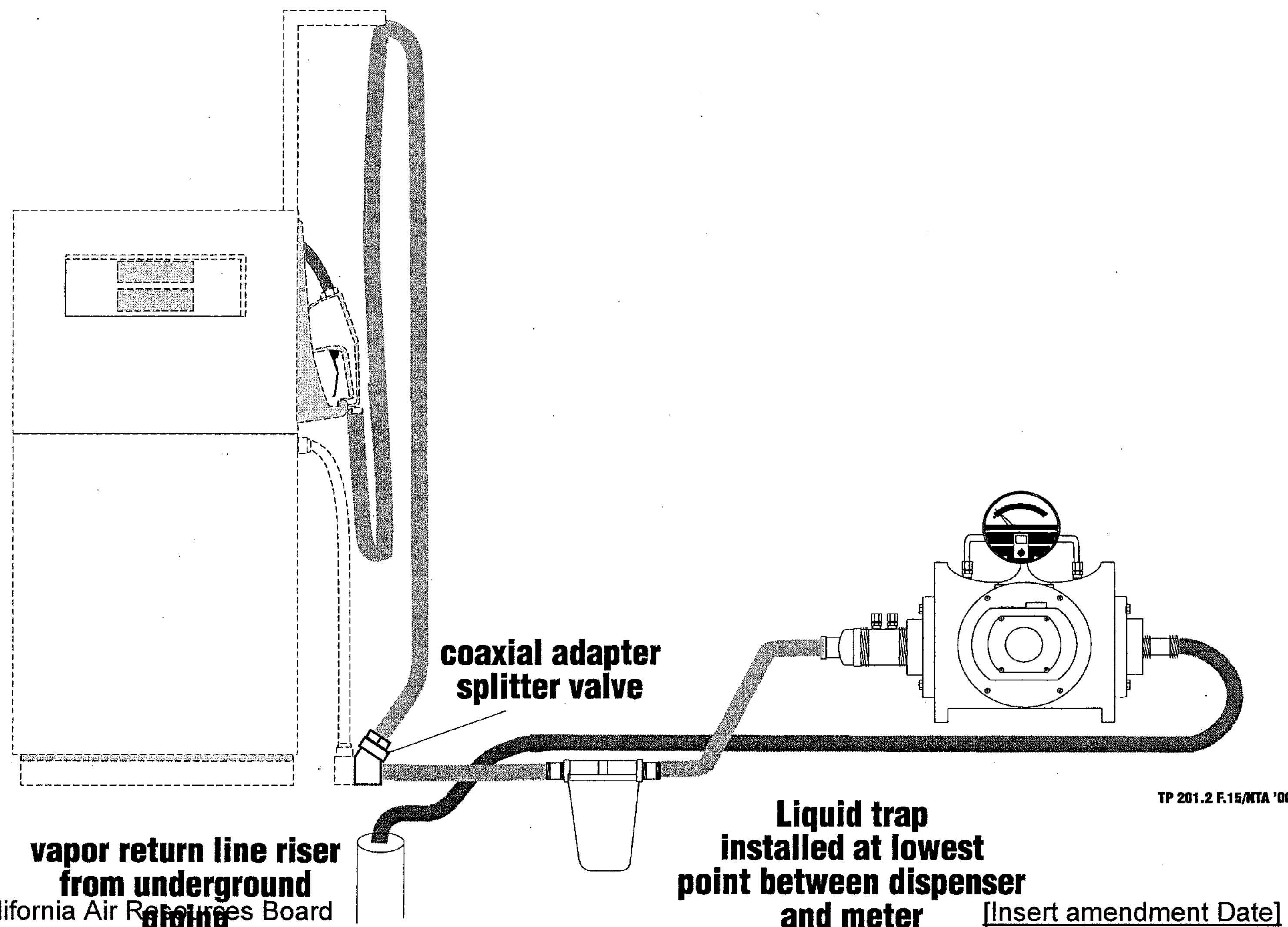


FIGURE 10
VAPOR RETURN LINE VOLUME MEASUREMENTS (VR LINES CONNECTED BY MANIFOLD)

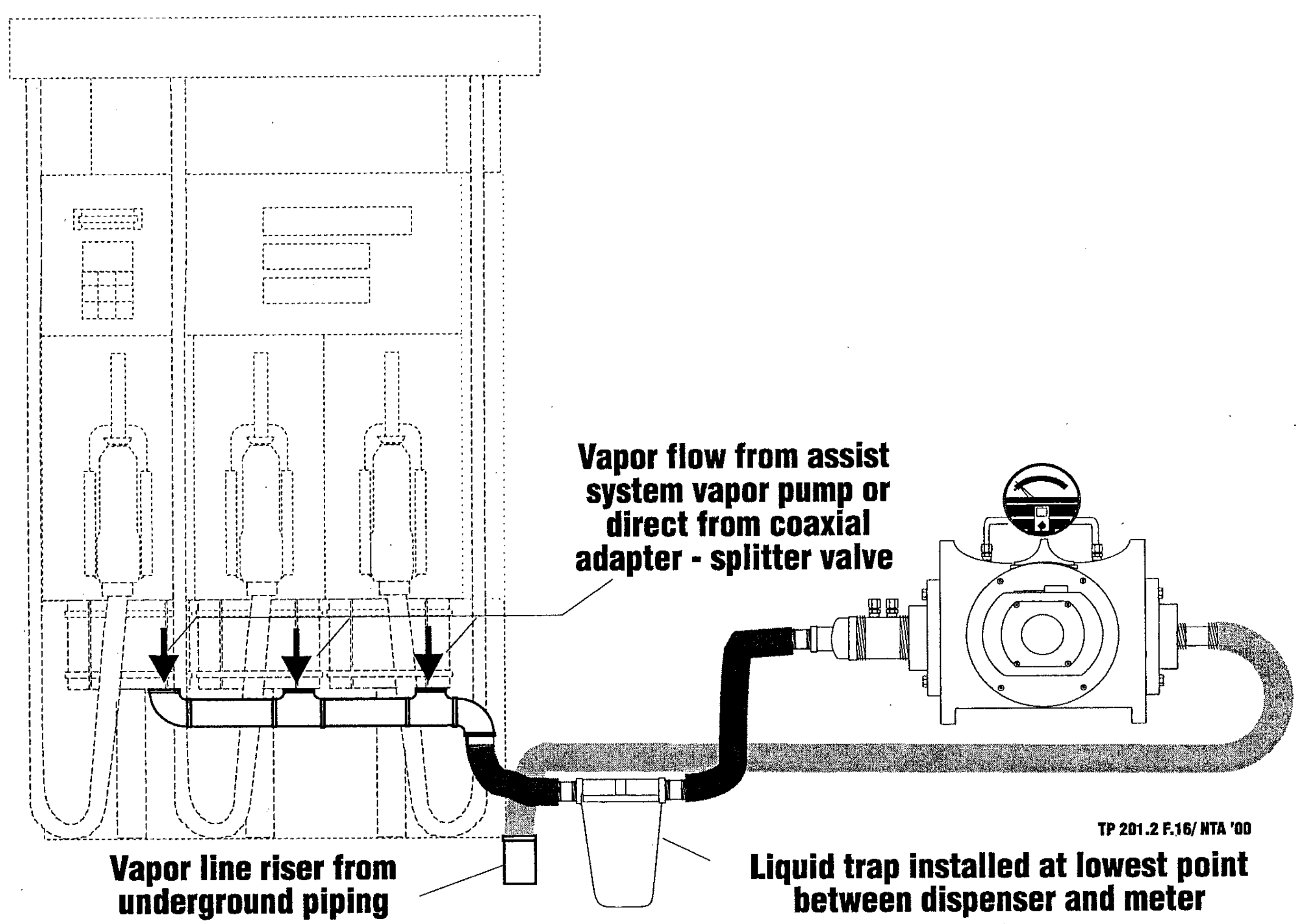


FIGURE 11
VAPOR RETURN LINE HC CONCENTRATION MEASUREMENTS

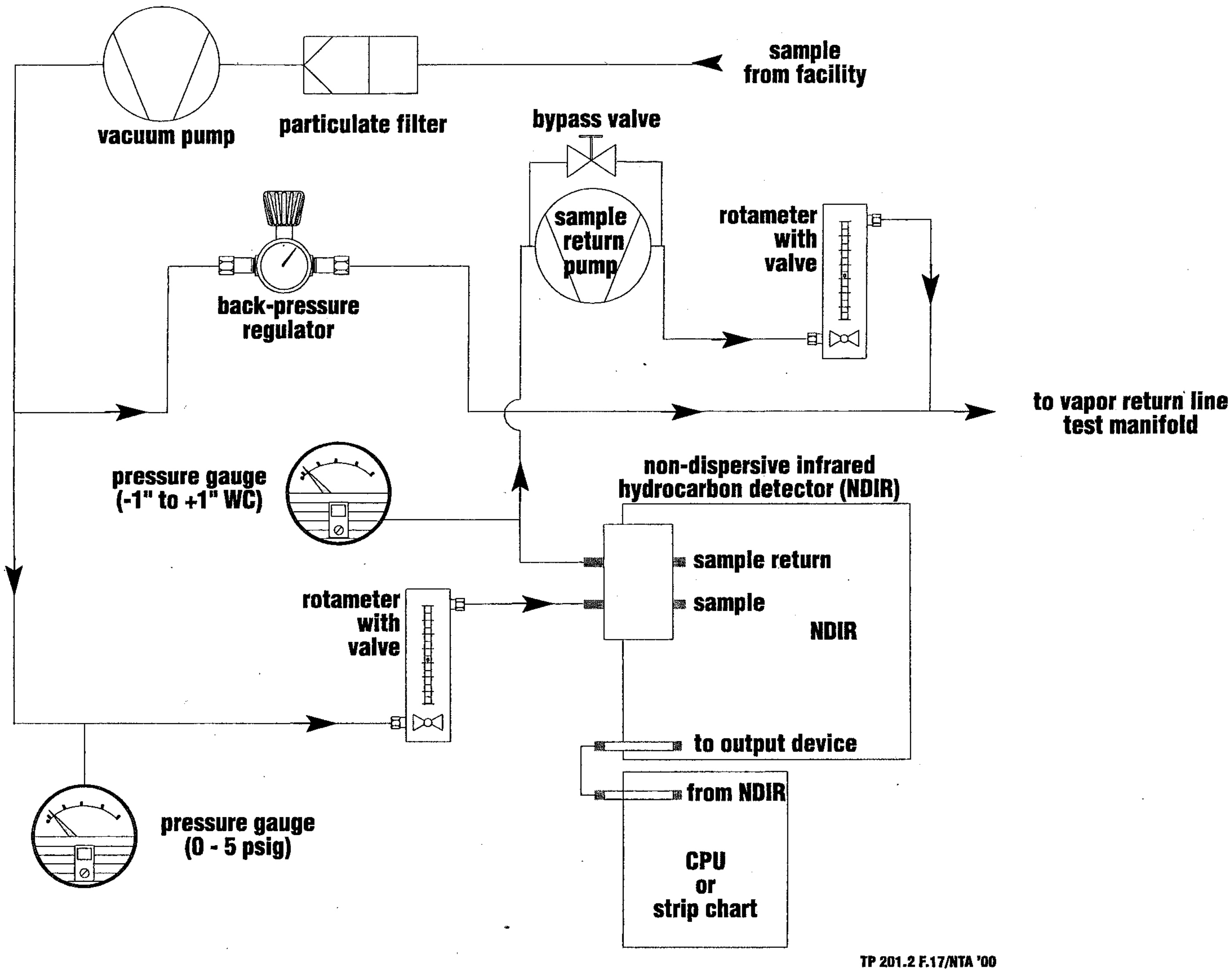


FIGURE 12
UST VENT PIPE SLEEVE ASSEMBLY

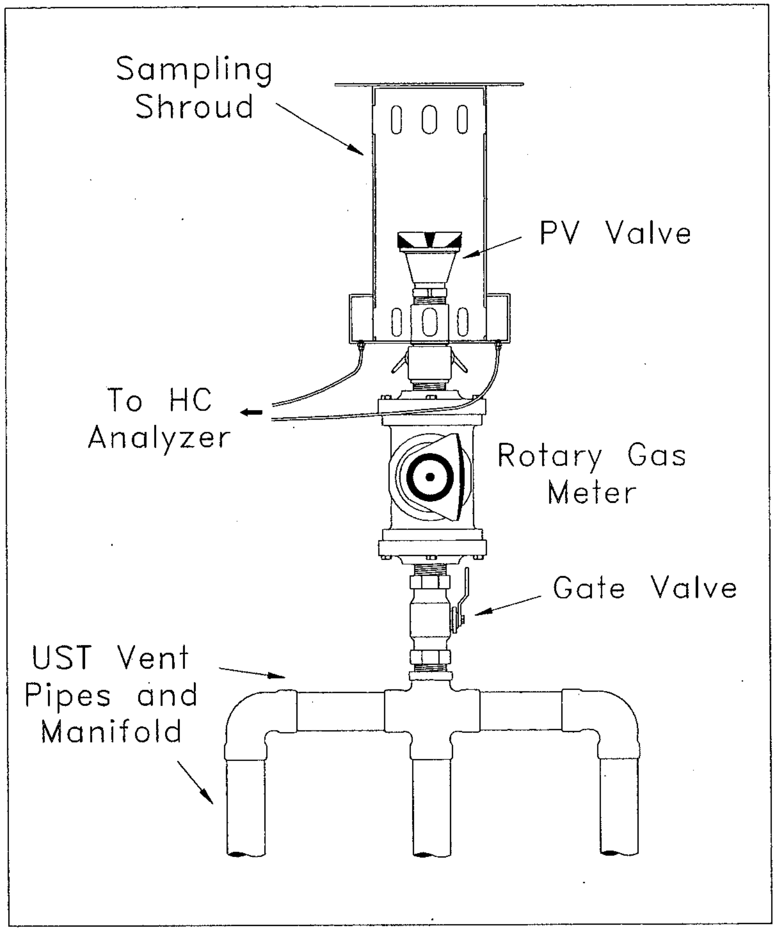


Figure 13 Test Site Vapor Recovery Equipment

Phase I Components

Fill Adapter Brand	Model	Serial	Installation Date	Warranty Exp. Date

Fill Cap Brand	Model	Serial	Installation Date	Warranty Exp. Date

Drop Tube Brand	Model	Serial	Installation Date	Warranty Exp. Date

Overfill Brand	Model	Serial	Installation Date	Warranty Exp. Date

Other	Model	Serial	Installation Date	Warranty Exp. Date

Vapor Adapter Brand	Model	Serial	Installation Date	Warranty Exp. Date

Vapor Cap Brand	Model	Serial	Installation Date	Warranty Exp. Date

Spill Bucket Brand	Model	Serial	Installation Date	Warranty Exp. Date

PV Valve Brand	Model	Serial	Installation Date	Warranty Exp. Date

Other	Model	Serial	Installation Date	Warranty Exp. Date

Phase II Components

Dsp. #	**Other**	Model	Serial	Installation Date	Warranty Exp. Date
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					

Dsp. #	**Other**	Model	Serial	Installation Date	Warranty Exp. Date
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					

Other	Model	Serial	Installation Date	Warranty Exp. Date

Other	Model	Serial	Installation Date	Warranty Exp. Date

FIGURE 14

VEHICLE REFUELING DATA SHEET

TP-201.2
DATA SHEET FOR TEST POINT 1

TEST ID: ________________ DATE: _____________ DATA RECORDED BY:

VEHICLE INFORMATION

VEH.NO.	MAKE	MODEL	YEAR	MATRIX CATEGORY	ORVR?	TIME IN

REFUELING TEST DATA

LIQUID IN TRAP (N/Y [ml])	VEHICLE LEAK (cfm)	VEHICLE LEAK (P/F)	GAS GRADE	SLEEVE LEAK (P/F)	FUEL VOL (GAL)	FUELING TIME (SEC)	SLEEVE LIQUID (P/F[ml])	DISP RATE (GAL/MIN)

VOLUME METER READINGS

INITIAL METER (ACF)	FINAL METER (ACF)	METER TEMP (°F)	METER PRESSURE (IN H2O)

COMMENTS:

California Environmental Protection Agency

Air Resources Board

PROPOSED

Vapor Recovery Test Procedure

TP-201.2A

DETERMINATION OF VEHICLE MATRIX FOR
PHASE II SYSTEMS

Adopted: April 12, 1996
Amended: February 1, 2001
Amended: [Insert amendment date]

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 amendment.

CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY
AIR RESOURCES BOARD

Vapor Recovery Test Procedure~~s~~

TP-201.2A

Determination of Vehicle Matrix for Phase II Systems

1 Applicability

Definitions common to all certification and test procedures are in:

D-200 Definitions for Vapor Recovery ~~Test~~ Procedures

For the purpose of this procedure, the term "CARB or ARB" refers to the ~~State of~~ California Air Resources Board, and the term "~~ARB~~ Executive Officer" refers to the ARB Executive Officer ~~of the ARB~~ or his or her authorized representative or designate.

This test procedure can be used to determine the characteristics of a test fleet of vehicles which, when tested by other test procedures, can yield data representative of the total vehicle fleet. For the purpose of ARB Test Procedure (TP)-201.2, Efficiency and Emission Factor for Phase II Systems, the test fleet shall consist of vehicles which do not have on-board refueling vapor recovery (ORVR).

2 Principle and Summary of Testing Procedure

A representative matrix of vehicle counts in various categories is calculated from registered vehicle data and other information. Vehicles are categorized by model year and by make and/or vehicle type. The number of vehicles specified in the matrix for each category is such that the average number of miles traveled in California by vehicles in each category is substantially similar.

3 Biases and Interferences

The number of vehicle miles traveled is not identical to the amount of gasoline used by vehicles in a category because gasoline consumption per mile will vary. ~~Correction for differences in gasoline consumption rate is considered impractical. It is a~~Also, ~~impractical to calculate a~~the matrix cells have been adjusted so that model years that have a mix of ORVR and non-ORVR vehicles are grouped together in the same cell. ~~where the vehicle miles traveled in each category is identical because of the need to round values off to integer vehicle counts in the matrix and include entire model years in categories.~~

4 Calculating the Vehicle Matrix

The criteria defining vehicle categories and the information on which calculations are based shall be chosen as reasonable and appropriate for the purposes described in sections 1 and 2. The same matrix shall be used for all testing performed in any calendar year, except that the Executive Officer may approve an alternative matrix to be used in special cases where a vapor recovery system is demonstrated to serve a vehicle population substantially different from the California vehicle population as a whole.

The vehicle makes and types, and models, and the number of vehicles per cell in the examples below are for illustration purposes only. More cells and other models, or vehicle makes and/or types, and different numbers of vehicles or categories shall be included at the discretion of the ~~ARB~~ Executive Officer.

The calculation procedures described below are illustrative only and other reasonable and appropriate procedures may be specified or approved by the Executive Officer provided only that the resulting matrix delineates a diverse and representative variety of vehicles and vehicle counts are determined considering estimated vehicle miles traveled by vehicles in each category.

At the Executive Officer's discretion, testing of any particular vapor recovery system may be required to include, in addition to the vehicle matrix, a supplementary list of vehicles or vehicle categories having features or equipment which may pose particular challenges or incompatibilities with that vapor recovery system.

4.1 Obtain Vehicle Make, Model, and Type Information

Obtain the number of vehicles in various categories from an appropriate source such as annual reports from the California Department of Motor Vehicles. An example of data for automobile categories defined by model year and make is illustrated in Table 1.~~by the following:~~

Table 1 - Number of Vehicles

Model Year	Chrysler	Ford	GM	Toyota	Honda	Other	Total
~~1991~~	~~109,563~~	~~344,867~~	~~334,974~~	~~218,577~~	~~191,174~~	~~378,731~~	~~1,577,886~~
~~1990~~	~~138,427~~	~~352,293~~	~~323,953~~	~~203,156~~	~~189,973~~	~~460,906~~	~~1,668,708~~
2002	203,397	447,947	483,019	407,384	272,205	733,610	2,547,562
2001	228,930	491,262	499,856	400,682	279,396	752,566	2,652,702
etc.							

4.2 Obtain Vehicle Miles Traveled Information By Model Year

Obtain data for the projected values for the number of vehicle miles traveled or percent of vehicle miles traveled in various model years expected in the current calendar year from an appropriate source such as projected values provided by ARB's Emission Factors Model (EMFAC)~~ modeling program~~. Include only gasoline fueled vehicles. An example of such data is illustrated in Table 2.~~by the following:~~

Table 2
Percent of Vehicle Miles Traveled by Vehicle Model Year

Model Year	Percent of Vehicle Miles Traveled
2010	0/9
2009	3.0
2008	4.6
2007	5.7
2006	5.9
2005	5.7
2004	5.9
2003	5.6
2002	5.4
2001	5.7
~~1991~~	~~6.9~~
~~1990~~	~~10.5~~
~~1989~~	~~10.7~~
~~1988~~	~~10.3~~
~~1987~~	~~9.3~~
~~1986~~	~~8.2~~
~~1985~~	~~7.4~~
Etcetera (percentage should add up to 100)	

4.3 Calculate Estimated Vehicle Miles Traveled for Each Make and/or Type Category and Each Model Year

Calculate the estimated vehicle miles traveled or percentage of vehicle miles traveled for each category of vehicle make or type in each model year using the data obtained above. For example, ~~calculate that because~~ there were 203,397 2002 ~~109563 1991~~ model Chrysler vehicles and ~~1,577,886 total 1991~~ 2,547,562 total 2002 model vehicles, and projected vehicle miles traveled for 2002 ~~1991~~ vehicles is ~~6.9%~~5.4% of all vehicle miles traveled.~~,~~ From this data the projected percentage of vehicle miles traveled by ~~1991~~ 2002 model Chrysler vehicles is calculated to be 0.43% (5.4%x(203,397/2,547,582))~~will be 6.9% x (109563/1577886) or 0.4791%~~.

4.4 Calculate the Cumulative Percentage of Vehicle Miles Traveled for each Model Year

Calculate the number of vehicle miles traveled in each model year as a percentage of vehicle miles traveled in all model years and, for each model year, the cumulative percentage of vehicle miles traveled by vehicles as new or newer than vehicles in that model year. The following table is an example calculations of the cumulative percent of vehicle miles traveled for 2010.

Model Year	Percent of Total	Cumulative Percent
2010	0.9	0.9
2009	3.0	3.9
2008	4.6	8.5
2007	5.7	14.2
2006	5.9	20.1
2005	5.7	25.8
2004	5.9	31.7
2003	5.6	37.3
2002	5.4	42.7
2001	5.7	48.4
~~1991~~	~~6.9~~	~~6.9~~
~~1990~~	~~10.5~~	~~17.4~~
~~1989~~	~~10.7~~	~~28.1~~
~~1988~~	~~10.3~~	~~38.4~~
~~1987~~	~~9.3~~	~~47.7~~
~~1986~~	~~8.2~~	~~55.9~~
~~1985~~	~~7.4~~	~~63.3~~
Etc.		

4.5 Divide Model Years into Category Groups

Using the cumulative percentages of vehicle miles traveled previously calculated for each model year, divide the model years into groups each representing approximately the same percentage of vehicle miles traveled but group together the transition model years which include both ORVR and non-ORVR vehicles. ~~As an illustrative example~~For example, divide ~~ing~~ model years into ~~5~~4 groups such as 1966-1990, 1991-1997, 1998-2005, and 2006-2010. Although these groups are not equal, they can be used to create a non-ORVR vehicle test matrix. Table 3 shows that model years before 1998 have only non-ORVR vehicles, model years 1998-2005 have both ORVR and non-ORVR vehicles, and model year 2006 and later have only ORVR vehicles. ~~each representing approximately 20% of vehicle miles traveled would be done as follows using the example data above: 1990-1991 model years represent 17.4% of vehicle miles traveled, 1988-1989 model years represent 21.0%, 1985-1987 model years represent 24.9% of vehicle miles traveled, etc. Trial and error selection of model years may be necessary to arrive at an arrangement with the most equal division of vehicle miles traveled in each category group of model years. Do not subdivide model years. The groups will normally represent percentages of vehicle miles traveled which are only approximately equal.~~

Table 3
Federally Mandated Phase-In Schedule for ORVR Vehicles

Vehicle Category	**Model Year**			
	Non-ORVR Vehicles	**40% ORVR**	**80% ORVR**	**100% ORVR**
Passenger Cars	1997 and earlier	1998	1999	2000
Light Duty Trucks ≤6,000 pounds gross vehicle weight rating (GVWR)	2000 and earlier	2001	2002	2003
Medium Duty Vehicles and Light Heavy Duty Trucks 6,000 to 10,000 GVWR	2003 and earlier	2004	2005	2006
Source: U.S. Code of Federal Regulations (CFR), Title 40, Part 86				

4.6 Calculate Percentage of Vehicle Miles Traveled In Each Model Year Category by Vehicles in Each Vehicle Make or Type Category

Sum the percentage of vehicle miles traveled for each category of vehicle in each model year category. For example ~~using data above, because 1991~~ 2002 Chrysler vehicles represent ~~0.4791%~~ 0.43% of total vehicle miles traveled and ~~1990~~ 2001 Chrysler vehicles represent 0.49% ~~0.8710%~~., When these percentages ~~the total percentage~~ of vehicle miles traveled by Chrysler vehicles are added together with the percentages of Chrysler vehicle miles for model year 1998, 1999, 2000, 2003, 2004, and 2005, the total percentage for Chrysler for the ~~1990-1991~~ 1998-2005 model year category is 3.5% ~~1.3501%~~.

4.7 Calculate the Vehicle Count Matrix

For the purpose of TP-201.2, the test fleet shall consist of non-ORVR vehicles only. Therefore, remove the categories for model years after 2005, since 2005 is the last year that non-ORVR vehicles with GVWR less than 10,000 pounds were manufactured. During the model years, 1998 through 2005, ORVR vehicles were phased in, as shown in Table 3. Use information from Table 3 and EMFAC to determine the likely percentage of non-ORVR vehicles in the model-years 1998-2005. For example, the likely percentage of non-ORVR vehicles in the model year 1998 is about 79% and the likely percentage of non-ORVR vehicles in 2005 is 2%. Multiply the percentage of vehicle miles travelled in the 1998-2005 model year category groups by the likely percentage of non-ORVR vehicles for these years. Select a constant AK@ with a value of approximately 2. Calculate a count of non-ORVR vehicles to be tested in each category of vehicle make or type and each model year range by rounding off the product the constant AK@and the percentage of vehicle miles traveled by vehicles in that category of make or type and model year range. Calculate the total of the resulting counts of vehicles in all categories of vehicle make or type and all model year ranges ~~(the total will be approximately 200)~~. Adjust the value of the constant AK@ in small increments by trial and error, and recalculate the total, until the total is exactly ~~200~~ 100. This is best done using a spreadsheet program.

Table 4 is an ~~An illustrative~~ example of a non-ORVR vehicle test matrix. The first row in Table 4 includes the model years 1998-2005, during which both ORVR and non-ORVR vehicles are manufactured. The matrix must include 21 non-ORVR vehicles manufactured between 1998 and 2005. Since vehicles manufactured after 2005 are all equipped with ORVR, these newer vehicles are not included in the test matrix. ~~completed table of vehicle counts is shown below.~~

~~1992 200 VEHICLE MATRIX~~

~~Model Yr~~	~~Chrysler~~	~~Ford~~	~~GM~~	~~Toyota~~	~~Honda~~	~~Other~~	~~Totals~~
~~89-92~~	~~3~~	~~12~~	~~11~~	~~8~~	~~7~~	~~13~~	~~54~~
~~86-88~~	~~6~~	~~9~~	~~10~~	~~9~~	~~4~~	~~16~~	~~54~~
~~82-85~~	~~5~~	~~9~~	~~11~~	~~6~~	~~4~~	~~13~~	~~48~~
~~77-81~~	~~3~~	~~6~~	~~9~~	~~3~~	~~2~~	~~9~~	~~32~~
~~< 77~~	~~3~~	~~4~~	~~5~~	~~0~~	~~0~~	~~2~~	~~12~~
~~TOTALS~~	~~18~~	~~40~~	~~46~~	~~26~~	~~17~~	~~54~~	~~200~~

Table 4
100 Non-ORVR Vehicles for Test Matrix in 2010

Model Year	**Chrysler**	**Ford**	**G.M.**	**Toyota**	**Honda**	**Nissan/ Datsun**	**VW/ Volvo**	**Others**	**Total**
1998-2005	2	4	4	3	2	2	1	3	21
1991-1997	3	8	8	6	5	1	3	5	39
1990 and earlier	3	7	11	5	3	3	3	5	40
Totals	**8**	**19**	**23**	**14**	**10**	**6**	**7**	**13**	**100**

California Environmental Protection Agency

Air Resources Board

PROPOSED

Vapor Recovery Test Procedure

TP- 201.2I

Test Procedure for In-Station Diagnostic Systems

Adopted: October 8, 2003
Amended: May 25, 2006
Amended: [Insert Amendment date]

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 amendment.

CONTENTS

California Environmental Protection Agency
Air Resources Board

Vapor Recovery Test Procedure

TP-201.2I

Test Procedure for In-Station Diagnostic Systems

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 "CARB or ARB" refers to the California Air Resources Board, and the term "Executive Officer" refers to the CARB Executive Officer or his or her authorized representative or designate.

1. PURPOSE AND APPLICABILITY

This test procedure provides a certification method to determine whether the in-station diagnostic (ISD) requirements specified in Certification Procedure 201 (CP-201) and Certification Procedure 206 (CP-206) are met.

2. PRINCIPLE AND SUMMARY OF TEST PROCEDURE

Adequacy of required documentation, including, but not limited, to required test and calibration procedures, is evaluated. The accuracy and precision of measurements made by the ISD system are evaluated based on comparison of ISD system measurements to measurements made using standard test methods, including measurements (where applicable) of (1) air-to-liquid (A/L) ratio (liquid and vapor volumes), (2) vapor collection flow performance (liquid and vapor volumes), (3) central vacuum pump vacuum, (4) underground storage tank (UST) ullage pressure and pressure decay rates, (5) vapor processor function, and (6) other measurement parameters as described in CP-201. Compliance with interface and communications capabilities requirements is tested by connection to, and communication with, the system. Generation of required alarms and actions and response to manual override of interrupted dispensing, is tested by practical tests in which failures are artificially induced, or by software or electrical simulation of failure conditions, or both. Compliance with required up-time percentages is determined by review of operational data. Statistical probabilities of generating required alarms and actions and, of generating false alarms when a vapor recovery system is operating in compliance, are calculated based on accuracy and precision of ISD system measurements compared to standard test procedures and on review of the algorithms used to generate alarms and actions from sensor data.

3. BIASES AND INTERFERENCES

Biases and interferences have not been formally established.

4. SENSITIVITY, RANGE AND PRECISION

Sensitivity range and precision have not been formally established.

5. TEST EQUIPMENT

Equipment specifications are contained in the vapor recovery test procedures cited herein. Additional special equipment specifications may be included at the time of certification if deemed necessary by the Executive Officer due to the nature of a particular ISD-system design.

6. PRELIMINARY SYSTEM EVALUATION AND INSPECTION

6.1 Evaluate Required Documentation of the ISD System

Review the documentation of the ISD system provided by the manufacturer. Evaluate whether or not the documentation conforms to the requirements in CP-201 and is sufficiently clear and complete to facilitate proper and necessary installation, operation, maintenance, calibration, certification testing, and periodic performance testing of the system.

6.2 Verify Standardization of the System Interface

Verify that the ISD system interface is as required by CP-201 by connecting to the system and accessing ISD information with a computer and communications software not provided by the ISD system manufacturer.

6.3 Evaluate Required Uptime Recording and Operational History of the ISD System

Verify that the ISD records the percentage of uptime (i.e. hours and minutes elapsed while the system was fully operational) each day. Examine the record of daily up-time from the operational test period of at least 180 days. Verify that the recorded average daily up-time is 95 percent (95%) or more as required by CP-201.

6.4 Evaluate Required Recorded ISD System Reports

Verify that the ISD system generates and stores reports as required by CP-201. Review available reports and data generated during the operational test period. Note the acceptability or unacceptability of the format of stored reports and whether or not the incidence of alarms and malfunctions and the UST system pressures seem atypical of plausible GDF vapor recovery system operations. An unusual history of UST pressure behavior, or other abnormalities may signal possible problems with the ISD system. Any abnormalities in reported data noted should be investigated as the Executive Officer may deem appropriate.

6.5 Evaluate Tampering Protection

Review those provisions of the system which prevent tampering with the system, i.e. enclosures around sensors, digital components, electrical connections, appropriate locks or seals, circuit integrity checks and alarm systems as necessary, password protection of program and data files, etc. Consider realistic scenarios and situations, common practice, historical events, cost/benefit factors, the need for access by maintenance and test personnel, etc., as deemed appropriate by the Executive Officer. Assess the adequacy of the system to resist various types of tampering including vandalism.

7. DETERMINATION OF ISD SYSTEM MEASUREMENT ACCURACY AND PRECISION

7.1 General Considerations

The procedures set out below for determination of precision and accuracy make certain assumptions regarding the physical arrangement and nature of the ISD system's sensors which may be incompatible with some future ISD system designs. If the Executive Officer finds that the methods below are inappropriate based on representations of the system manufacturer or examination of a system proposed for certification, the Executive Officer may require the system manufacturer to submit, and may approve and use, alternate procedures appropriate to the specific system design proposed for certification.

7.2 A/L Ratio Measurement (Assist Systems Only)

Perform at least 15 A/L tests using TP-201.5 on each gasoline nozzle.

Calculate, as specified in the "Statistical Calculations" section 8. below, the positive and negative errors which have a five percent (5%) and a one percent (1%) chance of occurrence in any group of measurements upon which the ISD system bases generation of alarms or actions.

7.3 Vapor Flow Performance Measurement (Balance Systems Only)

Install equipment for measurement of vapor return line flow as specified in TP-201.2 (refer to figures 9 and 10 of TP-201.2, Efficiency and Emission Factor for Phase II Systems, for equipment arrangement). If multiple nozzles are served by the same ISD system sensor, install similar equipment to simultaneously measure vapor flow from each nozzle served by the ISD system sensor. Insulate or shade test equipment to prevent unnecessary changes in vapor temperature. Perform all calibrations required by TP-201.2.

Conduct TP-201.4 dynamic back pressure testing at the ISD test site's fueling points at 60 CFH of nitrogen and 80 CFH of nitrogen. The fueling point must pass the TP-201.4 test criteria before testing continues. If the fueling point fails to meet this requirement solely because of flow resistance in the test equipment and the Executive Officer determines that vapor collection performance will not be affected by the measured back pressures then the Executive Officer may waive this requirement.

Record volume flow continuously for at least 24 hours on nozzles served by the ISD system sensor.

Repeat for each ISD system sensor.

Calculate, as specified in the "Statistical Calculations" section 8. below, the positive and negative errors which have a five percent (5%) and a one percent (1%) chance of occurrence in any group of measurements upon which the ISD system bases generation of alarms or actions.

7.4 UST Pressure Measurement (Phase I and II Operations)

Install a reference pressure sensor conforming to the specifications of TP-201.7, Continuous Pressure Monitoring, and compatible with a data acquisition system at the same elevation and location as the ISD system's sensor to ensure that no bias due to vapor density will affect comparison of measurements by the two sensors. Record pressure indicated by the reference sensor at 1-minute intervals for a period of at least one (1) week or a longer interval determined by the Executive Officer to be appropriate and until at least three (3) Phase I deliveries have occurred. Compare measured pressures to those measured by the ISD system.

Calculate, as specified in the "Statistical Calculations" section 8. below, the positive and negative errors which have a five percent (5%) and a one percent (1%) chance of occurrence in any group of measurements upon which the ISD system bases generation of alarms or actions.

7.5 Leak Rate Measurement

Conduct a series of TP-201.3, Determination of 2-Inch WC Static Pressure Performance of Vapor Recovery Systems of Dispensing Facilities, leak decay tests at the ISD test site, including at least three (3) runs each day on four (4) days, scheduling test days so the ISD system will calculate at least one weekly average leak rate between each pair of successive test days. Compare leak rate predicted from this testing to the weekly average leak rate determined by the system.

Calculate, as specified in the "Statistical Calculations" section 8. below, the positive and negative errors which have a five percent (5%) and a one percent (1%) chance of occurrence in any group of measurements upon which the ISD system bases generation of alarms or actions.

7.6 Central Vacuum System Measurements

Install a reference pressure/vacuum sensor conforming to the specifications of TP-201.7 and compatible with a data acquisition system at the same elevation and location as the ISD system's vacuum sensor to ensure that no bias due to vapor density will affect comparison of measurements by the two sensors. Record pressure indicated by the reference sensor at one-minute intervals for a period of at least one week or a longer interval determined by the Executive Officer to be appropriate. Compare measured vacuum values to those measured by the ISD system.

Calculate, as specified in the "Statistical Calculations" section 8. below, the positive and negative errors which have a five percent (5%) and a one percent (1%) chance of occurrence in any group of measurements upon which the ISD system bases generation of alarms or actions.

7.7 Vapor Processor Measurements

Test procedures for evaluation of precision and accuracy of ISD systems for use with vapor recovery systems incorporating a vapor processor shall be consistent with the arrangement of the ISD system sensors and the requirements imposed on the vapor processor by any applicable executive order and shall compare ISD system measurements to measurements made using procedures, measurement systems and sensors consistent with the specifications of other CARB certification and test procedures for gasoline vapor recovery systems where applicable. Such test procedures may be established in certification testing and made part of any applicable executive order as the Executive Officer determines to be reasonable and necessary. *NOTE: The nature of the tests required will depend on the nature of the interface between the ISD system and the vapor processor. If the interface* *between the vapor processor and the ISD system is entirely digital no testing is required.*

8. STATISTICAL CALCULATIONS

8.1 Calculation of Error and Normalized Error

Calculate the error and normalized error relative to the reference system of each measurement by the ISD system as follows:

$$e = V_{ISD} - V_{REF}$$

$$e_{norm} = (V_{ISD} - V_{REF})/V_{REF}$$

where

e	=	error of ISD system measurement relative to reference system measurement for any pair of simultaneous measurements of the same parameter
e_{norm}	=	normalized error of ISD system measurement relative to reference system measurement for any pair of simultaneous measurements of the same parameter
V_{ISD}	=	value of parameter measured by ISD system
V_{REF}	=	value of parameter measured by reference system

Rejection of outlier values is permissible, subject to approval of the Executive Officer, if the values are found to be physically implausible, attributable to known interfering causes, or otherwise non-representative.

8.2 Mathematical Characterization of Error Distributions

Calculate the average values of e and of e_{norm} using the following equation:

$$x_{avg} = \Sigma x_i/n$$

where Σ signifies summation of all individual values in the data set and

x_{avg}	=	the average, i.e. e_{avg} or $e_{norm\ avg}$
x_i	=	corresponding individual values of e or e_{norm}
n	=	number of values in the data set

Calculate the sample standard deviation of e and of e_{norm} using the following equation:

$$s = \left(\Sigma(x_i - x_{avg})^2 / (n-1) \right)^{1/2}$$

where Σ signifies summation of all individual values in the data set and

s	=	the standard deviation (s_e or $s_{e\text{-}norm}$)

x_i = corresponding individual values of e or e_{norm}
x_{avg} = corresponding average value (e_{avg} or $e_{norm\ avg}$)
n = number of values in the data set

The calculation of averages and standard deviations for data from A/L fuelings and Vapor Collection Performance fuelings may be weighted according to gallons dispensed subject to approval by the Executive Officer.

If $s_{e\text{-}norm}$ is less than s_e/e_{avg} then $s_{e\text{-}norm}$ is a better fit to the data and should be used to calculate the one percent (1%)-probable and five percent (5%)-probable error as described in subsections 8.4 and 8.5 below. Otherwise s_e should be used, again as in subsections 8.4 and 8.5 below.

8.3 Determining the Number of Measurements "n_{ACT}" or "n_{BORD}" Upon which an ISD System Decision Is Based

The number of measurements upon which the ISD bases decisions to generate or not generate an action (i.e., an alarm or a system shut-down) influences the calculation of probable errors below and will depend on the algorithm used by the system, on the prescribed time interval related to the action, and for some actions on typical fueling activity at the facility. Intervals related to various decisions are described in subsections below. Determine the number of measurements n_{ACT} or n_{BORD} upon which each decision will be based considering all pertinent factors including the historical record of activity at the test site. In many cases n_{ACT} and n_{BORD} may be identical, but this will depend on the nature of the decision algorithm. If the Executive Officer finds that activity at the test site is not representative of a typical facility the number of measurements may be based on normal activity at a typical facility.

8.4 Calculation of Five Percent (5%)-Probable Error Magnitude

Calculate the positive (or negative) error of the average of a group of measurements (upon which a required alarm or action is based) which is likely to occur only five percent (5%) of the time (i.e., expected to NOT occur 95% of the time) using the following equation:

$$e_{ACT\text{-}5\%} = 1.645\ n_{ACT}^{-1/2}\ s$$

where
1.645 = constant equal to the z-coordinate for a one-sided 5% outside probability assuming normal distribution
$e_{ACT\text{-}5\%}$ = magnitude of the 5%-probable error of the calculated average of n_{ACT} measurements
n_{ACT} = number of measurements upon which the action is based

s = either s_e or ($s_{e\text{-norm}} V_{ACT}$) , as follows. If $s_{e/}\, e_{avg} < s_{e\text{-norm}}$ then use s = ($s_{e\text{-norm}} V_{ACT}$) where V_{ACT} is the criterion value upon which the decision to act is based. Otherwise, use s = s_e instead.

8.5 Calculation of One-Percent (1%)-Probable Error Magnitude

Calculate the positive (or negative) error of the average of a group of measurements (upon which a required alarm or action is based) which is likely to occur only one percent (1%) of the time (i.e. expected to NOT occur 99% of the time) using the following equation:

$$e_{BORD\text{-}1\%} = 2.326\, n_{BORD}^{-1/2}\, s$$

where

2.326 = constant equal to the z-coordinate for a one-sided 1% outside probability assuming normal distribution

$e_{BORD\text{-}1\%}$ = magnitude of the 1%-probable error of the calculated average of n_{ACT} measurements

n_{BORD} = number of measurements upon which the decision is based

s = either s_e or ($s_{e\text{-norm}} V_{BORD}$) , as follows. If $s_{e/}\, e_{avg} < s_{e\text{-norm}}$ then use s = ($s_{e\text{-norm}} V_{BORD}$) where V_{BORD} is the "borderline" criterion value upon which the decision not to act is based. Otherwise, use s = s_e instead.

8.6 Calculation of Action Criterion Values V_{ACT} and Action Test Values V_T

When alarms or interruption of fueling are required at the indicated Action Criterion Values below in the presence of a five percent (5%)-probable measurement error by the ISD system. The indicated Action Test Values should be induced or simulated for the given interval, and twice the given interval where a shutdown action is required after a previous warning alarm.

The Action Criterion Value V_{ACT} is the first value which should provoke an alarm or action. The Action Test Value V_T is the value which the data acquisition system is expected to see and record five percent (5%) of the time when the system is operating such that V_{ACT} prevails. In testing the ISD system for proper generation of actions and alarms by inducing or simulating Action Criterion conditions the ISD system's data acquisition system must see and record values equal to or averaging V_T .

A/L Gross Failure (Interval = 1 day)

a. V_{ACT} = 1.75*(Upper limit of allowable A/L range); $V_T = V_{ACT} - e_{ACT\text{-}5\%}$

b. V_{ACT} = 0.25*(Lower limit of allowable A/L range); $V_T = V_{ACT} + e_{ACT\text{-}5\%}$

A/L Degradation (Interval = 1 week)
a. V_{ACT} = 1.25*(Upper limit of allowable A/L range); $V_T = V_{ACT} - e_{ACT\text{-}5\%}$
b. V_{ACT} = 0.75*(Lower limit of allowable A/L range); $V_T = V_{ACT} + e_{ACT\text{-}5\%}$

Reduced Vapor Collection Flow Performance (Interval = 2 days)
V_{ACT} = 0.50*(Volume of Fuel Dispensed); $V_T = V_{ACT} + e_{ACT\text{-}5\%}$

Central Vacuum System Failure (Interval = 20 minutes)
V_{ACT} = Lowest Vacuum (highest absolute pressure) in Certified Allowable Range; $V_T = V_{ACT} - e_{ACT\text{-}5\%}$ where it is understood that the error will result in a lower measured absolute pressure.

UST Ullage Pressure Gross Failure
The test interval for this criterion is 5% of the time in one week, which is 504 minutes (8.4 hours).
V_{ACT} = 1.5 Inches of H_2O; $V_T = V_{ACT} - e_{ACT\text{-}5\%}$

UST Ullage Pressure Degradation
The test interval for this criterion is ~~5%~~ 25% of the time in one 30-day month, which is ~~2160 minutes (36 hours)~~ 10,800 minutes (180 hours).
V_{ACT} = 0.5 Inches of H_2O; $V_T = V_{ACT} - e_{ACT\text{-}5\%}$

UST Ullage Pressure - Pressure Integrity Failure (Leakage) (Interval = 1 week)
V_{ACT} = pressure consistent with leakage at twice the maximum which would occur if the system passed a TP-201.3 test; $V_T = V_{ACT} - e_{ACT\text{-}5\%}$ where $e_{ACT\text{-}5\%}$ is calculated based on the average UST ullage pressure during the week.

~~UST Ullage Pressure Phase I Overpressure (Interval = 20 minutes)~~
~~V_{ACT} = 2.5 Inches of H_2O; $V_T = V_{ACT} - e_{ACT\text{-}5\%}$~~

Vapor Processor Malfunction (Interval = 1 day)
V_{ACT} = will be as recommended by manufacturer and approved by the Executive Officer; $V_T = V_{ACT} - e_{ACT\text{-}5\%}$

8.7 Calculation of Borderline Operation Values V_{BORD} and Action Test Values V_{BT}

No alarms or interruption of fueling are permissible at the indicated Borderline Operation Values below in the presence of a one percent (1%)-probable measurement error by the ISD system. The indicated Borderline Operation Values should be induced or simulated for the given interval, and twice the given interval where a shutdown action is required after a previous warning alarm.

The Borderline Operation Value V_{BORD} is the limit of normal operation. The Borderline Test Value V_{BT} is the value which the data acquisition system is expected to see and record one percent (1%) of the time when the system was operating at the limit of normal operation. In testing the ISD system for proper immunity to false alarms by inducing or simulating borderline conditions the ISD system's data acquisition system must see and record values equal to or averaging V_{BT}.

A/L Gross Failure (Interval = 1 day)
a. V_{BORD} = 1.00*(Upper limit of allowable A/L range); $V_{BT} = V_{BORD} + e_{BORD-1\%}$
b. V_{BORD} = 1.00*(Lower limit of allowable A/L range); $V_{BT} = V_{BORD} - e_{BORD-1\%}$

A/L Degradation (Interval = 1 week)
a. V_{BORD} = 1.00*(Upper limit of allowable A/L range); $V_{BT} = V_{BORD} + e_{BORD-1\%}$
b. V_{BORD} = 1.00*(Lower limit of allowable A/L range); $V_{BT} = V_{BORD} - e_{BORD-1\%}$

Reduced Vapor Collection Flow Performance (Interval = 2 days)
V_{BORD} = 1.00*(Volume of Fuel Dispensed); $V_{BT} = V_{BORD} - e_{BORD-1\%}$

Central Vacuum System Failure (Interval = 20 minutes)
V_{BORD} = Lowest Vacuum (highest absolute pressure) in the Normal Operating Range specified by the manufacturer and approved by the executive officer; $V_{BT} = V_{BORD} - e_{BORD-1\%}$ where it is understood that the error will result in a higher measured absolute pressure.

UST Ullage Pressure Gross Failure
The test interval for this criterion is 95% of the time in one week, which is up to 9576 minutes (159.6 hours).
$V_{BORD} = 95^{th}$ percentile of historically observed pressures, or alternatively a value between 0.25 and 1.5 inches of H_2O recommended by the manufacturer and approved by the executive officer; $V_{BT} = V_{BORD} + e_{BORD-1\%}$

UST Ullage Pressure Degradation
The test interval for this criterion is ~~95%~~ 75% of the time in one 30-day month, which is up to ~~41040 minutes (684 hours)~~ 32,400 minutes (540 hours) ~~assuming no deliveries or other events require exclusion of data~~.
$V_{BORD} = 95^{th}$ percentile of historically observed pressures, or alternatively a value between 0.25 and 1.5 inches of H_2O recommended by the manufacturer and approved by the executive officer; $V_{BT} = V_{BORD} + e_{BORD-1\%}$

UST Ullage Pressure - Pressure Integrity Failure (Leakage) (Interval = 1 week)
V_{BORD} = pressure consistent with leakage at the maximum which would occur if the system passed a TP-201.3 test; $V_{BT} = V_{BORD} + e_{BORD-1\%}$ where $e_{\cancel{ACT-5\%}BORD-1\%}$ is calculated based on the average UST ullage pressure during the week.

~~UST Ullage Pressure Phase I Overpressure (Interval = 20 minutes)~~
~~V_{BORD} = 75th percentile pressure observed in Phase 1 deliveries; V_{BT} = V_{BORD} + $e_{BORD-1\%}$~~

Vapor Processor Malfunction (Interval = 1 day)
V_{BORD} = will be as recommended by manufacturer and approved by the Executive Officer; $V_{BT} = V_{BORD} - e_{BORD-1\%}$

9. TESTING PROPER ISD SYSTEM OPERATION INCLUDING GENERATION OF AUTOMATIC ALARMS AND ACTIONS

9.1 General Considerations

As required in CP-201, the ISD system manufacturer shall provide a means for verifying proper operation of the ISD system.

Appropriate methods for such testing may include, depending on the nature of the ISD system and subject to approval of the Executive Officer: (1) temporary substitution of test data files reflecting failure conditions for actual data acquired and recorded by the ISD system; (2) temporary connection of special electrical equipment or components in the system's sensor circuitry to emulate failure conditions; (3) temporary modification or adjustment of the vapor recovery system which causes it to fail in a safe and controlled manner.

Testing by any of these means may require that tampering protections be bypassed, acquired data be flagged as affected by testing activity, or both.

9.2 Appropriateness of Generated Alarms

During certification testing the nature of the alarms generated by the system shall be considered and approved. Alarms which disrupt operations by virtue of being too loud or intrusive may risk being disabled by tampering. Alarms which are not sufficiently loud or intrusive may not be recognized or acted on by operating personnel. Common practice often calls for both audible and visible alarm indications, and for the ability to silence audible alarms once they have been heard.

9.3 System Startup and Restart

Verify that information indicating a restart is stored by the system as required by CP-201 by inducing or simulating a loss of power to the system.

9.4 Sensor Failure Detection

Verify that the system has the ability to test the integrity of its sensors and that an induced or simulated sensor failure causes an appropriate system response. At a minimum the ISD system should be capable of detecting removal or disconnection of any sensor.

9.5 A/L Gross Failure Response (Assist Systems Only)

This test spans an actual or simulated period of two (2) days for failures below the acceptable A/L range, two (2) days for failures above the acceptable A/L range, and two (2) days for borderline acceptable operation.

Induce or simulate A/L failure conditions and borderline acceptability conditions as follows and verify appropriate system response; Arrange induced or simulated conditions considering the ISD system's timing of daily assessments of A/L ratio acceptability. An alarm is scheduled immediately when any daily assessment shows failure, and interruption of fueling is scheduled immediately when a second consecutive daily assessment shows failure.

At a level 75 percent (75%) above the upper A/L range limit in the presence of a five-percent (5%)-probable negative error in measurement of A/L by the ISD system, and at a level 75 percent (75%) below the lower A/L range limit in the presence of a five-percent (5%)-probable positive error in measurement of A/L by the ISD system, the system should alarm and disable fueling as scheduled. Manual re-enabling of fueling should be successful and events should be properly recorded by the system.

At the lower A/L range limit in the presence of a one-percent (1%)-probable negative error in A/L measurement by the ISD system, and at the upper range limit in the presence of a one-percent (1%)-probable positive error, the system should neither alarm or disable fueling.

9.6 A/L Degradation Response (Assist Systems Only)

This test spans an actual or simulated period of two (2) weeks for failures below the acceptable A/L range, two (2) weeks for failures above the acceptable A/L range, and two (2) weeks for borderline acceptable operation.

Proceed as for the Gross Failure checks above but with A/L 25 percent (25%) outside certified range rather than 75 percent (75%) outside certified range and considering that the assessment interval is one (1) week rather than one (1) day.

9.7 Reduced Vapor Collection Flow Performance (Balance Systems Only)

This test spans an actual or simulated period of two (2) days for failures below the acceptable vapor collection flow performance level and two (2) days for borderline acceptable operation.

Induce or simulate reduced vapor collection flow and borderline acceptability conditions as follows and verify appropriate system response. Arrange induced or simulated conditions considering the ISD system's timing of daily assessments of vapor collection flow performance acceptability. An alarm is scheduled immediately when any daily assessment shows failure, and interruption of fueling is scheduled immediately when a second consecutive daily assessment shows failure.

With vapor collection flow performance 50 percent (50%) below the minimum certified level and a five-percent (5%)-probable positive error in ISD system measurement of vapor collection flow the system should alarm and disable fueling as scheduled. Manual re-enabling of fueling should be successful and events should be properly recorded by the system.

With vapor collection flow performance at the minimum certified level for the vapor recovery system and a one-percent (1%)-probable negative error in measurement of vapor collection flow by the ISD system the system should neither alarm nor disable fueling.

9.8 Central Vacuum System Failure (Systems so equipped only)

This test spans an actual or simulated period of 20 minutes for failures and 20 minutes for borderline acceptable conditions.

Induce or simulate a Central Vacuum Unit failure. The ISD system should alarm and disable fueling after 20 minutes. Manual re-enabling of fueling should be successful and events should be properly recorded by the system.

If detection of failure depends on quantitative measurements made by the ISD system, the Executive Officer shall specify an appropriate definition of borderline operating conditions. When such conditions are induced or simulated and a one-percent (1%) probable worst-case (positive or negative as applicable) error exists in quantitative measurements made by the ISD system the system should not alarm or interrupt fueling.

9.9 UST Ullage Pressure - Gross Failure Response

This test spans an actual or simulated period of two (2) weeks for failures where UST ullage pressure exceeds the specified criteria and two (2) weeks for borderline acceptable operation.

Induce or simulate UST ullage pressure excessive values and borderline acceptability conditions as follows and verify appropriate system response. Arrange induced or simulated conditions considering the ISD system's timing of weekly assessments of UST ullage pressure acceptability. An alarm is scheduled immediately when any weekly assessment shows failure, and interruption of fueling is scheduled immediately when a second consecutive weekly assessment shows failure.

If UST ullage pressure during a week exceeds 1.5 Inches of H_2O during five percent (5%) of the time and a five-percent (5%)-probable negative measurement error is present whenever pressure exceeds1.5 inches H_2O, the system should alarm and disable fueling as scheduled. Manual re-enabling of fueling should be successful and events should be properly recorded by the system.

If UST ullage pressure during a week is at the maximum allowable level permitted by an executive order applicable to the vapor recovery system (or the 95th percentile level of pressures actually observed in the system if no maximum limit is specified by an applicable executive order) during the time and a one-percent (1%)-probable positive measurement error is present whenever pressure exceeds1.5 inches H_2O the system should neither alarm or disable fueling.

9.10 UST Ullage Pressure - Degradation Response

This test spans an actual or simulated period of two (2) months for failures where UST ullage pressure exceeds the criteria as specified and two (2) months for borderline acceptable operation.

Proceed as for the UST ullage pressure Gross Failure checks above but with UST ullage pressure above 0.5 inches of H_2O during 25 percent (25%) of the time rather than above 1.5 inches of H_2O during five percent (5%) of the time. Arrange induced or simulated conditions considering the ISD system's timing of monthly assessments of UST ullage pressure acceptability. An alarm is scheduled immediately when any monthly assessment shows failure, and interruption of fueling is scheduled immediately when a second consecutive monthly assessment shows failure.

9.11 UST Ullage Pressure - Pressure Integrity Failure (Leakage) Response

This test spans an actual or simulated period of two (2) weeks for failures where leakage exceeds the criteria as specified and two (2) weeks for borderline acceptable operation.

Induce or simulate unacceptable and borderline acceptable leakage of the vapor recovery system as described below, or UST ullage pressure behavior indicative of such leakage as the Executive Officer may find appropriate. Arrange induced or simulated conditions considering the ISD system's timing of weekly assessments of leakage based on UST ullage pressure. An alarm is scheduled immediately when any weekly assessment shows failure, and interruption of fueling is scheduled immediately when a second consecutive weekly assessment shows failure.

If leakage occurs at a rate twice the maximum that would occur if the system passed a TP-201.3 test and a five-percent (5%)-probable negative error in measurement of the leak rate is present, the system should alarm and interrupt fueling as scheduled. Manual re-enabling of fueling should be successful and events should be properly recorded by the system.

If leakage occurs at a rate equal to the maximum that would occur if the system passed a TP-201.3 test and a one-percent (1%)-probable positive error in measurement of the leak rate is present, the system should neither alarm nor interrupt fueling.

9.12 Vapor Processor Malfunction Response (Systems So Equipped Only)

This test spans an actual or simulated period of two (2) days for failures where vapor processor malfunction is indicated and two (2) days for borderline acceptable operation (if applicable).

Induce or simulate a vapor processor malfunction. Arrange induced or simulated conditions considering the ISD system's timing of daily assessments of vapor processor function. An alarm is scheduled immediately when any daily assessment shows malfunction, and interruption of fueling is scheduled immediately when a second consecutive daily assessment shows malfunction.

The system should alarm and disable fueling as scheduled when a malfunction is induced or simulated.

If detection of malfunction depends on quantitative measurements made by the ISD system, the Executive Officer shall specify an appropriate definition of borderline failure conditions. When such conditions are induced or simulated and a 5-percent (5%)-probable worst-case (positive or negative as applicable) error exists in quantitative measurements made by the ISD system the system should alarm and interrupt fueling as scheduled.

If detection of malfunction depends on quantitative measurements made by the ISD system, the Executive Officer shall specify an appropriate definition of borderline acceptable operating conditions. When such conditions are induced or simulated and a one-percent (1%)-probable worst-case (positive or negative as applicable) error exists in quantitative measurements made by the ISD system the system should not alarm or interrupt fueling.

10. ALTERNATIVE TEST PROCEDURES

This procedure shall be conducted as specified. Modifications to this test procedure shall not be used to determine compliance unless prior written approval has obtained from the ARB Executive Officer pursuant to CP-201 or CP-206.

California Environmental Protection Agency

Air Resources Board

PROPOSED

Vapor Recovery Test Procedure

TP - 201.2J

PRESSURE DROP BENCH TESTING OF VAPOR RECOVERY COMPONENTS

Adopted: October 8, 2003
Amended: [Insert amendment date]

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 amendment.

California Environmental Protection Agency
Air Resources Board

TP-201.2J

Pressure Drop Bench Testing of Vapor Recovery Components

Definitions common to all certification and test procedures is in:

D-200 Definitions for Vapor Recovery Procedures

For the purpose of this procedure, the term "ARB" or "CARB" refers to the California Air Resources Board, and the term "Executive Officer" refers to the ARB Executive Officer ~~of the ARB~~ or his or her authorized representative or designate.

1. APPLICABILITY AND PURPOSE

This procedure applies to Phase II vapor recovery components installed at dispensing facilities. The purpose of this test procedure is to determine the pressure drop of components in vapor recovery systems at a fixed flow rate for compliance with pressure drop performance standards specified in Certification Procedure 201 (CP-201) and applicable Executive Order for specific components. This procedure is used during certification.

2. PRINCIPLE AND SUMMARY OF TEST PROCEDURE

The pressure drop across a vapor recovery component is determined by measuring the differential pressure. Test points are located immediately upstream and downstream from the component. The test is conducted while passing a known flow of nitrogen gas through the component.

Figures 1 illustrates typical components that undergo testing. Figure 2 illustrates an example of a pressure drop test bench.

3. BIASES AND INTERFERENCES

Equipment tested for certification must be representative of the equipment used in actual installations of vapor recovery systems.

4. SENSITIVITY, RANGE, AND PRECISION

This procedure can measure pressure drops in the range of 0.001 to ~~2~~ 0.250 inches H_2O at a flow of 60 cubic feet per hour (CFH) or 28.3 liters per minute (LPM) with a precision estimated at $\pm$ 0.002 inch H_2O.

5. EQUIPMENT

5.1 Differential Low Pressure Transmitter and Meter. This test procedure utilizes two electronic differential low-pressure transmitters to measure pressure drops for components and systems. The instrument used for measuring individual components has a range of 0.000 to ~~0.100~~ 0.250 inches H_2O and an accuracy of zero point two five percent (0.25%) of full scale with a resolution of 0.001. ~~The instrument used for measuring components connected in series has a range of 0.000 to 2 inches H_2O and an accuracy of zero point zero six percent (0.06%) of full scale with a resolution of 0.001 inch H_2O. Repeatability is point zero five percent (0.05%) of full-scale.~~

5.2 Mass Flow Meter. This test procedure utilizes a mass flow meter (MFM) to measure the flow rate. Since the volume flow specification in CP-201 for determining pressure drop that references this test procedure is 60 CFH or 28.3 ~~liters per minute (~~LPM~~)~~, the range of the mass flow meter used to measure flow is 0.0 to 30.0 LPM. The accuracy of the MFM is plus or minus 0.3 LPM of full scale with a resolution of 0.1 LPM. Repeatability is point two percent (0.2%) of full-scale.

5.3 Nitrogen (N_2). This procedure uses commercial grade nitrogen in a high-pressure cylinder, equipped with a two-stage pressure regulator.

5.4 Orifice Plate. A flat metal plate with a sharp edged hole accurately machined to 0.5 inch in diameter.

5.5 Pipe. Two 24-inch sections of 1 ½-inch diameter rigid piping with smooth bore. ~~schedule 40 PVC pipe.~~

5.6 Digital Manometer. A digital manometer with a range of 0 to 19.99 inches H_2O is used to check the pressure integrity of the system while performing a leak test.

6. CALIBRATION PROCEDURE

The MFM used in this test procedure is certified to a primary standard on an annual basis. To get an initial certification, the correlation coefficient from seven multi-point calibrations must be at least 0.9999. After the initial calibration, the annual MFM certification must be within one percent (1.0%) of the previously certified slope and intercept.

Pressure measurement devices are calibrated in accordance with manufacturer's specifications at an outside laboratory. To be considered, the outside laboratory must use NIST traceable standards to perform calibrations. The certification results in a slope and intercept from a five-point calibration to a known standard.

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 PROTOCOL

Ensure that the test equipment has been calibrated within the last year.

Turn on test equipment and allow it to stabilize for 30 minutes.

Perform a single-point-response check of the test equipment using an orifice plate. The observed response of differential low-pressure meter must be within three percent (3%) of the expected response as calculated under Section 9 below.

8. TEST PROCEDURE

Figure 1 shows examples of equipment to be tested, depending upon the application of the certification procedure.

Figure 2 shows an example of a test bench.

8.1 Measuring Barometric Pressure and Flow Temperature

8.1.1 Insure that the electronic test equipment has operated for 30 minutes.

8.1.2 Uncap the end of the ~~schedule-40 PVC~~ pipe.

8.1.3 Slowly establish a stable flow rate by slowly adjusting the needle valves shown in Figure 2 until the display of MFM reads 28.3 LPM.

8.1.4 Allow a few seconds for the system to reach equilibrium.

8.1.5 Record the downstream flow temperature and ambient barometric pressure readings on the Vapor Recovery Component Pressure Drop Bench Test Data Form.

8.2 Calculate the Correct MFM Display to Obtain a Flow of 28.3 LPM

Calculate the MFM display that corresponds to a flow rate of 28.3 LPM using the MFM calibration slope and intercept along with the barometric pressure and flow temperature as described in Attachment 1.

8.3 Establishing a Stable Test Flow

Slowly establish a stable flow rate of 28.3 LPM by slowly adjusting the needle valves shown in Figure 2 until the display of MFM reads the value calculated in Section 8.3.1.

8.4 Measuring the Test Bench Pressure Drop

8.4.1 Perform this measurement once prior to testing vapor recovery components.

8.4.2 Couple the upstream and downstream test bench flanges together.

8.4.3 Uncap the end of the ~~schedule 40~~ pipe.

8.4.4 Slowly establish a stable test flow rate of 28.3 LPM by slowly adjusting the needle valves until the display of MFM reads the value as calculated in Section 8.3.1.

8.4.5 After a stable test flow is obtained, record the pressure drop reading from the differential low-pressure meter. Record the reading on the Vapor Recovery Component Pressure Drop Bench Test Data Form.

8.5 Leak Test.

8.5.1 Insure that the liquid paths of the component to be tested are blocked to prevent N_2 from flowing through them.

8.5.2 Connect the test item with a leak-tight connector to the test bench flanges as shown in Figure 2.

8.5.3 Cap the end of the ~~schedule 40 PVC~~ pipe to obtain a leak-tight seal.

8.5.4 Visually and manually check all fittings for proper assembly.

8.5.5 Slowly establish a stable gauge pressure of approximately 2 inches H_2O.

8.5.6 Monitor the system for five minutes. If the pressure does not fall by more than 0.1 inch H_2O, the system is leak tight. If the pressure drops by more than 0.1 inch H_2O over the monitoring period the system may be leaking.

8.5.7 If the pressure check is unable to verify a seal, check for leaks by applying soap solution around all fittings and/or by observing the pressure meter.

8.5.8 If soap bubbles grow around fittings or if the pressure continues to drop, repeat subsections 8.1.1 through 8.1.5. It may be necessary to provide an isothermal environment for the pressurized ballast tank to minimize pressure changes caused by temperature fluctuations.

8.6 Recording Component Pressure Drops

8.6.1 After performing a leak check, uncap the end of the test pipe.

8.6.2 Obtain a stable test flow as specified in subsection 8.4.5.

8.6.3 Record the differential pressure drop and stop the flow momentarily. Re-establish a stable flow, take a second reading, and stop the flow momentarily. Re-establish a stable flow and take a third reading. Record the readings on the Vapor Recovery Component Pressure Drop Bench Test Data Form (Form 1).

9. QUALITY ASSURANCE / QUALITY CONTROL (QA/QC)

9.1 Equipment Certification. All test equipment (mass flow meter, differential low-pressure transmitter, temperature transducer, and barometric pressure transducer) is certified against a primary standard traceable to the NIST annually.

9.2 Single Point Response Check. The test equipment used to measure pressure drop is challenged with an orifice plate prior to testing vapor recovery components. The orifice plate will generate a known pressure drop for a given flow based on its dimensions and the dimensions of the test pipe. The measured pressure drop across the orifice plate must be within three percent (3%) of the predicted pressure drop for a flow rate of 28.3 LPM using the following equation:

$$\text{Orifice Plate Pressure Drop:} \quad p = \frac{}{2}\left(1 - \frac{A_2^2}{A_1^2}\right)\left(\frac{Q}{C_d A_2}\right)^2$$

Where:

p_1 = Pressure one laminar pipe diameter before orifice
p_2 = Pressure one half laminar pipe diameter after orifice
v_1 = Velocity of fluid in laminar pipe leading to orifice
v_2 = Velocity of fluid in orifice
ρ = Density of test fluid (Nitrogen = 1.16 kg/m^3 @ 20°C)
A_1 = Cross sectional area of laminar pipe leading to orifice

A_2 = Cross sectional area of square edged orifice
Q = Flow in laminar pipe leading to orifice
C_d = Orifice discharge coefficient

10. RECORDING DATA

Data are recorded on the Vapor Recovery Component Pressure Drop Bench Test Data Form (Form 1).

11. CALCULATING RESULTS

Differential pressure drop readings from three runs are averaged. This average is then compared with the applicable component requirement to determine compliance.

12. ALTERNATIVE TEST PROCEDURES

This procedure shall be conducted as specified. Any modifications to this test procedure shall not be used unless prior written approval has been obtained from the ARB Executive Officer pursuant to section 14 of Certification Procedure CP-201 or section 15 of Certification Procedure CP-206.

13. EXAMPLE FIGURES AND FORMS

13.1 Form 1 - Vapor Recovery Component Pressure Drop Bench Test Data Form

13.2 Figures

Each figure provides an illustration of an implementation that conforms to the requirements of this test procedure; other implementations that so conform are acceptable too.

13.2.1 Figure 1: Examples of Equipment to Be Tested

13.2.2 Figure 2: Example of a Bench Test

Form 1

California Environmental Protection Agency
Air Resources Board

Vapor Recovery Component Pressure Drop Bench Test Data Form

Manufacturer: ______________________________ **Model #** ______________________
Performance Type: Nozzle !   Hose !   Breakaway !   Dispenser !   Swivel !

Barometric Pressure:________mmHg Flow Temp:________°Celsius
Mass Flow Meter (MFM) Reading: ______ MFM Slope: ________ MFM Intercept: ____
Q_{STD} =MFM Display*MFM Slope + MFM Intercept = __________L/Min

$$Q_{Actual} = Q_{STD} * (\frac{FlowTemp + 273.15}{298.15}) * (\frac{760}{Barometric\,Pressure})$$

Q_{Actual} = _____L/Min

$$MFMDisplay = \frac{((\frac{28.3}{(\frac{FlowTemp + 273.15}{298.15}) * (\frac{760}{Baro\,Pressure})}) - MFMInt)}{MFMSlope}$$

		inches H_2O, Temp, MFM Display		
Serial # ____________	Run #1 Pressure Drop:	______		
	Run #2 Pressure Drop:			
	Run #3 Pressure Drop:	______	______	__________
	Average:	______		
	Test Bench Drop:	______		
	Average – Bench Drop:	______		
	Requirement:	______		

Average Pressure Drop – Test Bench Drop≤ Requirement?   Pass !   Fail !

Performance Type	*Requirement*
Nozzle Pressure Drop	ΔP at 28.3 LPM of $N_2 \leq$ 0.08 inches H_2O
Hose Pressure Drop	ΔP at 28.3 LPM of $N_2 \leq$ 0.09 inches H_2O
Breakaway Pressure Drop	ΔP at 28.3 LPM of $N_2 \leq$ 0.04 inches H_2O
Dispenser Pressure Drop	ΔP at 28.3 LPM of $N_2 \leq$ 0.08 inches H_2O
Swivel Pressure Drop	ΔP at 28.3 LPM of $N_2 \leq$ 0.01 inches H_2O

Test Performed By: ________________________________ Date:________________

Figure 1
Examples of Equipment to Be Tested

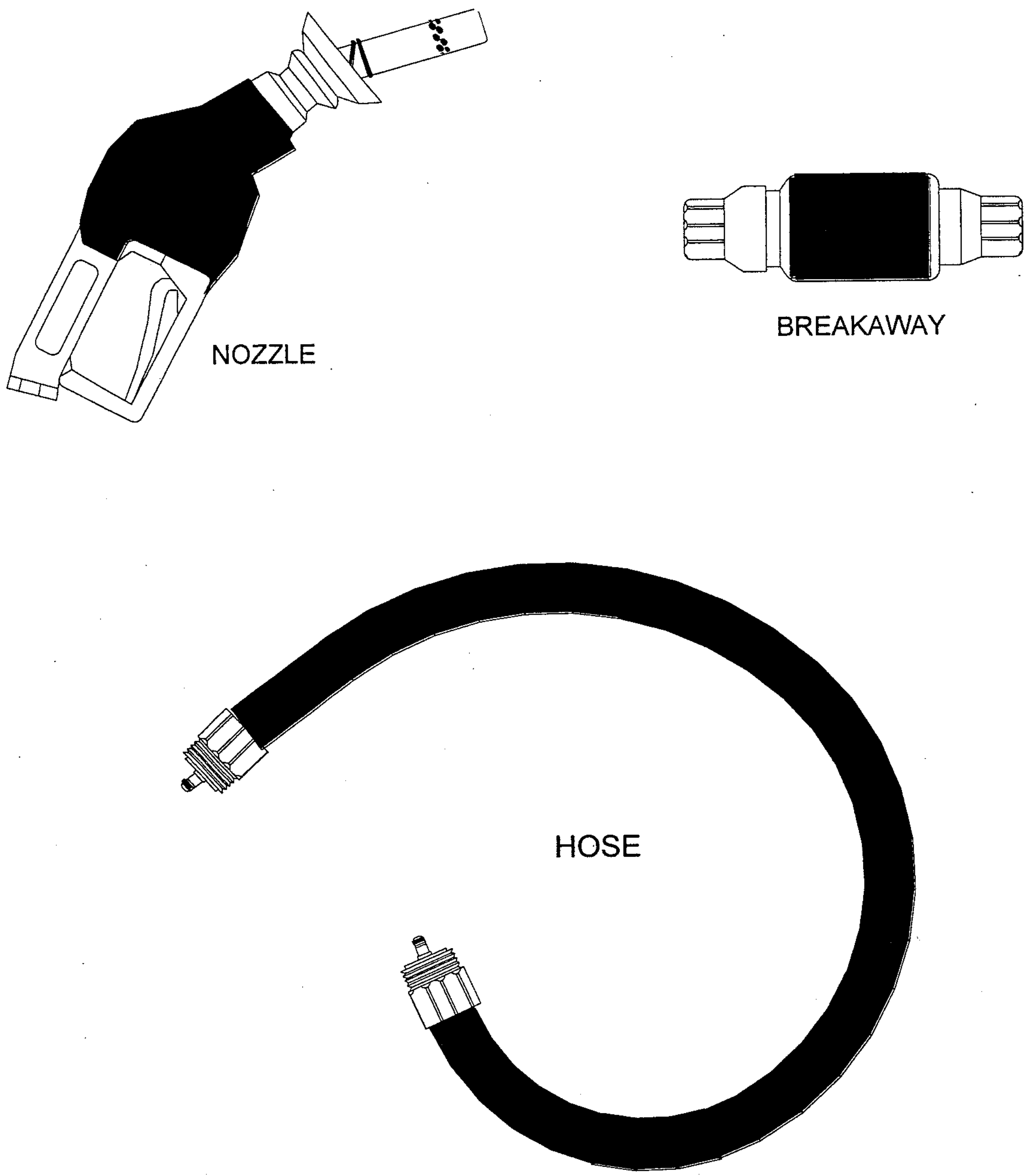
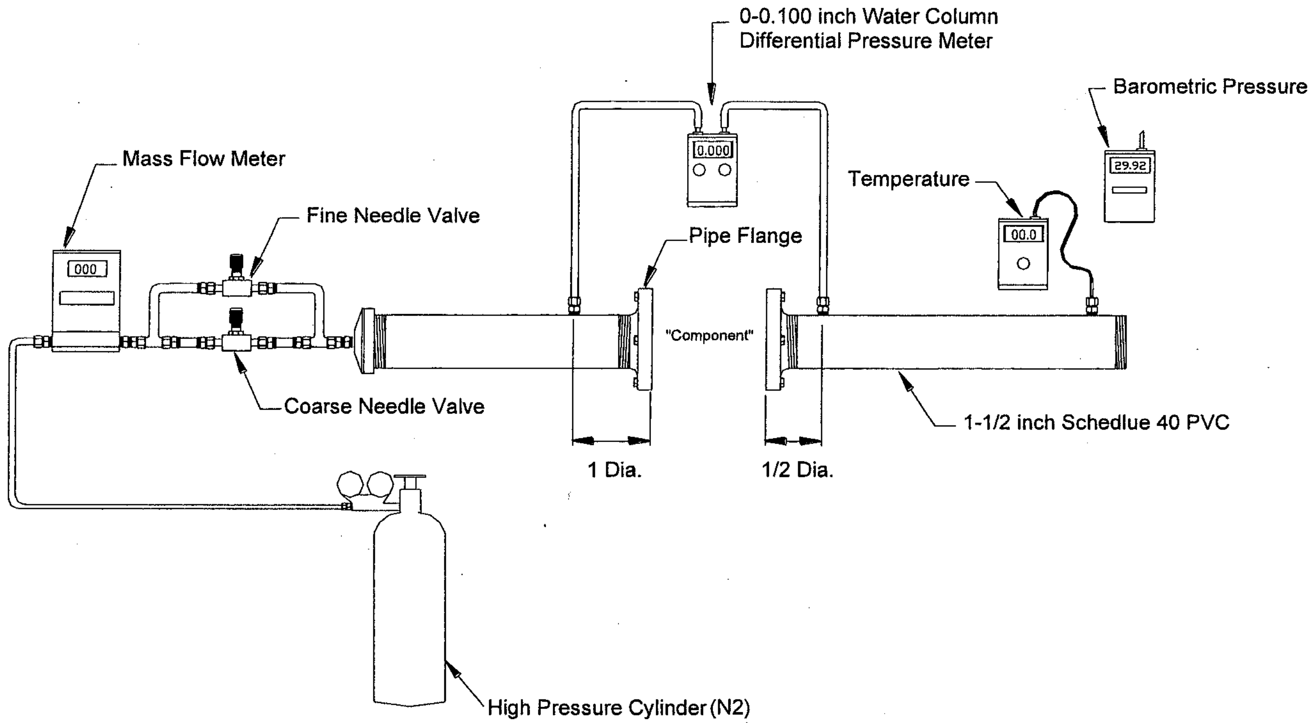


Figure 2
Example of a Bench Test



Notes: Three tube configurations are required to measure different components. Each configuration requires a uniquely designed orifice plate, flange, couplings, and male & female interfacing adapters.

California Environmental Protection Agency

Air Resources Board

PROPOSED

Vapor Recovery Test Procedure

TP-201.3

Determination of 2 Inch WC Static Pressure Performance of Vapor Recovery Systems of Dispensing Facilities

Adopted: April 12, 1996
Amended: March 17, 1999
Amended: (insert amended date)

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 amendment.

California Environmental Protection Agency
Air Resources Board
Vapor Recovery Test Procedure

TP-201.3

Determination of 2 Inch WC Static Pressure Performance of Vapor Recovery Systems of Dispensing Facilities

1 APPLICABILITY

Definitions common to all certification and test procedures are in:

D-200 Definitions for ~~Certification Procedures and Test Procedures for~~ Vapor Recovery Procedures ~~Systems~~

For the purpose of this procedure, the term "ARB or CARB" refers to the ~~State of~~ California Air Resources Board, and the term "~~ARB~~ Executive Officer" refers to the ARB Executive Officer ~~of the ARB~~ or his or her authorized representative or designate.

1.1 This test procedure is used to quantify the vapor tightness of vapor recovery systems installed at gasoline dispensing facilities (GDF) equipped with pressure/vacuum (P/V) valves, provided that the designed pressure setting of the P/V valves is a minimum of 2.5 inches of water column (inches H_2O).

1.2 Systems equipped with a P/V valve(s) allowed to have a designed cracking pressure less than 2.5 inches H_2O shall be bagged to eliminate any flow contribution through the valve assembly from the test results. The valve/vent pipe connection, however, shall remain unobstructed during this test.

1.3 At facilities not required to be equipped with a P/V valve(s), the vent pipe(s) shall be capped. For those installations, the test may be conducted at the vent pipe(s).

2 PRINCIPLE AND SUMMARY OF TEST PROCEDURE

2.1 The entire vapor recovery system is pressurized with nitrogen to two (2.0) inches H_2O. The system pressure is then allowed to decay and the pressure after five (5) minutes is compared with an allowable value. The minimum allowable five-minute final pressure is based on the system ullage and pressure decay equations. For the purpose of compliance determination, this test shall be conducted after all back-filling, paving, and installation of all Phase I and Phase

II components, including P/V valves, has been completed.

2.2 For GDF equipped with a coaxial Phase I system, this test shall be conducted at a Phase II vapor riser. For GDF which utilize a two-point Phase I system, this test may be conducted at either a Phase II riser or a Phase I vapor coupler provided that the criteria set forth in Section 6.7 have been met. If the integrity criteria for two-point systems specified in Section 6.7 are met, it is recommended that this test be conducted at the Phase I vapor coupler.

3 RANGE

3.1 If mechanical pressure gauges are employed, the full-scale range of pressure gauges shall be 0-2.0, 0-1.0, and 0-0.50 inches H_2O column. Maximum incremental graduations of the pressure gauge shall be 0.05 inches H_2O and the minimum accuracy of the gauge shall be three percent of full scale. The minimum diameter of the pressure gauge face shall be 4 inches.

3.2 If an electronic pressure measuring device is used, the full-scale range of the device shall not exceed 0-10 inches H_2O with a minimum accuracy of 0.5 percent of full-scale. A 0-20 inches H_2O device may be used, provided the equivalent accuracy is not less than 0.25 percent of full-scale.

3.3 The minimum total ullage, for each individual tank, shall be 1,000 gallons or 25% of the tank capacity, whichever is less. The maximum total ullage, for all manifolded tanks, shall not exceed 25,000 gallons. These values are exclusive of all vapor piping volumes.

3.4 The minimum and maximum nitrogen feed-rates, into the system, shall be one (1) and five (5) CFM, respectively.

4 INTERFERENCES

4.1 Introduction of nitrogen into the system at flowrates exceeding five (5) CFM may bias the results of the test toward non-compliance. Only gaseous nitrogen shall be used to conduct this test. Air, liquefied nitrogen, helium, or any gas other than nitrogen shall not be used for this test procedure.

4.2 For vacuum-assist Phase II systems which utilize an incinerator, power to the collection unit and the processor shall be turned off during testing.

4.3 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:

4.3.1 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.

4.3.2 The storage tank side of the vacuum producing device shall be tested in accordance with the procedures outlined in Section 7 of this method. Compliance shall be determined by comparing the final five-minute pressure with the allowable minimum five-minute final pressure from the first column (1-6 affected nozzles) in Table IB or use the corresponding equation in Section 9.2.

4.3.3 The upstream vapor passage (nozzle to vacuum producing device) shall also be tested. Methodology for this test shall be submitted to the California Air Resources Board (CARB) for approval prior to submission of test results or shall be conducted in accordance with the procedures set forth in the applicable CARB Executive Order.

4.4 The results of this static pressure integrity test shall not be used to verify compliance if an Air to Liquid Volumetric Ratio Test (TP-201.5 or equivalent) was conducted within 24 hours prior to this test.

4.5 Thermal Bias for Electronic Manometers

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.

5 APPARATUS

5.1 Nitrogen

Use commercial grade nitrogen in a high pressure cylinder, equipped with a two-stage pressure regulator and a one psig pressure relief valve.

5.2 Pressure Measuring Device

Use 0-2.0, 0-1.0, and 0-0.50 inches H_2O pressure gauges connected in parallel, a 0-2 inches H_2O manometer, or an electronic pressure measuring device to monitor the pressure decay in the vapor recovery system. The pressure measuring device shall, at a minimum, be readable to the nearest 0.05 inches H_2O.

5.3 "T" Connector Assembly

See Figure 1 for example.

5.4 Vapor Coupler Integrity Assembly

Assemble OPW 633-A, 633-B, and 634-A adapters, or equivalent, as shown in Figure 2. If the test is to be conducted at the storage tank Phase I vapor coupler, this assembly shall be used prior to conducting the static leak test in order to verify the pressure integrity of the vapor poppet. The internal volume of this assembly shall not exceed 0.1 cubic feet.

5.5 Vapor Coupler Test Assembly

Use a compatible OPW 634-B cap, or equivalent, equipped with a center probe to open the poppet, a pressure measuring device to monitor the pressure decay, and a connection for the introduction of nitrogen into the system. See Figure 3 for an example.

5.6 Stopwatch

Use a stopwatch accurate to within 0.2 seconds.

5.7 Flow Meter

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.

5.8 Combustible Gas Detector

A Bacharach Instrument Company, Model 0023-7356, or equivalent, may be used to verify the pressure integrity of system components during this test.

5.9 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 The following safety precautions shall be followed:

6.1.1 Only nitrogen shall be used to pressurize the system.

6.1.2 A one psig relief valve shall be installed to prevent the possible over-pressurizing of the storage tank.

6.1.3 A ground strap should be employed during the introduction of nitrogen into the system.

6.2 Failure to adhere to any or all of the following time and activity restrictions shall invalidate the test results:

6.2.1 There shall be no Phase I bulk product deliveries into or out of the storage tank(s) within the three (3) hours prior to the test or during performance of this test procedure.

6.2.2 There shall be no product dispensing within thirty (30) minutes prior to the test or during performance of this test procedure.

6.2.3 Upon commencement of the thirty minute "no dispensing" portion of this procedure, the headspace pressure in the tank shall be measured. If the pressure exceeds 0.50 inches H_2O, the pressure shall be carefully relieved in accordance with all applicable safety requirements. After the thirty minute "no dispensing" portion of this procedure, and prior to introduction of nitrogen, the headspace pressure shall again be lowered, if necessary, to less than 0.50 inches H_2O.

6.2.4 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.

6.2.5 The test shall be conducted with the station in normal operating mode. This includes all nozzles properly hung up in the dispenser boots and all dispenser cabinet covers in place. The exception to normal operating mode is that dispensing is disallowed as specified.

6.3 Measure the gallons of gasoline present in each underground storage tank and determine the actual capacity of each storage tank from facility records. Calculate the ullage space for each tank by subtracting the gasoline gallonage present from the actual tank capacity. The minimum ullage during the test, for all manifolded tanks, shall be 1,000 gallons or 25 percent of the tank capacity, whichever is less. The total ullage, for all manifolded tanks, shall not exceed 25,000 gallons.

6.4 For two-point Phase I systems, this test shall be conducted with the dust cap removed from both the product and the vapor coupler. This is necessary to determine the vapor tightness of the Phase I vapor poppet. See Section 6.7 if this test is to be conducted at the Phase I vapor coupler.

6.4.1 For coaxial Phase I systems, this test shall be conducted with the dust cap removed from the Phase I coupler. This is necessary to insure the vapor tightness of the Phase I vapor poppet.

6.4.2 Verify that the liquid level in the storage tank is at least four (4) inches above the highest opening at the bottom of the submerged drop tube.

6.5 If the Phase I containment box is equipped with a drain valve, this test shall be conducted with the drain valve installed and the manhole cover removed. If the drain valve is cover-actuated, the test shall be done once with the cover removed and repeated with the cover installed.

6.6 If the test is to conducted at a Phase II vapor riser, disconnect the dispenser end of one vapor recovery hose and install the "T" connector assembly (see Figure 1). Connect the nitrogen gas supply (do not use air) and the pressure measuring device to the "T" connector.

6.6.1 For those Phase II vapor systems utilizing a dispenser mounted remote vapor check valve, the "T" connector assembly shall be installed on the vapor riser side of the check valve.

6.7 If this test is to be conducted at the Phase I vapor coupler on a two-point Phase I system, the procedures set forth in subsections 6.7.1 and 6.7.2 shall be successfully completed prior to testing. The static pressure integrity test shall not be conducted at the Phase I coupler at facilities equipped with coaxial Phase I systems.

6.7.1 Connect the Vapor Coupler Integrity Assembly to the Phase I vapor coupler. Connect the Vapor Coupler Test Assembly. Connect the nitrogen supply to the assembly and carefully pressurize the internal volume of the assembly to two (2.0) inches H_2O. Start the stopwatch. Record the final pressure after one minute.

6.7.2 If the pressure after one minute is less than 0.25 inches H_2O, the leak rate through the Phase I vapor poppet precludes conducting the static leak test at this location. If the pressure after one minute is greater than or equal to 0.25 inches H_2O, the static leak test may be conducted at this location. This criteria assures a maximum leak rate through the Phase I vapor poppet of less than 0.0004 cubic feet per minute.

6.7.3 Disconnect the Vapor Coupler Integrity Assembly to the Phase I vapor coupler. If the requirements of subsection 6.7.2 were met, connect the Vapor Coupler Test Assembly to the Phase I vapor coupler.

6.7.4 Product may be poured onto the Phase I vapor coupler to check for leaks. This diagnostic procedure shall not be substituted for the procedures set forth in subsections 6.7.1 and 6.7.2.

6.8 All pressure measuring device(s) shall be bench calibrated using either a reference gauge or incline manometer. Calibration shall be performed at 20, 50, and 80 percent of full scale. Accuracy shall be within two percent at each of these calibration points. Calibrations shall be conducted on a frequency not to exceed 90 days.

6.9 Use the flowmeter to determine the nitrogen regulator delivery pressures which correspond to nitrogen flowrates of 1.0 and 5.0 CFM. These pressures define the allowable range of delivery pressures acceptable for this test procedure. Also record the regulator delivery pressure setting, and the corresponding nitrogen flowrate that will be used during the test. As an alternative, the flowmeter may be connected, in-line between the nitrogen supply regulator and Vapor Coupler Test Assembly, during the test.

6.10 Use Equation 9.3 to calculate the approximate time required to pressurize the system ullage to the initial starting pressure of two (2.0) inches H_2O. This will allow the tester to minimize the quantity of nitrogen introduced into those systems which cannot comply with the static leak standards.

6.11 Attach the Vapor Coupler Test assembly to the Phase I poppet or the "T" connector assembly to the Phase II vapor riser. Read the initial pressure of the storage tank and underground piping. If the initial pressure is greater than 0.5 inches H_2O, carefully bleed off the pressure, in accordance with all applicable safety procedures, in the storage tank and underground piping to less than 0.5 inches H_2O column.

6.12 Any electronic manometers shall be subject to warm-up and drift check before use; see Section 4.5.

7 TESTING

7.1 Open the nitrogen gas supply valve and set the regulator delivery pressure within the allowable range determined in Section 6.9, and start the stopwatch. Pressurize the vapor system (or subsystem for individual vapor return line systems) to **at least 2.2 inches H_2O** initial pressure. It is critical to maintain the nitrogen flow until the pressure stabilizes, indicating temperature and vapor pressure stabilization in the tanks. Check the test equipment using leak detecting solution or a combustible gas detector to verify that all test equipment is leak tight. Note: if a combustible gas detector is used to search for leaks, components which were certified with an allowable leak rate, such as 0.38 CFH at a pressure of two (2) inches, cannot be determined to be faulty solely on the basis of the concentration registered on the instrument.

7.1.1 If the time required to achieve the initial pressure of two (2.0) inches H_2O exceeds twice the time derived from Equation 9.3, stop the test and use liquid leak detector, or a combustible gas detector, to find leak(s) in the system.

Failure to achieve the initial starting pressure within twice the time derived from Equation 9.3 demonstrates the inability of the system to meet the performance criteria. Repair or replace the faulty component(s) and restart the test pursuant to Section 7.1.

7.2 Close and disconnect the nitrogen supply. Start the stopwatch when the pressure has decreased to the initial starting pressure of two (2.0) inches H_2O.

7.3 At one-minute intervals during the test, record the system pressure. After five minutes, record the final system pressure. See the applicable of Tables 1A (or Equation 9.1) or 1B (or equation 9.2) to determine the acceptability of the final system static pressure results. For intermediate values of ullage in Tables 1A and 1B, linear interpolation may be employed.

7.4 If the system failed to meet the criteria set forth in Table 1A or 1B (or the appropriate equation in Section 9), repressurize the system and check all accessible vapor connections using leak detector solution or a combustible gas detector. If vapor leaks in the system are encountered, repair or replace the defective component and repeat the test. Potential sources of leaks include nozzle check valves, nozzle vapor paths, pressure/vacuum relief valves, containment box drain valve assemblies, and plumbing connections at the risers.

7.4.1 If the facility fails to comply with the static leak test standards and the two point Phase I system utilizes overfill prevention devices in the drop tubes which were installed before July 1, 1993, and which are unable to pass the test with the dust caps removed from the product and vapor couplers (see Sec. 6.4), the test may be conducted with the caps on the couplers, as an exception.

This exception is not intended to allow bleed holes in drop tubes.

This exception expires on January 1, 2002, after which date all testing shall be conducted with the fill and vapor caps removed from two point systems. Under no circumstances may the test be conducted with the caps on coaxial Phase I couplers.

7.5 After the remaining system pressure has been relieved, remove the "T" connector assembly and reconnect the vapor recovery hose, if applicable.

7.6 If the vapor recovery system utilizes individual vapor return lines, repeat the leak test for each gasoline grade. Avoid leaving any vapor return line open longer than is necessary to install or remove the "T" connector assembly.

7.7 If the applicable CARB Executive Order requires the test to be conducted with and without the containment box cover in place, repeat the test with the cover in place. In these cases clearly specify, on Form 1, which results represent the pressure integrity with and without the cover in place.

8 POST-TEST PROCEDURES

8.1 Use the applicable of Table 1A or 1B, or the applicable of Equations 9.1 or 9.2, to determine the compliance status of the facility by comparing the final five-minute pressure with the minimum allowable final pressure.

8.1.1 For balance Phase II systems use Table 1A or the applicable of Equation 9.1 to determine compliance.

8.1.2 For vacuum-assist Phase II systems use Table 1B or the applicable of Equation 9.2 to determine compliance.

9 CALCULATIONS

9.1 For Phase II Balance Systems, the minimum allowable five-minute final pressure, with an initial pressure of two (2.0) inches H_2O, shall be calculated as follows:

$$P_f = 2e^{\left(\frac{-760.490}{V}\right)} \quad \text{if } N = 1-6 \qquad \text{[Equation 9-1]}$$

$$P_f = 2e^{\left(\frac{-792.196}{V}\right)} \quad \text{if } N = 7-12$$

$$P_f = 2e^{\left(\frac{-824.023}{V}\right)} \quad \text{if } N = 13-18$$

$$P_f = 2e^{\left(\frac{-855.974}{V}\right)} \quad \text{if } N = 19-24$$

$$P_f = 2e^{\left(\frac{-888.047}{V}\right)} \quad \text{if } N > 24$$

where:

N = The number of affected nozzles. For manifolded systems, N equals the total number of nozzles. For dedicated plumbing configurations, N equals the number of nozzles serviced by the tank being tested.

P_f = The minimum allowable five-minute pressure, inches H_2O

V = The total ullage affected by the test, gallons

e = A dimensionless constant approximately equal to 2.718

2 = The initial starting pressure, inches H_2O

9.2 For Phase II Vacuum Assist Systems, the minimum allowable five-minute final pressure, with an initial pressure of two (2.0) inches H_2O, shall be calculated as follows:

$$P_f = 2e^{\left(\frac{-500.887}{V}\right)} \quad \text{if } N = 1-6$$ [Equation 9-2]

$$P_f = 2e^{\left(\frac{-531.614}{V}\right)} \quad \text{if } N = 7-12$$

$$P_f = 2e^{\left(\frac{-562.455}{V}\right)} \quad \text{if } N = 13-18$$

$$P_f = 2e^{\left(\frac{-593.412}{V}\right)} \quad \text{if } N = 19-24$$

$$P_f = 2e^{\left(\frac{-624.483}{V}\right)} \quad \text{if } N > 24$$

where:

N = The number of affected nozzles. For manifolded systems, N equals the number of nozzles. For dedicated plumbing configurations, N equals the number of nozzles serviced by the tank being tested.

P_f = The minimum allowable five-minute final pressure, inches H_2O

V = The total ullage affected by the test, gallons

e = A dimensionless constant approximately equal to 2.718

2 = The initial starting pressure, inches H_2O

9.3 The minimum time required to pressurize the system ullage from zero (0) to two (2.0) inches H_2O gauge pressure shall be calculated as follows:

$$t_2 = \frac{V}{(\cancel{1980}\underline{1520})F}$$ [Equation 9-3]

where:

t_2 = The minimum time to pressurize the ullage to two inches H_2O, minutes

V = The total ullage affected by the test, gallons

F = The nitrogen flowrate into the system, CFM

~~1980~~1520= The conversion factor for pressure and gallons

9.4 If the policy of the local District requires an allowable tolerance for testing error, the minimum allowable five-minute final pressure, including testing error, shall be calculated as follows:

$$P_{f\text{-}E} = 2 - \left[1 + \left(\frac{E}{100}\right)\right]\left[408.9 - \left(P_f + 406.9\right)\right] \qquad \text{[Equation 9-4]}$$

where:

$P_{f\text{-}E}$ = The minimum allowable five-minute final pressure including allowable testing error, inches H_2O

E = The allowable testing error, percent

P_f = The minimum allowable five-minute final pressure calculated in Equations 9-1 or 9-2, inches H_2O

2 = The initial starting pressure, inches H_2O

408.9 = Atmospheric pressure plus the initial starting pressure, inches H_2O

406.9 = Atmospheric pressure, inches H_2O

10 REPORTING

10.1 The calculated ullage and system pressures for each five-minute vapor recovery system test shall be reported as shown in Form 1. District may require the use of alternate forms, provided they include the same minimum parameters identified in Form 1. Be sure to include the Phase I system type (two-point or coaxial), the Phase II system type, whether the system is manifolded, and the one-minute pressures during the test.

TABLE 1A

PHASE II **BALANCE** SYSTEMS

PRESSURE DECAY CRITERIA

INITIAL PRESSURE OF 2 INCHES WATER COLUMN (WC)

MINIMUM PRESSURE AFTER 5 MINUTES, INCHES WC

ULLAGE, GALLONS	NUMBER OF AFFECTED NOZZLES 01-06	07-12	13-18	19-24	>24
500	**0.44**	**0.41**	**0.38**	**0.36**	**0.34**
550	0.50	0.47	0.45	0.42	0.40
600	**0.56**	**0.53**	**0.51**	**0.48**	**0.46**
650	0.62	0.59	0.56	0.54	0.51
700	**0.67**	**0.64**	**0.62**	**0.59**	**0.56**
750	0.73	0.70	0.67	0.64	0.61
800	**0.77**	**0.74**	**0.71**	**0.69**	**0.66**
850	0.82	0.79	0.76	0.73	0.70
900	**0.86**	**0.83**	**0.80**	**0.77**	**0.75**
950	0.90	0.87	0.84	0.81	0.79
1,000	**0.93**	**0.91**	**0.88**	**0.85**	**0.82**
1,200	1.06	1.03	1.01	0.98	0.95
1,400	**1.16**	**1.14**	**1.11**	**1.09**	**1.06**
1,600	1.24	1.22	1.19	1.17	1.15
1,800	**1.31**	**1.29**	**1.27**	**1.24**	**1.22**
2,000	1.37	1.35	1.32	1.30	1.28
2,200	**1.42**	**1.40**	**1.38**	**1.36**	**1.34**
2,400	1.46	1.44	1.42	1.40	1.38
2,600	**1.49**	**1.47**	**1.46**	**1.44**	**1.42**
2,800	1.52	1.51	1.49	1.47	1.46
3,000	**1.55**	**1.54**	**1.52**	**1.50**	**1.49**
3,500	1.61	1.59	1.58	1.57	1.55
4,000	**1.65**	**1.64**	**1.63**	**1.61**	**1.60**
4,500	1.69	1.68	1.67	1.65	1.64
5,000	**1.72**	**1.71**	**1.70**	**1.69**	**1.67**
6,000	1.76	1.75	1.74	1.73	1.72
7,000	**1.79**	**1.79**	**1.78**	**1.77**	**1.76**
8,000	1.82	1.81	1.80	1.80	1.79
9,000	**1.84**	**1.83**	**1.83**	**1.82**	**1.81**
10,000	1.85	1.85	1.84	1.84	1.83
15,000	**1.90**	**1.90**	**1.89**	**1.89**	**1.89**
20,000	1.93	1.91	1.92	1.92	1.91
25,000	**1.94**	**1.94**	**1.94**	**1.93**	**1.93**

Note: For manifolded Phase II Balance Systems, the **"Number of Affected Nozzles"** shall be the total of all gasoline nozzles. For dedicated return configurations, the **"Number of Affected Nozzles"** shall be the total of those nozzles served by the tank being tested.

TABLE 1B

PHASE II **ASSIST** SYSTEMS

PRESSURE DECAY CRITERIA

INITIAL PRESSURE OF 2 INCHES WATER COLUMN (WC)

MINIMUM PRESSURE AFTER 5 MINUTES, INCHES WC

ULLAGE, GALLONS	NUMBER OF AFFECTED NOZZLES 01-06	07-12	13-18	19-24	>24
500	**0.73**	**0.69**	**0.65**	**0.61**	**0.57**
550	0.80	0.76	0.72	0.68	0.64
600	**0.87**	**0.82**	**0.78**	**0.74**	**0.71**
650	0.93	0.88	0.84	0.80	0.77
700	**0.98**	**0.94**	**0.90**	**0.86**	**0.82**
750	1.03	0.98	0.94	0.91	0.87
800	**1.07**	**1.03**	**0.99**	**0.95**	**0.92**
850	1.11	1.07	1.03	1.00	0.96
900	**1.15**	**1.11**	**1.07**	**1.03**	**1.00**
950	1.18	1.14	1.11	1.07	1.04
1,000	**1.21**	**1.18**	**1.14**	**1.10**	**1.07**
1,200	1.32	1.28	1.25	1.22	1.19
1,400	**1.40**	**1.37**	**1.34**	**1.31**	**1.28**
1,600	1.46	1.43	1.41	1.38	1.35
1,800	**1.51**	**1.49**	**1.46**	**1.44**	**1.41**
2,000	1.56	1.53	1.51	1.49	1.46
2,200	**1.59**	**1.57**	**1.55**	**1.53**	**1.51**
2,400	1.62	1.60	1.58	1.56	1.54
2,600	**1.65**	**1.63**	**1.61**	**1.59**	**1.57**
2,800	1.67	1.65	1.64	1.62	1.60
3,000	**1.69**	**1.68**	**1.66**	**1.64**	**1.62**
3,500	1.73	1.72	1.70	1.69	1.67
4,000	**1.76**	**1.75**	**1.74**	**1.72**	**1.71**
4,500	1.79	1.78	1.77	1.75	1.74
5,000	**1.81**	**1.80**	**1.79**	**1.78**	**1.77**
6,000	1.84	1.83	1.82	1.81	1.80
7,000	**1.86**	**1.85**	**1.85**	**1.84**	**1.83**
8,000	1.88	1.87	1.86	1.86	1.85
9,000	**1.89**	**1.89**	**1.88**	**1.87**	**1.87**
10,000	1.90	1.90	1.89	1.88	1.88
15,000	**1.93**	**1.93**	**1.93**	**1.92**	**1.92**
20,000	1.95	1.95	1.94	1.94	1.94
25,000	**1.96**	**1.96**	**1.96**	**1.95**	**1.95**

Note: For manifolded Phase II Assist Systems, the **"Number of Affected Nozzles"** shall be the total of all gasoline nozzles. For dedicated return configurations, the **"Number of Affected Nozzles"** shall be t he total of those nozzles served by the tank being tested.

FORM 1

SUMMARY OF SOURCE TEST DATA

SOURCE INFORMATION		FACILITY PARAMETERS
GDF Name and addresss	GDF Representative and Title GDF Phone No. ( )	PHASE II SYSTEM TYPE (Check One) Balance Hirt Red Jacket Hasstech Healy Other
Permit Conditions	Source: GDF Vapor Recovery System GDF # A/C #	Manifolded? Y or N

Operating Parameters
Number of Nozzles Served by Tank #1
Number of Nozzles Served by Tank #2
Number of Nozzles Served by Tank #3
Number of Nozzles Served by Tank #4

Applicable Regulations:	VN Recommended

Source Test Results and Comments

Tank #:		1	2	3	4
1.	Product Grade				
2.	Actual Tank Capacity, gallons				
3.	Gasoline Volume				
4.	Ullage, gallons (#2-#3)				
5.	Initial Pressure, inches H_2O				
6.	Pressure After 1 Minute, inches H_2O				
7.	Pressure After 2 Minutes, inches H_2O				
8.	Pressure After 3 Minutes, inches H_2O				
9.	Pressure After 4 Minutes, inches H_2O				
10.	Final Pressure After 5 Minutes, inches H_2O				
11.	Allowable Final Pressure				

Test Conducted by:	Test Company:	Date of Test:

Figure 1
"T" Connector Assembly

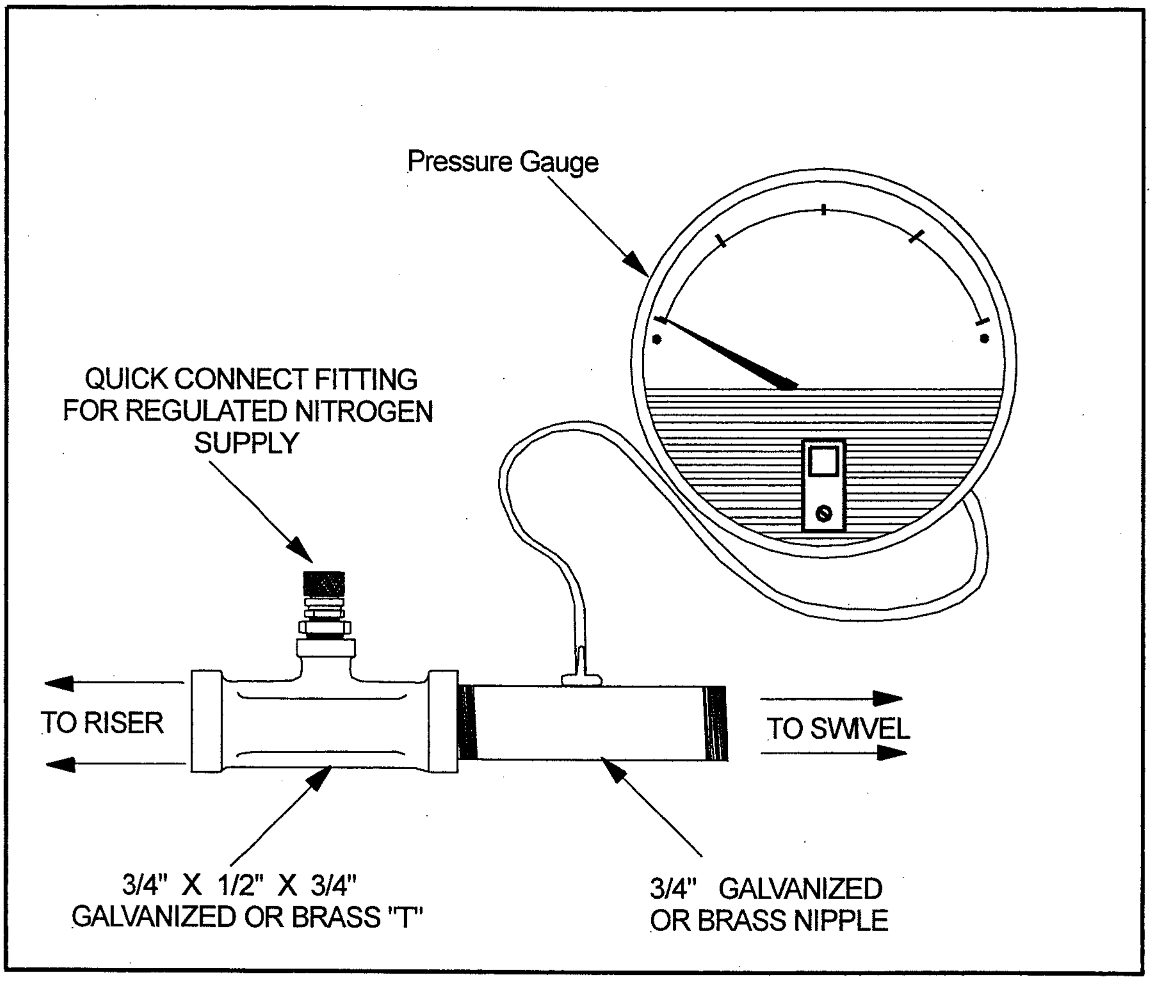


Figure 2

Vapor Coupler Integrity Assembly

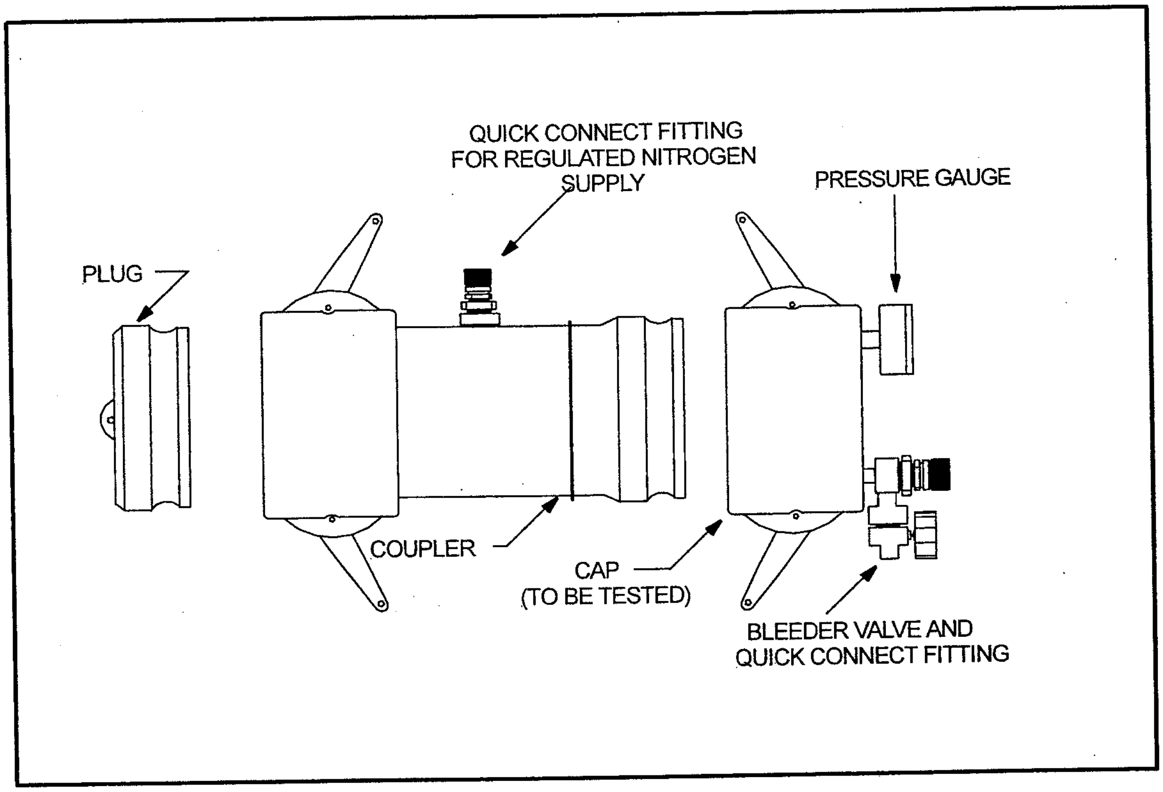
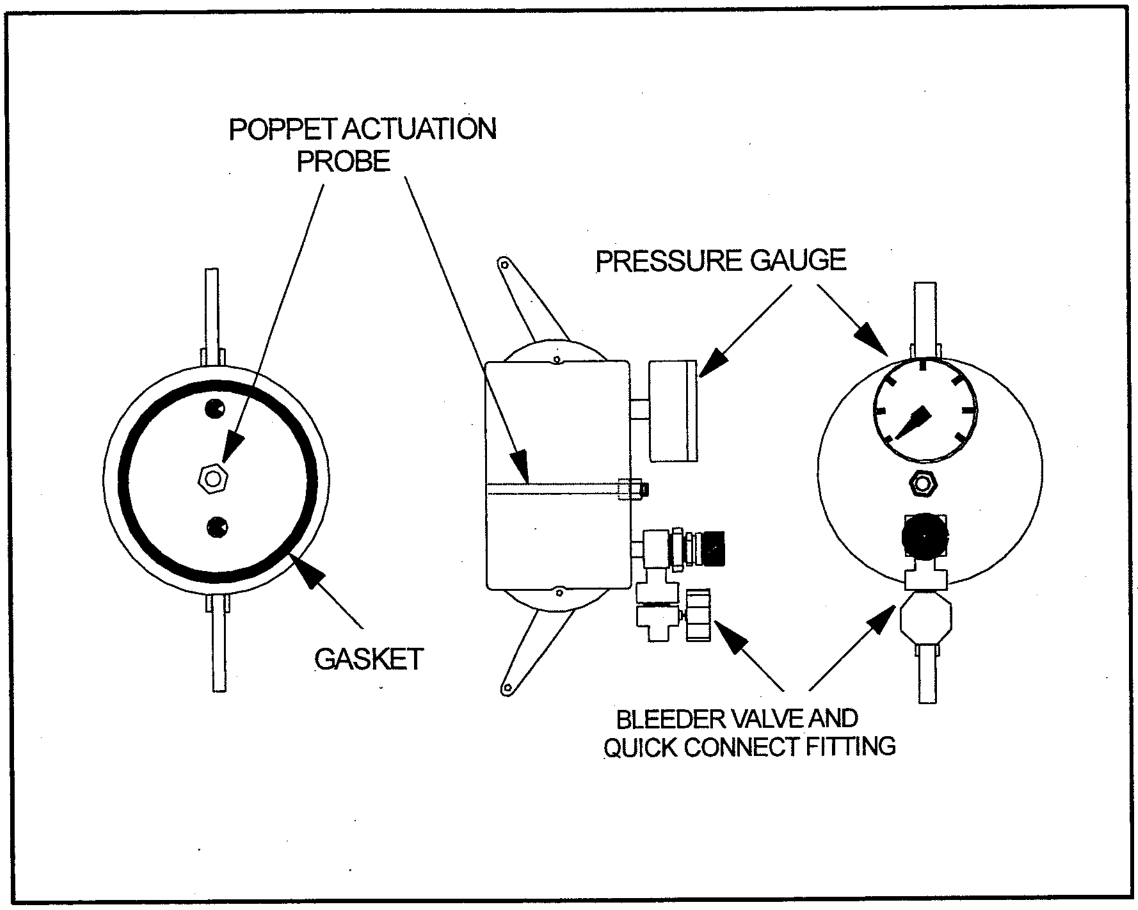


Figure 3

Vapor Coupler Test Assembly



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

Adopted: May 2, 2008
Amended: [Insert amendment date]

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 amendment]

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 or CARB" 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

4.1 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.

4.2 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.

4.3 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 Electronic pressure measuring devices or digital pressure indicators shall be 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 per the manufacturer's recommendation. 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.. For manifolded tanks, the minimum ullage during the test shall be 25 percent of the aggregate tank capacity and the maximum ullage during the test shall be 75 percent of the aggregate tank capacity.

6.5 Determine the allowable system leak rate using Equation 8-1 in section 8.

6.6 Ensure the nozzle(s) are properly hung in the dispenser boot and all dispenser cabinet covers are in place. No dispensing shall be allowed during the test.

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. An example is shown in Figure 1. Additional examples can be found in TP-201.3 (Figures 1-3).

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.~~

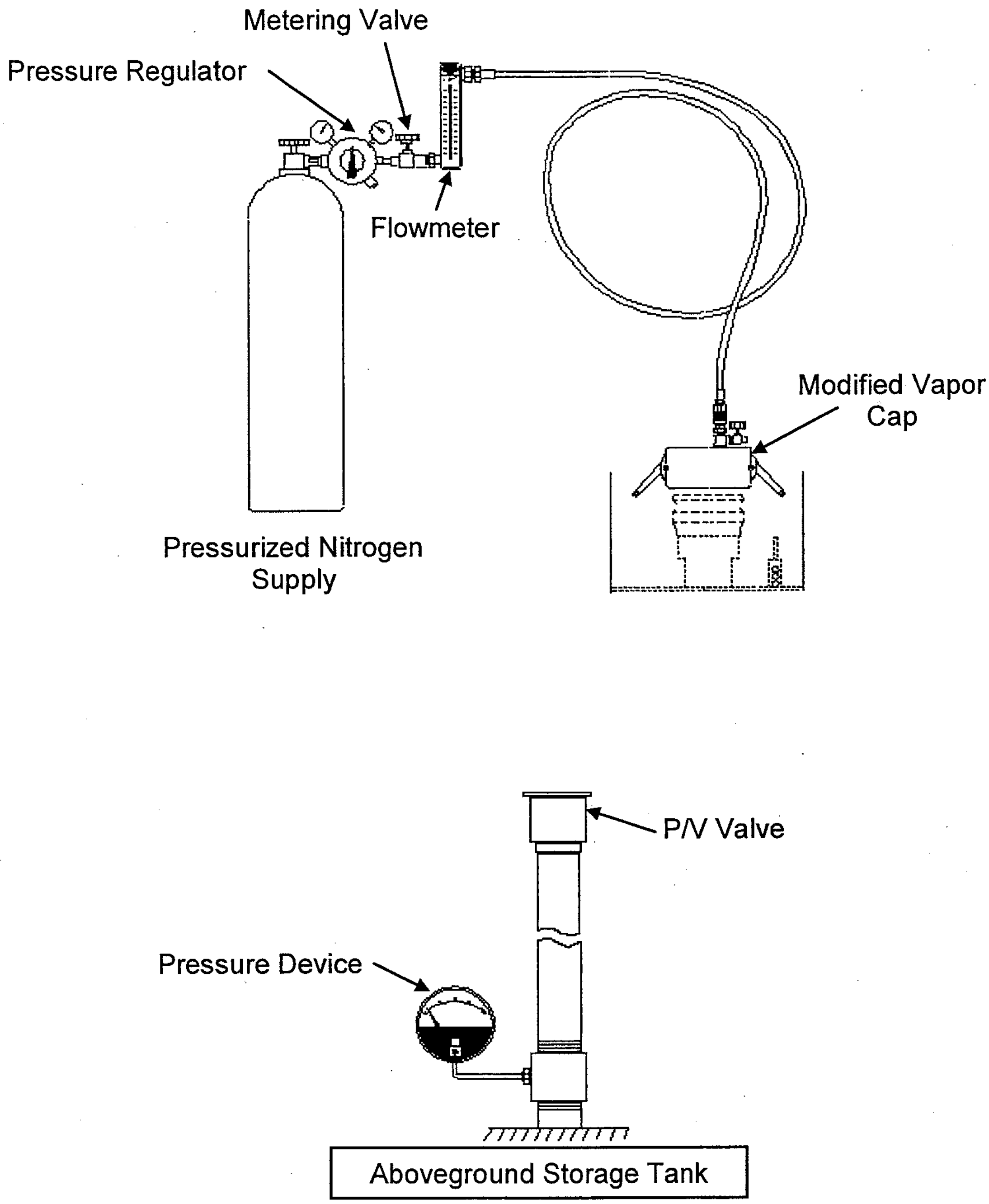
7.4 Re-open the nitrogen supply valve, and reset the tank pressure to reestablish a pressure slightly greater than 2 inches water column. Close the nitrogen supply valve and start the stopwatch when the pressure reaches an initial pressure of 2.0 inches of water column.

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

Typical 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 <u>require the use of alternate forms, provided they include the same minimum parameters identified in Form 1.</u>

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

Appendix 3

Vapor Recovery Health and Safety Code Statutes

H&S 41950 Vapor Recovery Systems for Stationary Gas Tanks

41950. (a) Except as provided in subdivisions (b) and (e), no person shall install or maintain any stationary gasoline tank with a capacity of 250 gallons or more which is not equipped for loading through a permanent submerged fill pipe, unless such tank is a pressure tank as described in Section 41951, or is equipped with a vapor recovery system as described in Section 41952 or with a floating roof as described in Section 41953, or unless such tank is equipped with other apparatus of equal efficiency which has been approved by the air pollution control officer in whose district the tank is located.

(b) Subdivision (a) shall not apply to any stationary tanks installed prior to December 31, 1970.

(c) For the purpose of this section, "gasoline" means any petroleum distillate having a Reid vapor pressure of four pounds or greater.

(d) For the purpose of this section, "submerged fill pipe" means any fill pipe which has its discharge opening entirely submerged when the liquid level is six inches above the bottom of the tank.
"Submerged fill pipe," when applied to a tank which is loaded from the side, means any fill pipe which has its discharge opening entirely submerged when the liquid level is 18 inches above the bottom of the tank.

(e) Subdivision (a) shall not apply to any stationary tank which is used primarily for the fueling of implements of husbandry.

(Added by Stats. 1975, Ch. 957.)

H&S 41951 Definition of Pressure Tank

41951. A "pressure tank" is a tank which maintains working pressure sufficient at all times to prevent hydrocarbon vapor or gas loss to the atmosphere.

(Added by Stats. 1975, Ch. 957.)

H&S 41952 Definition of Vapor Recovery System

41952. A "vapor recovery system" consists of 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.

(Added by Stats. 1975, Ch. 957.)

H&S 41953 Definition of Floating Roof

41953. A "floating roof" consists of a pontoon-type or double-deck-type roof, resting on the surface of the liquid contents and equipped with a closure seal, or seals, to close the space between the roof edge and tank wall. The control equipment required by this section shall not be used if the gasoline or petroleum distillate has a vapor pressure of 11.0 pounds per square inch absolute or greater under actual storage conditions. All tank gauging and sampling devices shall be gastight except when gauging or sampling is taking place.

(Added by Stats. 1975, Ch. 957.)

H&S 41954 ARB Shall Certify Vapor Recovery Systems

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 there for. 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.

(Amended by Stats. 2000, Ch. 729, Sec. 14.)

References at the time of publication (see page iii):

Regulations:
17, CCR, Sections 94006, 94010, 94011,
94012, 94013, 94014, 94015, 94148, 94149, 94150, 94151, 94152, 94153,
94154, 94155, 94156, 94157, 94158, 94159, 94160, 94163

H&S 41955 Certification Required by Other Agencies

41955. Prior to state board certification of a gasoline vapor control system pursuant to Section 41954, the manufacturer of the system shall submit the system to, or, if appropriate, the components of the system as requested by, the Division of Measurement Standards of the Department of Food and Agriculture and the State Fire Marshal for their certification.

(Added by Stats. 1976, Ch. 1030.)

H&S 41956 Other Agencies to Adopt Rules for Certification

41956. (a) As soon as possible after the effective date of this section, the State Fire Marshal and the Division of Measurement Standards, after consulting with the state board, shall adopt rules and regulations for the certification of gasoline vapor control systems and components thereof.

(b) The State Fire Marshal shall be the only agency responsible for determining whether any component or system creates a fire hazard. The division shall be the only agency responsible for the measurement accuracy aspects, including gasoline recirculation of any component or system.

(c) Within 120 days after the effective date of this subdivision, the Division of

Measurement Standards, shall, after public hearing, adopt rules and regulations containing additional performance standards and standardized certification and compliance test procedures which are reasonable and necessary to prevent gasoline recirculation in systems for the control of gasoline vapors resulting from motor vehicle fueling operations.

(Amended by Stats. 1981, Ch. 902.)

H&S 41956.1 Revision of Standards for Vapor Recovery Systems

41956.1. (a) Whenever the state board, the Division of Measurement Standards of the Department of Food and Agriculture, or the State Fire Marshal revises performance or certification standards or revokes a certification, any systems or any system components certified under procedures in effect prior to the adoption of revised standards or the revocation of the certification and installed prior to the effective date of the revised standards or revocation may continue to be used in gasoline marketing operations for a period of four years after the effective date of the revised standards or the revocation of the certification. However, all necessary repair or replacement parts or components shall be certified.

(b) Notwithstanding subdivision (a), whenever the State Fire Marshal determines that a system or a system component creates a hazard to public health and welfare, the State Fire Marshal may prevent use of the particular system or component.

(c) Notwithstanding subdivision (a), the Division of Measurement Standards may prohibit the use of any system or any system component if it determines on the basis of test procedures adopted pursuant to subdivision (c) of Section 41956, that use of the system or component will result in gasoline recirculation.

(Amended by Stats. 1996, Ch. 426, Sec. 2.)

References at the time of publication (see page iii):

Regulations: 17, CCR, Section 94011

H&S 41957 Division of Industrial Safety Responsibilities

41957. The Division of Occupational Safety and Health of the Department of Industrial Relations is the only agency responsible for determining whether any gasoline vapor control system, or component thereof, creates a safety hazard other than a fire hazard. If the division determines that a system, or component thereof, creates a safety hazard other than a fire hazard, that system or component may not be used until the division has certified that the system or component, as the case may be, does not create that hazard.

The division, in consultation with the state board, shall adopt the necessary rules and regulations for the certification if the certification is required.

(Amended by Stats. 1981, Ch. 714.)

H&S 41958 Rules Shall Allow for Flexibility in Design

41958. To the maximum extent practicable, the rules and regulations adopted pursuant to Sections 41956 and 41957 shall allow flexibility in the design of gasoline vapor control systems and their components. The rules and regulations shall set forth the performance standards as to safety and measurement accuracy and the minimum procedures to be followed in testing the system or component for compliance with the performance standards.

The State Fire Marshal, the Division of Occupational Safety and Health, and the Division of Measurement Standards shall certify any system or component which complies with their adopted rules and regulations. Any one of the state agencies may certify a system or component on the basis of results of tests performed by any entity retained by the manufacturer of the system or component or by the state agency. The requirements for the certification of a system or component shall not require that it be tested, approved, or listed by any private entity, except that certification testing regarding recirculation of gasoline shall include testing by an independent testing laboratory.

(Amended by Stats. 1982, Ch. 466, Sec. 72.)

H&S 41959 Certification Testing

41959. Certification testing of gasoline vapor control systems and their components by the state board, the State Fire Marshal, the Division of Measurement Standards, and the Division of Occupational Safety and Health may be conducted simultaneously.

(Amended by Stats. 1981, Ch. 714.)

References at the time of publication (see page iii):

Regulations: 17, CCR, Sections 94010, 94011, 94012, 94013

H&S 41960 Certification by State Agencies Sufficient

41960. (a) Certification of a gasoline vapor recovery system for safety and measurement accuracy by the State Fire Marshal and the Division of Measurement Standards and, if necessary, by the Division of Occupational Safety and Health shall permit its installation wherever required in the state, if the system is also certified by the state board.

(b) Except as otherwise provided in subdivision (g) of Section 41954, no local or regional authority shall prohibit the installation of a certified system without obtaining concurrence from the state agency responsible for the aspects of the system which the local or regional authority disapproves.

(Amended by Stats. 1996, Ch. 426, Sec. 3.)

References at the time of publication (see page iii):

Regulations: 17, CCR, Sections 94011, 94012, 94013

H&S 41960.1 Operation in Accordance with Standards

41960.1. (a) All vapor control systems for the control of gasoline vapors resulting from motor vehicle fueling operations shall be operated in accordance with the applicable standards established by the State Fire Marshal or the Division of Measurement Standards pursuant to Sections 41956 to 41958, inclusive.

(b) When a sealer or any authorized employee of the Division of Measurement Standards determines, on the basis of applicable test procedures of the division, adopted after public hearing, that an individual system or component for the control of gasoline vapors resulting from motor vehicle fueling operations does not meet the applicable standards established by the Division of Measurement Standards, he or she shall take the appropriate action specified in Section 12506 of the Business and Professions Code.

(c) When a deputy State Fire Marshal or any authorized employee of a fire district or local or regional firefighting agency determines that a component of a system for the control of gasoline vapors resulting from motor vehicle fueling operations does not meet the applicable standards established by the State Fire Marshal, he or she shall mark the component "out of order." No person shall use or permit the use of the component until the component has been repaired, replaced, or adjusted, as necessary, and either the component has been inspected by a representative of the agency employing the person originally marking the component, or the person using or permitting use of the component has been expressly authorized by the agency to use the component pending reinspection.

(Added by Stats. 1981, Ch. 902.)

H&S 41960.2 Maintenance of Installed Systems

41960.2. (a) All installed systems for the control of gasoline vapors resulting from motor vehicle fueling operations shall be maintained in good working order in accordance with the manufacturer' s specifications of the system certified pursuant to Section 41954.

(b) Whenever a gasoline vapor recovery control system is repaired or rebuilt by someone other than the original manufacturer or its authorized representative, the person shall permanently affix a plate to the vapor recovery control system that identifies the repairer or rebuilder and specifies that only certified equipment was used. In addition, a rebuilder of a vapor control system shall remove any identification of the original manufacturer if the removal does not affect the continued safety or performance of the vapor control system.

(c) (1) The executive officer of the state board shall identify and list equipment defects in systems for the control of gasoline vapors resulting from motor vehicle fueling operations that substantially impair the effectiveness of the systems in reducing air contaminants. The defects shall be identified and listed for each certified system and shall be specified in the applicable certification documents for each system.

(2) On or before January 1, 2001, and at least once every three years thereafter, the list required to be prepared pursuant to paragraph (1) shall be reviewed by the executive officer at a public workshop to determine whether the list requires an update to reflect changes in equipment technology or performance.

(3) Notwithstanding the timeframes for the executive officer's review of the list, as specified in paragraph (2), the executive officer may initiate a public review of the list upon a written request that demonstrates, to the satisfaction of the executive officer, the need for such a review. If the executive officer determines that an update is required, the update shall be completed no later than 12 months after the date of the determination.

(d) When a district determines that a component contains a defect specified pursuant to subdivision (c), the district shall mark the component "Out of Order." No person shall use or permit the use of the component until the component has been repaired, replaced, or adjusted, as necessary, and the district has reinspected the component or has authorized use of the component pending reinspection.

(e) Where a district determines that a component is not in good working order but does not contain a defect specified pursuant to subdivision (c), the district shall provide the operator with a notice specifying the basis on which the component is not in good working
order. If, within seven days, the operator provides the district with adequate evidence that the component is in good working order, the operator shall not be subject to liability under this division.

(Amended by Stats. 1999, Ch. 501, Sec. 1.)

References at the time of publication (see page iii):

Regulations: 17, CCR, Sections 94006, 94010, 94011

H&S 41960.3 Telephone Number for Reporting Problems

41960.3. (a) Each district which requires the installation of systems for the control of gasoline vapors resulting from motor vehicle fueling operations shall establish a toll free telephone number for use by the public in reporting problems experienced with the systems. Districts within an air basin or adjacent air basin may enter into a cooperative program to implement this requirement. All complaints received by a district shall be recorded on a standardized form which shall be established by the state board, in consultation with districts, the State Fire Marshal, and the Division of Measurement Standards in the Department of Food and Agriculture. The operating instructions required by Section 41960.4 shall be posted at all service stations at which systems for the control of gasoline vapors resulting from motor vehicle fueling operations are installed and shall include a prominent display of the toll free telephone number for complaints in the district in which the station is located.

(b) Upon receipt of each complaint, the district shall diligently either investigate the complaint or refer the complaint for investigation by the state or local agency which properly has jurisdiction over the primary subject of the complaint. When the investigation has been completed, the investigating agency shall take such remedial action as is appropriate and shall advise the complainant of the findings and disposition of the investigation. A copy of the complaint and response to the complaint shall be forwarded to the state board.

(Amended by Stats. 1986, Ch. 194, Sec. 1.)

H&S 41960.4 Operating Instructions

41960.4. The operator of each service station utilizing a system for the control of gasoline vapors resulting from motor vehicle fueling operations shall conspicuously post operating instructions for the system in the gasoline dispensing area. The instructions shall clearly describe how to fuel vehicles correctly with vapor recovery nozzles utilized at the station and shall include a warning that repeated attempts to continue dispensing, after the system having indicated that the vehicle fuel tank is full, may result in spillage or recirculation of gasoline.

(Added by Stats. 1981, Ch. 902.)

H&S 41960.5 Nozzle Size Requirements

41960.5. (a) No retailer, as defined in Section 20999 of the Business and Professions Code, shall allow the operation of any gasoline pump from which leaded gasoline is dispensed, or which is labeled as providing leaded gasoline, unless the pump is equipped with a nozzle spout meeting the required specifications for leaded gasoline nozzle spouts set forth in Title 40, Code of Federal Regulations, Section 80.22(f)(1).

(b) For the purpose of this section, "leaded gasoline" means gasoline which is produced with the use of any lead additive or which contains more than 0.05 gram of lead per gallon or more than 0.005 gram of phosphorus per gallon.

(Added by Stats. 1987, Ch. 592, Sec. 2.)

H&S 41960.6 Fuel Pump Nozzles

41960.6. (a) No retailer, as defined in subdivision (g) of Section 20999 of the Business and Professions Code, shall, on or after July 1, 1992, allow the operation of a pump, including any pump owned or operated by the state, or any county, city and county, or city, equipped with a nozzle from which gasoline or diesel fuel is dispensed, unless the nozzle is equipped with an operating hold open latch. Any hold open latch determined to be inoperative by the local fire marshal or district official shall be repaired or replaced by the retailer, within 48 hours after notification to the retailer of that determination, to avoid any applicable penalty or fine.

(b) For purposes of this section, a "hold open latch" means any device which is an integral part of the nozzle and is manufactured specifically for the purpose of dispensing fuel without requiring the consumer's physical contact with the nozzle.

(c) Subdivision (a) does not apply to nozzles at facilities which are primarily in operation to refuel marine vessels or aircraft.

(d) Nothing in this section shall affect the current authority of any local fire marshal to establish and maintain fire safety provisions for his or her jurisdiction.

(Added by Stats. 1991, Ch. 468, Sec. 2.)

H&S 41961 Fees for Certification

41961. The State Fire Marshal, the Division of Measurement Standards, and the Division of Occupational Safety and Health may charge a reasonable fee for certification of a gasoline vapor control system or a component thereof, not to exceed their respective estimated costs therefor. Payment of the fee may be made a condition of certification. All money collected by the State Fire Marshal pursuant to this section shall be deposited in the State Fire Marshal Licensing and Certification Fund established pursuant to Section 13137, and shall be available to the State Fire Marshal upon appropriation by the Legislature to carry out the purposes of this article.

(Amended by Stats. 1992, Ch. 306, Sec. 5. Effective January 1, 1993.
Operative July 1, 1993, by Sec. 6 of Ch. 306.)

H&S 41962 Vapor Recovery Systems on Cargo Tank Vehicles

41962. (a) Notwithstanding Section 34002 of the Vehicle Code, the state board shall adopt test procedures to determine the compliance of vapor recovery systems of cargo tanks on tank vehicles used to transport gasoline with vapor emission standards which are reasonable and necessary to achieve or maintain any applicable ambient air quality standard. The performance standards and test procedures adopted by the state board shall be consistent with the regulations adopted by the Commissioner of the California Highway Patrol and the State Fire Marshal pursuant to Division 14.7 (commencing with Section 34001) of the Vehicle Code.

(b) The state board may test, or contract for testing, the vapor recovery system of any cargo tank of any tank vehicle used to transport gasoline. The state board shall certify the cargo tank vapor recovery system upon its determination that the system, if properly installed and maintained, will meet the requirements of subdivision (a). The state board shall enumerate the specifications used for issuing such certification. After a cargo tank vapor recovery system has been certified, if circumstances beyond control of the state board cause the system to no longer meet the required specifications, the certification may be revoked or modified.

(c) Upon verification of certification pursuant to subdivision (b), which shall be done annually, the state board shall send a verified copy of the certification to the registered owner of the tank vehicle, which copy shall be retained in the tank vehicle as evidence of certification of its vapor recovery system. For each system certified, the state board shall issue a nontransferable and nonremovable decal to be placed on the cargo tank where the decal can be readily seen.

(d) With respect to any tank vehicle operated within a district, the state board, upon request of the district, shall send to the district, free of charge, a certified copy of the certification and test results of any cargo tank vapor recovery system on the tank vehicle.

(e) The state board may contract with the Department of the California Highway Patrol to carry out the responsibilities imposed by subdivisions (b), (c), and (d).

(f) The state board shall charge a reasonable fee for certification, not to exceed its estimated costs therefor. Payment of the fee shall be a condition of certification. The fees may be collected by the Department of the California Highway Patrol and deposited in the Motor Vehicle Account in the State Transportation Fund. The Department of the California Highway Patrol shall transfer to the Air Pollution Control Fund the amount of those fees necessary to reimburse the state board for the costs of administering the certification program.

(g) No person shall operate, or allow the operation of, a tank vehicle transporting gasoline and required to have a vapor recovery system, unless the system thereon has been certified by the state board and is installed and maintained in compliance with the state board's requirements for certification. Tank vehicles used exclusively to service gasoline storage tanks which are not required to have gasoline vapor controls are exempt from the certification requirement.

(h) Performance standards of any district for cargo tank vapor recovery systems on tank vehicles used to transport gasoline shall be identical with those adopted by the state board therefor and no district shall adopt test procedures for, or require certification of, cargo tank vapor recovery systems. No district may impose any fees on, or require any permit of, tank vehicles with vapor recovery systems. However, nothing in this section shall be construed to prohibit a district from inspecting and testing cargo tank vapor recovery systems on tank vehicles for the purposes of enforcing this section or any rule and regulation adopted thereunder that are applicable to such systems and to the loading and unloading of cargo tanks on tank vehicles.

(i) The Legislature hereby declares that the purposes of this section regarding cargo tank vapor recovery systems on tank vehicles are (1) to remove from the districts the authority to certify, except as specified in subdivision (b), such systems and to charge fees therefor, and (2) to grant such authority to the state board, which shall have the primary responsibility to assure that such systems are operated in compliance with its standards and procedures adopted pursuant to subdivision (a).

(Amended by Stats. 1982, Ch. 1255, Sec. 2. Operative July 1, 1983, or earlier, by Sec. 27.5 of Ch. 1255.)

References at the time of publication (see page iii):

Regulations: 17, CCR, Sections 94014, 94015

Appendix 4

Gasoline Dispensing Facilities Hose Emissions Inventory For Vacuum Assist and Conventional Hoses

APPENDIX 4

Gasoline Dispensing Facility Hose Emissions Inventory For Vacuum Assist and Conventional Hoses

Introduction

In 2011, California Air Resources Board (ARB) staff developed an emissions inventory for determining the permeation emissions from gasoline dispensing facility (GDF) hoses in California. Gasoline vapor emissions from hoses are the result of permeation of gasoline's constituent molecules through thermoplastic or rubber material of the hose. Specifically, staff considered emissions from only vacuum assist and conventional hoses. The combined vacuum assist and conventional statewide, year round and summertime average uncontrolled permeation emissions are estimated to be 1.00 and 1.26 tons per day (TPD) of reactive organic gas (ROG), respectively. The proposal is expected to reduce permeation emissions by 0.96 and 1.21 TPD for year round and summertime, respectively for these hoses. These reductions represent a 96 percent reduction from current levels.

GDF Hose Population and Hose Surface Area

In 2010, staff analyzed GDF population data gathered from air quality management districts (AQMDs or districts) within California to determine and characterize the population of fueling points at permitted GDFs (CARB, 2011). This report details that there are approximately 95,130 vapor recovery hoses in use at California GDFs, with approximately 65,420 being vacuum assist style vapor recovery hoses. Of these, staff estimates that approximately 64,950 are employed at GDFs using underground storage tanks (USTs) while the remaining 470 are in-use at GDFs employing aboveground storage tanks (ASTs).

There are approximately 1,010 conventional hoses in-use at facilities that predominantly refueled vehicles equipped with on-board refueling vapor recovery or ORVR. These facilities are generally exempt from Phase II vapor recovery requirements by district rules.

In order to determine permeation emissions of the hose population, it is necessary to determine the overall permeable surface area of the hose population. To do this, staff first calculated the surface area of an average hose, and then applied this average across the entire population.

Staff assumed that an average hoses length of approximately 10 feet (ft) for both vacuum assist and conventional GDF hoses. Staff further assumed an average nominal diameter of ¾ inch (in) for both types of hoses. From this, staff calculated the average permeable surface area for both a vacuum assist and conventional hose to be 1.823×10^{-1} square meters (m^2).

$$10 \times 12 \times 0.75 \times 3.14 \times (6.4516 \times 10^{-4})^{*} = 1.823 \times 10^{-1}$$

Applying the average hose permeable surface area to the vacuum assist hose population of 65,420, staff estimates a statewide vacuum assist hose permeable surface area of 11,930 m^2.

$$1.823 \times 10^{-1} \times 65{,}420 = 11{,}930^{**}$$

***After rounding for significant figures.*

Similarly, applying the average hose permeable surface area to the conventional hose population of 1,010 at ORVR fleet exempt facilities, staff estimates a statewide conventional hose permeable surface area at these facilities of 184 m^2.

$$1.823 \times 10^{-1} \times 1{,}010 = 184$$

Normalization of Permeation Emissions Results

Permeation of gasoline is reported in terms of grams per square meter per day or $g/m^2/day$ and is highly dependent upon temperature, concentration gradient across the hose wall, fuel type, hose material, and construction. Several technical papers published by the Society of Automotive Engineers (SAE) indicate a change in temperature of 10 °C typically results in a doubling of the permeation rate (SAE, 2003 and Lockhart, M., Nulman, M., Rossi, G., 2001). This rate of change is indicative of exponential growth. Staff used the above SAE model for adjusting permeation rates when normalizing for temperature differences.

Evaporative and permeation emissions are temperature driven, which varies widely throughout the year. It is important to understand that since average summertime and year-round temperatures are different, the average permeation emissions for summertime and year-round will also differ. It is also important to note here that the term summertime is used loosely within this report to refer to the portion of the year covered by the State Implementation Plan (SIP) for ozone, which is May through October. Since ROG is an ozone precursor, controlling ROG emissions during the summer is a very important measure to reduce ground level ozone. Year-round average emissions, while necessary for understanding annual emissions impacts are also important for calculating cost effectiveness of a proposed emission control technology.

ARB staff analyzed fuel temperature data collected by the California Energy Commission (CEC) to determine average summertime and annual fuel temperatures (CEC, 2009). The average monthly gasoline temperatures from the CEC data are summarized in Table 1.

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* Area Conversion – Square Inches to Square Meters

To determine the average summertime gasoline temperature staff averaged the monthly average CEC temperatures from the months of May through October, as these months correspond to the ozone SIP. Using these temperatures from Table 1, the average summertime gasoline temperature is 76.9 °F (25.0 °C).

To determine the average annual gasoline temperature staff averaged the monthly average CEC temperatures over the entire year. From the temperature values in Table 1, the average annual gasoline temperature is 71.0 °F (21.7 °C).

Table 1. CEC Observed Monthly Average Fuel Temperatures

Month	Average Temperature	
	°F	°C
January	60.4	15.8
February	62.9	17.2
March	65.7	18.7
April	67.3	19.6
May	71.0	21.7
June	75.3	24.1
July	79.6	26.4
August	81.5	27.5
September	79.8	26.6
October	74.4	23.6
November	70.6	21.4
December	63.5	17.5

Uncontrolled GDF Hose Permeation Rates

In 2009, staff conducted testing to determine gasoline permeation rates from vacuum assist and conventional GDF hoses (CARB, 2010). This report concluded that average vacuum assist and conventional GDF hoses, when subjected to an average temperature of 71.9 °F (22.2 °C), and filled with summer blend CaRFG 3 (California summer pump fuel) with 6% ethanol, permeate at a rate of approximately 77.4 g/m^2/day.

As previously discussed, staff assumes that the permeation rate changes with exponential growth such that the rate will double for every 10 °C increase in temperature. Based upon this information, the following equation is developed empirically to predict the uncontrolled permeation rate.

$$y = 16.628e^{0.0693x}$$

where y is the permeation rate (g/m^2/day) and x is the temperature (°C).

Normalizing the uncontrolled permeation rate to a summertime temperature of 76.9 °F (25.0 °C) and using the above equation, the average summertime permeation rate for vacuum assist and conventional hoses is estimated to be

94.0 g/m^2/day.

$$16.628e^{(0.0693 \cdot 25.0)} = 94.0$$

Similarly, normalizing the uncontrolled permeation rate to the year-around temperature of 71.0 °F (21.7 °C), the average year-round permeation rate for vacuum assist and conventional hoses is estimated to be 74.8 g/m^2/day.

Current Statewide Uncontrolled GDF Hose Emissions

In order to estimate statewide uncontrolled emissions for vacuum assist GDF hoses and conventional GDF hoses at ORVR fleet exempt facilities, staff applied the uncontrolled hose permeation rates across the hose populations.

The vacuum assist hose summertime statewide permeation emissions are estimated to be 1.24 TPD of ROG by applying the summertime permeation rate of 94.0 g/m^2/day and statewide vacuum assist hose surface area of 11,930 m^2 to the following equation.

$$94.0\times 11{,}930 \times (1.1023 \times 10^{-6})^{(**)} = 1.24$$

Staff determined the vacuum assist hose average year-round statewide permeation emissions to be 0.984 TPD of ROG by applying the average year-round permeation rate of 74.8 g/m^2/day and statewide vacuum assist hose surface area of 11,930 m^2.

$$74.8 \times 11{,}930 \times (1.1023 \times 10^{-6})^{(**)} = 0.984$$

Similarly, for conventional hoses at ORVR exempt facilities, staff determined the average summertime uncontrolled statewide permeation emissions to be 1.91×10^{-2} TPD and the average year-round uncontrolled statewide permeation emissions to be 1.52×10^{-2} TPD.

When combining emissions from both types of hoses, average total summertime emissions are 1.26 TPD of ROG and average total year-round reductions are 1.00 TPD of ROG.

Proposed GDF Hose Emissions Limit

Staff is proposing a GDF hose permeation rate performance standard of 10.0 g/m^2/day using CE-10 test fuel (SAE, 2000) at a constant temperature of 100 °F (38.0 °C). Based upon the previously discussed exponential growth assumptions, the following empirical equation was developed to predict the permeation rate at 100 °F:

$$y = 0.7179e^{0.0693x}$$

where y is the permeation rate (g/m^2/day) and x is the temperature (°C).

Applying the average summertime temperature of 76.9 °F (25.0 °C) to the above equation, staff determined the average summertime permeation limit for vacuum assist and conventional hoses to be 4.06 g/m^2/day as determined by the following calculation, assuming the other above conditions are constant.

$$0.7179e^{(0.0693 \cdot 25.0)} = 4.06$$

Similarly, the year-round permeation limit can be determined when applying a temperature of 71.0 °F (21.7 °C). The average year-round permeation limit for vacuum assist and conventional hoses is estimated to be 3.23 g/m^2/day, assuming the other above conditions are constant.

As mentioned previously staff determined statewide emissions limits for vacuum assist GDF hoses and conventional GDF hoses by applying the hose permeation limits across the hose populations.

Vacuum assist hose summertime statewide permeation emissions were determined to be 5.34×10^{-2} TPD of ROG by applying the summertime permeation limit of 4.06 g/m^2/day and statewide vacuum assist hose surface area of 11,930 m^2.

$$4.06 \times 11{,}930 \times (1.1023 \times 10^{-6})^* = 5.34 \times 10^{-2}$$

Staff determined the vacuum assist hose average year-round statewide permeation emissions limit to be 4.25×10^{-2} TPD of ROG by applying the average year-round permeation limit of 3.23 g/m^2/day and statewide vacuum assist hose surface area of 11,930 m^2.

$$3.23 \times 11{,}930 \times (1.1023 \times 10^{-6})^* = 4.25 \times 10^{-2}$$

Similarly, for conventional hoses at ORVR exempt facilities, staff determined the average summertime statewide permeation emissions to be 8.23×10^{-4} TPD and the average year-round statewide permeation emissions to be 6.55×10^{-4} TPD.

Statewide GDF Hose Emissions Reductions

In order to determine how many emissions would be reduced by the proposed low permeation vacuum assist hoses and conventional hoses at ORVR fleet exempt facilities, staff subtracted the statewide emissions limits from the statewide uncontrolled emissions.

For example, staff determined the average summertime statewide emissions

* Short Tons per Gram at Standard Surface Conditions

reductions from vacuum assist hose permeation to be 1.19 TPD of ROG by subtracting the statewide summertime permeation limit of 5.34×10^{-2} TPD from the statewide vacuum assist uncontrolled emissions of 1.24 TPD.

$$1.24 - 5.34 \times 10^{-2} = 1.19$$

Staff determined the average year-round statewide emissions reductions from vacuum assist hose permeation to be 0.942 TPD of ROG by subtracting the statewide summertime permeation limit of 4.25×10^{-2} TPD from the statewide vacuum assist uncontrolled emissions of 0.984 TPD.

$$0.984 - 4.25 \times 10^{-2} = 0.942$$

Similarly, for conventional hoses at ORVR exempt facilities, staff determined the average summertime statewide permeation reductions to be 1.83×10^{-2} TPD and the average year-round statewide permeation reductions to be 1.45×10^{-2} TPD.

When combining reductions from both types of hoses, average total summertime reductions are 1.21 TPD (96%) of ROG and average total year-round reductions are 0.96 TPD (96%) of ROG.

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Low Permeation Hose Emissions Summary Table

HOSE POPULATION	Vacuum Assist	Conventional	Total	
Population affected	68.05%	1.05%	69.10%	
Population	65,420	1,010	66,430	hoses
HOSE PERMEATION SURFACE AREA				
Statewide	11930	184.0	12110	m^2
PROPOSED HOSE EMISSION LIMIT				
With CE-10 Test Fuel @ 38.0°C	10.0	10.0	-	$g/m^2/day$
Test Standard Normalized to 25.0°C	4.06	4.06	-	$g/m^2/day$
Test Standard Normalized to 21.7°C	3.23	3.23	-	$g/m^2/day$
SUMMER EMISSIONS BASELINE				
Per Hose of ROG	94.0	94.0	-	$g/m^2/day$
Statewide Emissions of ROG	1.24	1.91E-02	1.26	TPD
	2,480	38.2	2,520	lb/day
ANNUAL EMISSIONS BASELINE				
Per Hose of ROG	74.8	74.8	-	$g/m^2/day$
Statewide Emissions of ROG	0.984	1.52E-02	1.00	TPD
	1,970	30.4	2,000	lb/day
SUMMER EMISSIONS ALLOWED				
Statewide Emissions of ROG	5.34E-02	8.23E-04	5.42E-02	TPD
	107	1.65	109	lb/day
ANNUAL EMISSIONS ALLOWED				
Statewide Emissions of ROG	4.25E-02	6.55E-04	4.32E-02	TPD
	85.0	1.31	86.3	lb/day
SUMMER EMISSION REDUCTIONS				
Statewide Percent Reductions	-	-	96%	
Statewide Emissions of ROG	1.19	1.83E-02	1.21	TPD
	2,380	36.6	2,420	lb/day
ANNUAL EMISSION REDUCTIONS				
Statewide Percent Reductions	-	-	96%	
Statewide Emissions of ROG	0.942	1.45E-02	0.957	TPD
	1,880	29.0	1,910	lb/day

Appendix 5

Cost Effectiveness and Economic Impact

APPENDIX 5
Cost-effectiveness and Economic Impact

Introduction

In support of the proposed 2011 Amendments to the Regulation for Certification of Vapor Recovery Systems at Gasoline Dispensing Facilities (GDFs), California Air Resources Board (ARB or CARB) staff assessed the overall cost-effectiveness along with the economic and fiscal impacts of the proposed amendments. The proposed permeation standard for GDF hoses is the only item of this rulemaking that will have fiscal and economic impact. All other amendments being proposed are administrative in nature and should not impose any new costs.

The proposed permeation standard would be limited to hoses where liquid gasoline would be in contact with the outer wall of the hose. This means that hoses used with vacuum assist vapor recovery systems and conventional hoses[1] are subject to the proposal. Staff has determined the proposal will not impose a significant cost burden on retail businesses located in California or on implementing government agencies. Manufacturers, located outside California, are currently providing low-permeation hoses for other applications (e.g., small off-road engines) subject to similar performance standards.

Staff has determined that the total five-year cost of the proposed regulation for all affected GDF owners and operators within California will be approximately $1,445,000. California GDFs dispense about 14.8 billion gallons of gasoline per year. When compared to the cost of gasoline dispensed, compliance cost is negligible, and is expected to be passed on to consumers. However, low-permeation hoses will prevent dispensed fuel from evaporating, resulting in a five-year fuel savings to consumers of approximately $1,715,000. Therefore, the regulation will result in a net savings and has a cost-effectiveness of $0.09 saved per pound of ROG reduced. A summary table of these results can be found at the end of this document in Attachment 1. Further, all calculations for this appendix may be viewed online at ARB's website at: http://www.arb.ca.gov/vapor/gdfhe/low_permeation_gdf_hose_emissions_spreadsheet.xls

Methodology: Cost and Cost-effectiveness

To compare regulatory cost-effectiveness, ARB staff uses the measure of dollars per pound of emissions reduced ($/lb.). The following demonstrates the assumptions and calculations staff used to determine cost-effectiveness.

Hose-to-Fueling Point Ratio

For all of the calculations throughout this report staff assumes that gasoline is

[1] Conventional hoses are installed on GDFs that have been exempted from Phase II vapor recovery because the GDF refuels predominately vehicles that are equipped with onboard refueling vapor recovery or ORVR.

dispensed primarily with unihose dispenser or one hose per fueling point. There are some exceptions to this rule as with "six-pack" dispensers. Since the quantity of gasoline dispensed through "six-pack" dispenser are small, staff assumed the ratio of one hose per fueling point throughout this report.

Cost Increase of Low-permeation Hoses

Staff conducted a survey of hose manufacturers to determine the cost increase to GDF owners for low-permeation GDF hoses (CARB, 2010). The survey defined the hose permeation limit to be 5 grams per square meter per day (g/m^2/day) using CE-10 test fuel at a constant temperature of 104.0 °F (40.0 °C). The hose length was defined to be 10 feet. The responses to the survey indicated the upgrade cost to the end-user would be approximately $10 for either a vacuum assist or conventional GDF hose. Staff concludes these numbers are conservative, as the permeation standard that was proposed in the survey is more rigorous than what is now proposed (10.0 g/m^2/day using CE-10 test fuel at a constant temperature of 100.4 °F (38.0 °C)).

Average GDF Hose Life

Staff interviewed several GDF hose manufacturers and determined the average life of a GDF hose is approximately two years. Although there are many cases of hoses lasting longer than two years, damage from customer drive-offs and driving over hoses leads to a shorter hose life.

From this assumption, staff assumes that in any given year, on average, approximately half of the affected hoses would be replaced. Therefore, staff assumes that only 50 percent of the affected hoses will be replaced in 2013, the initial year that staff assumes when an ARB certified low-permeation hose would be available commercially. Similarly, the following year, staff projects that the remaining half of the affected hoses would be replaced, with 50 percent of the affected population being replaced every year thereafter.

This is a conservative assumption for the purpose of simplifying calculations within this paper. If hoses last longer than projected, then cost-effectiveness of the emission reductions in this regulation would improve due to reduced replacement costs.

Emissions Reductions and Gasoline Savings

As discussed in detail in Appendix 4 of this report, staff determined that the unregulated average year round vacuum-assist and conventional GDF hose permeation rate of 74.8 g/m^2/day leads to an average uncontrolled annual emissions of 1.00 tons per day (tpd). Further, staff demonstrated that the proposed GDF hose permeation limit of 10 g/m2/day at 38 °C would control 0.957 tpd of these emissions. These controlled emissions result directly in gasoline savings, as the gasoline is not allowed to permeate through the hose and evaporate into the environment.

From this, staff determined the average amount of gasoline saved per hose per year (1.68 gallons) by applying the emission reductions of the regulation (0.957 tpd) by the gallons per ton conversion factor for gasoline (320) over the affected hose population (66,430).

$$365 \text{ days per year} \times 0.957 \text{ tons per day} \times 320 \text{ gallons per ton} / 66430 \text{ hoses} = 1.68 \text{ gallons per hose per year}$$

Compliance Cost (Cost of Purchasing Low-permeation Hoses)
Staff determined the annual cost of compliance by multiplying the amortized upgrade cost of an average individual low-permeation hose across the affected hose population.

To determine the amortized upgrade cost of the hose ($5.38), staff multiplied the standard factor for two-year capital recovery (0.5378) by the upgrade cost of a hose from the manufacturer's survey ($10).

$$0.5378 \times \$10 \text{ per hose} = \$5.38 \text{ per hose}$$

Multiplying this result across the affected population of conventional and vacuum assist hoses (66,430), yields the undiscounted annual compliance cost ($357,000).

$$\$5.38 \text{ per hose} \times 66{,}430 \text{ hoses} \cong \$357{,}000^*$$

**After rounding for significant figures.*

As discussed earlier, in 2013 (the first year when an ARB certified low-permeation hose would be available commercially) only half of the current hose population will be replaced with new low-permeation hoses due to the average two-year hose life expectancy. Therefore, the cost impact for the first year of the analysis will only be half of the annual compliance cost ($179,000)

Staff then calculated the present value of compliance costs over the five-year lifetime of the regulation[2], applying a 5% discount rate to annual compliance costs per the following formula:

$$y_n = x_n / (1 + 0.05)^\wedge{(t_n - t)}$$

where;
y_n is the present value of the cost of the regulation over year n,
x_n is the annual cost of the regulation over year n,
t is the year the regulation took effect,
t_n is the particular year being evaluated

Staff summed annual subtotals of the above calculation for the years 2013 to 2017 to estimate the total discounted cost of the regulation ($1,445,000), in today's dollars. (See Attachment 1)

Staff then levelized annual compliance cost for the regulation ($334,000), by multiplying the total discounted cost of the regulation ($1,445,000) by the standard five-year amortization factor (0.231).

[2] Where the lifetime of compliance equipment is less than five years, ARB estimates economic impact on the basis of a five-year regulatory lifetime.

$\$1,445,000$ per 5 years $\times$ $0.231 = \$334,000$*

After rounding for significant figures.

Compliance Cost Savings (Value of the Fuel Saved)
Because this regulation will result in cost savings to California consumers in the form of gasoline savings, it is appropriate to offset the upgrade costs of these hoses with gasoline savings. Staff determined the annual value of statewide fueling savings due to low-permeation hoses by multiplying the annual gasoline savings of the affected hose population by the average value per gallon of gasoline saved.

Staff applied a projected gasoline value for 2017, the year when all GDFs must be in compliance with the low permeation hose standard (assuming that low permeation hoses would be available commercially in 2013)[3]. Staff estimates that the value of gasoline saved in 2017 will be $3.80 per gallon in today's dollars. This is based upon averaging high ($4.42/gal) and low ($3.17/gal) projections for the retail prices of 2017 California reformulated gasoline (CaRFG) from the California Energy Commission (CEC, 2010).

As discussed earlier, staff determined the annual amount of gasoline saved per hose to be 1.68 gallons. Staff then applied this to the 2017 value per gallon of gasoline ($3.80) to determine the annual value of gasoline savings per hose ($6.38).

$\$3.80$ per gallon $\times$ 1.68 gallons per hose per year = $\$6.38$ per hose per year

By applying the per-hose gasoline savings across the affected hose population, staff estimated the regulation's statewide annual gasoline cost savings to be $424,000.

$\$6.38$ per hose per year $\times$ 66,430 hoses = $\$424,000$* per year

After rounding for significant figures.

As discussed earlier, in 2013 only half of the existing hose population would be replaced with new low-permeation hoses due to the average two-year hose life expectancy. Therefore, gasoline savings for that year would only be half of the annual gasoline savings ($212,000).

Staff then calculated the present value of cost savings over the five-year lifetime of the regulation by applying a 5% discount rate to annual gasoline cost savings, and summing, as above. The discounted value of the regulation's gasoline savings for the years 2013 to 2017 is $1,715,000. (See Attachment 1, "Total Present Value of Regulatory Compliance Cost.")

Staff then levelized annual cost savings for the regulation ($396,000), by multiplying the discounted value of regulatory fuel savings ($1,715,000) by the five-year

[3] See other parts of proposal for discussion regarding the "four year clock" for new vapor recovery performance standards.

amortization factor (0.231).

$1,715,000 per 5 years × 0.231 = $396,000* per year

After rounding for significant figures.

Net Annual Compliance cost
Staff determined the net annual levelized cost of the regulation (-$62,000) by subtracting the levelized annual savings ($396,000) from the levelized annual cost ($334,000) from the above sections. Note that the negative sign indicates a net savings.

$334,000 per year - $396,000 per year = -$62,000 per year

Cost-effectiveness of Low-permeation GDF Hoses
To compare regulations on a cost effective basis, ARB staff uses the measure of dollars spent per pound of emissions reduced ($/lb.). To determine this, staff divided the net annual statewide cost of the regulation (-$62,000 per year) by the annual emissions reductions of the regulation.

The average year-round statewide emissions reductions of 0.957 TPD for low-permeation hoses converts to 699,000 pounds per year. From this, staff estimates the cost-effectiveness of the regulation, with respect to low-permeation hoses, to be -0.09/lb. Note that the negative sign indicates a cost savings.

(-$62,000 per year) / 699,000 lb. ROG per year = -$0.09* per lb. of ROG

After rounding.

Economic Impact

This section addresses estimated private sector impacts, estimated costs, estimated benefits, and alternatives of the proposed regulation used to satisfy the requirements of the accompanying economic impact statement. As demonstrated above, the estimated net five-year cost of the proposed regulation to affected California stakeholders is less than $10 million, and so does not constitute a major regulation. Staff has determined that this regulation will not lead to the elimination or creation of jobs within California, as the actual cost impact to any one GDF is very small. The proposed regulation will not affect the competitiveness of California businesses because the impacts on any one California business are expected to be minor. GDF hose manufactures affected by the proposed regulation are headquartered outside California.

Estimate of Small Businesses Affected
Staff is unaware of any credible sources identifying the number of GDFs classified as small businesses. Small businesses are defined in California Government Code Section 11342.610. GDFs are in the retail trade sector, and the applicable part of the code excludes businesses with gross annual receipts exceeding two million dollars.

Staff initially assumed that an average number of fueling points at a small GDF is three. Further, staff assumed that the average number of fueling events per fueling point per day is approximately 65. Staff also assumed that the average amount of fuel dispensed per fueling event is 10 gallons. Given these assumptions, and the $3.80 per gallon fuel price, staff calculates that the average annual gross receipts for gasoline for a GDF with three hoses is approximately $2,700,000.

365 day per year × 3 hoses × 65 fueling events per day ×
10 gallons per fueling event × $3.80 per gallon ≅ $2,700,000* per year

**After rounding.*

This clearly exceeds the legal threshold for a small business. Further, many GDFs also sell other merchandise and services. Therefore, it is staff's estimation that very few GDFs could qualify as a small business. For the purposes of this report, staff estimates that less than ten percent of GDFs are small businesses. Further, as demonstrated above, small business GDFs would necessarily have no more than two fueling points.

Estimate Private vs. Public Portion of Affected Population

The proposed regulation is expected to have statewide impacts on GDF owners. Staff expects these impacts to affect approximately 7,110 privately owned GDFs. This number was determined this by applying the percent of private California GDFs (91.8) to the combined vacuum assist and conventional GDF population affected by the regulation (7,742) (CARB, 2011a).

91.8% (private GDFs) × 7,742 GDFs = 7,110* GDFs

**After rounding for significant figures.*

Similarly, the regulation is expected to affect 550 (7.1 percent) GDFs operated by local government entities, 70 (0.90 percent) GDFs operated by State government entities and 15 (0.20 percent) GDFs operated by federal government entities. All together the affected government facilities add up to 635 GDFs (8.2 percent). (CARB, 2011a)

Estimate of Hoses per GDF by GDF Type

For most applications, staff estimates that Government GDFs (635) generally have two fueling points. From this staff estimates that there are 1,270 hoses at GDFs operated by government entities.

2 hoses per GDF × 635 GDFs = 1,270 hoses

Further, as discussed previously, staff estimates that small businesses have an average of no more than two fueling points and account for no more than 10 percent of the affected privately operated population (711). From this staff estimates that there are 1,422 hoses at GDFs operated by small business entities.

2 hoses per GDF × 711 GDFs = 1,422 hoses

Staff determined the statewide number of hoses (63,740) employed at affected privately operated GDFs that are not considered small businesses by subtracting the number of government and small business hoses from the total number of affected hoses (66,430) (CARB 2011a).

66,430 hoses - 1,270 hoses - 1,422 hoses = 63,740* hoses

After rounding for significant figures.

Staff further determined that there are approximately 6,400 affected privately operated GDFs that are not considered small businesses by subtracting the number of small business GDFs (711) from the total number of affected privately operated GDFs (7,110).

7,110 GDFs - 711 GDFs = 6,400* GDFs

After rounding for significant figures.

From this, staff determined that an average of 10.0 hoses is employed at privately operated GDFs that are not considered small businesses by dividing the number of hoses at these GDFs by the number of these GDFs.

63740 hoses / 6400 GDFs = 10.0 hoses per GDF

Subtracting the number of hoses at affected government operated GDFs (1,270) from the total affected hose population (66,430) yields the total number of hoses at privately operated GDFs (65,160). This is 98.1 percent of the affected hose population.

66,430 hoses - 1,270 hoses = 65,160 hoses

Estimate of Total Economic Impact

The gross statewide five-year cost impact of the regulation is the five-year present value cost of the regulation ($1,445,000). This was determined earlier in the Cost and Cost-effectiveness Section.

The gross statewide five-year gasoline savings impact of the regulation is the five-year present value of the regulation's gasoline savings ($1,715,000). This was also determined earlier in the Cost and Cost-effectiveness Section.

The net statewide five-year economic impact of the regulation is a cost savings of $270,000. This is determined by subtracting the regulation's five-year present value of gasoline savings ($1,715,000) from the regulation's five-year present value cost ($1,445,000). Note that the negative sign indicates a net savings.

$1,445,000 - $1,715,000 = -$270,000

Estimate of Costs for a Typical Private GDF

Staff estimated the initial-year cost to a typical GDF ($50) by multiplying unamortized per-hose costs ($10) by the number of hoses expected to be purchased in the first year of the regulation (five). The same approach was applied to estimating initial-year cost for a typical small business ($10). These initial-year cost estimates represent the capital investment regulated entities are expected to make to comply with the proposed rule.

To calculate annual ongoing costs of compliance for typical and small businesses staff multiplied the annual amortized upgrade cost for the two-year life of the hose, ($5.38), by the number of hoses per GDF, (10 for typical, two for small), and by the annual hose turnover factor (0.50). See results in Table 1, below. As discussed previously, due to the two-year life of a hose only half of the hoses are expected to be replaced in the first year of the regulation. For example:

$$\$5.38 \text{ per hose per year} \times 2 \text{ years} \times 10 \text{ hoses} \times 50\% \text{ (annual hose replacement factor)} \cong \$54^{*}$$

**After rounding.*

Table 1, Annual Ongoing Costs for Typical and Small GDFs

	Average Number of Hoses per GDF	Annual Amortized Cost per Hose	Annual Costs
Small Business	2.0	$5.38	$11
Typical Business	10.0	$5.38	$54

Estimate of Benefits and Gasoline Savings

The proposed regulation will reduce approximately one tpd of reactive organic gases (ROG). These emission reductions benefit citizens of the State of California by contributing to cleaner air and the associated health benefits. It is difficult to assign a dollar value to the health benefit of ROG emission reductions. The proposed regulation is consistent with the State Implementation Plan (CARB, 2007).

As previously discussed, staff estimates the annual gasoline saved per hose to be about 1.68 gallons. Further, staff estimates the 2017 value for a gallon of gasoline to be $3.80. The average annual gross value of gasoline saved per fueling point is approximately $6.38. It is important to note that these gasoline savings are realized directly by the consumer and not the GDF owner, as the gasoline is saved in the hose, after the dispenser where the gasoline dispensed is actually metered. However, staff assumes that the increased cost of the hoses will be passed along to the consumer through the cost of gasoline.

By subtracting the annual amortized upgrade cost of a hose ($5.38) from the annual fuel savings of a hose ($6.38), the consumers will realize a net annual savings of $1.00 per hose.

$6.38 per hose per year - $5.38 per hose per year = $1.00 per hose per year

As mentioned in the introduction, this translates into a negligible cost savings to individual consumers of less than one cent per gallon.

It should be noted that in the special cases where the GDF and the fleet being fueled are owned by the same entity then those operations will experience a net annual savings of $1.00 per fueling point. Examples of such special operations include rental car fleet facilities and government fleet facilities, among others.

The proposed regulation will amend current enhanced vapor recovery (EVR) requirements to require low-permeation hoses. There are no proposed compliance tests of the hose after it has been ARB certified. Therefore, staff has determined that there will be no significant compliance reporting costs associated with the proposed regulation.

Alternatives to the Regulation

The economic and fiscal impact of the alternatives considered include no action by ARB and requiring balance EVR hoses to incorporate low-permeation technology in addition to the other hoses covered in the current proposal.

Alternative 1: No Action

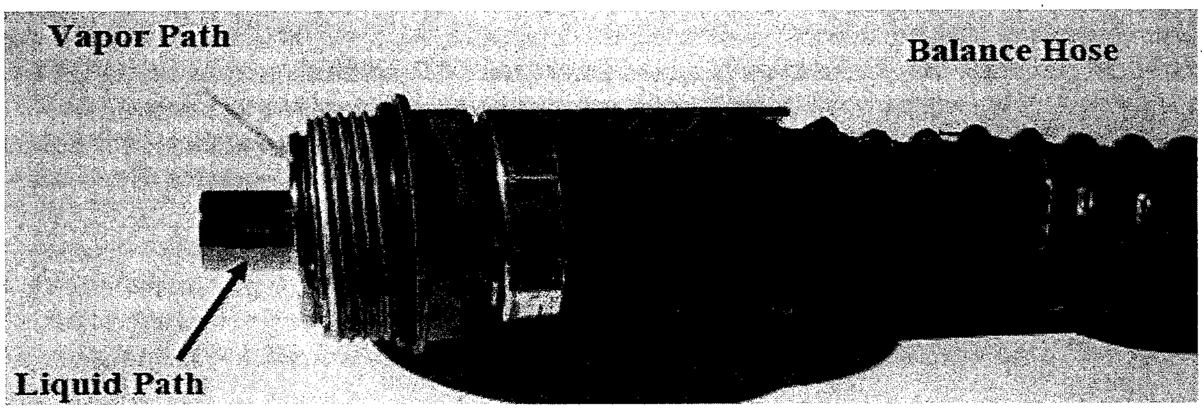
There currently exists no state or federal regulation designed to reduce emissions from GDF hoses. Therefore, if no action is taken by ARB, then no improvement in air quality would likely occur. This would mean the emissions reduction from GDF hose permeation will have to be obtained from sources, which may be more expensive than controlling GDF hose permeation. As discussed earlier, $396,000 is the statewide levelized annual value of gasoline that will be lost when there is no permeation standard for GDF hoses. Therefore, staff rejected this alternative as it does not produce air quality benefits and leads to a waste of gasoline.

Alternative 2: Require Low-permeation for Balance Hoses in Addition to the Current Proposal

Staff has considered requiring balance EVR hoses to incorporate low-permeation technology in addition to the other hoses covered in the current proposal. However, staff rejected this strategy because of concerns over technological feasibility and the increased mitigation of permeation emissions from balance hoses by the continued increase of ORVR vehicles within California's vehicle population.

Staff's concerns over technological feasibility on balance hoses stems from manufacturers failure to produce a prototype for ARB staff to test, and the fact that the estimated increased hose cost for a low-permeation hose would be approximately 3 times that of vacuum assist and conventional hoses (CARB, 2010). Staff believes that the difficulty stems from fact that low-permeation hose technologies observed by staff have multiple layers that are derived from an extrusion process. Permeation is reduced by one of these layers specifically chosen for its permeation reducing qualities. However, the outer hose of a balance GDF hose assembly encompasses a metal helix causing the hose to have a corrugated shape (Figure 1). This current design complicates the extrusion process for applying a barrier material.

Figure 1 - Cutaway of A Balance GDF Hose Showing Vapor and Liquid Paths

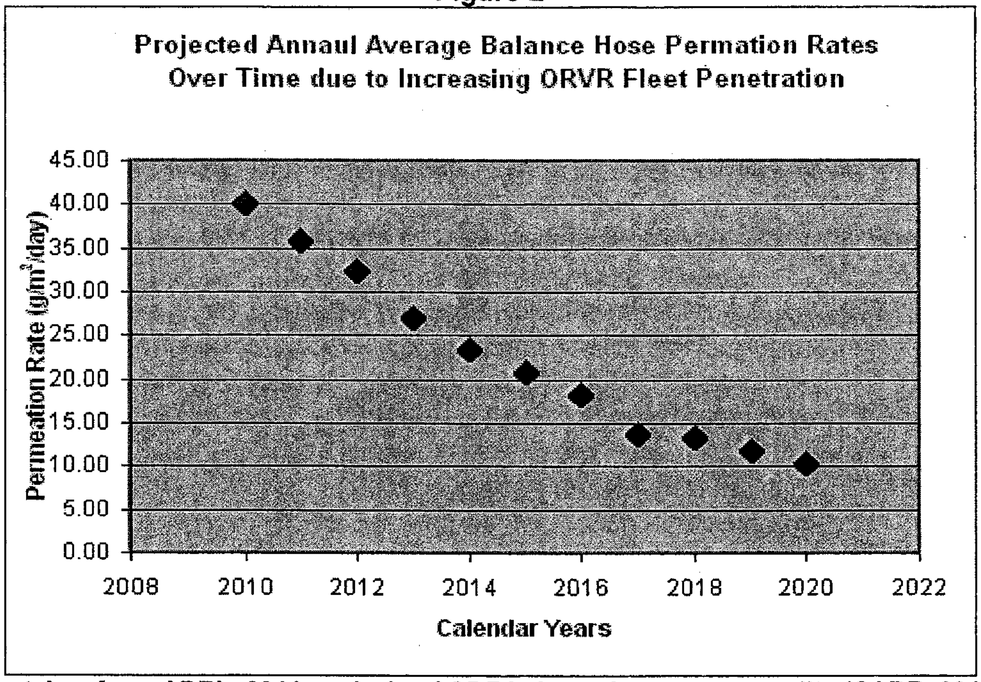


Staff has further observed that when fueling vehicles equipped with ORVR, balance hoses return very little gasoline vapor while sucking in outside air through the vapor return path (CARB, 2011b). This decrease in vapor quality within the vapor path of the balance hose causes permeation to decrease. This decrease in vapor quality is exacerbated with consecutive fueling of vehicles equipped with ORVR. Because ORVR technology on cars is required by both ARB and federal regulations, ORVR equipped vehicles are expected to increase every year as a percent California's vehicle population to 94 percent by the year 2020. Therefore, staff expects this trend to reduce most of the emissions which would be caused by permeation from balance GDF hoses (Figure 2).

To estimate the five-year economic impacts of this alternative to the proposed regulation, staff employed the same methodology to balance hoses as was used to evaluate the current proposal, and then added the results to those of the current proposal. Details of this analysis can be found in a spreadsheet posted at: http://www.arb.ca.gov/vapor/gdfhe/low_permeation_gdf_hose_emissions_spreadsheet.xls

There is one key methodological difference in performing the five-year economic impact analysis for low-permeation balance hoses, and that stems from the changing permeation rate of balance hoses over time as ORVR equipped vehicles dominate the vehicle population. Staff dealt with this by taking emissions from the 2013 estimated annual average permeation rate (27.0 g/m^2/day) and the 2017 estimated annual average permeation rate (13.9 g/m^2/day) (CARB, 2011b) and averaging those emissions (0.224 tpd) resulting approximately 368 tons of ROG over five years.

Figure 2



Data taken from ARB's 2011 analysis of GDF balance hose vapor quality (CARB, 2011b)

Staff determined the gross statewide five-year cost impact of low-permeation balance hoses would be $1,874,000. Further, staff determined the gross statewide five-year gasoline savings impact of low-permeation balance hoses would be $401,000. Therefore the five-year economic impact of regulating low-permeation balance hoses is a net cost of $1,536,000 (See Attachment 2)

Staff determined the statewide net amortized five-year cost of this alternative to the regulation for GDF owners and operators within California will be approximately $3,320,000, by combining the five-year cost impact of the regulation ($1,445,000) and the five-year cost impact of low-permeation balance hoses ($1,874,000).

$1,445,000 + $1,874,000 = $3,320,000*

**After rounding.*

Staff determined the statewide net amortized five-year gasoline savings of this alternative to the regulation for GDF owners and operators within California will be approximately $2,120,000, by combining the five-year gasoline savings impact of the regulation ($1,715,000) and the five-year impact of low-permeation balance hoses ($401,000).

$1,715,000 + $401,000 = $2,120,000*

**After rounding.*

Further, because of the mitigating effects of ORVR, the savings to consumers would gradually decrease to the baseline five-year savings of the proposed regulation of approximately $1,715,000 while the costs would remain constant.

Due to the increased cost of the regulation with only minimal extra reductions in emissions and uncertainty of the feasibility of low-permeation balance hose technology, staff rejected this alternative to the current proposal.

Fiscal Impact

This section addresses the estimated fiscal effect on local and State government. Government-operated GDFs will realize annual cost savings of $1.00 per hose because these facilities fuel government fleet vehicles and will therefore realize the gasoline savings that would otherwise be realized by GDF customers.

As discussed earlier, by subtracting the annual amortized upgrade cost of a hose ($5.38) from the annual fuel savings of a hose ($6.38), these government facilities will realize a net annual savings of $1.00 per hose.

Fiscal Effect on Local Government
The statewide total savings to local agencies, such as schools and fire districts that operate affected GDFs to fuel their fleets will be approximately $1,100.

As discussed earlier, local government has approximately 550 affected GDFs with approximately 2 hoses each. When applying this number across the total population of local government hoses, local government is expected to save $1,100 annually statewide.

Fiscal Effect on State Government
The statewide total savings to state agencies that operate affected GDFs to fuel their fleets will be approximately $140.

As discussed earlier, state government has approximately 70 affected GDFs with approximately 2 hoses each. When applying this number across the total population of state government hoses, state government is expected to save $140 annually statewide.

Staff has determined that ARB will not incur any additional operating costs in the implementation of this regulation.

Fiscal Effect on Federal Government
The statewide total savings to federal agencies that operate affected GDFs to fuel their fleets will be approximately $30.

As discussed earlier, federal government has approximately 15 affected GDFs with approximately 2 hoses each. When applying this number across the total population of local government hoses, local government is expected to save $30 annually statewide.

Staff does not believe this regulation will have any effect on federal funding of state programs as no fiscal impact exists because this regulation will not affect any federally funded State agency or program.

Conclusion

Staff has determined that the proposed regulation will not have a significant impact on the private sector or the government. Staff has also determined that the total statewide five-year cost of the proposed regulation for GDF owners and operators within California will be approximately $1,445,000. Further, because this regulation results in a five-year fuel savings valued of approximately $1,715,000, the regulation will result in a net savings to consumers. The result is a cost-effectiveness of $0.09 savings per pound of ROG reduced.

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Attachment 1
Five-Year GDF Hose Regulatory Cost Table

Conventional and Vacuum Assist

2-yr Capital Recovery Factor	0.537805
Per-Hose Cost in Current $	$10.00
5-year Amortization Factor	0.231
Annual ROG Emissions Controlled lb./year	698610
5-year ROG Emissions Controlled (tons)	1572

Year of Reg	# Compliant GDF Hoses Sold annually	$10 price increase amortized over 2-year life of hose	Compliant GDF Hoses Providing Benefits in any given year	Annual Cost of Regulatory Compliance	Present Value of Regulatory Compliance Cost (discounted @ 5%)	Levelized Annual Compliance Cost (for Cost-effectiveness Calc)	Annual Fuel Savings from Regulatory Compliance	Present Value of Regulatory Fuel savings (discounted @ 5%)	Levelized (Average) Annual Fuel Savings	Annual Cost of Reductions (Net of Fuel Savings)
2013	33215	$5.38	33215	$178,632	$178,632	$333,759	$212,000	$212,000	$396,122	-$62,363
2014	33215	$5.38	66430	$357,264	$340,251	$333,759	$424,000	$403,810	$396,122	-$62,363
2015	33215	$5.38	66430	$357,264	$324,049	$333,759	$424,000	$384,580	$396,122	-$62,363
2016	33215	$5.38	66430	$357,264	$308,618	$333,759	$424,000	$366,267	$396,122	-$62,363
2017	33215	$5.38	66430	$357,264	$293,922	$333,759	$424,000	$348,826	$396,122	-$62,363

Total Present Value of Regulatory Compliance Cost	**$1,445,000**
Total Present Value of Regulatory Fuel Savings	**$1,715,000**
Net Total 5-year Cost of Regulation	**-$270,000**
Net Annualized Statewide Cost	-$62,000
Cost-effectiveness (per lb.)	-$0.089
Cost-effectiveness (per ton)	-$177.00

Attachment 2
Five-year GDF Balance Hose Cost Table[4]

Balance

2-yr Capital Recovery Factor	0.537805
Per-Hose Cost in Current $	$29.00
5-year Amortization Factor	0.231
Annual ROG Emissions Controlled lb./year	137970
5-year ROG Emissions Controlled (tons)	310

Year of Reg	# Compliant GDF Hoses Sold annually	$10 price increase amortized over 2-year life of hose	Compliant GDF Hoses Providing Benefits in any given year	Annual Cost of Regulatory Compliance	Present Value of Regulatory Compliance Cost (discounted @ 5%)	Levelized Annual Compliance Cost (for Cost-effectiveness Calc)	Annual Fuel Savings from Regulatory Compliance	Present Value of Regulatory Fuel savings (discounted @ 5%)	Levelized (Average) Annual Fuel Savings	Annual Cost of Reductions (Net of Fuel Savings)
2013	14850	$15.60	14850	$231,606	$231,606	$432,847	$49,500	$49,500	$92,621	$340,226
2014	14850	$15.60	29700	$463,211	$441,154	$432,847	$99,000	$94,286	$92,621	$340,226
2015	14850	$15.60	29700	$463,211	$420,146	$432,847	$99,000	$89,796	$92,621	$340,226
2016	14850	$15.60	29700	$463,211	$400,139	$432,847	$99,000	$85,520	$92,621	$340,226
2017	14850	$15.60	29700	$463,211	$381,085	$432,847	$99,000	$81,448	$92,621	$340,226

Total Present Value of Regulatory Compliance Cost	**$1,874,000**
Total Present Value of Regulatory Fuel savings	**$401,000**
Net Total 5-year Cost of Regulation	**$1,473,000**
Net Annualized Statewide Cost	$340,000
Cost-effectiveness (per lb.)	$2.46
Cost-effectiveness (per ton)	$4,930.00

[4] For purposes of estimating the costs of regulatory alternative 2: *Require Low-permeation for Balance Hoses in Addition to the Current Proposal.* See p.9, above.

Appendix 6

Frequently Asked Questions and Responses

Appendix 6
Frequently Asked Questions and Responses

1. **When will gasoline dispensing facility (GDF) owners be required to have low permeation hoses?**

- All existing GDF with vacuum assist hoses (hoses carrying gasoline against the outermost hose wall) will be required to comply four years from the date the first hose meeting the new low hose permeation standards is certified.
- New vacuum assist installations, existing installations undergoing major modifications, or any existing vacuum assist installations that replace hoses after the date the first hose meeting the new hose permeation standards is certified, will be required to comply.
- Facilities with balance systems are not subject to the hose permeation standard.
- Facilities that are exempt from Phase II requirements may be subject to the hose permeation requirement. Owners/operators of such facilities should check with the appropriate local air districts. A list of air district contacts can be found at http://www.arb.ca.gov/vapor/EVR%20District%20Contacts%202011.pdf. If subject, the above timeline for assist hoses applies.

2. **I am a GDF owner and have just recently purchased new hoses. Will I be forced to discard my old hoses when the proposed regulation comes into effect?**

No, if hoses were purchased before the date when the first hose meeting the new standard is certified. See responses to question 1 regarding replacement hoses.

3. **Is low permeation GDF hose technology available?**

Yes. Two different GDF hose manufacturers have already demonstrated compliance with the proposed GDF hose permeation standard with prototypes. The technology to control permeation on GDF hoses has been applied to hoses used on small off-road engines and outboard marine tanks.

4. **Why did ARB work with Underwriters Laboratories (UL) in developing a low permeation GDF hose certification test procedure?**

Working with UL allowed ARB staff to work with other stakeholders such as hose manufacturers, U.S. Environmental Protection Agency, and others to develop a consensus GDF hose permeation standard and test procedure.

5. **Why does the UL test procedure in the proposal require removing the inner hose from vapor recovery GDF hose assemblies during permeation testing?**

The removal of the inner hose allowed for a longer test period before the fuel starts to degrade and to ensure that the permeation emissions are released into the air and not into the inner hose.

6. **Why did ARB and UL decide to use CE-10 test fuel to certify low permeation GDF hoses instead of CA RFG III with 10% ethanol?**

   CE-10 fuel has the same level of ethanol content as CA RFG III. CE-10 is comprised of only three constituents and can be more tightly controlled than CA RFG III, thus eliminating the issue of fuel variability. In addition most permeation data are based on CE-10 fuel, which means the effectiveness of GDF hose permeation control can be compared with other applications.

7. **Why did ARB choose a permeation limit of 10.0 $g/m^2/day$?**

   This limit is technically feasible since two manufacturers have prototypes that comply with the limit of 10.0 $g/m^2/day$ for assist hoses. The adoption of this standard will result in a 96 percent reduction in permeation emissions from GDF hoses and is extremely cost effective due to fuel savings.

8. **In 2008, ARB staff drafted a proposal for Board consideration that would have required balance hoses to meet the same low permeation standards as those currently proposed for Board consideration. This proposal was withdrawn before it could be considered by the Board. Why does the current proposal not require permeation limits for balance hoses?**

   The most recent population data showed that the permeation standard was not cost effective for balance hoses. Balance hoses are typically corrugated and applying barrier material on corrugated hoses has not been successfully demonstrated. In addition the amount of permeation from balance hoses is expected to decrease because hydrocarbon concentration in the vapor return line will decrease as the number of on-board refueling vapor recovery equipped vehicle increases.

9. **Will hoses continue to meet permeation limits over the life of the hose?**

   ARB staff is confident that the permeation standard of GDF hose will be maintained over its life. This is based on the evaluation of the same technology used on other hose applications. In those applications, the permeation standard was maintained over a period which was much longer than the two year life of a GDF hose.

TITLE 13. CALIFORNIA AIR RESOURCES BOARD

NOTICE OF PUBLIC HEARING TO CONSIDER AMENDMENTS TO THE REGULATION FOR MOBILE CARGO HANDLING EQUIPMENT AT PORTS AND INTERMODAL RAIL YARDS

The Air Resources Board (ARB or Board) will conduct a public hearing at the time and place noted below to consider adoption of amendments to the Regulation for Mobile Cargo Handling Equipment at Ports and Intermodal Rail Yards (section 2479, title 13, California Code of Regulations (CCR)).

DATE: September 22, 2011

TIME: 9:00 a.m.

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

This item will be considered at a two-day meeting of the Board, which will commence at 9:00 a.m., September 22, 2011, and may continue at 8:30 a.m., September 23, 2011. This item may not be considered until September 23, 2011. Please consult the agenda for the hearing, which will be available at least 10 days before September 22, 2011, to determine the day on which this item will be considered.

INFORMATIVE DIGEST OF PROPOSED ACTION AND POLICY STATEMENT OVERVIEW

Sections Affected: Proposed amendment of section 2479, title 13, California Code of Regulations, the Regulation for Mobile Cargo Handling Equipment at Ports and Intermodal Rail Yards (CHE Regulation or regulation). The following documents would be incorporated in the regulation by reference: *(1) Society of Automotive Engineers (SAE) Snap-Acceleration Smoke Test Procedures for Heavy-Duty Diesel Powered Vehicles as set forth in SAEJ1667 issued February 1996; (2) International Standard ISO 8178-4(E):1996, "Reciprocating Internal Combustion Engines – Exhaust Emission Measurement – Part 4: Test Cycles for Different Engine Applications"; (3) International Standard ISO 8178-2(E):1996, "Reciprocating Internal Combustion Engines – Exhaust Emission Measurement – Part 2: Measurement of Gaseous and Particulate Exhaust Emissions at Site, and (4) International Standard ISO 8178-1(E):1996, "Reciprocating Internal Combustion Engines – Exhaust Emission Measurement – Part 1: Test Bed Measurement of Gaseous and Particulate Exhaust Emission.*

Background:

In December 2005, the ARB approved for adoption the CHE Regulation as one of many steps to reduce emission from goods movement activities.[1] The regulation reduces emissions of diesel particulate matter (PM) and oxides of nitrogen (NO_x). The regulation also fulfills an element of the Diesel Risk Reduction Plan, adopted by the Board in 2000, that identified available strategies for reducing diesel PM. Diesel PM emission reductions are needed to reduce the potential cancer risk and other adverse impacts from exposure to this toxic air contaminant (TAC) for the people who live in the vicinity of California's major ports and intermodal rail yards. The regulation reduces diesel PM and NO_x that contribute to regional PM and assist California in its goal of achieving state and federal air quality standards. Reductions in NO_x, a precursor in the formation of ozone, also helps reduce regional ozone levels.

The regulation, effective December 6, 2006, establishes best available control technology (BACT) for new and in-use mobile cargo handling equipment (CHE) that operate at California's ports and intermodal rail yards. The regulation requires yard trucks that operate at a port or intermodal rail yard in California to meet in-use performance standards through accelerated turnover of older yard trucks to ones equipped with cleaner, on-road engines. Non-yard truck equipment is also required to meet BACT. This equipment includes retrofits and/or replacement to cleaner on-road or off-road engines. Owners or operators are required to maintain records of their equipment, compliance method, and compliance dates, as well as periodically report to ARB their compliance plans and demonstrations of compliance.

The proposed amendments would provide owners/operators with additional flexibility for the purpose of reducing compliance costs, maintain the emissions reduction benefits of the regulation, initiate an opacity based monitoring program, and clarify several of the regulation's provisions. The proposed amendments would continue to protect the public's health while providing cargo handling equipment (CHE) owners/operators with additional flexibility to comply with the regulation in the most cost-effective manner. The proposed amendments are summarized below.

DESCRIPTION OF THE PROPOSED REGULATORY ACTION

The proposed amendments were designed to provide additional compliance flexibility, maintain the anticipated emission reductions, and clarify several provisions in the regulation. The proposed amendments address several areas including: retrofit requirements, operational requirements, emission standards, compliance provisions, definitions, and other clarifying language.

[1] The regulation was formally adopted October 17, 2006 and became effective on December 31, 2006

Retrofit Requirements

Additional time for equipment with no VDECS available: Staff is proposing to add two years to the current two years maximum annual compliance extensions for in-use non-yard truck equipment for which there are no VDECS available to provide owner/operators the flexibility to use the least costly compliance option.

Add a safety provision for VDECS: Staff is proposing to add VDECS safety as a reason for determining that there is "No VDECS Available" and granting an annual extension. Under the amendment, the owner/operator would have to demonstrate that there is no VDECS that can be safely and feasibly used for a particular type of equipment. The extension would be reviewed annually and additional extensions would be contingent upon a re-evaluation of whether or not there continues to be no VDECS available for reasons of safety or feasibility.

Allow more time for extension application: The time frame to apply for the "No VDECS Available" extension would be changed from 6 months to 60 days prior to the compliance deadline in order to give operators more time to determine if a compliance extension is needed.

Require equipment with a "No VDECS Available" extension to be brought into compliance within 6 months after a VDECS does become available: Staff is proposing that the "No VDECS Available" extension be amended to require the installation of VDECS, or another compliance option, within six months of notification that a VDECS has become available for the equipment. This is consistent with the current requirements for new equipment that must be retrofitted.

Allow extensions for experimental diesel PM emissions control strategies for gathering verification data: Staff is proposing to expand the "No VDECS Available" extension for an experimental diesel emission control strategy to allow CHE owners/operators to gather information needed for verification.

Operational Practices

Low-use compliance extension: Staff is proposing two one-year annual compliance extensions for equipment that operates 200 hours per year or less. The amendment would allow ARB to limit the number of extensions per fleet to two pieces of equipment or two percent of the fleet equipment.

Non-yard truck equipment transfers: Staff is proposing to allow non-yard truck equipment owned or leased by one party to be transferred to another location within California that is owned or leased by the same party. Transfers could not be used to comply, or delay compliance, with the regulation. The equipment would be required to apply BACT prior to being used in the new location. ARB would approve transfer requests, on a case-by-case basis, for non-yard truck equipment only.

Warranty engine replacement: Staff is proposing an amendment to allow, in cases of premature engine failure, owners/operators to replace an engine under the original equipment manufacturers warranty with a like-engine even when newer engine standards are in place.

Allow rental of non–compliant equipment for manufacturer delivery delays: Staff is proposing, in cases where new compliant equipment has been purchased but there is a delay in delivery, to allow owners/operators, for period of up to six months or until new equipment can be delivered, to rent or lease equipment that does not meet current emission standards, if rental equipment meeting current standards are not available and the owner/operator can demonstrate the need to use such equipment. The rental or leased equipment that could be used under the amendment can only be one Tier lower than required engine standards (i.e., if Tier 4 engine standards are in place, only Tier 3 engines could be rented).

Initiate CHE opacity based monitoring program: Staff is proposing that an opacity-based monitoring program be incorporated into the CHE Regulation. This program would establish work practice requirements for annual opacity monitoring of all CHE to ensure proper operation and maintenance such that engines continue to perform as designed or certified. Retrofitted engines would be monitored annually to ensure that the engine continues to be incompliance with the VDECS executive order.

Emission Standards

Treat Tier 4 Engines Certified to Alternate PM Emissions Standards as Tier 3 Engines: Staff is proposing to require that any engine certified to Tier 4 Family Emission Limit (FEL) Alternate PM standards (Alt PM standards) be retrofitted with highest level VDECS within one year of acquisition. The U.S. EPA allows engine manufacturers to produce a specified percentage of Tier 4 engines built to alternative, less stringent, PM and NO_x emissions limits. These engines are referred to as FEL or Averaging, Banking, and Trading (AB&T) engines. The Tier 4 Alt PM standards are essentially Tier 3 standards. Their use would effectively undermine the emission reductions that were anticipated to be achieved by the CHE Regulation with the introduction of Tier 4 engines.

Allow demonstration of emissions equivalency for alternative technology: Staff is proposing an amendment to allow owners/operators to use power systems that they can demonstrate compliance with the applicable new or in-use emissions limits. Hybrid power systems are an example of a type of systems that could benefit from this amendment.

Compliance Requirements

Allow compliance schedule modification to bring older engines into compliance first: Staff is proposing to allow CHE owners/operators to modify their non-yard truck compliance schedules to permit them to bring older model-year engines into compliance prior to newer model-year engines that are otherwise required to come into compliance before the older model-year engines. The number of engines required to comply each year would remain the same.

Exempt equipment at rural low-throughput ports: Staff is proposing that any port that has an average annual throughput of less than one million tons and is located more than 75 miles from an urban area would be exempt from the requirements of the CHE Regulation. The Port of Humboldt Bay is the only port that currently meets this set of criteria. If adopted, CHE with off-road engines at an exempted port would be subject to ARB's off-road in-use equipment regulation. CHE with on-road engines would be subject to the on-road truck and bus regulation. The Port of Humboldt Bay is in an ozone attainment area and does not contribute to any downwind violations.

Amendments to Clarify Language and Intent

Definitions: Staff is proposing to clarify the intent of the CHE Regulation by modifying several existing definitions including: port; owner or operator; intermodal rail yard; newly, purchased, leased or rented cargo handling equipment; rubber-tired gantry crane; retirement or retire; and compression ignition engines.

In addition, staff is proposing to add definitions for the following terms to support both modified definitions and other amendments: alternate PM standard; two-year average annual cargo throughput; water-borne commerce; construction activities; cargo; Class I Railroad; low-throughput port; opacity; otto cycle engine; safe; urban area; warranty period; and Family Emissions Limit.

Clarifying Language: Staff is also proposing to clarify that equipment brought onto a port or intermodal rail yard solely for construction or unexpected repairs are exempt from the regulation and other clarifying changes.

COMPARABLE FEDERAL REGULATIONS

Presently, no federal law has been promulgated addressing emission reductions from in-use CHE engines. Unless specifically preempted under Section 209(e)(1), California is the only state allowed to adopt emission requirements for off-road engines that are different from those of the federal government. Section 209(e)(2)(A) of the federal Clean Air Act (CAA) authorizes California to adopt and enforce emission standards and other requirements for off-road engines and equipment not subject to federal preemption, so long as the California standards "will be, in the aggregate, at least as protective of public health and welfare as the applicable Federal standards." However, California must apply for, and receive authorization from, the administrator of the United States Environmental Protection Agency (U.S. EPA) before ARB may enforce its regulations.

In January 2007, the ARB submitted a waiver and authorization request to the U.S. EPA, pursuant to section 209(e)(2) of the federal Clean Air Act. On January 25, 2011, the U.S. EPA initiated a public comment period on ARB's authorization request. This comment period ended March 17, 2011. As of this publication, the U.S. EPA has not yet made a decision on the request.

The proposed amendments to the regulation continue to rely on the implementation of U.S. EPA's Tier 4 nonroad emission standards for new diesel engines, with which the ARB has harmonized, since engine replacement continues to be one of many compliance pathways. While under CAA Section 213, U.S. EPA may only adopt new emission standards for nonroad engines; California is the only government agency in the nation that may adopt in-use emission standards for non-road engines.

AVAILABILITY OF DOCUMENTS AND AGENCY CONTACT PERSONS

ARB staff has prepared a Staff Report: Initial Statement of Reasons (ISOR) for the proposed amendments to the regulation, which includes a summary of the potential environmental and economic impacts, if any, of the proposed amendments. The ISOR is entitled, *"Staff Report: Initial Statement of Reasons for the Proposed Amendments to the Regulation for Mobile Cargo Handling Equipment at Ports and Intermodal Rail Yards."*

Copies of the ISOR and the full text of the proposed regulatory language, in underline and strikeout format to allow comparison with existing regulations, may be accessed on 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, First Floor, Sacramento, California 95814, (916) 322-2990, on August 3, 2011.

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 ARB's website listed below.

Inquiries concerning the substance of the proposed regulation may be directed to the designated agency contact persons, Cherie Rainforth, Manager of the Control Strategies Section, at (916) 327-7213 or Kirk Rosenkranz, Air Pollution Specialist, at (916) 327-7843.

Further, the agency representative and designated back-up contact persons to whom nonsubstantive inquiries concerning the proposed administrative action may be directed are Ms. Lori Andreoni, Manager, Board Administration and Regulatory Coordination Unit, (916) 322-4011, or Ms. Trini Balcazar, Regulations Coordinator, (916) 445-9564. 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 ARB's website for this rulemaking at http://www.arb.ca.gov/regact/2011/cargo11/cargo11.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, with the exception noted below, 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 local agency or school district, whether or not reimbursable by the State pursuant to Government Code, title 2, division 4, part 7 (commencing with section 17500), or other nondiscretionary cost or savings to State or local agencies. The proposed amendments would impose a mandate on some local agencies established for the oversight of ports that also own CHE, but any costs incurred are not reimbursable under Government Code section 17500 et seq.

In developing this regulatory proposal, ARB staff evaluated the potential economic impacts on representative private persons or businesses. ARB staff estimated that while the amendments would result in both costs and savings to businesses, the overall total statewide impact on businesses would be a net savings of $1 to $2 million in 2011 dollars over the time period of 2011 to 2020. The annual net savings range from $100,000 to $200,000 statewide.

For those businesses that operate at ports or intermodal rail yards, and have diesel powered cargo handling equipment, the costs due to the amendments will vary depending on the age, number and type of equipment operated. While the costs due to the amendments implementing an opacity based monitoring program are fairly predictable for a typical business, the various savings provided by the amendments, such as those due to the additional two years of extensions for equipment with "No VDECS Available", or due to the flexibility to move equipment when business needs arise, are less predictable. Additionally, the only other cost due to the amendments, the cost to retrofit Tier 4 engines certified to the FEL Alt PM standards, may be an avoidable cost as owners/operators may have the choice to purchase Tier 4 engines meeting the non-FEL standards.

It would be expected that the costs and savings associated with the different amendments would impact the different sectors of the industry in a relatively uniform manner. The one exception to this would be the amendment to exempt small rural ports. The approximately $1 million savings associated with this amendment would impact only those businesses operating at the Port of Humboldt Bay.

The Executive Officer has determined that, because there are net savings from the proposed regulatory actions, no significant impact on mobile cargo handling equipment owner/operators, businesses that import or export goods, California port competitiveness, or on individuals purchasing such goods is expected, even if all these costs were passed on 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. A number of businesses are integrally linked to the goods that travel through California ports and intermodal rail yards. However, we do not believe that the added costs of some of the proposed regulatory actions would result in vessel operators or shippers choosing alternative ports and intermodal rail yards outside California.

In accordance with Government Code section 11346.3, the Executive Officer has determined that the proposed regulatory action would not significantly 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 short delay in capital investment could be expected due to the amendments that provide for a two year delay in compliance for equipment with no VDECS available and low-use equipment. This delay is expected to benefit equipment owners/operators and has no adverse impact on VDECS manufactures because these manufacturers are unable to supply a marketable VDECS at this time. No other impacts on business would be expected.

The Executive Officer has also determined, pursuant to title 1, CCR, section 4, that the proposed regulatory action would affect, but not adversely impact, small businesses.

In accordance with Government Code sections 11346.3(c) and 11346.5(a) (11), the Executive Officer has found that the proposed regulatory action will have no significant impact with regard to reporting requirements since only minor changes are proposed to these provisions of the regulations.

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.

A detailed assessment of the economic impacts of the proposed regulatory action can be found in the ISOR.

SUBMITTAL OF COMMENTS

Interested members of the public may also present comments orally or in writing at the meeting, and comments may be submitted by postal mail or by electronic submittal before the meeting. The comment period for this regulatory action will begin on August 8, 2011. To be considered by the Board, written comments, not physically submitted at the meeting, must be submitted on or after August 8, 2011 and received no later than 12:00 noon on September 21, 2011, and must be 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

New Feature

You can now sign up online in advance to speak at the Board meeting when you submit an electronic board item comment. For more information go to: http://www.arb.ca.gov/board/online-signup.htm.

Please note that under the California Public Records Act (Gov. 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.

ARB requests that written and email statements on this item be filed at least 10 days prior to the hearing so that ARB staff and Board members have additional time to 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.

Additionally, the Board requests but does not require that persons who submit written comments to the Board reference the title of the proposal in their comments to facilitate review.

STATUTORY AUTHORITY AND REFERENCES

This regulatory action is proposed under the authority granted in Health and Safety Code, sections 39002, 39600, 39515, 39516, 39600, 39601, 39602, 39650, 39655, 39656, 39658, 39659, 39665, 39666, 39667, 39674, 39675, 40000, 41511, 43000.5, 43013, and 43018. This action is proposed to implement, interpret, and make specific Health and Safety Code sections 39002, 39515, 39516, 39600, 39601, 39602, 39650, 39655, 39656, 39657, 39658, 39659, 39665, 39666, 39667, 39674, 39675, 40000, 41511, 43000.5, 43013, and 43018.

HEARING PROCEDURES

The public hearing will be conducted in accordance with the California Administrative Procedure Act, Government Code, title 2, division 3, part 1, chapter 3.5 (commencing with section 11340).

Following the public hearing, the Board may adopt the regulatory language as originally proposed, or with non-substantial or grammatical modifications. The Board may also adopt the proposed regulatory language with other modifications if the text as modified is sufficiently related to the originally proposed text that the public was adequately placed on notice that the regulatory language as modified could result from the proposed regulatory action; in such an 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 ARB's Public Information Office, Air Resources Board, 1001 I Street, Visitors and Environmental Services Center, First Floor, Sacramento, California 95814, (916) 322-2990. The document will also be posted on ARB's website listed above.

SPECIAL ACCOMODATION REQUEST

Special accommodation or language needs can be provided for any of the following:

- An interpreter to be available at the hearing;
- Documents made available in an alternative format (i.e., Braille, large print, etc.) or another language;
- A disability-related reasonable accommodation.

To request these special accommodations or language needs, please contact the Clerk of the Board at (916) 322-5594 or by facsimile at (916) 322-3928 as soon as possible, but no later than 10 business days before the scheduled Board hearing. TTY/TDD/Speech-to-Speech users may dial 7-1-1 for the California Relay Service.

Comodidad especial o necesidad de otro idioma puede ser proveido para alguna de las siguientes:

- Un interprete que este disponible en la audiencia.
- Documentos disponibles en un formato alterno (por decir, sistema Braille, o en impresion grande) u otro idioma.
- Una acomodacion razonable relacionados con una incapacidad.

Para solicitar estas comodidades especiales o necesidades de otro idioma, por favor llame a la oficina del Consejo al (916) 322-5594 o envie un fax a (916) 322-3928 lo mas pronto possible, pero no menos de 10 dias de trabajo antes del dia programado para la audiencia del Consejo. TTY/TDD/Personas que necesiten este servicio pueden marcar el 7-1-1 para el Servicio de Retransmision de Mensajes de California.

CALIFORNIA AIR RESOURCES BOARD

James N. Goldstene
Executive Officer

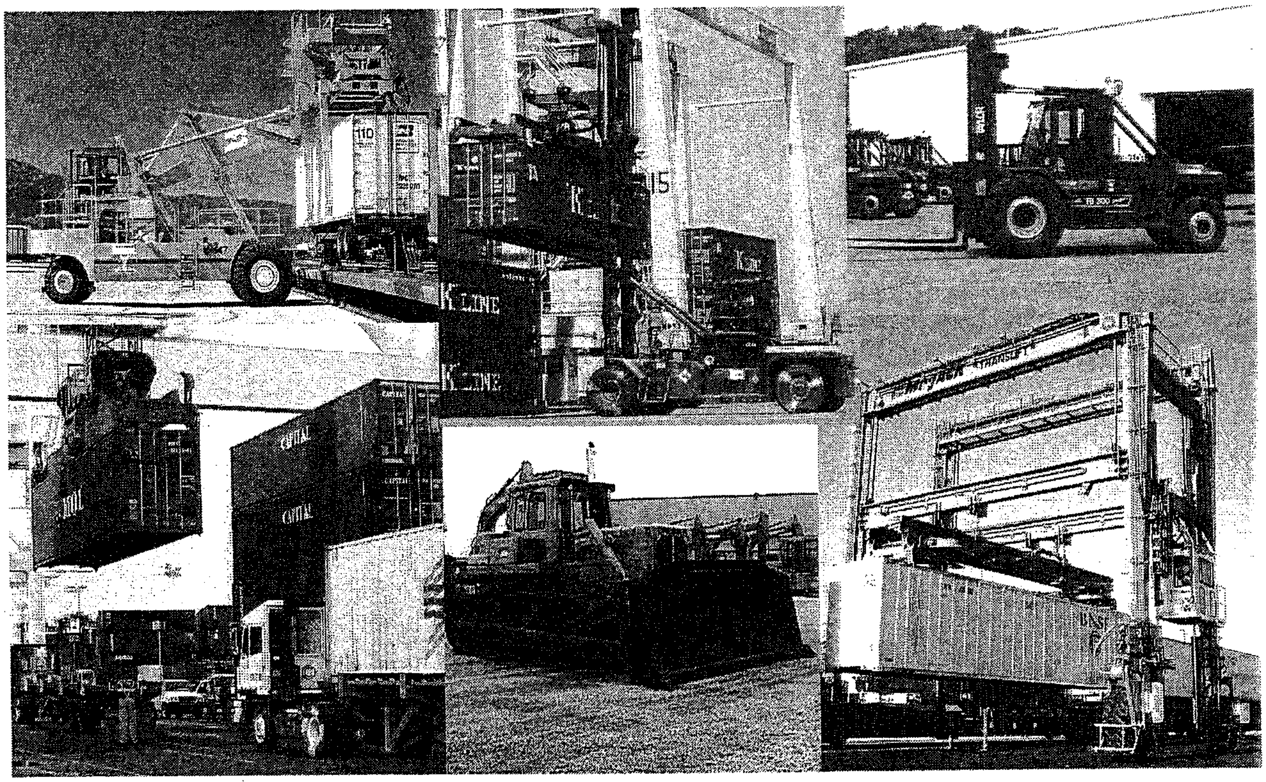
Date: July 26, 2011

"The energy challenge facing California is real. Every Californian needs to take immediate action to reduce energy consumption. For a list of simple ways you can reduce demand and cut your energy costs, see our Web-site at www.arb.ca.gov."

California Environmental Protection Agency

AIR RESOURCES BOARD

STAFF REPORT: INITIAL STATEMENT OF REASONS FOR PROPOSED RULEMAKING



AMENDMENTS TO THE REGULATION FOR MOBILE CARGO HANDLING EQUIPMENT AT PORTS AND INTERMODAL RAIL YARDS

Stationary Source Division
Emissions Assessment Branch

August 2011

State of California
AIR RESOURCES BOARD

STAFF REPORT: INITIAL STATEMENT OF REASONS FOR PROPOSED RULEMAKING

Public Hearing to Consider

ADOPTION OF THE PROPOSED AMENDMENTS TO THE REGULATION FOR MOBILE CARGO HANDLING EQUIPMENT AT PORTS AND INTERMODAL RAIL YARDS

To be considered by the Air Resources Board on September 22-23, 2011, at:

California Environmental Protection Agency
Headquarters Building
1001 "I" Street
Byron Sher Auditorium
Sacramento, California

Stationary Source Division:
Richard Corey, Chief
Daniel E. Donohoue, Chief, Emissions Assessment Branch
Cherie Rainforth, Manager, Control Strategies Section

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State of California
AIR RESOURCES BOARD

PROPOSED AMENDMENT OF THE REGULATION FOR MOBILE CARGO HANDLING EQUIPMENT AT PORTS AND INTERMODAL RAIL YARDS

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Planning and Technical Support Division
Research Division

Acknowledgements

This report was prepared with the assistance and support from the other divisions and offices of the Air Resources Board. In addition, we would like to acknowledge the assistance and cooperation that we have received from many individuals and organizations.

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EXECUTIVE SUMMARY

The California Air Resources Board (ARB or Board) staff is proposing amendments to the *Regulation for Mobile Cargo Handling Equipment at Ports and Intermodal Rail Yards* (CHE Regulation or regulation).[1] The primary purposes of the proposed amendments are to provide additional flexibility to owners/operators in an effort to reduce compliance costs, maintain the anticipated emissions reduction benefits of the regulation, and clarify several provisions in the regulation. These amendments were designed to ensure the continued reduction of diesel particulate matter (PM) and oxides of nitrogen (NO_x) emissions from mobile cargo handling equipment (CHE) that operate at ports and intermodal rail yards in California. California's ports and intermodal rail yards operate in, or near, densely populated areas, exposing residents to unhealthy levels of air pollution. As such, the proposed amendments to the regulation will continue to protect the public's health while providing CHE owners/operators with additional flexibility to comply with the regulation in a cost-effective manner.

The proposed amendments to the CHE regulation address several areas including: retrofit requirements, operational requirements, emission standards, compliance requirements, definitions, and other clarifying language. A description of each amendment is presented later in this section.

The emissions reductions originally anticipated from the implementation of the regulation continue to be ARB's goal and are still projected to be met. However, when compared to the emission reductions anticipated in the original rule, there is a potential for small increases in diesel PM emissions in 2012 through 2014 and NO_x emissions in 2012 through 2016. Overall, diesel PM emission reductions will be greater under the proposed amendments than under the original rule. However, NO_x emission reductions will be slightly less. At the Port of Humboldt Bay, diesel PM and NO_x emission reductions will be slightly less than under the original rule. ARB staff estimates that by 2020, diesel PM emissions from CHE at ports and intermodal rail yards will have been reduced by nearly 90 percent and NO_x emissions by approximately 75 percent relative to the 2006 baseline, including the impacts of the amendments.

In developing the proposed 2011 amendments to the CHE regulation, ARB staff conducted three public workshops and worked closely with stakeholders, including CHE owners/operators, CHE original equipment manufacturers, CHE dealers, diesel emissions control strategy manufacturers, environmental groups, and other interested parties. ARB staff also hosted a one-day technical meeting to discuss issues associated with exhaust emission control strategies (retrofits) installed on new and in-use engines and the use of on-road engines in yard trucks. CHE owners/operators, CHE original equipment manufacturers, diesel emissions control strategy manufacturers, and other interested parties participated in the meeting. ARB staff travelled to Eureka, California to meet with representatives of the Port of Humboldt Bay

[1] Title 13, California Code of Regulations, section 2479.

and the local air district. Staff toured the port area, discussed the issues facing the port, and collected information on emissions sources and receptor locations.

BACKGROUND

Why did the ARB adopt the CHE Regulation?

In 1998, following the ARB's identification of diesel PM as a toxic air contaminant (TAC), California embarked on an ambitious strategy to reduce emissions from diesel-fueled engines. The Risk Reduction Plan to Reduce Particulate Matter Emissions from Diesel-Fueled Engines and Vehicles (Diesel Risk Reduction Plan), adopted by the Board in October 2000, outlined steps to reduce diesel emissions and associated potential cancer risks by 85 percent by 2020. (ARB, 2000) Diesel PM is a primary contributor to adverse health impacts in California. It is estimated that nearly 80 percent of the statewide potential cancer risks from exposure to TACs comes from exposure to diesel PM. Exposure to fine PM (PM2.5) has been linked to increased hospital admissions, emergency room visits, asthma attacks, and premature deaths. (USEPA, 2009) Diesel PM is a major component of PM2.5, and as such is a contributor to the statewide burden of adverse health impacts related to PM2.5 exposure. CHE are a significant source of diesel PM.

What are the types of equipment affected by the CHE Regulation and how many are there in the State?

The current regulation applies to mobile equipment with compression-ignition engines that handle cargo at ports and intermodal rail yards. Cargo arrives and/or departs by ship, truck, or train, and can include liquid, bulk (break bulk and dry bulk material), and containers. Bulk cargo handling usually requires equipment such as loaders, dozers, cranes, forklifts, and sweepers. Container cargo handling, which is the most common type of cargo at ports and intermodal rail yards, requires equipment such as yard trucks, rubber-tired gantry (RTG) cranes, top picks, side picks, forklifts, and reach stackers. Staff estimates there are about 4,400 mobile CHE vehicles at California's ports and intermodal rail yards in the updated 2006 baseline inventory.

The most common type of CHE is a yard truck, comprising approximately 55 percent of all CHE in the 2006 baseline year. Yard trucks are also known as yard goats, utility tractor rigs, hustlers, yard hostlers, and yard tractors. Yard trucks are very similar to heavy-duty on-road truck tractors, but the majority has historically been equipped with off-road engines. In this report, the CHE are often referred to as either yard truck or non-yard truck equipment.

When was the CHE Regulation adopted and what does it require?

The CHE Regulation was considered and approved by the Board on December 8, 2005 (title 13, California Code of Regulations, section 2479) and became effective on December 31, 2006. This regulation is one of many steps that ARB is taking to reduce diesel PM emissions and the associated health risk in communities near ports and intermodal rail yards. The ultimate goal of the CHE Regulation is to reduce diesel PM emissions from CHE by 85 percent or more through the application of Level 3 VDECS or replacement to Tier 4 engine technology. A summary of the key requirements of the CHE Regulation is provided in Table ES-1.

Table ES-1: Key Requirements of CHE Regulation

	Requirement of CHE Regulation
Yard Trucks	New Yard Trucks • Equip with either a certified on-road engine meeting the current model year standards or a certified final Tier 4 off-road diesel engine.
	In-Use Yard Trucks • Meet BACT performance standards primarily through accelerated turnover of older yard trucks to those equipped with cleaner, certified on-road or off-road engines.
Non-Yard Truck Equipment	New Non-Yard Truck Equipment • Equip with a certified on-road engine meeting the current model year standards or certified Tier 4 off-road diesel engine. • If neither is available, the engine must be certified to the highest level off-road diesel engine standards and the highest level available verified diesel emission control strategy (VDECS) must be installed within one year or within six months of the VDECS becoming available, whichever is later.
	In-Use Non-yard Truck Equipment • Equipment are required to meet BACT, which includes replacement to cleaner on-road or off-road engines and/or the use of retrofits. • For owners/operators that elect to use retrofits, a second compliance step, which would require replacement to Tier 4 off-road engines or installation of a Level 3 VDECS (85 percent diesel PM reduction), may be required, depending on the equipment category and level of VDECS applied.
Compliance Schedule	• Compliance with the regulation is phased in beginning in 2007 based on the age of the engine, whether or not it is equipped with VDECS, and the size of the fleets. • Compliance date for the in-use performance standards can be extended if: o an engine is within one year of retirement o no VDECS are available for non-yard truck equipment o an experimental diesel PM emission control strategy is used for non-yard truck equipment o there are delivery delays
Recordkeeping	• Owners/operators are required to maintain records for all CHE • Submit a compliance plan • Perform annual reporting

What is the implementation status of the CHE Regulation and how are owners/operators complying?

Implementation of the CHE regulation began in 2007 and is reducing diesel PM emissions and associated health risk in communities near ports and intermodal rail yards.[2] The data from the regulation's reporting requirements indicates that as of June 2011, 60 percent of yard trucks and nearly 45 percent of non-yard truck equipment have taken action to meet the phase-in compliance schedule in the current regulation. This represents over 2,400 pieces of CHE, or over 50 percent of the in-use inventory. The above percentages indicate that the implementation of the regulation is on schedule. Overall, the two methods used most frequently to comply with the current regulation are equipment retirement and equipment replacement. In Table ES-2 below, it can be seen that nearly 60 percent of the equipment were retired and 36 percent were replaced with compliant equipment.

Table ES-2: Method of Compliance with Current CHE Regulation

Method of Compliance	Percent of Compliant Equipment
Retired from Service	58%
Replaced with Compliant Engine	36%
Retrofitted with VDECS	6%

Staff had anticipated wider use of VDECS through the retrofit compliance options as this is typically considered less costly. However, with the economic downturn and subsequent decline in port and intermodal rail yard activity, many owners/operators have chosen to retire older equipment, finding that this compliance path was often less costly as the equipment was not needed. Approximately 75 extensions have been granted for non-yard truck equipment for which no VDECS were available.

What VDECS have been verified for CHE and what equipment has been retrofitted?

VDECS are an essential component of the compliance strategies that can be utilized by CHE owners/operators to achieve emission reductions. Installing VDECS is a less costly compliance strategy than equipment or engine replacement. VDECS work across a broad spectrum of CHE types and functions. Table ES-3 provides a summary of the number of VDECS that are currently available to CHE owners/operators. All of

[2] While the ARB has the authority to implement and enforce the recordkeeping, reporting, and new engine requirements of the CHE Regulation per California State law, an authorization from the United States Environmental Protection Agency (U.S. EPA) is required in order for ARB to enforce the retrofit component of the regulation. (USEPA, 1990) In January 2007, the ARB submitted a waiver and authorization request to the U.S. EPA, pursuant to section 209(e)(2) of the federal Clean Air Act. On January 25, 2011, the U.S. EPA initiated a public comment period on ARB's authorization request. This comment period ended March 17, 2011. As of this publication, the U.S. EPA has not yet made a decision on the request. Nevertheless, as evidenced, by the level of compliance shown in the response, many port terminal and rail yard operators have elected, to date, to comply voluntarily with the regulation's implementation schedule.

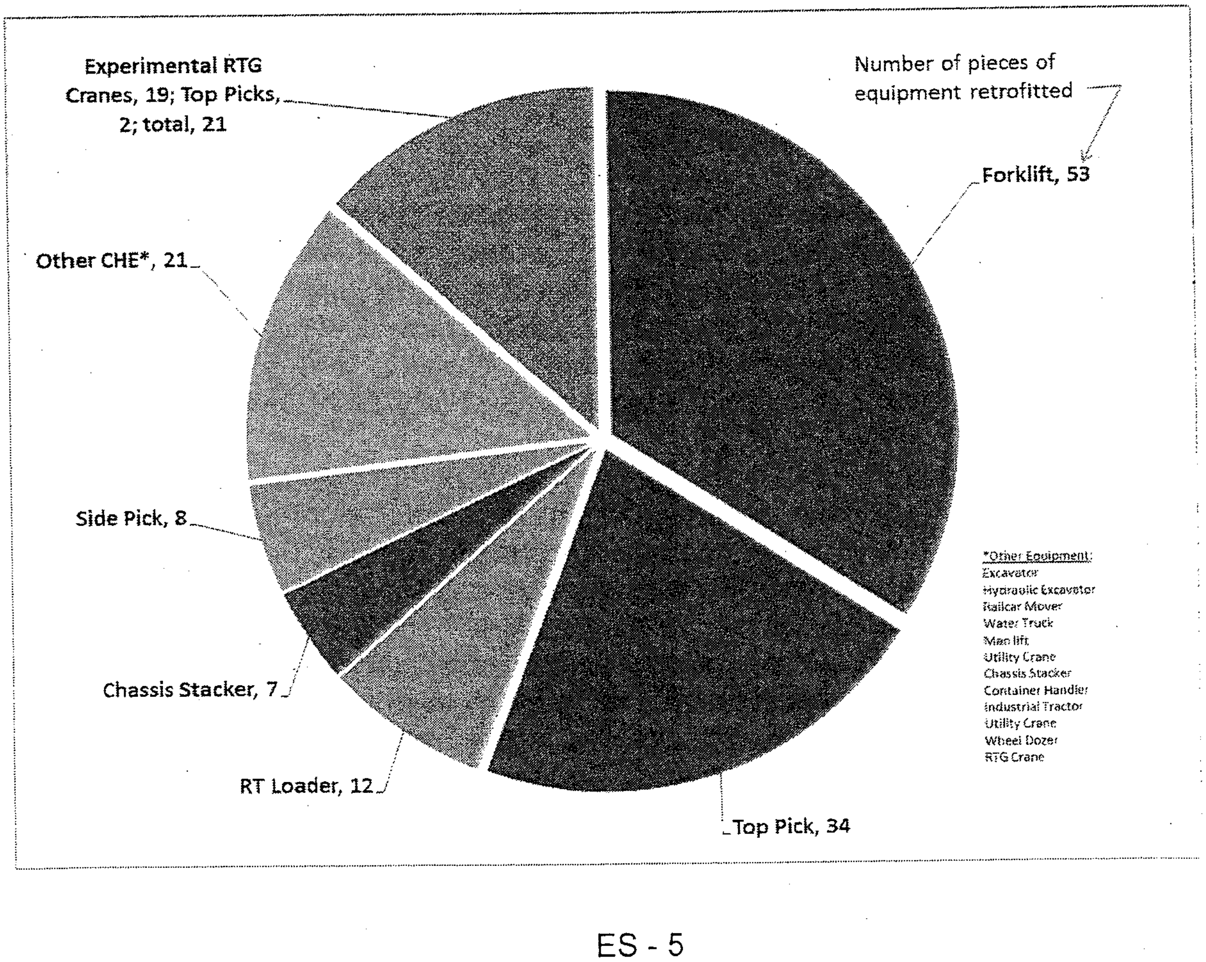
these devices have one or more operational restrictions including engine model year, equipment type, engine horsepower, or operational characteristics of the engine.

Table ES-3: Summary of Verified Diesel Emission Control Strategies

Level of Control	Percent of Diesel PM Control	Number of Verified Devices
3	85 or greater	9
2	50 or greater	1
1	25 to 50	4

Based on information reported to date, there have been over 150 CHE retrofits installed on non-yard truck equipment including 21 CHE retrofits using experimental control technologies. The types of CHE and number of pieces of equipment that these VDECS are retrofitted on are shown in Figure ES-1 below. Experimental control technologies include diesel particulate filters targeting specific equipment types, mainly RTG cranes, and engine-rebuild kits. The most common types of equipment that have been retrofitted are forklifts, top picks, and loaders, comprising approximately 65 percent of all retrofits. However, as shown in the "Other" equipment category, VDECS have been installed on a wide variety of CHE.

Figure ES-1: Equipment Types and Number of Equipment Retrofitted with DECS (as of June 2011)



Diesel emissions control systems continue to be verified and ARB anticipates that there will be more VDECS options available to CHE owners/operators in the future. This should provide CHE owners/operators with additional lower-cost compliance options for their consideration when assessing compliance options.

How have fluctuations in the state's economy impacted CHE operating at California's ports and intermodal rail yards?

Due to its geographic location and major ports and railways, California is a global gateway for goods movement. In terms of world-wide annual container throughput, California's ports of Los Angeles and Long Beach rank 16th and 18th in 2009, respectively. However, the recent downturn in trade and general goods movement have caused ports and intermodal rail yards to experience decline or limited growth over the past four years.

The economic impacts on California's ports and intermodal rail yards directly impact CHE activities. From 2007 through 2009, there was a 24 percent decline in container throughput at the ports of Los Angeles, Long Beach, and Oakland. Throughput of bulk materials also declined from 2007 through 2009. The ports of Los Angeles, Long Beach, Humboldt, Sacramento, and Stockton had a 20 percent decline in the tonnage of bulk material handled by these ports.

Recent increases in container traffic are an indication that California's economy has begun to recover from the downturn. The three major ports in California have seen an 18 percent increase in container traffic when comparing 2010 to 2009 traffic. That recovery is still developing, and the State's ports and intermodal rail yards have not experienced the full benefits of that recovery.

ARB staff does not believe that major adjustments to the compliance schedules in the regulation are needed to address the economic impacts of the decline in throughput at ports and rail yards due to the economic recovery that is occurring and the need for reductions of CHE emissions impacting public health in surrounding communities. However, staff is proposing several amendments which will provide additional compliance flexibility and a measure of economic relief to owners/operators at ports and intermodal rail yards.

The one exception to the above statement would be for the Port of Humboldt Bay. The Port of Humboldt Bay has experienced severe economic impacts due to limited operations. The Port of Humboldt Bay tonnage shipped dropped from 800,000 tons in 2005 to 500,000 tons in 2007 and 90,000 tons in 2009. In 2008 the Port of Humboldt Bay annual throughput was approximately 0.2 percent of California's annual throughput of non-petroleum products. Because the port primarily serves the local lumber industry, it has been hard hit due to the close tie of the lumber industry to housing. The North Coast Unified Air Quality Management District (North Coast) and the Humboldt Bay Harbor, Recreation, and Conservation District (Humboldt Bay District) sent letters to ARB requesting an exemption from the current CHE Regulation for the equipment at this port.

SUMMARY OF PROPOSED AMENDMENTS

What are the proposed amendments?

The proposed amendments were designed to provide additional compliance flexibility, maintain the anticipated emission reductions, and clarify several provisions in the regulation. The proposed amendments address several areas including: retrofit requirements, operational requirements, emission standards, compliance provisions, definitions, and other clarifying language.

Retrofit Requirements

- *Additional time for equipment with no VDECS available:* Staff is proposing to add two years to the current two years maximum annual compliance extensions for in-use non-yard truck equipment for which there are no VDECS available to provide owners/operators the flexibility of the least costly compliance option.

- *Add a safety provision for VDECS:* Staff is proposing to add VDECS safety as a reason for determining there is "No VDECS Available" if the owner/operator can demonstrate that there is no VDECS verified that can be safely and feasibly used for their equipment. The annual extension is contingent upon a re-evaluation of whether or not the VDECS available continue to pose a safety or feasibility issue.

- *Allow more time for extension application:* The time frame to apply for the "No VDECS Available" extension or an extension to use an experimental strategy is proposed to be changed from 6 months to 60 days prior to the compliance deadline in order to give operators more time to determine if a compliance extension is needed.

- *Require equipment with a "No VDECS Available" extension to be brought into compliance within 6 months:* Staff is proposing that the "No VDEC Available" extension be amended to require the installation of VDECS, or another compliance option, within six months of notification that a VDECS becomes available for the equipment. This is currently required for new equipment with retrofit requirements.

- *Allow extensions for experimental diesel PM emissions control strategies for gathering verification data:* Staff is proposing to expand the "No VDECS Available" extension for an experimental diesel emission control strategy to allow use of this extension to gather information needed for verification even in situations where there are other VDECS available..

Operational Practices

- *Low-use compliance extension:* A two-year compliance extension for equipment that operates 200 hours per year or less is proposed. The amendment would allow ARB to limit the number of extensions per fleet to two pieces of equipment or two percent of the fleet. The current CHE Regulation does not include a low-use compliance extension.

- *Non-yard truck equipment transfers:* Staff is proposing to allow non-yard truck CHE owned or leased by one party to be transferred to another location within California owned or leased by the same party. Transfers could not be used to comply, or delay compliance, with the regulation. The equipment would be required to apply BACT prior to being used in the new location. ARB would approve transfer requests, on a case-by-case basis. The allowance would not be available to yard trucks.

- *Warranty engine replacement:* Staff is proposing an amendment allowing, in cases of premature engine failure, the replacement of an engine under the original equipment manufacturers warranty with a like-engine even when newer engine standards are in place.

- *Allow rental of non–compliant equipment for manufacturer delivery delays:* Staff is proposing, in cases where new compliant equipment has been purchased but there is a delay in delivery, to allow rental of equipment that does not meet current standards for up to six months, or until new equipment can be delivered, if rental equipment meeting current standards are not available and the owner/operator can demonstrate need for the equipment. Rental equipment could only be one Tier lower than required engine standards (i.e., if Tier 4 engine standards are in place, only Tier 3 engines could be rented).

- *Initiate CHE opacity based monitoring program:* Staff is proposing that an opacity-based monitoring program be incorporated into the CHE Regulation. This program would establish work practice requirements for annual opacity monitoring of all CHE to ensure proper operation and maintenance so that engines continue to perform as designed and certified. Retrofitted engines would be monitored to ensure that the engine continues to be in compliance with the VDECS executive order. Equipment with excessive opacity would receive necessary maintenance and repair before being returned to service.

Emission Standards

- *Treat Tier 4 Engines Certified to Alternate PM Emissions Standards as Tier 3 Engines:* Staff is proposing to require that any engines certified to Tier 4 Family Emission Limit (FEL) Alternate PM standards be retrofitted with highest level VDECS within one year of acquisition. The U.S. EPA allows engine manufacturers to produce a specified percentage of Tier 4 engines built to alternative, less stringent, PM and NO_x emissions limits. These engines are referred to as FEL or Averaging, Banking, and Trading (AB&T) engines. The Tier 4 Alternate PM standards are essentially Tier 3 standards and will not result in the emission reductions anticipated by the CHE Regulation with the introduction of Tier 4 engines.

- *Allow demonstration of emissions equivalency for alternative technology:* Staff is proposing an amendment to allow owners/operators to use alternate compression-ignition power systems that meet applicable new or in-use emissions limits. Hybrid power systems are an example of a type of systems that could benefit from this amendment.

Compliance Requirements

- *Allow compliance schedule modification to bring older engines into compliance first:* Staff is proposing an amendment to allow CHE owners/operators to modify their non-yard truck compliance schedules such that older model year engines (that happen to have later compliance dates) can be brought into compliance in place of newer model year engines (that are required to comply earlier). The number of engines required to comply each year would remain the same.

- *Exempt equipment at rural low-throughput ports:* Staff is proposing that any port that has an average annual throughput of less than one million tons and is located more than 75 miles from an urban area would be exempt from the requirements of the CHE regulation. The Port of Humboldt Bay is the only port that currently meets this set of criteria. CHE with off-road engines at exempt ports would be subject to ARB's Off-Road In-Use Equipment Regulation. CHE with on-road engines would be subject to the on-road truck and bus regulation.

Amendments to Clarify Language and Intent

- *Definitions:* Staff is proposing to clarify the intent of the CHE Regulation by modifying several existing definitions including: compression ignition engines; intermodal rail yard; newly, purchased, leased or rented cargo handling equipment; owner or operator; port; retirement or retire; and rubber-tired gantry crane.

  In addition, staff is proposing to add definitions for the following terms to support both modified definitions and other amendments: alternate PM standard; cargo; Class I Railroad; construction activities; Family Emissions Limit (FEL); low-throughput port; opacity, Otto cycle engine; safe; two-year average annual cargo throughput; urban area; warranty period; and water-borne commerce.

- *Clarifying Language:* Staff is also proposing to clarify that equipment brought onto a port or intermodal rail yard solely for construction or unexpected repairs are exempt from the regulation.

IMPACTS OF THE PROPOSED AMENDMENTS

What are the environmental impacts from the amendments?

The goals of the CHE Regulation, to reduce diesel PM by 85 percent and NO_x by 75 percent by 2020, as compared to the 2006 baseline, are expected to be achieved. However, when compared to the emission reductions anticipated for the original rule, there is a potential for small increases in diesel PM emissions in 2012 through 2014 and NO_x emissions in 2012 through 2016. Overall, diesel PM emission reductions will be greater under the proposed amendments than the original rule. However, NO_x emission reductions will be slightly less. At the Port of Humboldt Bay, diesel PM and NO_x emissions will be slightly greater than under the original rule, but will remain well below the 2006 baseline levels due to decreased activity. Staff has not identified any other significant adverse environmental impacts due to the proposed amendments.

What are the health impacts of the proposed amendments?

Given that the proposed amendments will result in a very small potential increase in emissions over a two to four year period and an overall decrease in diesel PM emissions over the 2012 through 2020 timeframe, staff does not anticipate any significant adverse health impacts due to the proposal.

What are the economic impacts from the amendments?

Staff estimates that the proposed amendments will result in both costs and savings to CHE owners/operators. However, the overall cost-effectiveness of the CHE Regulation will remain essentially the same as estimated in the original CHE rulemaking. The overall economic impact is estimated to be a savings of approximately $100,000 to $200,000 annually over the next ten years. These cost savings are due to added flexibility in the rule including the additional two years of annual compliance extension for "No VDECS Available" and low-use non-yard truck equipment. The cost savings associated with the "No VDECS Available" and low-use non-yard truck compliance extensions are based on delayed compliance costs. Currently, the CHE Regulation would require owners/operators to replace equipment for which VDECS are not available once the initial two year extension has expired. Low-use equipment must be similarly brought into compliance or retired. Additionally, the exemption from the CHE Regulation for equipment at the Port of Humboldt Bay, which would then be required to comply with the Off-Road In-Use Regulation, would result in a savings of approximately $1 million to the tenants at this port. The additional costs to CHE owners/operators are the result of the amendments requiring annual opacity testing of all equipment and the retrofit of Tier 4 engines certified to the FEL Alternate PM standards.

What are the impacts from the amendments on greenhouse gas emissions?

The impacts of the proposed amendments on the emissions of greenhouse gases would be minimal. The proposed amendments would have a minor impact to both increase and decrease the emissions of greenhouse gases. While some of the amendments would defer some of the emissions reductions and equipment activity with newer, more fuel efficient engines, the opacity test requirements would require engines producing high soot levels to receive needed maintenance, resulting in a reduction of carbon black emissions. It is anticipated that the net impacts on the emissions of greenhouse gases associated with CHE would be insignificant.

ENVIRONMENTAL JUSTICE

The proposed 2011 amendments to the CHE regulation are consistent with ARB environmental justice policies. These amendments achieve the emissions reduction benefits set forth in the current regulation, irrespective of the two year shift in the required compliance date for a small portion of the in-use equipment. The proposed amendments would have a negligible net effect on emissions and public health risks in communities near ports and intermodal rail yards.

RECOMMENDATION

ARB staff recommends the Board approve the proposed 2011 amendments to the CHE regulation as presented in Appendix A of this Staff Report.

REFERENCES:

(ARB, 2000) California Air Resources Board. *Risk Reduction Plan to Reduce Particulate Matter Emissions from Diesel-Fueled Engines and Vehicles*; October 2000.

(USEPA, 2009) United States Environmental Protection Agency. *U.S. EPA Integrated Science Assessment for Particulate Matter*, December 2009. http://www.epa.gov/ncea/pdfs/partmatt/Dec2009/PM_ISA_full.pdf

(USEPA, 1990) United States Environmental Protection Agency. *Federal Clean Air Act, Title II, Part A, Sec. 209(e)*; 1990.

I. INTRODUCTION

A. Overview

In this chapter, the Air Resources Board (ARB or Board) staff provides a brief description of cargo handling equipment (CHE), an overview of the Mobile Cargo Handling Equipment at Ports and Intermodal Rail Yards Regulation (CHE Regulation or regulation), and regulatory authority.[3] Also included in this chapter is information on the implementation status of the CHE Regulation, the need for the CHE Regulation, and a description of staff's actions to develop the proposed amendments. Additional information on some of these topics can also be found in the Initial Statement of Reasons prepared for the adoption of the regulation in 2005 (2005 ISOR or Staff Report). (ARB, 2005a) The 2005 ISOR can be accessed at the following web address: http://www.arb.ca.gov/regact/cargo2005/cargo2005.htm

The primary purposes of the proposed amendments are to provide additional flexibility to owners/operators in an effort to reduce compliance costs while continuing to reduce emissions of diesel particulate matter (PM) and oxides of nitrogen (NO_x), maintain the anticipated emissions reduction benefits of the regulation, and make clarifying changes. Additionally, the amendments maintain the anticipated emission reductions to be achieved with the introduction of Tier 4 engines and enable the successful use of retrofits. This approach is consistent with ARB's mission to protect public health, welfare, and ecological resources through the effective and efficient reduction of air pollutants, while recognizing and considering the effects on the economy of the State.

B. Description of Cargo Handling Equipment

Mobile CHE at ports and intermodal rail yards is as diverse a group of equipment as the cargo that it handles. Cargo that arrives and/or departs by ship, truck, or train, can include liquid, bulk (break bulk and dry bulk), and containers. Liquid cargo, such as petroleum products and chemicals, are often transported via pipelines, and therefore, do not usually have mobile cargo handling equipment associated with their operation. Break bulk cargo, such as lumber, steel, machinery, and many types of palletized goods, and dry bulk cargo, such as cement, scrap metal, salt, sugar, sulfur, and petroleum coke, usually require equipment such as loaders, dozers, cranes, forklifts, and sweepers for their operations. Container cargo, which is the most common type of cargo at ports and intermodal rail yards, requires equipment such as yard trucks, rubber-tired gantry (RTG) cranes, top picks, side picks, forklifts, and straddle carriers. There are about 4,400 mobile cargo handling equipment vehicles at California's ports and intermodal rail yards in the updated 2006 baseline inventory.

The most common type of cargo handling equipment is a yard truck, comprising about 55 percent of the in-use CHE at the beginning of regulation implementation. Yard trucks are also known as yard goats, utility tractor rigs, hustlers, yard hostlers, and yard

[3] Title 13, California Code of Regulations, section 2479

tractors. Yard trucks are very similar to heavy-duty on-road truck tractors, but the majority has been equipped with off-road engines. For this report, the CHE are commonly referred to as either yard truck or non-yard truck equipment. A more detailed description of CHE and their uses can be found in the 2005 Staff Report. (ARB, 2005a)

C. Regulatory Authority

ARB has been granted both general and specific authority under the Health and Safety Code (HSC) to adopt the proposed regulation. HSC sections 39600 (General Powers) and 39601 (Standards, Definitions, Rules, and Measures) confer to the ARB, the general authority and obligation to adopt rules and measures necessary to execute the Board's powers and duties imposed by State law. HSC sections 43013(b) and 43018(a) provide broad authority to achieve the maximum feasible and cost-effective emission reductions from all mobile source categories, including off-road diesel engines and equipment.

With respect to toxic air contaminants (TACs), California's Air Toxics Program, established under California law by Assembly Bill (AB) 1807 (Stats. 1983, Ch. 1047) and set forth in HSC sections 39650 through 39675, mandates that ARB identify and control air toxics emissions in California. The identification phase of the Air Toxics Program requires the ARB, with participation of other state agencies, such as the Office of Environmental Health Hazard Assessment (OEHHA), to evaluate the health impacts of, and exposure to, substances and to identify those substances that pose the greatest health threat as TACs. ARB's evaluation is then made available to the public and is formally reviewed by the Scientific Review Panel (SRP) established under HSC section 39670. Following the ARB's evaluation and the SRP's review, the Board may formally identify a TAC at a public hearing. Following the identification of a substance as a TAC, HSC sections 39658, 39665, 39666, and 39667 require ARB, with the participation of the air pollution control and air quality management districts (districts), and in consultation with affected sources and interested parties, to prepare a report on the need and appropriate degree of regulation for that substance. The mobile CHE subject to these proposed amendments to the regulation are vehicular sources for which ARB is the agency that has been vested by the Legislature with near-exclusive authority to adopt standards and regulations. (HSC sections 39002, 39667, 40000, 43000, 43000.5, 43013, and 43018.)

Under federal Clean Air Act (CAA) section 209(e)(2), California may adopt emission standards for off-road engines that are not otherwise expressly preempted under section 209(e)(1).[4] Section 209(e)(1) provides that no state, including California, or any political subdivision thereof may adopt or enforce emission standards or other requirements relating to the control of emissions for nonroad engines under 175 horsepower that are used in farm or construction equipment or used in locomotives or locomotive engines. CAA section 209(e)(2) provides California with sole authority among the states to adopt emission standards and requirements related to emission

[4] The CAA refers to "nonroad engines" and California has historically referred to these same engines as "off-road engines." For the purposes of this regulation the two terms are interchangeable.

control for new and in-use nonroad engines that are not specifically preempted under section 209(e)(1). Section 209(e)(2) requires that California must obtain authorization from the Administrator of the U.S EPA prior to the regulation becoming effective. As part of the authorization process, ARB must establish that the adopted regulations "will be, in the aggregate, at least as protective of public health and welfare as the applicable Federal standards." U.S. EPA is authorized by CAA section 213 to adopt emission standards and other regulations for only new non-road engines. In *Engine Manufacturers Association v. U.S. EPA* (D.C. Cir.1996) 88 F.3d 1075, the Court concluded that California is the only government body, including U.S. EPA, with authority to adopt emission standards and other regulations for in-use nonroad engines. (*Id.*, at 1089-1091.)

In January 2007, the ARB submitted a waiver and authorization request to the U.S. EPA, pursuant to section 209(e)(2) of the federal Clean Air Act. On January 25, 2011, the U.S. EPA initiated a public comment period on ARB's authorization request. This comment period ended March 17, 2011. As of this publication, the U.S. EPA has not yet made a decision on the request. Nevertheless, as evidenced, by the level of compliance shown in the response, many port terminal and rail yard operators have elected, to date, to comply voluntarily with the regulation's implementation schedule.

D. Summary of the Current Regulation

The CHE Regulation was formally adopted by the Board in 2006 and became operative under California law on December 31, 2006. The regulation is designed to use the best available control technology (BACT) to reduce the public's exposure to diesel PM and NO_x emissions from mobile CHE. In addition, the regulation includes recordkeeping and reporting requirements to provide staff up-to-date information on CHE and activities.

The requirements for newly purchased, leased, or rented equipment, as well as in-use equipment affect owners/operators of mobile CHE that operate at ports and intermodal rail yards in California. The requirements also affect any person who sells, offers for sale, purchases, leases, or rents mobile CHE for use at a port or intermodal rail yard in California. This includes shipping terminals at ports and intermodal rail yard terminals. Mobile CHE that do not operate at a port or intermodal rail yard, portable compression-ignition engines, and cargo handling equipment used to transport personnel and deliver fuel are not be covered by the rule. Table I-1 provides a summary of the key requirements of the CHE Regulation.

Table I-1: Key Requirements of CHE Regulation

	Requirement of CHE Regulation
Yard Trucks	New Yard Trucks • Equip with either a certified on-road engine meeting the current model year standards or a certified final Tier 4 off-road diesel engine.
	In-Use Yard Trucks • Meet BACT performance standards primarily through accelerated turnover of older yard trucks to those equipped with cleaner, certified on-road or off-road engines.
Non-Yard Truck Equipment	New Non-Yard Truck Equipment • Equip with a certified on-road engine meeting the current model year standards or certified Tier 4 off-road diesel engine. • If neither is available, the engine must be certified to the highest level off-road diesel engine standards, and the highest level available verified diesel emission control strategy (VDECS) must be installed within one year or within six months of the VDECS becoming available, whichever is later.
	In-Use Non-yard Truck Equipment • Equipment are required to meet BACT, which includes replacement to cleaner on-road or off-road engines and/or the use of retrofits. • For owners/operators that elect to use retrofits, a second compliance step, which would require replacement to Tier 4 off-road engines or installation of a Level 3 VDECS (85 percent diesel PM reduction), may be required, depending on the equipment category and level of VDECS applied.
Compliance Schedule	• Compliance with the regulation is phased in beginning in 2007 based on the age of the engine, whether or not it is equipped with VDECS, and the size of the fleets. • Compliance date for the in-use performance standards can be extended if: o an engine is within one year of retirement o no VDECS are available for non-yard truck equipment o an experimental diesel PM emission control strategy is used for non-yard truck equipment o there are delivery delays
Recordkeeping	• Owners/operators are required to maintain records for all CHE • Submit a compliance plan • Perform annual reporting

The regulation includes provisions that allow qualified owners/operators to delay compliance with the in-use performance standards under the following circumstances: if an engine is within one year of retirement, if no VDECS are available, if an experimental diesel PM emission control strategy is used, or if there are equipment manufacturer delivery delays. Additionally, owners/operators of yard trucks may delay compliance if the yard truck had received incentive funding from public agencies to apply VDECS by the end of 2005 with minimum use requirements. The maximum delay depends on the compliance extension granted. Several of the proposed amendments affect these sections of the regulation.

E. Implementation Status

Implementation of the CHE regulation began in 2007 and is reducing diesel PM emissions and associated health risk in communities near ports and intermodal rail yards.[5] The data from the regulation's reporting requirements indicates that as of June 2011, over 2,400 pieces of CHE have been brought in to compliance with the CHE Regulation. Nearly two-thirds of the compliant equipment have been yard trucks due to the accelerated compliance time lines for these vehicles. Consequently, 60 percent of yard trucks and 45 percent of non-yard truck equipment are compliant with the current regulation. The above percentages indicate that the implementation of the regulation is on schedule. Table I-2 provides the current status of the implementation of the existing CHE regulation.

Table I-2: Status of Implementation of Current CHE Regulation (as of June 2011)

Equipment Type	Target Date for Full Compliance	Percent Compliant*
Yard trucks w/off-road engines	2015 or 2016 (w/VDECS)	60
Yard trucks w/on-road engines	2016 or 2017 (w/VDECS)	
Non-yard truck equipment	2013	45

* Compliance with the CHE Regulation is on schedule

Of the 2,400 pieces of compliant equipment, approximately 1,400 pieces of CHE have complied with the current regulation by being retired from service. This represents 58 percent of all compliant equipment. Approximately 850 pieces of CHE (approximately 30 percent of all compliant equipment) have complied with the current regulation by being replaced with equipment having compliant engines. Overall, the two methods used most frequently to comply with the current regulation are equipment retirement and equipment replacement. Staff had anticipated wider use of VDECS for compliance, as this option is typically considered less costly than other means of compliance. However, with the economic downturn and subsequent decline in port and intermodal rail yard activity, owners/operators have elected to retire older equipment as a path to compliance, finding it to be less costly than retrofitting since the equipment was not needed. The retirement and replacement of older equipment has accelerated the emissions reduction of the regulation. Table I-3 provides a breakdown of the methods of yard truck and non-yard truck CHE compliance to-date. However, with

[5] As stated, as of this publication, the U.S. EPA has not yet made a decision on the request. Nevertheless, as evidenced, by the level of compliance shown, many port terminal and rail yard operators have elected, to, date, to comply voluntarily with the regulation's implementation schedule.

economic recovery, it is anticipated that more owners/operators will turn to the use of VDECS for non-yard truck CHE compliance.

Table I-3: Methods Used to Comply with the Current CHE Regulation

Equipment Type	Method of Compliance	Approximate Percent of Compliant Equipment
Yard truck	Retired	49
	Replaced w/on-road engine yard trucks	45
	Use alternate fuel	5
	Other (repower, retrofit, etc.)	1
Non-yard truck	Retired	71
	Aftertreatment controls	17
	Replace w/off-road engine	8
	Use alternate fuel	3
	Other (repower, on-road engine, etc.)	1

A list of the currently verified controls is provided in Appendix D. Table I-4 provides a summary of the verification levels and number of devices that have been verified in each level.

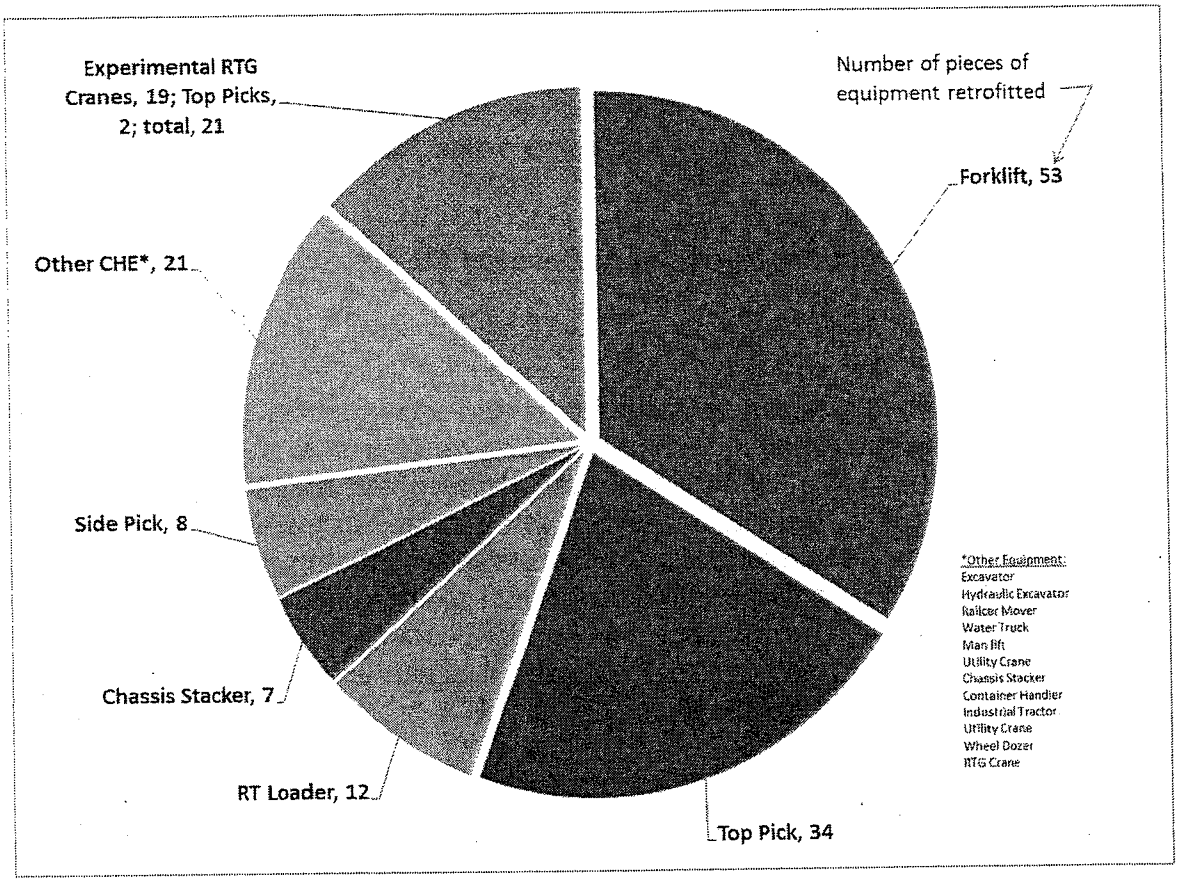
Table I-4: Summary of Verified Diesel Emission Control Strategies

Level of Control	Percent of Control	Number of Verified Devices
3	85 or greater	9
2	50 or greater	1
1	25 to less than 50	4

All of these devices have one or more operational restrictions including engine model year, equipment type, engine horsepower, and operational characteristics of the engine. The Level 1 and Level 2 VDECS are only applicable to RTG cranes. Additional information regarding these VDECS is provided in Appendix D.

Based on information reported to date, there have been over 150 CHE retrofits with various types of control strategies. Of these retrofits, 21 have used experimental control technologies. The types and number of CHE that VDECS have been installed on are shown in Figure I-1 below. The most common equipment types that have been retrofitted are forklifts, top picks, and loaders, comprising approximately 65 percent of all retrofits. The experimental retrofits include DPFs targeting specific equipment types and engine rebuild kits. The vast majority of the experimental retrofits have been installed on RTG cranes.

Figure I-1: Equipment Types and Number of Equipment Retrofitted with DECS (as of June 2011)



F. Need for the Regulation for Mobile Cargo Handling Equipment at Ports and Intermodal Rail Yards

ARB's vision is that all individuals in California, especially children and the elderly, can live, work, and play in a healthful environment – free from harmful exposure to air pollution. In 1998, diesel engine exhaust was identified as a TAC. Diesel engine exhaust is a source of unhealthful air pollutants including PM, carbon monoxide, hydrocarbons, and NO_X. Diesel PM is a primary contributor to adverse health impacts in California. It is estimated that nearly 80 percent of the statewide potential cancer risks from exposure to TACs comes from exposure to diesel PM. Diesel PM is a major source of fine particulate pollution. Exposure to fine PM (PM2.5) has been linked to increased hospital admissions, emergency room visits, asthma attacks, and premature deaths. (USEPA, 2009) CHE are a significant source of diesel PM.

Emissions from diesel-fueled CHE continue to be of concern in communities near ports and intermodal rail yards. The regulation has reduced emissions that have contributed to ambient levels of PM, reducing the resulting community exposures to diesel PM, and reducing the contribution to NO_x levels and reactive organic compounds (ROG) levels, which are precursors to the formation of ozone. To ensure continued reductions of diesel PM and NO_x from CHE in the most efficient manner, staff is proposing some amendments to the regulation. The proposed amendments to the regulation are designed to provide additional implementation flexibility to CHE owners/operators while continuing to reduce levels of ambient particulate matter, the general public's exposure to diesel PM, and ozone precursor emissions from CHE at ports and intermodal rail yards. Additionally, the amendments will assure that the anticipated reductions are achieved due to the introduction of Tier 4 engines and to enable the successful use of retrofits. Chapter II of this Staff Report contains a discussion of the need for amendments to the regulation.

G. ARB Staff Actions and Process to Develop the Proposed Amendments

Public Outreach

During the development process, ARB staff provided opportunities to present information about the proposed amendments to the regulation at places and times convenient to stakeholders. Attendees included representatives from environmental community organizations, terminal operators, port and rail representatives, engine and diesel emission control associations, and other parties interested in CHE. These individuals participated both by providing data and reviewing draft regulations and by participating in open forum workshops, in which staff directly addressed their concerns. Table I-5 below provides meeting dates that were made to apprise the public about the development of the proposed regulation.

Table I-5: Workshop/Workgroup and Public Outreach Meetings

Date	Meeting	Location	Time
November 30, 2010	Public Workshop	Cal/EPA Building, Sacramento	12:30 p.m.
February 23, 2011	Public Workshop	Cal/EPA Building, Sacramento	9:00 a.m.
March 21 & 22, 2011	Site Visit and Public Meeting	Port of Humboldt Bay, Eureka	2:00 p.m. & 7:30 a.m.
May 26, 2011	Technology Workgroup	Cal/EPA Building, Sacramento	9:00 a.m.
June 27, 2011	Public Workshop	Cal/EPA Building, Sacramento	1:00 p.m.

ARB staff has held three public workshops, one site visit/public meeting, and one exhaust aftertreatment (retrofit) control technology workgroup meeting since November 2010 in developing the proposed amendments. Over 700 individuals and/or companies were notified for each workshop/meeting through a series of mailings. Notices were posted to ARB's CHE and public workshops web sites and e-mailed to subscribers of the CHE electronic list server. The public workshops were broadcast live via the internet. The public meeting in Eureka was held at the request of the Port of Humboldt Bay, the local air district, and the businesses associated with activities at the port in an effort to make staff more accessible to the stakeholders. In addition, ARB staff and management participated in numerous industry meetings over the past two years, presenting information on implementation of the current regulation and our proposed amendments to the CHE regulation.

As a way of inviting public participation and enhancing the information flow between the ARB and interested parties, staff created a CHE Internet web site (http://www.arb.ca.gov/cargo) in March 2004. Since that time, staff has consistently made available on the web site all related documents, including meeting presentations and draft versions of the proposed regulatory language. The web site has also provided background information on diesel PM, workshop and meeting notices and materials, and other diesel related information, and has served as a portal to other web sites with related information.

Outreach efforts have also included more than a hundred personal contacts via telephone, electronic mail, regular mail, surveys, facility visits, and individual meetings with interested parties. These contacts have included interactions with engine manufacturers and operators, emission control system manufacturers, local, national, and international trade association representatives, and environmental, community, and public health organizations.

Environmental Justice

ARB is committed to integrating environmental justice in all of its activities. On December 13, 2001, the Board approved "Policies and Actions for Environmental Justice," which formally established a framework for incorporating Environmental Justice into the ARB's programs, consistent with the directive of California state law. (ARB, 2001) 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.

The proposed amendments to the regulation are consistent with the environmental justice policy to reduce health risks from TACs in all communities, including those with low-income and minority populations, regardless of location. The proposed amendments to the regulation will continue to reduce diesel PM emissions from mobile CHE at ports and intermodal rail yards by requiring a turnover to cleaner engines and the use of BACT. The proposed amendments to the regulation will continue provide air quality benefits for all Californians, particularly those living near ports and intermodal rail facilities where CHE operate.

REFERENCES:

(ARB, 2005a) California Air Resources Board. *Staff Report: Initial Statement of Reason for Proposed Rulemaking, Regulation for Mobile Cargo Handling Equipment at Ports and Intermodal Rail Yards,* October 2005.

(USEPA, 2009) United States Environmental Protection Agency. *U.S. EPA Integrated Science Assessment for Particulate Matter*, December 2009. http://www.epa.gov/ncea/pdfs/partmatt/Dec2009/PM_ISA_full.pdf

II. NEED FOR AMENDMENTS

In this chapter, ARB staff provides a discussion of the events and information that have resulted in the need for amendments to the CHE Regulation. In addition, ARB staff provides the rationale for the individual amendments. These amendments have been drafted to address a variety of implementation issues that have arisen since the CHE Regulation became effective and provide some relief from the recent economic downturn. While all of the amendments are relatively minor, they provide the additional flexibility sought after by the regulated community without sacrificing significant emission reductions.

A. Retrofit Requirements

The CHE Regulation requires that in-use non-yard truck equipment, as of January 1, 2007, meet BACT emission standards though one of a menu of compliance options. These options include replacement to cleaner on-road or off-road engines and/or the use of retrofits. For owners/operators that elect to use retrofits, a second compliance step, which would require replacement to Tier 4 off-road engines or installation of a Level 3 (85 percent or greater of diesel PM reduction) VDECS, may be required, depending on the equipment category and level of VDECS applied.

While retrofitting of in-use non-yard truck equipment is not required, it is seen as the most cost-effective option for compliance. However, since the regulation has been implemented, the use of VDECS has not been as robust as staff anticipated and some start-up problems have been reported by terminal operators. The use of retrofits is relatively new to port and intermodal rail yard operators. The successful use of retrofits requires some changes in operation and maintenance practices. This has been demonstrated with other regulated categories and their introduction to retrofits.

ARB staff believes a few minor changes to the CHE Regulation will help port and intermodal rail yard owners/operators to more successfully use retrofits as a compliance option. These include:

- Providing an additional two years of eligibility for compliance extensions where no VDECS are available.
- Providing owners/operators with more time to evaluate the need for an extension before having to apply for a "No VDECS Available" extension.
- Including safety issues as a reason for a "No VDECS Available" extension.
- Allowing an experimental extension for situations where a diesel emissions control strategy (DECS) manufacturer is developing an experimental system and needs to generate data for verification.

The following paragraphs discuss the need for these changes.

"No VDECS Available" Compliance Extension

There are CHE for which no currently verified VDECS will work. The CHE Regulation allows an annual compliance extension of up to two years for non-yard truck mobile cargo handling equipment when a VDECS is not available. Owners/operators are required to bring all other equipment into compliance before applying this extension. Under the current CHE Regulation, owners/operators must bring this equipment into compliance by either replacing or retiring if there are still no VDECS available once the two years extension has passed. There are situations where there is specialty equipment required for certain cargo that is very expensive. Staff is proposing to amend the CHE Regulation to add two additional annual years of compliance extension to allow more time for additional DECS to be verified for CHE. These additional two years delays the capital expenditure to replace this equipment and provides more time for an applicable retrofit to be verified. In consideration of the amount of time required for the evaluation of whether VDECS are available or not, staff is also proposing to change the deadline for submitting a "No VDECS Available" compliance extension request from six months to 60 days prior to the compliance deadline.

While a VDECS may be available for a piece of equipment, it is important that the installation of the retrofit device does not impact the safe operation of the equipment. This is a clarification in that safety has always been allowable as a factor in determining available VDECS. Factors impacting the installation include the location of the exhaust outlet, the equipment configuration, and the size of the retrofit device necessary for the engine. One possible impact would be if the retrofit device was placed such that the view of the driver was obstructed. Title 8, section 1591(b) of the California Code of Regulations (CCR) states, "Equipment and accessories installed on haulage vehicles shall be arranged so as to avoid impairing the driver's operational vision to the front and sides." ARB staff has been working with staff of California Division of Occupational Safety and Health (CalOSHA) in an effort to better define what constitutes a line-of-sight impairment so aftertreatment control installers have a consistent standard. Those discussions are on-going. Until such time as the line-of-sight standards are clearly delineated, ARB will work with CHE owners/operators to ensure that aftertreatment controls are installed in safe manner.

Extension for Experimental Systems

Since the start of CHE Regulation implementation, it has been determined that significant differences between RTG cranes and other rubber tired off-road equipment impact their operation with exhaust retrofit devices. RTG cranes are used to lift and move containers from container stacks to trucks or rail cars. The propulsion engine on an RTG crane is a diesel generator set that either produces electricity to run the crane (diesel-electric crane) or runs a pump to produce hydraulic pressure to run the crane (hydraulic crane). These engines are similar to generator sets used for stationary applications. Additionally, the engine operates under a low load (idle) a large percentage of the time, such as when it is moving a container laterally or dropping a container, but then ramps up to high load when it picks up a container. Consequently, VDECS demonstrated on non-RTG crane equipment may not operate satisfactorily on RTG cranes.

Therefore, RTG cranes are a separate category for verification. Currently, there are only three devices verified for RTG cranes, one Level 2 device and two Level 1 devices. There are approximately 370 RTG cranes in California. Consequently, this is a very small market and may not attract the attention of DECS manufacturers for verification. The devices that are currently verified for RTG cranes were demonstrated using an experimental extension which allows the use of a non-verified DECS if there are no VDECS available for the equipment.

Once there are VDECS available for the equipment, this experimental extension is no longer available. Staff believes that having more verified products for CHE cranes would provide greater flexibility for CHE owners/operators. Therefore, we are proposing to add a provision to allow the use of the experimental extension for situations where a DECS manufacturer needs to generate data for verification of a system, regardless of whether VDECS are available. Staff believes these types of extensions will support the verification of additional DECS.

B. Operational Practices

ARB staff has determined that there are four minor amendments that could be made in the regulation to allow port and intermodal rail yard operators to conduct their operations more effectively while delaying minor emission reductions. These are:

- Providing a low-use extension for a limited number of equipment.
- Allowing non-yard truck equipment to be transferred between terminals or intermodal rail yards controlled by single owner.
- Allowing for warranty replacements due to engine failure.
- Allowing rental of equipment meeting previous engine standards for up to six months after new engine standards go into effect if there is a manufacturer's delay.
- Requiring operators to annually conduct opacity monitoring on the engine-out exhaust for all CHE equipment.

The need for these amendments is discussed in the following paragraphs.

Low-Use Provision

Equipment owners/operators maintain a small number of equipment that is used only for backup should another piece of equipment stop operating. Maintaining this back-up equipment is essential to keeping a terminal operating when a ship comes into dock or a train into a rail yard for loading or unloading. Additionally, some smaller port terminals have specialty equipment that is required for certain cargo such as large steel I-beams and large wire coils and would be expensive to replace. This equipment is used infrequently but is necessary for situations where this cargo comes in. Staff is proposing a two year extension for equipment operated less than 200 hours per year for such equipment. Other fleet rules include a low-use extension. Staff is proposing an extension for this equipment due to the environmental justice issues related to the residential communities surrounding these captive fleets. A provision would be included that gives Executive Officer discretion to limit the number of pieces of equipment at a facility to two percent or two pieces of equipment of an owner/operator's fleet based on the potential impact of the low-use equipment activity on public health.

Transfer of Equipment

Equipment owners/operators with fleets in different parts of California occasionally need to move equipment from one facility to another facility elsewhere in the State. To require an owner/operator to purchase additional equipment while equipment elsewhere sits unused creates an unnecessary impact on capital expenditures. Currently, these transfers are allowed only if the two facilities are at the same port or if the equipment meets current engine emission standards. Staff is proposing to allow an owner/operator to transfer non-yard truck equipment from one port terminal or intermodal rail yard to another port terminal or intermodal rail yard that is under common control of the same owner/operator if specified conditions we met that ensure that risk exposure and public health are not adversely impacted.. Among the conditions would be a requirement that equipment would have to meet the regulation's BACT performance standards.

Warranty Replacements

An issue has come up regarding engines that fail within the manufacturer's warranty period (usually one to two years after initial purchase). If the new engine standard changed during the warranty period, under the current rule a warranty replacement of an engine meeting the old standard would not be allowed. Since the warranty would only pay for the replacement of an engine identical to the failed engine, the owner/operator would be responsible for the difference between the cost of the warranty engine and new engine and equipment modifications to accommodate the newer engines. Tier 4 engines typically have aftertreatment controls that require more engine compartment space and increased cooling capacity and equipment modifications to accommodate these changes may be costly. To address this situation, staff is proposing to allow engines that fail under warranty to be replaced with a same emission level engine even if there has been an engine emission standard change since the original engine was purchased.

New Equipment Delivery Delays

Equipment with engines meeting new engine standards are often not immediately available once the standard comes into effect. Consequently, if during the time when the new standard first comes into effect, an owner/ operator orders new equipment and there is a manufacturer's delay, they may not be able to rent equipment with engines meeting the new standards to use until the equipment they have purchased is delivered. Consequently, staff is proposing an amendment to allow the rental of equipment meeting the previous standard for up to six months, or until the equipment is delivered, whichever is longer.

Opacity Based Inspection Program

Diesel engines have been the workhorse of American industry since the early 20th century. These engines, which are designed to withstand the explosive impact of compression ignition, are highly durable and will continue to operate effectively with minimal maintenance. Unfortunately, this can result in delayed maintenance and engines operating at higher than design emission levels.

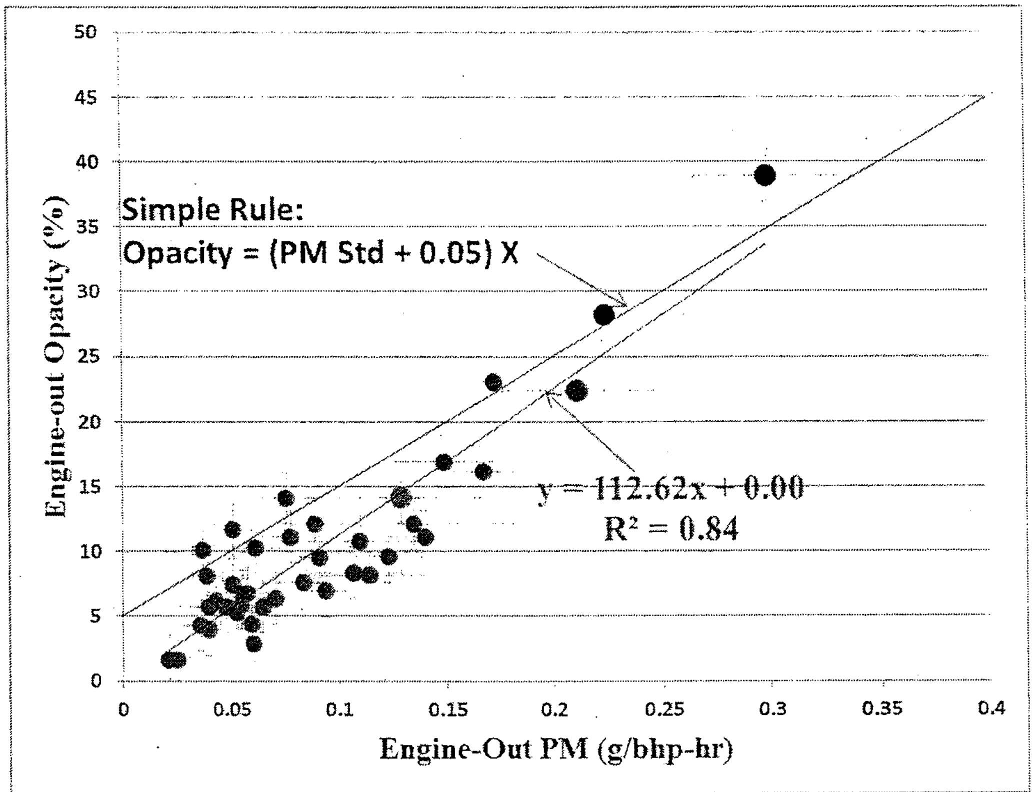
The smoke opacity test is a quick and inexpensive way to detect if an engine is emitting excessive visible emissions. These visible emissions could be an indication of a maintenance issue such as the fuel pump calibration, fuel injection timing, air filter plugging, or turbo pump failure. ARB staff has been using opacity testing to determine when on-road truck engines need maintenance since 1991. This program is called the Period Smoke Inspection Program and requires that diesel truck and bus fleet owners conduct annual smoke opacity inspections of their vehicles and repair those with excessive smoke emissions to ensure compliance.[6] ARB randomly audits fleets, maintenance and inspection records and tests a representative sample of vehicles. All vehicles that do not pass the test must be repaired and retested. Opacity limits for these on-road engines are a maximum of 55 percent opacity for pre-1991 model year (unregulated) on-road engines and a maximum of 40 percent opacity for 1991 model year and later (certified) on-road engines.

The opacity test is performed using the Society of Automotive Engineers' (SAE) J1667 snap-acceleration test procedure. (SAE, 1996) To perform this test, a smoke sensing meter is placed either just above the exhaust, or a probe is placed inside the vehicle's exhaust pipe. The driver then rapidly accelerates the engine three times, with the transmission in neutral, to clear the exhaust of loose particles. The driver then repeats the snap-acceleration test three times. The meter measures the opacity of the smoke being emitted.

ARB is in the first phase of a detailed study on the correlation of measured engine-out exhaust opacity to a variety of engine parameters including measured PM emissions and engine mileage, age and certification level. This study has included measuring both the opacity and engine-out PM of a number of on-road and off-road engines. (ARB, 2011a) The PM measurements were made with a portable emissions measurement system (PEMS). Data from the study indicates that while measured engine-out opacity does not appear to correlate with engine mileage, age, or certification level, it does correlate with measured PM emission levels. The measured engine-out opacity is shown plotted as a function of the measured PM emission data in Figure II-1 below.

[6] Title 13, sections 2180 - 2194

Figure II-1: Opacity and Measured Engine-Out PM Correlation



Two of the preliminary conclusions from this study are that measured opacity can be used to estimate engine PM emission levels and that this test can be easily extended to off-road equipment.

One startling observation of the data from this ARB study is that in-use engine-out PM emissions from certified diesel engines can be significantly higher than the certification levels if the engine manufacturer's recommended engine maintenance schedules are not followed. These in-use PM levels are significantly higher than the expected engine deterioration levels. However, PM emission levels and measured opacity levels in well-maintained fleets correlate much better with their certification levels. Based on this information, ARB staff has devised a simplified correlation of an opacity limit to the PM standard that an engine is certified to. This "Simple Rule", shown in the figure above, is:

Opacity Limit = (PM standard + 0.05) X 100.

So, while measured opacity does not appear to correlate well with the certification level in random fleets, the measured opacity for the engines in well-maintained fleets follow the ARB "Simple Rule" unless engine maintenance or repair is necessary.

The following maximum opacity limits are based on the "Simple Rule".

Table II-1: Maximum Opacity Limits Based on the "Simple Rule"

Off/On-Road Certified at X: (g/bhp-hr)	Maximum Opacity Limit
>0.4	55%
0.31≤X≤0.40	45%
0.21≤X≤0.30	35%
0.11≤X≤0.20	25%
0.05≤X≤0.10	15%
X<0.05	5%

ARB staff is proposing to require an opacity test of the engine-out exhaust of all CHE once a year to identify elevated emission levels and alert operators to potential engine maintenance issues. This is similar to what is required of California truck and bus fleet operators. The engine-out exhaust would be opacity tested for all equipment, including those retrofitted with VDECS or equipped with a factory installed PM control system.

Retrofitted engines would be tested when the VDECS is removed for cleaning out the ash. Engines that include integral aftertreatment devices that are part of the certified engine would not require removing these aftertreatment devices for opacity testing. The maximum opacity limits for certified engines would be based on the limits set by the "Simple Rule," shown in Table II-1 above. The maximum limit for unregulated engines would be set at 55 percent, similar to that for unregulated on-road engines. Retrofitted engines would need to meet the limit set for the installed VDECS. This will help prevent VDECS failures.

The ARB Verification Procedure, Warranty and In-Use Compliance Requirements for In-Use Strategies to Control Emissions from Diesel Engines (ARB Verification Procedure) requires that when diesel emission control devices are verified for use in California, specifications for the engine size and maximum PM emissions level are included as part of the verification.[7] If a VDECS is installed on an engine that exceeds the PM emissions level that it is designed for, the device quickly becomes clogged with soot and cannot operate as expected. Additionally, if an engine is burning an excessive amount of lubricating oil, the VDECS will quickly become clogged with incombustible ash from the metal additives in the lubricating oil. Consequently, an engine maintenance program designed to keep diesel engines running at sufficient power to complete the job may not be sufficient to keep engines from producing excessive soot and burn excessive oil for proper VDECS operation.

The ARB Verification Procedure in currently being amended to require that a maximum opacity limit be specified for each verified device. (ARB, 2011b) While the ARB Verification Procedure will require that a pre-retrofit opacity test be performed on engines to be retrofitted, it will not require that periodic checks be performed to confirm that the engine opacity does not exceed the maximum level for the device. An annual opacity test program, as proposed here, would help ensure that operators perform

[7] Title 13, sections 2700 - 2711

proper engine maintenance to correct problems before they cause retrofit failure. Additionally, use of the opacity test would help keep non-retrofitted equipment operating more cleanly by requiring repairs to equipment that operate at higher than the specified limits.

C. Emission Standards

With Tier 4 off-road engine emission standards becoming effective for engines used in CHE, some implementation issues have arisen. Interim Tier 4 standards came into effect at the beginning of 2011 for engines of 175 horsepower (hp) or greater and in 2012 for engines of 75 to less than 175 hp. Final Tier 4 standards will become effective in either 2014 or 2015, depending on engine horsepower. The proposed amendments address:

- Tier 4 Family Emission Limits (FEL) engines.
- The demonstration of emissions equivalency.

<u>Tier 4 FEL Engines</u>

U.S. EPA allows engine manufacturers some flexibility during periods where engine emissions standards are transitioning from one tier to the next. This flexibility involves allowing engine manufacturers to certify specific percentages of engines manufactured, and identified as being part of the next Tier, to emissions levels that do not meet the emissions standards for the specified Tier. These engines are known as Family Emission Limits (FEL) engines and are certified to alternate (Alt) PM and Alt NO_x emissions limits. The FEL Alt PM standards allow for emissions that are approximately ten times higher than the Tier 4 PM standards. These Alt PM standards are essentially equivalent to Tier 3 PM standards. The original regulation assumed that all Tier 4 engines would be certified to the Tier 4 PM standards. If engines certified to these Alt PM standards are allowed to be introduced into California's ports and intermodal rail yards as Tier 4 engines, emission reductions anticipated with the adoption of the original regulation will be lost. Consequently, staff is proposing that if engines certified to the Alt PM standards are used at ports or intermodal rail yards, these engines would be treated as if they were Tier 3, and owners/operators would be required to retrofit this equipment with the highest level VDECS within one year of purchase, lease, or rental. Owners/operators will be able to determine if an engine is a FEL engine based on the engine label. Labeling requirements set forth in the Code of Federal Regulations, title 40, part 1039, section 135, require that the FEL standards to which an engine is certified to be included on the label.

<u>Demonstration of Emissions Equivalency</u>

There is now new hybrid technology for RTG cranes that has undergone years of development with Tier 3 engines. Modifying the technology to accommodate Tier 4 engines would require significant additional development funding. The current CHE Regulation would not allow this technology to be introduced at port or intermodal rail yard terminals once Tier 4 engine emission standards come into effect and those engines are available for RTG cranes. Staff is proposing an amendment that would allow alternative technology developed with an engine certified to a previous standard to be allowed to be purchased, leased, or rented as compliant equipment at a port or intermodal rail yard if it can be demonstrated that the engine provides the same emission reductions that the use of an engine certified to the current standard would with conventional technology. These alternative technologies are much more energy efficient than conventional technologies, thus providing GHG benefits as well as toxic and criteria pollutant reductions. This amendment would encourage the introduction of more energy efficient technologies at terminal ports and intermodal rail yards.

D. Compliance Requirements

Two compliance related issues have surfaced since the start of CHE Regulation implementation. The first issue involves general compliance deadlines for fleets that have in-use engines that were manufactured across several model years; the second issue deals specifically with the Port of Humboldt Bay. To address these issues, two amendments are being proposed:

- Allow compliance schedule modification to bring older engines into compliance first.
- Exempt equipment at rural low-throughput ports.

These are discussed in the following sections.

<u>Compliance Schedule Modification</u>

The compliance schedules in the CHE Regulation organizes the engines in fleets into model year groups and then requires a certain percentage of each group to be brought into compliance each year. Compliance for the older model year groups is initiated earlier than that for the newer model year groups. However, the phased compliance schedules overlap such that a certain number of newer model year engines are required to comply before all of the older model year engines have been brought into compliance. Some owners/operators have requested that they be allowed to bring all of their older equipment into compliance before they start bringing their new equipment into compliance. Allowing modifications to the compliance schedule to swap older engine's earlier compliance dates with earlier dates for newer engines makes sense and provides the same or better emission benefits. Consequently, staff is proposing an amendment to allow such modifications. The newer engines would then be required to comply when the older engines were originally required to comply. The number of engines required to comply each year would remain the same.

<u>Rural Low-Throughput Ports</u>

The North Coast Unified Air Quality Management District (North Coast), the Port Authority of the Port of Humboldt Bay, and Port of Humboldt Bay tenants have requested that ARB consider providing relief to this small port from the CHE Regulation requirements. (North Coast, 2010), (Humboldt Bay District, 2010)

The Port of Humboldt Bay is a small port in Northern California surrounded by a community of less than 50,000 people. (CB, 2011) The 2010 United States Census Bureau designated the surrounding community as an urban cluster. (CB, 2010) The next largest community, Redding, California, which the census designated as an urban area, is over 75 miles away. The North Coast, in which the port is located, is in attainment for ozone per the National Ambient Air Quality Standards (NAAQS) and does not contribute to violations of the federal ozone standard for air districts downwind. (ARB, 2011c)

The port is primarily dependent on the local lumber industry. Logs and chips are the primary cargo going through the port. The rail access to the community and the port is out of service due to the geologic activity in the area and is not anticipated to be brought back into service due to the high maintenance costs related to this area. The community is economically dependent on the lumber industry and the availability of the port to get the lumber products to market. The activity has averaged about one to two wood chip or log barges a month. The recent decline in the economy, and specifically the housing industry, has caused a severe decline in the lumber industry.

Using U.S. Army Corps of Engineers, Waterborne Statistics Data Center Data historical information, the peak port throughput was in 2005 at 815,000 tons of material per year. The economic decline has brought this down to 90,000 tons per year in 2009. (USACE, WSDC, 2010) With the closure of one of the local lumber mills, return to the peak of 2005 is unlikely. However, the Port is seeking additional business in a long-term project to transport containers by barge. The current plan for the project would bring approximately 1,100 twenty-foot equivalent units (TEUs) through the port per month. As planned, it would take several years to reach the project's anticipated annual throughput goals of approximately 140,000 tons. Taking into account the current annual throughput tonnage and the projected increases, a projected annual throughput tonnage of 230,000 tons would be significantly below the maximum throughputs experienced in 2005. (ARB, 2011d)

A survey of port tenants indicated that less than 20 pieces of CHE either work at the port or may work at the port in the future. (ARB, 2011e) Much of this equipment works only part time at the port. The annual hours of operation of this equipment range from 200 up to 2,500 hours, with a horsepower weighted average of 875 annual hours. The average horsepower of the equipment is approximately 240 hp. Average annual hours of operation for similar equipment at other ports are estimated to be approximately 1,500 hours. The emissions for these equipment are estimated to be approximately 0.001 tpd of PM and 0.02 tpd of NO_x. These emissions are less than 1 percent of the emissions of either the Port of Los Angeles or Long Beach in 2011. Consequently, the health risk from these emissions is similarly insignificant.

The variable nature of the lumber industry is expected to result in higher throughputs in some years than in others. The seasonal nature of the lumber industry also results in port activity being limited by weather to May to October. In an effort to even out peak years with low years, a two-year average is being proposed for determination of the throughput limit. This would allow the port to sustain a single peak year, but not two in a row.

To address this and similar situations in the future, staff is proposing an amendment that would exempt a port from the CHE regulation if it has an annual throughput of less than one million tons and is located more than 75 miles from an urban area.

E. Need to Clarify the Current Regulation

Staff is also proposing changes to clarify the intent of the CHE Regulation by modifying several existing definitions including: compression ignition engines; intermodal rail yard; newly, purchased, leased or rented cargo handling equipment; owner or operator; port; retirement or retire; and rubber-tired gantry crane. In addition, staff is proposing to add definitions for the following terms to support both modified definitions and other amendments: alternate PM standard; cargo; Class I Railroad; construction activities; Family Emissions Limits (FEL); low-throughput port; opacity; Otto cycle engine; safe; two-year average annual cargo throughput; urban area; warranty period; and water-borne commerce. Staff is also proposing to clarify that equipment brought onto a port or intermodal rail yard solely for construction or unexpected repairs would be exempt from the regulation.

F. Other Issues

Other issues were discussed in the workshops that staff felt were better addressed through means other than a regulatory amendment. These issues include the operation of VDECS on non-yard truck equipment and of on-road engines in the yard trucks. ARB staff conducted a survey of owners/operators with retrofitted equipment and yard trucks with on-road engines and hosted a technical meeting on May 26, 2011, to address these issues. The following sections provide a discussion of the issues, findings, and action plan that evolved from this meeting.

<u>May 26, 2011 Technical Meeting</u>

Staff held a technical meeting on May 26, 2011, in Sacramento to address concerns heard at the workshops from owners/operators regarding the operation of VDECS on non-yard truck equipment and on-road engines in the yard trucks. The morning session addressed the use of VDECS on non-yard truck equipment; the afternoon session addressed the use of on-road engines in yard trucks. All terminal port and intermodal rail yard operators were invited to both meetings. VDECS manufacturers with products verified for use on CHE were invited to the morning session and representatives from the on-road engine manufacturer, Cummins, were invited to the afternoon session. In addition, representatives from the Manufacturers of Emissions Control Association (MECA) were invited to the morning session, and representatives from the Pacific Maritime Association (PMA) were invited to both sessions. An open invitation to provide a presentation was extended to all participants. The MECA representative and the Cummins representative both provided presentations.

Use of VDECS on Non-Yard Truck CHE

In the technical meeting, owners/operators discussed different operational problems that they have been encountering with the use of VDECS on their non-yard truck CHE. These issues are similar to issues other fleets have encountered under ARB's in-use regulations that require the use of VDECS to reduce in-use fleet emissions.

The owners/operators' concerns primarily involved the operational and financial impacts incurred by the fleets from equipment downtime due to problems with VDECS. Many felt that their equipment duty cycles were not amenable to retrofitting with VDECS due to the degree of idling that occurs during vehicle operation and the resulting low exhaust temperatures. ARB staff, however, has determined that VDECS are available that can operate under these conditions. It appears that a common problem is that many pieces of equipment operating at the ports and rail yards have VDECS installed that have not been adequately matched to the equipment's duty cycles. Additionally, VDECS manufacturers believe that owners/operators need more education on the VDECS operational and maintenance requirements and that this would help the owners/operators operate the retrofitted equipment more effectively. While diesel engines without aftertreatment controls will normally continue to operate without required maintenance, engines that have been retrofitted will more likely incur high incidences of operational problems if they are not properly maintained.

ARB staff found that closer coordination between all of the parties involved, including the owners/operators, equipment field operators, VDECS manufacturers, VDECS installers, and ARB staff is essential in making certain that equipment is properly matched to the VDECS that will be installed, taking into consideration the equipment's duty cycle, and to ensure that proper maintenance is provided. ARB's Verification Procedure, by which devices become verified products, is in the process of being modified to require that VDECS manufacturers provide adequate education to the equipment owners/operators. Additionally, this procedure is being modified to require the VDECS manufacturers to determine a maximum opacity level for equipment that is to be retrofitted with their device. The opacity requirements of the Verification Procedure program would be synergistic with the proposed opacity monitoring requirements proposed herein. The opacity tests would alert owners/operators as to when equipment are starting to produce soot levels that are too high for adequate VDECS operation. The equipment would then be able to receive maintenance necessary to reduce soot levels.

ARB staff have committed to host periodic meetings on the use of VDECS on non-yard truck CHE to work out solutions to issues with retrofitting equipment and to alert owners/operators concerning these solutions.

Use of On-Road Engines in Yard Trucks

In the technical meeting, owners/operators discussed different operational problems that they have been encountering with the use of on-road engines in yard trucks. These issues included DPF regeneration, exhaust pipe leakage, sludge in exhaust the gas recirculation (EGR) system, and diesel fuel fumes in the air brakes. Meeting participants suggested that the problems appear to correlate with drive time and speed.

Multiple causes were identified for problems that have been incurred, including: an engine duty cycle that involves significant idle and low speed operation, lack of truck operator education, and truck operators ignoring necessary maintenance requirements. The Cummins representative made a commitment to meet with the different terminal operators who were having problems with the on-road engines in their yard trucks to determine if maintenance or software upgrade solutions are available.

The findings from the Cummins representative; to date, indicated that he found multiple causes for the operational problems and suggested maintenance practices and upgrades to deal with the different issues. The issues and suggested solutions are provided in the paragraphs below. One of the fundamental issues is that some yard truck operators were not cooperating regarding providing necessary maintenance, primarily the DPF regeneration. Regeneration is the name for the process by which the accumulated soot in the filter is burned off. There is an indicator light on the yard trucks' dashboard that turns on when the engine DPF needs to be regenerated. Performing the regeneration, referred to as a stationary regeneration, requires parking the truck and pushing the regeneration button. This regeneration process takes between 20 to 45 minutes depending on the amount of soot that has accumulated in the filter. (Cummins, 2008) One terminal has addressed the problem by hooking the truck's horn into the electrical circuit for the dash light to call attention to the warning light. Other findings from the Cummins representative were that some terminals have not updated their maintenance procedures for the 2007+ model year engines. These newer engines are significantly different from earlier model year engines. One important difference is that they include an integral DPF. As discussed above, regeneration burns off accumulated soot. However, there is a component of the soot that is not combustible. This non-combustible portion of the soot is called ash. Ash is composed of metals from lubricating oil compounds. Diesel engines burn a small amount of the oil that lubricates the pistons and cylinders. Required DPF maintenance includes regularly removing the DPF from the truck to clean out the ash. As ash accumulates, the engine back pressure increases. If the ash is allowed to accumulate too long, it becomes more difficult to remove all the ash and the engine back pressure will not return to the original conditions after cleaning. This increase in back pressure can cause other problems, as discussed in the next paragraph.

Another Cummins finding was that the exhaust pipe leak was exacerbated by high back pressure in the exhaust system. As discussed above, excessive ash and soot accumulation in the DPF can cause an increase in engine back pressure. Additionally, the exhaust is a two piece system with a slip fit. When the pressure in the exhaust

system increases due to ash and soot buildup in the DPF, exhaust gases may be forced through the slip fit in the exhaust pipe. Consequently, the Cummins representative found that the exhaust leak can be remedied by replacing the original equipment two-piece exhaust with a single piece exhaust system. This single piece exhaust system has significantly less potential to leak when engine back pressure increases.
The Cummins representative also found that there were two possible solutions to the issue of migration of the engine exhaust air into the truck air system. Cummins has a service bulletin describing the relocation of the air compressor inlet to help mitigate this problem. Additionally, the maintenance practice of daily purging the truck's main air tank would also help relieve this problem. Purging the air tanks releases accumulated fluids which could otherwise release vapors and contaminate the air. Terminals that practiced the daily purging did not experience this problem.

One important Cummins finding was that some port yard trucks had not received up to ten calibration updates needed for engines in-field. Since Cummins is responsible for the critical updates, closer interaction between Cummins and owners/operators would facilitate the necessary calibration updates.

ARB staff has determined that closer coordination among all parties, including Cummins representatives, terminal owners/operators, equipment field operators, and ARB staff is needed to continue troubleshooting the operational problems being encountered. ARB staff have committed to host periodic technical meeting to review the performance of the on-road engines in yard trucks, find out what is working, and what is needed for future success.

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(ARB, 2011a) California Air Resources, *Preliminary Investigation of the Correlation Between In-Use Diesel PM Emission Rate and Opacity Reading*, CRC Real World Emissions Workshop, March 2011.

(ARB, 2011b) California Air Resources Board, ARB staff presentation at public workshop for Proposed Amendments to the Verification Procedure, May 24, 2011. http://www.arb.ca.gov/diesel/verdev/in-use/workshop_presentation_5-24-11.pdf

(North Coast, 2010) North Coast Unified Air Quality Management District. Letter of Recommendation, July, 2010.

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(ARB, 2011d) California Air Resources Board, Personal correspondence, Stephen Pepper, May 19, 2011.

(ARB, 2011e) California Air Resources Board, Humboldt Bay Cargo Handling Equipment Database: Results from 2011 Survey of Operators at the Port", April 2011.

(Cummins, 2008), Cummins, *Cummins Driver Tips*, 2008.

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III. PROPOSED AMENDMENTS

In this chapter, we discuss the key requirements of the proposed amendments to the regulation for mobile CHE at ports and intermodal rail yards. This chapter begins with a general summary of the proposed amendments to the regulation, and each major requirement of the proposed amendments is discussed and explained. Unless otherwise noted herein, all references to mobile CHE include mobile CHE at ports and intermodal rail yards, as defined in the current regulation.

A. Summary of the Proposed Amendments to the Regulation

The complete text of the proposed amendments to the regulation for Mobile Cargo Handling Equipment at Ports and Intermodal Rail Yards is included in Appendix A. The proposed amendments have been developed to provide CHE owners/operators with additional flexibility when complying with the regulation while using BACT to reduce the general public's exposure to diesel PM and NO_x emissions from mobile CHE. Amendments are also being proposed to maintain the anticipated risk reduction with the introduction of Tier 4 engines, enable the more successful use of retrofits, and provide clarification of the regulatory language. The proposed amendments address several areas including retrofit requirements, operational requirements, emission standards, compliance provisions, definitions, and other clarifying language.

Retrofit Requirements:

- allow an additional two years of annual extension for equipment for which there are no VDECS available,
- add safety as a factor when considering VDECS availability,
- allow more time for extension applications,
- require equipment with a "No VDECS Available" extension to be brought into compliance within 6 months of a VDECS becoming available, and
- allow an experimental extension regardless of VDECS availability if it supports generating data for verification.

Operational Practices:

- allow a two year extension for a limited number of low-use equipment (200 annual hours of operation or less),
- allow transfer of non-yard truck equipment for which BACT has been applied,
- allow replacement of an engine that fails while under warranty to be replaced with a like engine regardless of the current emissions standard,
- allow rental of non-compliant equipment when there are manufacturer delays for the delivery of purchased compliant equipment, and
- require CHE opacity monitoring to ensure that engines meet original design specification or VDECS manufacturers' smoke opacity limits.

Emission Standards:

- treat Tier 4 engines certified to Alternate PM Standards as Tier 3 engines, and
- allow alternative technologies that demonstrate emissions equivalency.

Compliance Requirements:

- allow compliance schedule modification to bring older engines into compliance first, and
- exempt CHE equipment at rural low-throughput ports.

Clarify language and intent:

- modify several existing definitions and add others to support the amendments, and
- clarify that equipment brought onto a port or intermodal rail yard solely for construction or unexpected repairs are exempt from the regulation.

These amendments are explained in the following sections.

B. Discussion of the Proposed Amendments to the Regulation

The following paragraphs provide a plain English description of each of the proposed amendments. This discussion has been grouped by the general areas of the regulation where the amendments apply.

1. Applicability

Staff is proposing to add a sentence to the Applicability section, title 13, CCR section 2479(b) which clarifies that the regulation is applicable only to equipment powered by diesel fueled (compression ignition) engines and not gasoline or propane fueled (spark ignition) engines. Diesel fueled engines are certified to a test cycle referred to as the diesel cycle and gasoline and propane fueled engines are certified to a test cycle referred to as the Otto cycle. Consequently, the added sentence states that CHE powered by engines certified to a cycle other than the diesel cycle, such as the Otto cycle, are not subject to the CHE Regulation.

2. Exemptions

Staff is proposing several new exemptions to title 13, CCR section 2479(c) to provide additional clarity to the CHE Regulation and flexibility to owners/operators. The proposed amendments also include a reorganization of the exemption paragraphs to delete repetitious language.

a. *Construction Equipment and Equipment for Unexpected Repairs - Section (c)(1)(D) and (G)*

The proposed amendments would clarify the intent of the current regulation by including an exemption for equipment used solely to support construction activities at a port or intermodal rail yard and an exemption for rented, leased, or contracted equipment brought onto a port or intermodal rail yard to perform repairs that are not anticipated. These are repairs that are not routine or predictable. These equipment types were never intended to be covered by the CHE Regulation and have been excluded based on the definition of cargo handling equipment.

b. *Personnel and Fuel Delivery Vehicles - Section (c)(2)*

An exemption for personnel and fuel delivery vehicles has been clarified. Again, these vehicles were never intended to be covered by the CHE Regulation.

c. *Warranty Replacement of Engines - Section (c)(3)(A)*

Under the current CHE Regulation, if an engine fails while still under warranty but a new engine standard has come into effect since the time of purchase, the engine must be replaced with an engine meeting the new standard. Staff is proposing to allow an owner/operator to replace the engine with the warranty engine, even if new engine emissions standards are in place at the time of replacement. This amendment is needed to protect owners from losing the value of their new engine warranties.

d. *Transferring Non-Yard Truck Cargo Handling Equipment from One Terminal to Another - Sections (c)(3)(B) and (k)*

The current CHE Regulation requires that any CHE that was not part of the in-use fleet as of January 1, 2007, that is brought onto a port or intermodal rail yard must meet the requirements of newly purchased, leased, or rented equipment. Consequently, any non-yard truck CHE that is powered by a diesel engine that does not meet current engine emission standards cannot be moved from an owner/operator's terminal in one part of California to their terminal in another part of California. This results in added expense if an owner/operator must purchase additional equipment to meet operational needs at one facility while equipment sits idle at another facility.

Staff is proposing an amendment that would allow owners/operators to transfer non-yard truck CHE equipment from one location in California to another location in California through an application/approval process. This exemption is needed in cases where there is unused equipment at an owner/operator's one terminal and the need for that equipment at another of the same owner/operator's terminal. This amendment provides a process by which the equipment can be approved for the move. Application requirements specified in a proposed new section (k), Executive Officer Approval to Transfer Non-Yard Truck Mobile Cargo Handling Equipment Between Two Facilities, include:

- Both the originating and destination facilities must be in California and must be under common control.
- The move must not be used to meet compliance requirements at either of the two facilities.

- The equipment must be brought into compliance with the in-use requirements prior to it being put into use at the destination facility.
- The Executive Officer finds no significant adverse public health impact due to the action. The added regulatory language provides parameters to be considered in evaluating the public health impact.

3. Definitions

Staff is proposing to add 13 definitions in the Definitions section, title 13, CCR section 2479(d) to the current regulation. These 13 definitions support the other proposed changes to the CHE Regulation, including the exemptions previously discussed, proposed clarification of existing definitions, and other proposed changes that are discussed in the following sections. The proposed definitions listed were developed by staff, with input from the public during workshops and workgroup meetings. Staff working on the proposed amendments to the regulation also coordinated with staff working on other diesel PM regulations to provide consistency where it is practical.

The new definitions are listed below by category:
Definitions added to support the proposed clarifications to existing definitions include; "cargo", "Class I Railroad", and "water-borne commerce."
Definitions added to support the proposed modifications to the exemptions include: "two-year average annual cargo throughput", "construction activities", "low-throughput port", "Otto cycle engine", "urban area", and "warranty period."

Definitions added to support proposed changes to the requirements include: "Alternate PM Standard", "Family Emissions Limits (FEL)", "opacity", and "safe."

Staff is also proposing to clarify the following seven definitions: "compression ignition engine", "intermodal rail yard", "newly, purchased, leased, or rented cargo handling equipment", "owner or operator", "port", "retirement or retire", and "rubber-tired gantry crane or RTG crane." These definitions were clarified based on questions that had come up during the first few years of implementation of the CHE Regulation.

4. Requirements

Staff is proposing a number of changes to the Requirements section, title 13, CCR section 2479(e) of the current regulation. Some of these changes are non-substantive changes to clarify the language while others are to provide flexibility. Some of the amendments apply to newly purchased, leased or rented equipment, some apply to in-use equipment, and some apply to both. Staff is also proposing to add requirements for an opacity based monitoring program. Additionally, staff is proposing to require engines certified to FEL Tier 4 alternate PM standards to be treated similarly to Tier 3 engines and require retrofit with highest level verified control within one year of purchase, lease, or rental. The proposed amendments to the compliance requirements of the current regulation are discussed below.

a. Treat Engines Certified to the FEL Alternate PM Standard as a Tier 3 Engine – Sections (e)(1)(B)2.a., (e)(3)(B)1.a., b., and c., 2.a., b., and c., and 3.a., b., and c.

When the CHE regulation was initially adopted in 2005/2006, ARB expected that most owners/operators electing to comply with the regulation's performance standards would install new engines meeting the primary Tier 4 PM emission standards. ARB subsequently discovered, however, that at least some, if not many, non-yard truck equipment are equipped with engines certified to the less stringent alternative PM and NO_x standards based on family emission limits (Tier 4 FEL engines). The Tier 4 FEL engine PM standard is at least ten times dirtier the primary Tier 4 PM standard and is similar in stringency to the primary Tier 3 PM standard.

To address this problem, staff is proposing to add language clarifying ARB's initial intent – that engines meet the primary Tier 4 engine emission standards, not the FEL standards. The amendments specifically require that engines must meet the primary standards set forth at title 13, CCR section 2423(b)(1)(B). Additionally, staff is proposing that to the extent that owners/operators choose or are compelled to use FEL Tier 4 engines, because of limited availability of primary Tier 4 engines in the marketplace, such engines must be retrofitted with the highest level VDECS within one year of purchase, lease, or rental. As mentioned above, the Tier 4 FEL PM standards are essentially primary Tier 3 PM standards and do not achieve the PM emission reductions initially anticipated with the adoption of the CHE Regulation. The amendments insure that originally anticipated emission reductions are achieved while concurrently providing owners/operators with flexibility to meet short-term operational needs by using engines meeting less stringent emission standards.

b. Demonstration of Emissions Equivalency – Sections (e)(1)(B)4.d., (e)(3)(B)1.d., 2.d., and 3.d. and (n)

Staff is proposing an amendment that would allow alternative technology developed with an engine certified to a previous standard to be purchased, leased, or rented as new equipment if it can be demonstrated that the power system provides the same emission reductions that the use of an engine certified to the current, more stringent standard would achieve with conventional technology. The proposed language requires a demonstration that the power system meets the interim or final Tier 4 NO_x and PM off-road engine emissions standards for the rated horsepower and current model year. The amendment is needed to allow the use of hybrid and other energy efficient lower-emission power systems that have been developed with Tier 3 engines after Tier 4 engine emission standards have become effective. These would only be allowed if they achieve the same emission reductions as an engine certified to the current standards.

Five methods are provided in a new section (n), Test Methods, for determining this emissions equivalency. These are:

- results from using test methods specified in proposed new section (n), or an alternative test method approved by the Executive Office,

- certification test data or other emissions test data of the engine manufacturer for that engine
- emissions test data derived from another in-use engine that has a similar configuration or use,
- emissions test data used to verify an emission control device through ARB's Verification Program, or
- emissions test data used for U.S. EPA certification of a system for remanufacture to a cleaner standard.

The addition of approved test methods was necessary to support the proposed amendment to allow the use of equipment that could be demonstrated to meet the required emissions standards.

c. Rental of Non-Compliant Non-Yard Truck Equipment due to Manufacturer Delivery Delays – Section (e)(1)(B)5.

The off-road engine emissions standards began transitioning from Tier 3 engine emissions standards to Tier 4 standards in January 2011, with Interim Tier 4 (Tier 4i) standards for engines with maximum horsepower of 175 and higher becoming effective early 2011. Tier 4i standards for engines from 75 to 175 horsepower will become effective in 2012. While the standards take effect at the beginning of the year, CHE with engines certified to Tier 4i may not be available until later in the year. Consequently, owners/operators who wish to buy new equipment with Tier 4i engines may experience manufacturer delivery delays. If an owner/operator needs the equipment prior to the anticipated delivery date, they would need to rent a piece of compliant non-yard truck equipment. However, compliant rental equipment, with engines meeting the Tier 4i standard, may not be available.

This amendment would allow an owner/operator that has purchased new equipment but has not received it due to manufacturer delays to rent equipment not meeting the current standard for up to six months or until delivery of the compliant equipment, whichever is later. The new proposed regulatory language specifies an application process, which requires that the CHE owner/operator provide to the ARB Executive Officer information about the equipment purchased, including the predicted delivery date, and documentation from representatives of equipment and/or engine manufacturers supporting the claim of non-availability of compliant rental equipment and providing the anticipated date of availability. This amendment would allow owners/operators to meet their operational needs while waiting for the delivery of new equipment.

d. Opacity Based Inspection Program – Sections (e)(2)(A)4., (e)(3)(A)3., and (i)(1)(D)

Engine exhaust opacity testing has been used for two decades to control excessive smoke emissions from heavy-duty on-road diesel trucks and buses. Truck and bus fleets are required to test their fleets for engine exhaust opacity on an annual basis and repair engines that do not meet the set maximum opacity limit. Similarly, opacity testing is being used by VDECS manufacturers as a soot level indicator to determine whether or not an engine is too dirty for their filter to operate properly. Currently proposed amendments to the ARB Verification Procedure, title 13, section 2700, would require that VDECS manufacturer set a maximum engine-out exhaust opacity level for their verified device.

The amendment proposed here would require CHE fleets to measure the engine-out exhaust opacity of all CHE on an annual basis. The requirement would include a phase-in period that would allow time for fleets to obtain opacity meters and have their mechanics trained to perform the test. Training is available at community colleges. Specifications for opacity meters allowed for use are also included. Those fleets that choose not to have their mechanics perform the test could hire a third party to test their engines. Engines with VDECS installed could schedule their opacity test to coincide with normally scheduled VDECS removal for cleaning and inspection.

The amended language sets maximum opacity limits for non-retrofitted engines based on a correlation of opacity with measured PM emissions developed by ARB. Engines for which VDECS are installed would need to meet the limits set by the VDECS manufacturers for the verified device. Testing procedures are included in the amended language. Similar to the on-road engine fleet rule, engines that test dirtier than the maximum opacity limit would need to be repaired such that they meet the engine standards or the engine-out emission limits for the VDECS. Owners/operators will need to include the opacity test results as part of their on-site recordkeeping, as specified in proposed new section (i)(1)(D).

This amendment is needed to help the early identification of engine maintenance issues that result in excessive exhaust soot. This excess soot can result in higher than design emissions. This monitoring test can also identify failure of aftertreatment controls that are part of the certified engine system. These additional recordkeeping requirements would allow ARB to verify that the annual opacity testing is being conducted.

e. Modification of Compliance Schedule to Bring Older Engines into Compliance First- Section (e)(3)(C)1.c.

The compliance schedules in the CHE Regulation organizes the engines in fleets into model year groups and then requires a certain percentage of each group to be brought into compliance each year. In general, compliance for the older model year groups is initiated earlier than that for the newer model year groups. However, the phased compliance schedules overlap such that a certain number of newer model year engines are required to comply before all of the older model year engines have been brought into compliance. This amendment would allow owners/operators to modify their non-yard truck equipment engine compliance schedule such that older model year engines (that are not required to comply until later) are brought into compliance in place of newer model year engines (that are otherwise required to comply earlier). The newer engines would then be required to meet the compliance dates initially established for older engine compliance. The total number of engines that must come into compliance each year for a specific fleet, however, would not change under the proposed amendment. This amendment is the result of a request by owners/operators that wanted to replace all of their older equipment before bringing their newer equipment into compliance.

5. Compliance Extensions

Staff is proposing a number of changes to the Compliance Extensions section that is presented in title 13, CCR section 2479(f) of the current regulation. Staff's proposed amendments for compliance extensions include:

- adding an additional two years to the "No VDECS Available " compliance extension for non-yard truck equipment,
- allowing owners/operators to file an extension request closer to the compliance deadline,
- requiring the compliance of an engine with a "No VDECS Available" extension within six months of being notified by ARB that a safe and feasible VDECS has become available,
- clarifying that reasons for determining that there are no VDECS available include safety considerations,
- expanding the experimental controls extension to include cases where the installation is necessary to obtain data for verification regardless of whether there are other VDECS available, and
- adding a two-year annual compliance extension for a limited number of non-yard truck equipment that operate less than 200 hours annually.

These amendments are discussed in more detail below.

a. No Verified Diesel Emission Control Strategy- Section (f)(2)

The current regulation allows an annual compliance extension to be granted for two years for equipment for which there are no VDECS available. Staff is proposing to allow CHE owners/operators to apply for two additional one-year compliance extensions if the owner/operator can continue to demonstrate that there is no VDECS available for their equipment. These additional extension years are being proposed to provide compliance flexibility for specialty equipment for which VDECS are not yet verified. There are specialty equipment that is not frequently used but is expensive to replace. This may allow additional VDECS to become verified for this equipment. If VDECS do not become available, this adds an additional two years of life to this equipment.

b. Allow Owners/Operators to Request Compliance Extensions Closer to the Compliance Date- Sections (f)(2)(A) and (3)(A)

Staff is also proposing to provide owners/operators with additional time before having to file an extension application. The current regulation requires owners/operators to request an extension six-months prior to the compliance deadline. The proposed amendments would allow owners/operators to request extensions as late as 60 days prior to the compliance deadline. This would allow owners/operators more time to determine if there are VDECS available for their equipment or if there is an experimental control available. This provides more compliance flexibility without impacting emission reductions.

c. *Clarify that Safety is a Consideration for VDECS Availability-Sections (f)(2)(A)4., (f)(3)(B), and (f)(3)(D)*

Staff proposes to add language to the "No VDECS Available" extension to clarify that safety is a consideration in determining if a VDECS is available for equipment. Similar clarifying language was also added to the section allowing for the use of experimental controls when VDCES are unavailable. This is a clarifying amendment. The safe operation of a VDECS has always been a consideration in determining VDECS availability.

d. *Require Retrofit of an Engine with a "No VDECS Available" Extension within Six Months of a VDECS Becoming Available-Section (f)(2)(B)*

Staff is proposing to require that if, at any time while a "No VDECS Available" extension is in effect, a VDECS becomes available for an engine, an owner/operator must install the VDECS, or otherwise bring the engine into compliance, within six months of being notified by ARB that a VDECS has become available. This requirement is already included in section (e)(1)(B)3 which describes the requirements for the installation of VDECS on new equipment. This amendment clarifies that this requirement also applies to in-use equipment.

e. *Allow Experimental Control Extension in Cases where Data is Necessary for Verification-Section (f)(3)*

Staff is proposing to add language that would allow an extension to be granted for the use of a diesel emission control strategy that is not verified if the installation is necessary for collecting data to support verification for that control strategy. This would be granted regardless of whether there were other VDECS available for the equipment. This would allow the verification of a larger number of controls. This amendment was proposed to allow more opportunity for the verification of additional control strategies.

f. *Non-yard Truck Equipment Operated Less Than 200 Hours Annually-Section (f)(6), (i)(2)(I), and (j)(3)(F)*

Staff is proposing adding a low-use compliance extension. This would allow owners/operators with equipment that operates less than 200 hours per year a two-year compliance extension. This extension may be limited, at the Executive Officer's discretion, to 2 percent of a fleet or two pieces of non-yard truck equipment, whichever is greater. This amendment was proposed to allow limited use of back-up equipment that is kept for use when another piece of equipment stops operating. Maintaining this back-up equipment is essential for keeping a terminal or rail yard operating when a ship comes into dock or a train into the rail yard for loading or unloading. Additionally, it may be used for specialty equipment that is used infrequently but would be expensive to replace.

The following requirements would need to be met for this extension:

- install a non-resettable hour meter on the low-use engine,
- submit an application 60 days prior to the compliance deadline,
- identify the engine by manufacturer, serial number, model year, and engine family and series,
- report hours of operation annually, as specified in proposed new section (j)(3)(F), and
- maintain record of engine use, as specified in proposed new section (i)(2)(I).

Owners/operators must provide documentation from the previous year that the engine had operated less than 200 hours. Since the hour meter may not have been on the engine the previous year, other methods for determining the previous year's hours are allowed. These include fuel records or some other credible method upon approval of the Executive Officer. Owners/operators must also identify their fleet size.

The Executive Officer would base the decision regarding limiting the number of extensions on an evaluation of the impact on public health. The parameters to consider would be the numbers of equipment requested, the hours of operation, estimated emissions levels, and the proximity of the equipment to off-site residences.

Amended section 2479(i)(2) specifies the information that must be kept in the vehicle to document that it is operating within the requirements of the low-use extension. This would allow ARB to verify that the equipment is in compliance with the requirements of the low-use extension. The proposed amendments would add annual reporting requirements regarding the operating hours for any equipment that are operating under the proposed low-use extension. These requirements are added to allow ARB to maintain records on equipment operating under this extension.

In addition, this amendment would require that owners/operators notify ARB if engine operation exceeds 200 hours, and the owner/operator must stop operating the engine until it is brought into compliance with the in-use compliance requirements.

6. <u>Exempt Equipment at Low-Throughput Ports in Rural Areas - Section (l)</u>

Staff is proposing to add a paragraph to exempt from the entire CHE Regulation any CHE equipment operating at low-throughput ports located in rural areas. The port must be at least 75 miles from an urban area, as defined by the U.S. Census Bureau. (CB, 2010) An urban area is defined as containing 50,000 or more people. These values were chosen to represent a rural area. The port must have a two-year average annual throughput of less than one million tons excluding petroleum products. Petroleum products are excluded because they do not use CHE. The two-year average annual throughput would be evaluated every year using the arithmetic average of throughput (as reported by the U.S, Army Corps of Engineers Waterborne Commerce Statistics Center) for the previous two years. A two-year average would be used to allow for an occasional high production year. The only California port that presently meets, and is expected to meet in the foreseeable future, these criteria is the Port of Humboldt Bay. If the two-year average annual throughput exceeds the limit of one million tons or the surrounding community's population grows to 50,000 or more then, within six month of the notification of exceeding the limit, the CHE owners/operators at the port would be required to submit a plan showing how they would come into compliance with the CHE Regulation within three years.

This amendment was needed for the Port of Humboldt Bay, the only California port that meets the throughput and location requirements. The North Coast and Humboldt Port Authority requested the exemption because compliance with the CHE Regulation would be economically infeasible for the businesses operating at the port. Additionally, the North Coast is in ozone attainment and does not contribute to any downwind ozone violations.

REFERENCES:

(CB, 2010) Federal Register, Department of Commerce, *Proposed Urban Area Criteria for the 2010 Census; Notice*, August, 2010.

IV. AIR EMISSIONS AND HEALTH IMPACTS FROM PROPOSED AMENDMENTS

This chapter presents the most recent emissions inventory for diesel-fueled cargo CHE engines operating at ports and intermodal rail yards in California, the emissions impacts of the proposed amendments, as well as a discussion on the potential health risks that may occur due to exposures to emissions from CHE.

A. Emissions from Cargo Handling Equipment

Since the original CHE emissions inventory was developed (ARB, 2005a), a number of new data sources became available. A revised 2006 CHE baseline emissions inventory has been developed using those new data sources. The new sources include:

- data associated with CHE regulatory reporting requirements,
- annual emission inventories developed for the ports of Los Angeles and Long Beach (2005 through 2009),
- emissions inventory for the Port of San Diego (2006),
- emissions inventory for the port of Oakland (2005), and
- rail yard health risk assessments (2005).

Baseline emission estimates of diesel PM and NO_x for the year 2006 were developed and emission projections to 2014 and 2020 were developed using estimates of expected growth, effects of the economic downturn, and equipment turnover. In addition, staff updated key assumptions about engine load and annual activity. These updates, as well as the impacts from the proposed amendments are presented below. Details of the emissions inventory methodology and data sources can be found in Appendix B. The updated inventory and emissions model, Cargo Handling Emissions Inventory Model, or CHEI, and the CHEI Working Files are posted on ARB's web site at http://www.arb.ca.gov/ports/cargo/cheamd2011.htm. (ARB, 2011f), (ARB,2011o) Table IV-1 presents the equipment population at ports and intermodal rail yards used in the original 2005 inventory and the updated 2006 baseline inventory for CHE.

Table IV-1: Equipment Population for Baseline Inventory

Equipment Type	Original 2005 Inventory	Updated Inventory
Yard Tractor	2,441	2,368
Forklift	485	778
Container Handling Equipment	559	525
Crane	360 (All Cranes)	342 (RTG Only)*
Construction Equipment	135	195
Other General Industrial Equipment	46	164
Total	**4,026**	**4,372**

*Mobile cranes other than RTG cranes are now covered by either the Off-Road In-Use Equipment Regulation or the On-Road Truck and Bus Regulation.

As shown in Table IV-1, approximately 4,400 pieces of CHE were operating at ports and intermodal rail yards in California in 2006. Of these, approximately 55 percent are yard trucks.

Updated 2006 Baseline Emission Estimates for Diesel-fueled CHE

The updated statewide 2006 diesel PM and NO_x emissions inventory for cargo handling equipment are presented in Table IV-2. The updated 2006 baseline emission inventory for diesel-fueled CHE equipment is approximately 0.54 tons per day or 196 tons per year of diesel PM emissions and 13.4 tons per day of NO_x, statewide. Yard trucks make up the majority of the emissions, representing approximately 55 percent of the diesel PM emissions and 52 percent of the NO_x emissions for CHE. Combined, yard trucks, container handling equipment (top picks, sides picks, etc.), and cranes are responsible for approximately 85 percent of the emissions for all pollutants.

Table IV-2: Estimated Statewide 2006 Cargo Handling Equipment Emissions

Equipment Types	Updated 2006 Baseline Emissions (tons per day)	
	PM	NO_x
Construction Equipment	0.046	1.03
Container Handling Equipment	0.094	3.06
Forklift	0.032	0.56
Other General Industrial Equipment	0.030	0.54
RTG Crane	0.038	1.23
Yard Tractor	0.298	6.98
Totals	**0.538**	**13.4**

The ARB staff also updated the district-specific emissions associated with CHE. The allocation of these estimates is based on the location of the port or intermodal rail yard. Table IV-3 presents a district-by-district estimate of emissions from CHE for the 2006 baseline.

Table IV-3: Estimated 2006 Cargo Handling Equipment Emissions by District (tons per day)[8]

District	PM	NO_x
Bay Area AQMD	0.080	1.91
Yolo-Solano AQMD	0.001	0.02
San Diego County APCD	0.003	0.07
San Joaquin Valley Unified APCD	0.016	0.30
South Coast AQMD	0.436	11.06
Ventura County APCD	0.002	0.04
North Coast Unified AQMD	0.0009	0.02

Note: The following districts did not have emissions allocated to them; Amador, Antelope Valley, Butte, Calaveras, Colusa, El Dorado, Feather River, Glenn, Great Basin Unified, Imperial, Kern, Lake, Lassen, Mariposa, Mendocino, Modoc, Monterey Bay, Unified, Northern Sierra, Northern Sonoma, Placer, Sacramento, San Luis Obispo, Santa Barbara, Shasta, Siskiyou, Tehama, and Tuolumne. (The numbers may not match the statewide totals in Table IV-2 due to rounding.)

Projected 2014 and 2020 Emission Estimates for Cargo Handling Equipment

The updated baseline (without the CHE Regulation) projected emission estimates for the years 2014 and 2020 are presented in Table IV-4. These estimates are based on updated annual growth rates which have been adjusted to reflect the impacts of the recent economic downturn.

[8] The total emissions may vary slightly from the values shown in Table IV-2 due to rounding.

Table IV-4: Cargo Handling Equipment Engines Projected Year 2014 and 2020 Baseline Emission Estimates (Without the CHE Regulation)

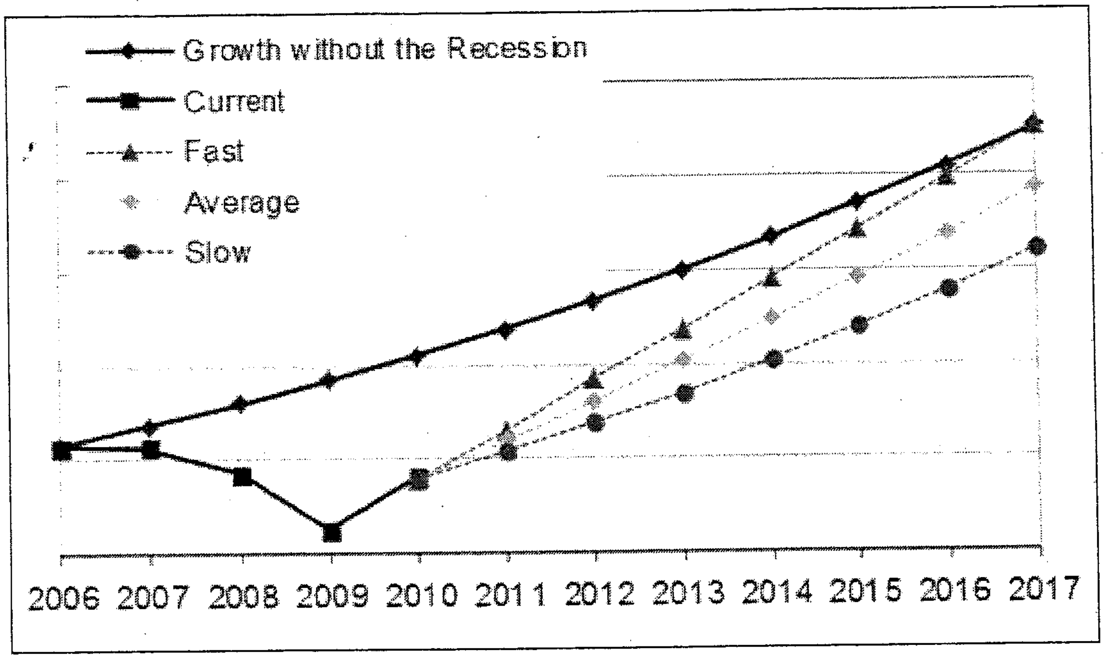
Equipment Types	2014 Emission, (tons per day)		2020 Emission, (tons per day)	
	Diesel PM	NO_x	Diesel PM	NO_x
RTG Cranes	0.03	0.93	0.02	0.71
Construction Equipment	0.04	0.86	0.04	0.78
Forklifts	0.03	0.45	0.02	0.41
Container Handling Equipment	0.07	1.97	0.05	1.32
Other General Industrial Equipment	0.02	0.42	0.02	0.38
Yard Trucks	0.11	2.65	0.04	1.08
Total	**0.30**	**7.3**	**0.20**	**4.7**

Values have been rounded

Projected Equipment Inventory Growth

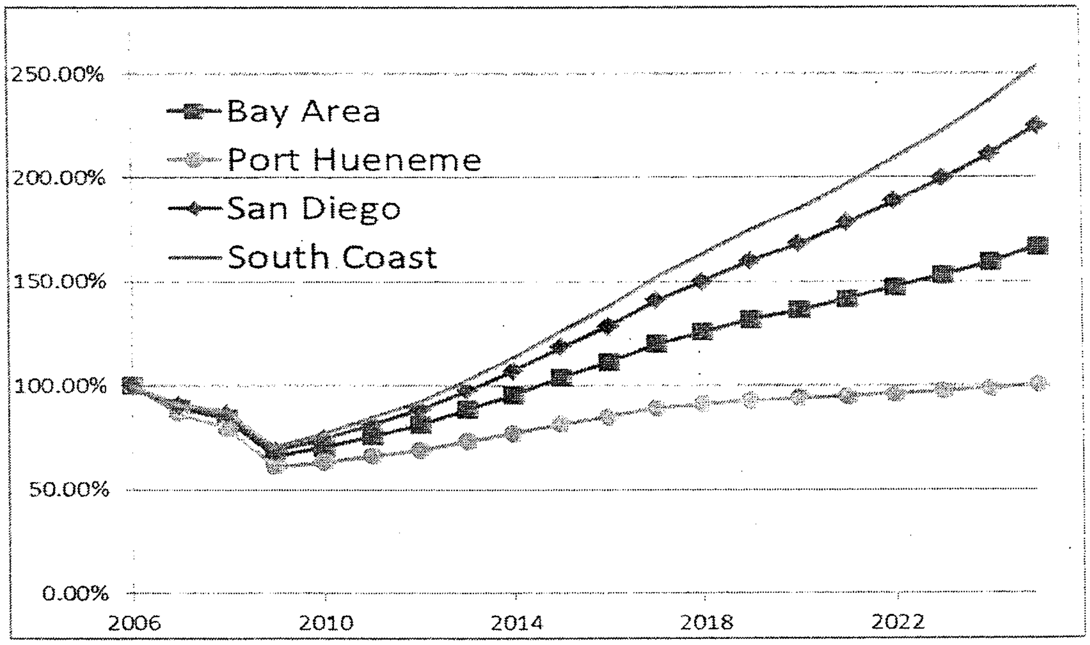
To forecast the impact of the recession on CHE activity, three recovery scenarios were considered to encompass the possible rates of growth of "fast", "slow", and "average". These are shown in Figure IV-1. The fast recovery scenario assumes that total activity would return to projected historically average levels in 2017 and then grow at the historical average rate. For the slow recovery scenario, staff assumed that activity would be permanently depressed relative to historical levels, but continue to grow at historical rates. The average scenario is the average of the fast and slow scenarios. Given the uncertainty in forecasting emissions after such a deep recession, staff relied on the average recovery scenario. This scenario, for the years of interest for these regulatory amendments, was used for the recent ocean-going vessel regulation and is also supported by the most recent San Pedro Bay forecasts. The methodology is consistent with the On-Road Truck and Bus and Off-Road In-Use Equipment rules.

Figure IV-1: Economic Recovery Scenarios



The growth rates were aggregated according to ports and rail yards in the South Coast, San Diego, Bay Area, and Hueneme and are shown in Figure IV-2 below and in Appendix B. The growth rates are composed of two parts, the equipment inventory and equipment activity level. Staff assumed that both the equipment inventory and the equipment hours of use will increase, so the equipment inventory will grow at a factor less than this growth rate, with the increase in hours of use accounting for the remainder. The growth rates for the Bay Area and the South Coast range from 140 to 175 percent in 2020. The equipment inventory projections result in approximately a 140 percent growth compared to the 2006 inventory.

Figure IV-2: Growth Factors for California Ports

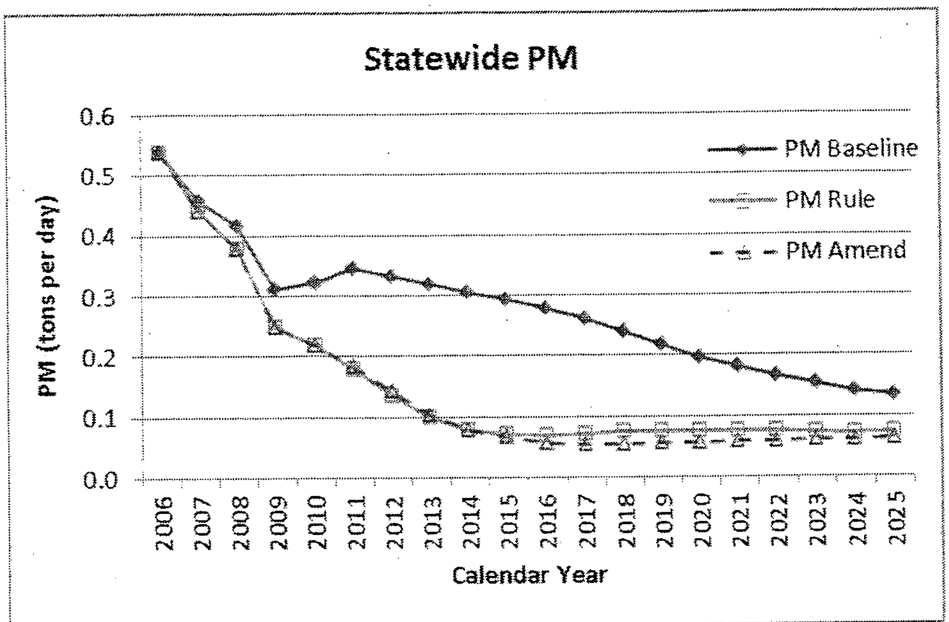


B. Emission Impacts from the Proposed Amendments

Statewide Emission Impacts from Proposed Amendments

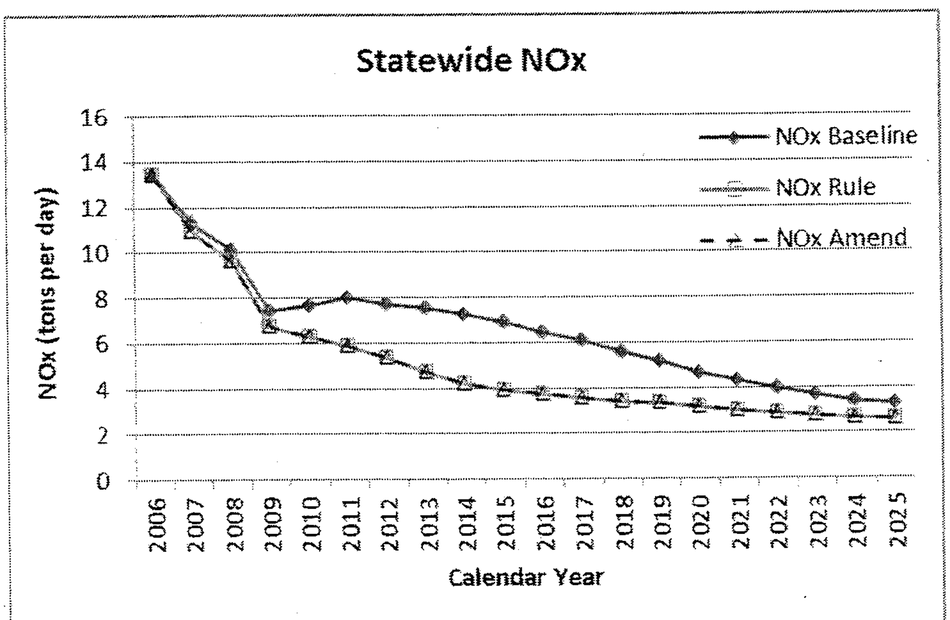
Staff estimated the projected emission impacts from the current adopted CHE Regulation and from the proposed amendments for both statewide PM and NO_x. The increased reductions in the years following the start of CHE Regulation implementation include benefits from the use of equipment retirement and replacement as the preferred compliance options used to date. Overall, we estimate a net impact of the amendments to be 5 percent more diesel PM reductions and 2 percent less NO_x reductions between 2012 and 2020 as compared to reduction estimates for the current rule. As seen in Figure IV-3 and IV-4, the proposed amendments will result in slightly less reductions of diesel PM and NO_x emissions in 2012 through 2016 than originally anticipated. This is due to the delay in emission reductions associated with the proposed low-use and the "No VDECS Available" extensions. However, other proposed amendments will result in slightly more reductions in diesel PM in 2015 and beyond. These additional PM reductions are due to the Tier 4 Alt PM Engine requirement to retrofit with VDECS after one year of in-use service. These retrofits reduce PM but do not provide a NO_x benefit.

Figure IV-3: Projected Statewide PM Emission Estimates from CHE



Note: Baseline is without CHE Rule

Figure IV-4: Projected Statewide NO_x Emission Estimates from CHE



Note: Baseline is without CHE Rule

A comparison of the Statewide emissions inventories for the 2006, 2011, 2014 and 2020 calendar years is provided in Table IV-5 below for the baseline, current adopted CHE Regulation (noted as "Rule"), and the proposed amendments. It is apparent from this table that the statewide emissions inventories for the amendments compared to the rule are the same within about 3 percent for each of the reported years. The exception is benefit of increased reduction in the PM inventory in 2020 due to the amendment to require the retrofit of Tier 4 Alt PM standard engines.

Table IV-5: Emissions Inventory Statewide (tons per day)

Statewide						
Calendar Year	PM (tons per day)			NO_X (tons per day)		
	Baseline*	Rule	Amendments	Baseline*	Rule	Amendments
2006	0.54	0.54	0.54	13.4	13.4	13.4
2011	0.35	0.18	0.19	8.0	5.9	5.9
2014	0.30	0.08	0.08	7.3	4.2	4.3
2020	0.20	0.08	0.06	4.7	3.2	3.1

*Without Rule

The inventories for the South Coast Air Basin and the San Francisco Air Basin are provided in Tables IV-6 and IV-7. The impacts on these two air basins are similarly very small.

Table IV-6: Emissions Inventory for South Coast Air Basin (tons per day)

South Coast Air Basin						
Calendar Year	PM (tons per day)			NO_X (tons per day)		
	Baseline*	Rule	Amendments	Baseline*	Rule	Amendments
2006	0.44	0.44	0.44	11.1	11.1	11.1
2011	0.28	0.15	0.15	6.6	4.9	4.9
2014	0.24	0.07	0.06	5.9	3.4	3.5
2020	0.15	0.06	0.05	3.7	2.6	2.5

*Without Rule

Table IV-7: Emissions Inventory for San Francisco Air Basin (tons per day)

San Francisco Air Basin						
Calendar Year	PM (tons per day)			NO_X (tons per day)		
	Baseline*	Rule	Amendments	Baseline*	Rule	Amendments
2006	0.08	0.08	0.08	1.9	1.9	1.9
2011	0.05	0.03	0.03	1.1	0.9	0.9
2014	0.05	0.01	0.01	1.1	0.7	0.7
2020	0.03	0.01	0.01	0.8	0.5	0.5

*Without Rule

The PM and NO_x emission reductions due to the current adopted CHE Regulation and the emissions reductions impacts due to the proposed amendments are tabulated for the years 2006 through 2020 in Table IV-8 below. The total emission impacts from the proposed amendments are estimated to be a reduction of approximately 0.08 tpd of PM and a small increase of 0.4 tpd of NO_x, as seen in Table IV- 8 below. This is 5 percent additional PM reduction and 2 percent loss in NO_x benefits, as shown in Table IV-9 below. As seen in Table IV-8, the initial delay in PM reductions due to the additional two years of compliance extensions is recovered when the requirement to apply VDECS to the FEL engines becomes effective. Consequently, the net emissions impacts of these amendments over the 2012 to 2020 would be a small reduction in PM emissions and a slight increase in NO_x emissions compared to the original rule.

Table IV-8: Statewide Emission Reductions Attributable to the Existing CHE Regulation and Reductions Attributable to the Proposed Amendments

Calendar Year	Reductions Under the Rule (tons per day)		Reductions due to the Amendments (tons per day)	
	PM	NO_x	PM	NO_x
2006	0.00	0.00	0.000	0.00
2007	0.02	0.37	0.000	0.00
2008	0.04	0.55	0.000	0.00
2009	0.06	0.65	0.000	0.00
2010	0.10	1.37	0.000	0.00
2011	0.17	2.15	0.000	0.00
2012	0.19	2.34	-0.005	-0.13
2013	0.22	2.77	-0.004	-0.12
2014	0.23	3.07	-0.001	-0.13
2015	0.22	3.02	0.004	-0.11
2016	0.21	2.75	0.012	-0.05
2017	0.19	2.50	0.018	0.02
2018	0.16	2.17	0.020	0.05
2019	0.14	1.84	0.020	0.05
2020	0.12	1.50	0.019	0.05
Total	2.08	27.05	0.084	-0.37

Note: Positive numbers indicate emissions reduction. Negative numbers indicate emissions increase.

Table IV-9: Total PM Emissions Reductions and NO_x Emissions Increases Due to Proposed Amendments

Reductions	PM		NO_x	
	Tons	%*	Tons	%*
Emissions Reduced 2012 to 2020 (Tons)	31	5.0%	-135	-1.7%
Annual Average Reductions (Tons per Year)	3	5.0%	-15	-1.7%

*As compared to predicted reductions for current regulation from 2012 to 2020 of 616 tons of PM and 8,015 tons of NO_x .

Emission Impacts on Port of Humboldt Bay

One of the proposed amendments will exempt small ports with a throughput of less than one million tons of cargo handled per year and which are located no closer than 75 miles to an urban area. The Port of Humboldt Bay is the only port in California meeting these requirements. While CHE at the Port would be exempt for the CHE Regulation, the equipment with off-road engines would then be subject to the ARB's Off-Road In-Use Regulation for diesel engines. The equipment with on-road engines would be subject to ARB's On-Road Truck and Bus Regulation. The total number of CHE at the Port of Humboldt Bay is small and the proposed amendment will have an insignificant environmental impact. (ARB, 2011n) Shown below in Table IV-10 are the potential estimated emission differences for the port due to the proposed amendments. The difference in the compliance requirements for the equipment is presented in detail in Chapter V on the economic impacts of the proposed amendments. These emissions increases represent less than a 0.5 percent increase in PM and NO_x emissions due to mobile sources in the North Coast, based on the Almanac Emissions Projection data published in 2009. (ARB, 2009) Additionally, this air district is in attainment of the State and federal ozone standards and does not contribute to violations of State or federal ozone standards for air districts downwind. Consequently, this is determined to be an insignificant emissions increase.

Table IV-10: Comparison of Port of Humboldt Bay Emissions Inventory: Subject to CHE Regulation Compared to Subject to Off-Road In-Use Equipment Regulation

Controlling Regulation	2006-2020 (tons per day)	
	PM	NO_x
Without Amendment: CHE Regulation	0.006	0.18
With Amendment: Off-Road In-Use Regulation	0.013	0.32
Total Potential Difference in Emissions	0.007	0.14

Greenhouse Gas Emission Impacts

The accelerated replacement of older technology engines occurring as a result of the CHE Regulation should reduce greenhouse gas emissions (GHG). However, some actions allowed by the proposed amendments could result in a slight delay in those reductions. Two of the proposed amendments allow CHE owners/operators to delay compliance with the regulation for a year or two, but that delay does not have a significant impact on projected emissions reductions. This is the case with emissions of GHGs as well. One of the amendments, the requirement for an opacity based maintenance program, could result in a reduction in soot levels from CHE. This amendment would require owners/operators to test the exhaust opacity of all their non-yard truck equipment annually. A check of engine opacity would alert mechanics to needed maintenance that would reduce exhaust soot levels contributing to the inventory of carbon black. Overall, these proposed amendments are not anticipated to result in any significant increase or decrease in GHG's. However there is potentially a small decrease in carbon black emissions.

C. Public Health Impacts from the Proposed Amendments

Reducing diesel PM emissions from CHE at ports and intermodal rail yards will have public health and environmental benefits. The proposed amendments will continue to reduce localized potential cancer risks associated with emissions from CHE and will continue to contribute to the reduction of the general exposure to diesel PM that occurs on a region-wide basis due to collective emissions from diesel-fueled engines. Additional benefits associated with the proposed amendments include further progress in meeting the ambient air quality standards for PM_{10}, $PM_{2.5}$, and ozone, and enhancing visibility.

The proposed amendments will result in a temporary delay in diesel PM reductions anticipated in 2011 through 2014 under the original rulemaking. However, the proposed amendments will provide additional reductions in PM in 2015 and beyond. The proposed amendments will also result in a small increase in NO_x emissions from 2012 through 2016 compared to the reductions estimated in the original rulemaking. Staff does not expect any significant adverse health impacts due to the delay in diesel PM reduction or the projected increase in NO_x emission due to the very small magnitude of the emissions and the limited time period over which the emission "increase" will occur.

This section examines the exposures and potential cancer health risks associated with PM emissions from diesel-fueled CHE at ports and intermodal rail yards. This discussion is a brief recap of the discussion of potential exposures and risk presented in the ISOR for CHE Regulation in 2005. (ARB, 2005a) ARB staff believes that the results from the risk assessment presented in that ISOR remain substantially unchanged and are still applicable to the proposed amendments to the CHE regulation as only negligible emission impacts are expected before 2014 and increased emission reductions will occur after that year.

Exposures to Diesel PM

The diesel PM emissions from cargo handling equipment contribute to ambient levels of diesel PM emissions. Based on the updated emissions inventory for the 2006 baseline, there are about 4,400 pieces of diesel-fueled CHE operating at ports and intermodal rail yards in California. The majority of ports and intermodal rail yards are in urban areas and, in most cases, are located near where people live, work, and go to school. This results in exposures to diesel PM emissions from the operation of diesel-fueled cargo handling equipment.

Because analytical tools to distinguish between ambient diesel PM emissions from CHE and that from other sources of diesel PM do not exist, we are unable measure actual exposures to emissions from diesel-fueled cargo handling equipment. However, modeling tools have been be used to estimate potential exposures. In 2004, ARB staff used dispersion modeling to estimate the ambient concentration of diesel PM emissions that result from the operation of cargo handling equipment at the Ports of Los Angeles and Long Beach. The potential cancer risks from exposures to these estimated ambient concentrations of diesel PM were then determined. The complete results from this study and additional details on the methodology used to estimate the health risks are presented in Appendix C of the ISOR prepared for the CHE Regulation in 2005. Because the emission changes due to the proposed amendments were very small and of limited duration, staff did not find it necessary to do a new dispersion modeling analysis and health risk assessment.

The annual diesel PM emission changes due to the proposed amendments at the Ports of Los Angeles and Long Beach are shown in Table IV-6 (Emissions Inventory for South Coast Air Basin). As shown in the table, the annual percent change in diesel PM emissions due to the proposed amendments range from 1 to 2 percent of the annual emissions at the ports. A reasonable approximation of the change in potential cancer risk due to the changes would be on the same order as the percent change in emission. Thus, staff finds that the potential cancer risk impact of the proposed changes are not likely to result in a significant adverse health impact near the Ports of LA and Long Beach. And, by inference, the proposed changes will not have an adverse impact at other ports since the greatest potential for adverse impacts are at these ports, based on the health risk assessments of the Ports of LA and Long Beach and for West Oakland. (ARB, 2006), (ARB, 2008)

REFERENCES:

(ARB, 2005a) California Air Resources Board, *Staff Report: Initial Statement of Reason for Proposed Rulemaking, Regulation for Mobile Cargo Handling Equipment at Ports and Intermodal Rail Yards,* October, 2005.

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(ARB,2011o) California Air Resources Board. "Cargo Handling Emissions Inventory Model Working Files", July, 2011.
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(ARB, 2008) California Air Resources Board. *Diesel Particulate Matter Health Risk Assessment for the West Oakland Community*. December 2008.
http://www.arb.ca.gov/ch/communities/ra/westoakland/documents/westoaklandreport.pdf

V. ECONOMIC IMPACTS FROM PROPOSED AMENDMENTS

In this chapter, we present the estimated costs, savings, and resulting economic impacts associated with implementation of the proposed amendments to the CHE Regulation. The costs and savings presented are the estimated incremental costs and savings associated with the proposed amendments relative to the costs under the original CHE Regulation, which is the cost of industry compliance with the current CHE Regulation.

A. Summary of Statewide Economic Impacts

ARB staff estimates that the proposed amendments will result in a net savings of approximately $1 to $2 million to industry between 2011 and 2020. The proposed amendments are listed in Table V-1 below with a notation as to whether they would result in costs or a savings. Only two of the proposed amendments are anticipated to result in additional costs whereas the others either result in savings or no impact. The estimated cost or savings associated with each amendment is also shown in Table V-1. The savings anticipated from several of the amendments are difficult to estimate with a high level of confidence due to uncertainty as to how often the action allowed by the amendment would be needed. However, estimates were made and the assumptions are discussed in this chapter. The total net savings corresponds to about $100,000 to $200,000 annually on average for the years 2011 through 2020, expressed in 2011 dollars.

Table V-1: Costs or Savings Associated With Proposed Amendments over Years 2011 through 2020 in 2011 Dollars

Amendment Description	Costs	Savings	Costs/(Savings) ($ millions)
1. Additional time for equipment with no VDECS available		X	($4.3)
2. Add safety as provision for no VDECS available extension			0
3. Low-use compliance extension		X	($3.3)
4. Exempt equipment at low-throughput ports in NO_x-exempt areas not within 75 miles of an urban area		X	($1.0)
5. Require CHE opacity testing and set maximum allowable levels	X		$2.1 to $3.1
6. Allow demonstration of emissions equivalency		X	
7. Non-yard truck equipment transfers		X	($1.4)
8. Manufacturer delays for new equipment			0
9. Warranty engine replacement		X	
10. Treat Tier 4 engines certified to FEL Alt PM emissions standards as Tier 3 engines	X		$6.0
11. Add flexibility to extension for experimental diesel PM emissions control		X	0
12. Allow compliance schedule swapping	NA*	NA*	0
Net Costs/(Savings)		X	($1) to ($2)

*Not applicable

B. Legal Requirements

In this section, we explain the legal requirements that must be satisfied in analyzing the economic impacts of the proposed amendments.

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 of, and the ability of California business to compete with businesses in other states.

Also, State agencies are required to estimate the cost or savings to any State or local agency and school district in accordance with instructions adopted by the Department of Finance (DOF). The estimate shall include any non-discretionary cost or savings to local agencies and the cost or savings in federal funding to the State.

In addition, 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 10 million dollars in any single year. The criterion of exceeding 10 million dollars in cost is not met for the proposed amendments. However, we have conducted an economic analysis of two alternatives to the proposal.

C. Methodology

In this section, ARB staff describes the methodology used to estimate the economic impacts from the proposed amendments. The methodology is based on an approach similar to that used when estimating the costs associated with the original 2005 rulemaking.

As mentioned previously, while a majority of the proposed amendments will provide a savings to affected industries, there is uncertainty in how often situations utilizing some of these amendments would arise. The assumptions used to estimate the frequency of these occurrences are presented in the following section.

The costs or saving for each amendment was based on an evaluation of the action allowed by the amendment and estimating the cost or savings. Some amendments allow a delay in capital expenditure whereas others allow an avoidance of capital expenditure. In cases where costs are delayed, the savings is based on the capital expenditure and the cost of money for that expenditure over the delay time period. The cost of money is based on a real annual interest rate of 5 percent.

Capital costs for purchasing equipment and retrofit costs were based on costs for similar off-road equipment used in the cost analysis for the Off-Road In-Use Equipment Regulation. (ARB, 2010a) The costs for the purchase of RTG cranes were based on costs generated for the original CHE Regulation rulemaking. The equipment purchase costs include a premium cost for Tier 4 engines, as developed for the Off-Road In-Use Equipment Regulation, where it would be anticipated that Tier 4 engines would be purchased.

The costs and savings were estimated as future costs in 2011 dollars and then converted to present value dollars. A real interest rate of 5 percent was used for this evaluation.

All costs and savings were compared in present value dollars. This was calculated using the following equation:

Present Value = Future Cost x $1/(1+i)^n$
where i = real interest rate and n = future date – 2011.

The cost estimate for each amendment is discussed in the following section. More detailed information on the cost estimations can be found in Appendix C. Worksheets with the calculations for the economic analysis are posted on ARB's web site at http://www.arb.ca.gov/ports/cargo/cheamd2011.htm. (ARB, 2011g)

D. Costs and Savings Estimated To Result From Proposed Amendments

The following paragraphs provide an explanation of the estimated costs and savings for each amendment listed in Table V-1 above.

1. Additional time for equipment with no VDECS available

This proposed amendment would allow an additional two years of annual compliance extension for in-use non-yard truck equipment for which there are currently no VDECS available. The regulation currently allows two years of annual compliance extension, and requires the in-use equipment to be brought into compliance by repower, replacement, or retirement if there are still no VDECS available when the current two-year extension period expires.

This proposed amendment would allow manufacturers more time to develop VDECS for a wider range of CHE engines. As more VDECS become available, there is more opportunity for owners/operators to comply with the regulation by retrofitting non-yard truck equipment rather than replacing.

This proposed amendment delays the owner/operator's capital expenditure of either replacing the engine or equipment or installing a retrofit. This would save owners/operators the time value of the capital expenditure over two years. The savings was estimated by comparing the cost to replace or retrofit the equipment at the end of the initial two years extension to the cost at the end of the additional two year extension, all in 2011 dollars. This is shown in Table V-2 below. It was assumed that equipment that would be required to comply in 2011 would become eligible for the two additional year extensions once the Board approves the amendments.

It was estimated that about 300 pieces of equipment would be eligible for these additional two years of compliance extension based on the history of the equipment that have been granted extensions in the past and an evaluation of possible safety criteria. It is assumed that at the end of the second two years of extension some of the equipment would be replaced and some would be retrofitted to achieve compliance, depending on the type and age of the equipment.

In order to determine the cost savings, assumptions had to be made as to whether equipment would be retrofitted or replaced at the end of the extension. It was assumed that the equipment would not be retired based on the large numbers of equipment that have already been retired due to the current recession. The compliance path for container handling equipment, construction equipment, and general industrial equipment (approximately 20 percent of the CHE identified for this extension) was assumed to be that half of the equipment would be retrofitted and half of the equipment replaced. The compliance path for forklifts (approximately 80 percent of the CHE identified for this extension) was assumed to be that 10 percent would be retrofitted and 90 percent replaced. These assumptions were based on observed industry practices. Forklifts generally have low residual value near the end of their useful life and it is more cost effective to replace them rather than to retrofit. This analysis is provided in more detail in Appendix C, Table C-4.

Table V-2: Savings from Delayed Expenditure Due to Additional Two Years of "No VDECS Available" Amendment

Year	Equipment Eligible for "No VDECS Available" Extension	Compliance Cost Without Amendment*		Compliance Cost at End of Extension*		(Savings)* Present Value
		Future Cost in 2011 Dollars	Present Value	Future Cost in 2011 Dollars	Present Value	
2011	13	$2,770,000	$2,770,000	-		($260,000)
2012	42	$6,810,000	$6,480,000	-		($600,000)
2013	82	$13,860,000	$12,570,000	$2,770,000	$2,510,000	($1,170,000)
2014	88	$14,710,000	$12,710,000	$6,810,000	$5,880,000	($1,180,000)
2015	87	$14,500,000	$11,930,000	$13,860,000	$11,400,000	($1,110,000)
2016		-		$14,710,000	$11,530,000	
2017		-		$14,500,000	$10,820,000	
2018		-		-		
Total	312	$52,650,000	$46,462,000	$52,650,000	$42,140,000	($4,320,000)

*Values have been rounded

A savings of approximately $4.3 million, in present value dollars, was estimated for the 312 pieces of equipment that are expected to qualify for this extension.

2. Add safety as a provision for evaluating VDECS availability

This proposed amendment would add language specific to safety considerations to the current "No VDECS Available" extension. This is a clarifying amendment and does not provide additional cost savings.

3. Low-use compliance extension

Adding a two year compliance extension for equipment that operate 200 hours per year or less would result in savings for owners/operators who keep back-up CHE for use when other equipment is out of service for maintenance. The number of extensions per fleet would be limited.

This proposed extension would save owners/operators the delayed cost of either retrofitting this equipment or purchasing a new piece of equipment for back-up operation. It was estimated that 176 pieces of equipment would be eligible for this extension. This was based on data from a survey of operators with low-use equipment. Assumptions for retrofit or replacement were similar to those made for the additional two years of compliance extension for equipment without VDECS available discussed in section 1. above. The cost to bring this equipment into compliance at the original compliance date was compared to the cost to bring it into compliance after the two-year extension. The cost savings are shown in Table V-3.

The savings due to the delayed compliance costs for these 176 pieces of equipment are summarized in Table V-3 below. Compliance costs for this equipment would have occurred in 2011 through 2013.

Table V-3: Savings from Delayed Expenditure Due to Low-Use Amendment

Year	Equipment Eligible for Low-Use Extension	Compliance Cost Without Amendment*		Compliance Cost at End of Extension*		(Savings)* Present Value
		Future Cost in 2011 Dollars	Present Value	Future Cost in 2011 Dollars	Present Value	
2011	86	$15,790,000	$15,790,000			($1,470,000)
2012	57	$12,350,000	$11,760,000			($1,090,000)
2013	33	$8,910,000	$8,080,000	$15,790,000	$14,320,000	($750,000)
2014				$12,350,000	$10,670,000	
2015	8			$8,910,000	$7,330,000	
2016						
2017						
2018						
Total	176	$37,050,000	$35,630,000	$37,050,000	$32,320,000	($3,310,000)

*Values have been rounded

A savings of approximately $3.3 million in present value dollars was estimated based on delaying the expenditure of capital for two years. Details are summarized in Appendix C.

4. Exempt equipment at low-throughput ports not within 75 miles of an urban area

The savings associated with the proposal to exempt equipment at small rural ports was estimated based on an analysis of the equipment at the Port of Humboldt Bay. The Port of Humboldt Bay is the only port that meets the criteria for this exemption. An inventory of equipment was generated based on a survey of the companies either operating or planning to operate at the port. Two compliance plans were generated, one for compliance with the CHE Regulation and another for if the equipment were exempted and become subject to the Off-Road In-Use Equipment Regulation. The net present value of the compliance costs for each scenario was estimated in 2011 dollars and compared to determine the cost savings.

There are currently 17 non-compliant pieces of equipment at this port, either operating or planning to operate in the future, as shown in Table V-4 below. These equipment are from three different fleets, identified as fleets A, B, and C in the table. Under the proposed amendment, this equipment would become subject to either the Off-Road In-Use Equipment or On-Road Truck and Bus Regulation, depending on if the equipment has an on-road or an off-road engine. An analysis of the equipment indicated that 16 pieces of equipment would fall under the Off-Road In-Use Equipment Regulation and one (a dump truck with an on-road engine) would fall under the On-Road Truck and Bus Regulation.

Table V-4: Cost Savings for Small Port Equipment Exemption

Fleet	Equipment	Engine Model Year	Max. Horse-power	CHE Compliance***			Off-Road Compliance***		
				Year	Cost in 2011 Dollars	Present Value	Year	Cost in 2011 Dollars	Present Value
A	Loader	1981	200	2011	$177,000	$177,000	2021	$177,000	$109,000
A	Loader	1981	375	2012	$317,000	$302,000	2022	$317,000	$185,000
A	Loader	1982	200	2011	$177,000	$177,000	2025	$177,000	$90,000
A	Loader	1987	215	2012	$189,000	$180,000	2026	$189,000	$91,000
B	Loader	1995	235	2011	$205,000	$205,000	2021	$205,000	$126,000
B	Loader	1987	410	2012	$354,000	$340,000	2022	$354,000	$209,000
B	Loader	2003	180	2011	$25,000	$25,000	N/A**	0	0
B	Loader	1990	250	2013	$217,000	$197,000	2028	$217,000	$95,000
B	Loader	1973	170	2011	$147,000	$147,000	2019	$147,000	$100,000
C	Loader	1981	375	2012	$317,000	$302,000	2019	$317,000	$214,000
C	Loader	2004	260	2011	$25,000	$25,000	N/A**	0	0
C	Log Loader	2005	135	2013	$18,000	$16,000	N/A**	0	0
C	Bulldozer	2003	120	2011	$18,000	$18,000	2028	$153,000	$67,000
C	Bulldozer	1985	300	2012	$370,000	$352,000	2022	$370,000	$216,000
C	Backhoe	2003	85	2011	$18,000	$18,000	2028	$73,000	$32,000
C	Dump Truck*	1996	400	2011	$15,000	$15,000	2012	$15,000	$14,000
C	Fork Lift	1990	120	2011	$84,000	$84,000	2027	$84,000	$51,000
Total Fleet Cost (2011 dollars)				$2,580,000			$1,599,000		
Total Savings Under Off-Road vs. CHE Regulation							($981,000)		

* The dump truck has an on-road engine and therefore would be subject to On-Road Truck and Bus Regulation.

** These pieces of equipment are not required to retrofit because the fleet meets its fleet average target and/or has sufficient BACT carry-over retrofit credit under the Off-Road In-Use Equipment Regulation.

*** Values have been rounded

A comparison of the capital costs to bring equipment at the Port of Humboldt Bay into compliance with the CHE Regulation versus the Off-Road In-Use Equipment Regulation is provided in Table V-4 above. The compliance dates required under each of the regulatory scenarios is given for each piece of equipment in the table. A compliance cost was estimated for each piece of equipment. Each compliance cost was then converted to present value using a 5 percent rate. A summation of the costs in 2011 dollars was made to compare the costs under the two scenarios. The following paragraphs describe the different compliance paths.

For compliance with the CHE Regulation, it was assumed that equipment with off-road engines of 1996 model year and older would be replaced after obtaining a two-year compliance extension, and that these engines would not be repowered or retrofitted. It was assumed that VDECS will be available for engines that are Tier 1 or newer (model year 1996 or newer). Most of the CHE in the identified Port of Humboldt Bay fleets have engines with 1970s and 1980s model years. These equipment were assumed to be replaced. The five pieces of equipment that are model years 2003 to 2005 were assumed to be retrofitted.

The Off-Road In-Use Equipment Regulation is a fleet rule that requires certain non-compliant engines to be replaced or retrofitted beginning in 2019 through 2028, depending on the model year of the engine. The net effect of exempting this equipment from the CHE Regulation and allowing them to comply with the Off-Road In-Use Equipment Regulation would be to delay bringing these pieces of equipment into compliance 7 to 16 years beyond the dates specified in the CHE regulation. All of the equipment under the Off-Road In-Use Equipment Regulation were assumed to be replaced for compliance. This was because the equipment would all be over 25 years old by the time that they were required to comply. Additionally, one of the fleet rule provisions exempts three of the newest engines (model years 2003, 2004 and 2005) from compliance requirements, which would otherwise be scheduled for 2028. The one piece of equipment with an on-road engine, the dump truck, would be required to be retrofitted in 2012 under the On-Road Truck and Bus Regulation.

In summary, compliance costs for the 17 pieces of equipment would be a total of $2.6 million in 2011 dollars under the CHE Regulation. Under the Off-Road In-Use Regulation, the expenditures during 2019-2028 total $1.6 million in present value dollars. The difference is a cost savings to the owners/operators of $981,000 in present value dollars.

5. Require CHE opacity monitoring

This proposed amendment would require annual opacity monitoring of the engine-out exhaust for all CHE engines. Tests for equipment retrofitted with VDCES could be scheduled for when the VDECS is removed for cleaning and inspection. This amendment would result in incremental costs to owners/operators.

Owners/operators may opt to purchase the test equipment and train their mechanics to test the equipment themselves or to hire consultants to test the equipment.

The costs for in-house testing would include an initial capital investment of purchasing the test meter and training the mechanics to perform the tests in addition to the yearly cost to test each engine. Training costs include the class tuition plus the labor cost for the mechanics to attend class. Two one-day (eight-hour) classes are required for certification in the test procedure. Labor rates are estimated at $100 per hour. The tuition for the training classes is $175 per one-day class. The training costs are summarized in Table V-5 below. The total cost for training is estimate to be $1,950 per mechanic.

Table V-5: Opacity Test Training Costs

Cost Category	Cost	Required	Cost for two 8-hour classes
Class tuition	$175/class	2 classes	$350
Labor rate	$100/hour	16 hours	$1,600
Total costs			$1,950

ARB staff assumed that each terminal would train two mechanics. It was assumed that there would be approximately 140 terminals and rail yards based on the initial number of facilities that reported under the CHE Regulation in 2005. Consequently, the total training costs for industry would be $546,000, as presented in Table V-6.

Table V-6: Opacity Test Training Cost for Two Mechanics at 140 Facilities

Cost for two 8-hour classes	Mechanics Per Terminal	Number of Facilities	Training Cost
$1,950	2	140	$546,000

ARB staff estimated the cost for an opacity meters at approximately $5,500 each based on the experience of the ARB staff performing the opacity correlation study. It was assumed that each of the 140 terminals and rail yards would purchase a meter for a total industry cost of $770,000.

The total initial cost for training mechanics and purchasing opacity meters for each of the approximately 140 terminals and rail yards is $1.3 million as summarized below in Table V-7.

Table V-7: Initial Statewide Costs for Mechanic Training and Opacity Meters

Cost Category	Initial Cost*
Mechanic Training	$546,000
Opacity Meters	$770,000
Total Initial Cost	$1,316,000
Total Initial Cost, 2011$	$1,253,000

*Values have been rounded

Testing an engine is estimated to take approximately 30 minutes. At a labor rate of $100/hour, this results in a cost of $50 per engine per year. The total estimated fleet cost is summarized In Table V-8 below:

Table V-8: Statewide Costs for Terminal Mechanics to Conduct Opacity Tests

Calendar Year	Non-Yard Truck Engines	Yard Trucks Engines	Total Engines	Mechanic Testing Cost Per Year*	
				Cost in 2011 Dollars	Present Value
2012	1,585	2464	4,049	$202,000	$193,000
2013	1606	2502	4,108	$205,000	$186,000
2014	1707	2660	4,367	$218,000	$189,000
2015	1841	2853	4,694	$235,000	$193,000
2016	1979	3042	5,021	$251,000	$197,000
2017	2137	3256	5,393	$270,000	$201,000
2018	2256	3419	5,675	$284,000	$202,000
2019	2383	3590	5,973	$299,000	$202,000
2020	2487	3732	6,219	$311,000	$200,000
Total					$1,763,000

*Values have been rounded

The total estimated costs for terminals or rail yards to perform the opacity testing in-house would be the sum of the initial capital costs of $1.2 million plus the recurring cost of testing of $1.8 million dollars for a total of $3.1 million in present value dollars.

The industry cost for opacity testing was also estimated based on consultant costs for testing. Consultant costs to run opacity tests range from $30 to $60 per engine. ARB staff used the higher value of $60 per engine to estimate the opacity test costs of about $2 million in present value dollars over the 2012 to 2020 period, as summarized in Table V-9 below:

Table V-9: Cost for Consultants to Conduct Opacity Tests

Calendar Year	Non-Yard Truck Engines	Yard Trucks Engines	Total Engines	Consultant Testing Cost Per Year*	
				Cost in 2011 Dollars	Present Value
2012	1,585	2464	4,049	$243,000	$231,000
2013	1606	2502	4,108	$246,000	$224,000
2014	1707	2660	4,367	$262,000	$226,000
2015	1841	2853	4,694	$282,000	$232,000
2016	1979	3042	5,021	$301,000	$236,000
2017	2137	3256	5,393	$324,000	$241,000
2018	2256	3419	5,675	$340,000	$242,000
2019	2383	3590	5,973	$358,000	$243,000
2020	2487	3732	6,219	$373,000	$241,000
Total					$2,116,000

*Values have been rounded

Opacity testing costs are estimated to range from $2.1 to $3.1 million in present value dollars, based on the costs for terminals or rail yards to hire a consultant for the testing or the cost to perform the tests themselves.

Engines with monitored opacity levels greater than the limit consistent with their certification level would be required to be repaired. However, this repair cost would not result in additional costs as this would be maintenance required to keep the engine well maintained to operate as originally designed and certified.

6. Allow demonstration of emissions equivalency

Allowing owners/operators to purchase new technology that uses engines that can be demonstrated to achieve the applicable new or in-use emissions limits could possibly result in cost savings to the owners/operators. This proposed amendment would allow flexibility to owners/operators to use hybrid systems developed with Tier 3 engines which could result in fuel cost savings in the long term. Any economic impact is expected to result in savings by virtue of reducing fuel cost over the engine life in excess of any voluntary initial capital investment. These savings are not anticipated to be significant.

7. Non-yard truck equipment transfers

Allowing owners/operators to move their non-yard truck equipment from port-to-port or rail yard-to-rail yard to provide operational flexibility will eliminate the need to purchase redundant equipment. This would result in a savings. The savings to industry would depend upon the number of transfers requested, the cost to purchase the equipment, and transportation costs if the equipment were moved.

The cost savings is estimated to be the difference between the cost to purchase a new piece of equipment and the cost to transport the equipment. ARB staff assumed a purchase cost of approximately $200,000 based on current population of equipment and current replacement costs. The transportation costs would depend on the type and size of equipment and the distance between terminals. The transportation cost could be significant. It is reasonable to assume that an owner/operator would not transfer older equipment if the transfer costs were more than 50 percent of the purchase price. Therefore, ARB staff assumed that transportation costs were 50 percent of the purchase cost, or $100,000 per piece of equipment transferred.

ARB staff assumed that two pieces of equipment are required to be moved each year, over the period from 2012 to 2020. This estimate was based on the assumption that there would be some need for transfers but that it would not be excessive. These transfers are estimated to result in a net savings of $200,000 per year as summarized in Table V-10 below. The total savings, in present value dollars, would be $1.4 million.

Table V-10: Savings Due to Equipment Transfer

Calendar Year	Annual Transfers	Transfer Cost*	Purchase Cost*	(Savings)* in 2011 Dollars	(Savings)* Present Value
2012	2	$200,000	($400,000)	($200,000)	($190,000)
2013	2	$200,000	($400,000)	($200,000)	($181,000)
2014	2	$200,000	($400,000)	($200,000)	($173,000)
2015	2	$200,000	($400,000)	($200,000)	($165,000)
2016	2	$200,000	($400,000)	($200,000)	($157,000)
2017	2	$200,000	($400,000)	($200,000)	($149,000)
2018	2	$200,000	($400,000)	($200,000)	($142,000)
2019	2	$200,000	($400,000)	($200,000)	($135,000)
2020	2	$200,000	($400,000)	($200,000)	($129,000)
Total					($1,421,000)

*Values have been rounded

8. Manufacturer delays for new equipment

This proposed amendment would allow owners/operators who are awaiting the delivery of newly purchased compliant equipment to rent equipment that does not meet current standards for up to six months or until the newly purchased equipment is delivered. This amendment would not result in any costs or savings to the owner/operator.

9. Warranty engine replacement

This proposed amendment would allow the replacement of an engine under warranty with the same engine type in cases of premature engine failure, even when newer engine standards are in place. This would result in a savings to owners/operators. Owners/operators would save the capital cost to acquire a new engine meeting the new emissions standards. However, as the number of engines expected to fail during the warranty is small, this savings is not expected to be significant.

10. Treat Tier 4 engines certified to Alt PM emissions standards as Tier 3 engines

This proposed amendment would require Tier 4 engines certified to FEL Alternate PM (Alt PM) emission standards to be retrofitted with highest level VDECS within one year of acquisition. The FEL Alt PM emissions standards are essentially the same as Tier 3 PM emission standards and do not require the use of original engine manufacturer diesel particulate filters to meet them.

Engine manufacturers are allowed to certify a maximum of 20 percent of their U.S. production to the FEL Alt PM emission standards. Staff was unable to determine what portion of these engines would be delegated to cargo handling equipment. Therefore, it was assumed that 20 percent of all new CHE engines will be certified to the FEL Alt PM emission standards. This resulted in an estimated 224 FEL engines.

The cost for 224 FEL engines to be retrofitted with VDECS was estimated based on the cost as a function of engine horsepower. For this calculation, staff used the distribution of engine sizes predicted by the emissions inventory model for the 224 engines. A summary of the estimated costs per year is provided in Table V-11 below. Details of this calculation are provided in Appendix C. The cost to retrofit was estimated to be $7.0 million. This cost would be incurred during the 2012 to 2015 calendar years. This cost is estimated to be $6.0 million in present value dollars.

Table V-11: Cost for VDECS Retrofits for FEL Alternative PM Engines

Year	Number of FEL Engines	Cost to Retrofit* in 2011 Dollars	Present Value*
2011			
2012	32	$1,070,000	$1,019,000
2013	34	$1,110,000	$1,012,000
2014	56	$1,760,000	$1,521,000
2015	53	$1,640,000	$1,348,000
2016	49	$1,460,000	$1,142,000
2017			
2018			
Total	224	$7,040,000	$6,042,000

*Values have been rounded

Only the initial cost to retrofit is being included for this estimate. Any VDECS maintenance costs would be similar to maintenance costs incurred if an owner/operator was to purchase a Tier 4 certified to the non-FEL standards. As such, these costs were included in the costs associated with the current CHE Regulation.

The emissions benefit of this proposed amendment is tabulated by year in Appendix C. The total benefit for retrofitting the 224 engines was estimated to be a total of 48 tons over the 2012 to 2020 time period. This benefit results in a cost-effectiveness of $63 per pound of PM with all costs attributed to the PM reduction.

The cost to retrofit FEL engines may be an avoidable cost as owners/operators may request engines certified to the non-FEL Tier 4 standards in order to avoid the need to retrofit.

11. Add flexibility to the extension for experimental diesel PM emissions control

This proposed amendment would provide additional compliance flexibility by allowing extensions for use of experimental strategies for non-yard truck equipment when needed to generate information for verification regardless of whether or not there are VDECS available. This proposed amendment would enable the verification of additional control technologies and may result in cost savings. However, these cost savings are not anticipated to be significant.

12. Allow compliance schedule swapping

This proposed amendment would allow CHE owners/operators to modify their non-yard truck compliance schedules such that older model year engines (that happen to have later compliance dates) are brought into compliance in place of newer model year engines (that are required to comply earlier). The number of engines required to comply each year would remain the same. There is not anticipated to be any cost or savings associated with this amendment.

E. Estimated Costs to Businesses

In this section, we summarize the costs, savings, and economic impacts on businesses. ARB staff estimated that while the proposed amendments would result in both costs and savings to businesses, the overall total statewide impact on businesses would be a net savings of $1 to $2 million in present value dollars. The annual net cost savings range from $100,000 to $200,000 over the time period of 2011 to 2020.

It would be expected that the costs and savings associated with the different proposed amendments would impact the different sectors of the industry in a relatively uniform manner. The one exception to this would be the proposed amendment to exempt small rural ports. The approximately $1 million savings associated with this amendment would impact only those businesses operating at the Port of Humboldt Bay.

A summary of the estimated year by year estimated costs is presented in Table V-12 below. Both the minimum and maximum cost estimates are shown for the opacity monitoring program.

Table V-12: Summary of Annual Costs/(Savings) Resulting from Proposed Amendments (Present Value)

Year	Additional 2 Years for VDECS*	Low-Use Extension*	Small Rural Ports Off-Road*	Require Opacity Monitoring		Non-Yard Truck Transfers*	Allow Tier 4 FEL Engines*
				Minimum*	Maximum*		
2011	($257,000)	($1,468,000)	($303,000)				
2012	($603,000)	($1,094,000)	($560,000)	$231,000	$1,446,000	($190,000)	$1,019,000
2013	($1,169,000)	($751,000)	($118,000)	$224,000	$186,000	($181,000)	$1,012,000
2014	($1,181,000)			$226,000	$189,000	($173,000)	$1,521,000
2015	($1,109,000)			$232,000	$193,000	($165,000)	$1,348,000
2016				$236,000	$197,000	($157,000)	$1,142,000
2017				$241,000	$201,000	($149,000)	
2018				$242,000	$202,000	($142,000)	
2019				$243,000	$202,000	($135,000)	
2020				$241,000	$200,000	($129,000)	
Total	($4,319,000)	($3,313,000)	($981,000)	$2,116,000	$3,016,000	($1,421,000)	$6,042,000

* Values have been rounded

Costs to a Typical Business

Cost impacts on businesses that operate at ports or intermodal rail yards, and have diesel powered cargo handling equipment, will vary depending on the age, number, and type of equipment operated.

While the costs associated with an opacity-based maintenance program are fairly predictable for a typical business, the savings provided by the additional two years of extensions for equipment with the proposed "No VDECS Available" or low-use equipment amendments, or savings due to the flexibility to move equipment when business needs arise, are less predictable.

Additionally, the cost to retrofit Tier 4 engines certified to the FEL Alt PM standards may be an avoidable cost. Armed with the knowledge that Tier 4 engines certified to the FEL Alt PM standards will need to be retrofitted, owners/operators may be able to specify an engine that meets the non-FEL standards when purchasing equipment.

The assumptions made to determine estimated costs for a typical business are discussed in the following paragraphs. A typical port container terminal, evaluated for the initial CHE Regulation rulemaking, was selected as a typical business to evaluate. Costs and savings associated with the proposed amendments are tabulated in Table V-13 below for this typical business.

Savings from the proposed No VDECS available and the low-use equipment extensions as well as costs for the proposed FEL engine amendment would be expected to impact this business. While smaller business would not be expected to benefit from the proposed non-yard truck equipment transfers amendment, a container terminal with 77 pieces of equipment may benefit from this amendment. The number of low-use engines was limited to no more than two per business based on the option for ARB to limit the use of this extension.

The estimated equipment that could be affected by the amendments and associated costs and savings are shown in Table V-13 below. As discussed in the section on opacity costs above, the cost for opacity monitoring was estimated assuming compliance in two different ways. The first way is for terminals and rail yards to purchase the opacity measurement device and train employees to perform the monitoring. The other way is to hire a third party consultant to monitor the engines annually. Using in-house employees to monitor engines results in a higher initial cost, but slightly lower on-going costs of $50 per engine tested. The initial cost of purchasing an opacity meter and training two employees is estimated at $9,400. Hiring a third party was assumed to cost $60 per engine test. For the opacity testing, the typical container terminal business would be anticipated to purchase the opacity measurement device and train employees to perform this function, which results in a higher initial cost, but a slightly lower opacity test cost of $50 per engine per year.

Table V-13: Estimated Costs and Savings for Typical Businesses in 2011 Dollars Over 2011 to 2020 Time Period

Business	Typical Container Terminal*
Total Inventory	77
# of Equipment Affected by Amendment (2011 - 2020)	
# No VDECS	4
# Low-Use	2
# Equipment Transfers	1
# FEL engines	4
Costs/(Savings) from 2011 to 2020	
No VDECS	($55,000)
Low-Use	($38,000)
Equipment Transfers	($79,000)
FEL engine	$108,000
Opacity	$44,000
Total	**($20,000)**

* Values have been rounded

The net impact on a typical business over the 2011 through 2020 time period is predicted to be a net savings ranging of $20,000. These costs and savings include both capital and on-going operation and maintenance (O&M) costs. The annual ongoing O&M costs for a typical business are based on the required opacity monitoring. The annual ongoing O&M costs for this typical business are $3,850 per year.

<u>Small Business Costs</u>

Staff estimated the costs and savings for small business associated with the proposed amendments. A survey conducted for the original rulemaking estimated that a typical small business has an average of 11 CHE. The cost for a typical small business was based on this.

For a small business, savings from the proposed non-yard truck equipment transfers amendment are not applicable. However savings from the proposed No VDECS available and the low-use equipment extensions as well as costs for the proposed FEL engine amendment would impact these businesses. The estimated equipment affected by these amendments and associated costs and savings are shown in Table V-14 below. For the typical small business with 11 pieces of equipment it was assumed that it would have two pieces of equipment impacted by the proposed No VDECS available extension and one piece each impacted by the proposed low-use extension and the proposed FEL engine amendment. Small business may have more need for these extensions due to their more limited resources. The opacity monitoring is estimated to cost $60 per equipment per year. These costs are shown for the 2011 to 2020 time period in Table V-14.

Table V-14: Estimated Costs and Savings for Typical Small Businesses in 2011 Dollars Over 2011 to 2020 Time Period

	Typical Small Business
Total Inventory	11
# of Equipment Affected by Amendment (2011 - 2020)	
# No VDECS	2
# Low-Use	1
# Equipment Transfers	0
# FEL engines	1
Costs/(Savings) from 2011 to 2020*	
No VDECS	($27,700)
Low-Use	($18,800)
Equipment Transfers	
FEL engine	$27,000
Opacity	$5,940
Total	**($13,600)**

* Values have been rounded

As shown in this table, the net costs over the 2011 to 2020 time period for this typical small business is estimated to be a cost savings of $12,500. These net costs include both capital and O&M costs. The O&M costs are estimated at $60 per engine per year for this typical small business, or $660 per year.

<u>Potential Business Impacts</u>

In this section, we analyze the potential impacts of the estimated costs of the proposed amendments on business enterprises in California. Section 11346.3 of the Governments Code requires that, in proposing to adopt or amend any administrative regulation, state agencies shall assess the potential for adverse economic impact on California business enterprises and individuals. The assessment shall include a consideration of the impact of the proposed or amended regulation on the ability of California businesses to compete with businesses in other states, the impact on California jobs, and the impact of California business expansion, elimination, or creation.

It is anticipated that there would be no overall impact on business competitiveness. A short delay in capital investment would be expected due to the proposed amendments that provide for a two year delay in compliance for equipment with no VDECS available and low-use equipment. This delay is expected to benefit equipment owners/operators and has no adverse impact on VDECS manufacturers because these manufacturers are unable to supply a marketable VDECS for this equipment at this time. Overall, the proposed amendments are expected to result in cost savings to business, mitigating any negative impact that the original regulation might have on business or jobs.

F. Potential Costs to Local, State, and Federal Agencies

With the exception noted below, this regulation does not directly affect any local and State agencies, or Federal funding of state programs. We anticipate no increase in costs for ARB to assist in implementation of the regulation. Some local agencies established for the oversight of ports also own CHE. The proposed amendments would impose a mandate on some local agencies established for the oversight of ports that also own CHE, but any costs incurred are not reimbursable under Government Code section 17500 et seq. ARB staff estimated that while the amendments would result in both costs and savings, the net impact on specific local agencies that own CHE would be a minor cost savings, similar to the impact on small and typical businesses. The specific agencies and fleets are provided in Appendix C. Table V-15 shows the overall potential costs to local agencies.

Table V-15: Estimated Costs and Savings for Local Agencies in 2011 Dollars Over the 2011 to 2020 Time Period

Business	Total Equipment
Total Inventory	37
# of Equipment Affected by Amendment (2011 - 2020)	
# No VDECS	4
# Low-Use	3
# Equipment Transfers	0
# FEL engines	2
Costs/(Savings) from 2011 to 2020	
No VDECS	($55,400)
Low-Use	($56,500)
Equipment Transfers	
FEL engine	$54,000
Opacity	$20,000
Total	**($37,900)**

G. Analysis of Alternatives

In this section, we compare the proposed amendments to two alternatives: (1) provide an additional three years of annual extensions for equipment for which there are no VDECS instead of the proposal to add an additional two years, and (2) do nothing regarding Tier 4 engines certified to the FEL Alt PM emission standards.

Alternative 1: Three additional years extension for "No VDECS Available"

This alternative would be to provide three additional years of extension for engines for which there are no VDECS available instead of the proposal for two additional years extension. This alternative would extend the emissions reduction delay an additional year and provide additional savings of approximately $2 million. This delay would result in an additional 6 ton increase in the diesel PM emissions and an 81 ton increase in NO_x emissions. The purpose of this amendment is to allow more time for technologies to become verified for use on CHE. Adding an additional year to the extension would extend the compliance delay out to 2018. Staff believes that this additional year of delay would not provide any significant benefits in terms of additional VDECS becoming verified. Tier 4 engines, which will not require retrofits for final compliance with the CHE Regulation if certified to the non-FEL standards, will be fully available by 2015 and the vast majority of CHE would have been brought into compliance. Consequently, there would be little incentive for VDECS manufacturers to continue verification efforts into this time frame. Therefore, staff rejected this alternative because it is not responsive to the purpose of the amendment.

Alternative 2: Do not require Tier 4 engines certified to FEL Alt PM standards to apply VDECS

This alternative would be to not require Tier 4 engines certified to FEL Alt PM standards to apply highest level VDECS within one year of acquisition. This alternative would save $6 million for the regulated industry. However, the PM emissions would be anticipated to increase by a total of 48 tons. This would result in a net PM emissions disbenefit for the amendments. This would possibly allow a significant population of engines not meeting the effective Tier 4 PM standards into the CHE inventory as new engines. Staff rejected this alternative because it would not meet the goals of the original CHE Regulation.

REFERENCES:

(ARB, 2010a) California Air Resources Board. *Proposed Amendment to the Regulation for In-Use Off-Road Diesel-fueled Fleets and the Off-Road Large Spark Ignition Fleet Requirements,* Appendix F: Cost Methodology. October 2010. http://www.arb.ca.gov/regact/2010/offroadlsi10/offroadappf.pdf

(ARB, 2011g) California Air Resources Board. *Economic Analysis Worksheets*, http://www.arb.ca.gov/ports/cargo/cheamd2011.htm, *July 2011.*

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VI. CEQA ENVIRONMENTAL IMPACTS ANALYSIS

In this chapter, ARB staff discusses potential significant adverse environmental impacts from the proposed amendments. This regulation and the associated amendments generally apply statewide. Typical locations where equipment subject to this regulation operate include, but are not limited to ports at Los Angeles, Long Beach, Oakland, Stockton, Hueneme, San Diego, San Francisco, Richmond, Sacramento, Redwood City, Humboldt, and other Bay Area ports, and intermodal rail yards located in Los Angeles, Long Beach, San Bernardino, San Diego, City of Commerce, Oakland, Stockton, Lathrop, City of Industry, Fresno, Richmond, and other Bay Area rail yards. Staff has identified a potential significant adverse impact on air quality due to the proposed amendments. Emissions of diesel PM and NO_x will continue to decrease each year even with the proposed amendments. However, when compared to the emission reductions anticipated for the original rule, there is a potential for small increases in diesel PM emissions in 2012 thorough 2014 and NO_x emissions in 2012 through 2016. Overall, diesel PM emission reduction will be greater under the proposed amendment than the original rule. However, NO_x emission reductions will be slightly less. At the Port of Humboldt Bay, diesel PM and NO_x emissions will be slightly greater than under the original rule, but will remain well below the 2006 baseline levels due to decreased activity. Staff has not identified any other significant adverse environmental impacts due to the proposed action.

The following is a detailed discussion of the potential environmental impacts and feasible mitigation measures to address any significant adverse impacts due to the proposed amendments. Also discussed are feasible alternatives means of complying that would reduce or eliminate any significant adverse impacts.

A. Legal Requirements

The California Environmental Quality Act (CEQA) and ARB policy require an analysis to determine the potential environmental impacts of proposed regulations. Because the ARB's program involving the adoption of regulations has been certified by the Secretary of Resources pursuant to Public Resources Code section 21080.5, the CEQA environmental analysis requirements may be included in the ISOR for this rulemaking. In the ISOR, ARB must include a "functionally equivalent" document, rather than adhering to the format described in CEQA, consisting of an Initial Study, a Negative Declaration, and an Environmental Impact Report. In addition, staff will respond, in the Final Statement of Reasons for the regulation, to all significant environmental issues raised by the public during the public review period or at the Board public hearing.

Public Resources Code section 21159 requires that the environmental impact analysis conducted by ARB include the following:

- An analysis of reasonably foreseeable environmental impacts of the methods of compliance;
- An analysis of reasonably foreseeable feasible mitigation measures; and

- An analysis of reasonably foreseeable alternative means of compliance with the regulation.

B. Reasonably Foreseeable Environmental Impacts of Methods of Compliance

Since the proposed amendments do not require changes to the existing infrastructure at ports or intermodal rail yards, staff finds that, no new facilities, expansion of existing facilities, or changes in operations from the status quo are likely to occur. Therefore, ARB staff finds that there will be no adverse impacts on aesthetics, land-use/planning, population and housing, transportation, agricultural and forestry resources, cultural resources, mineral resources, public services, utility and service systems, geology and soils, hydrology and water quality, or recreation.

Taking a conservative approach, ARB staff has, however, identified a potentially significant adverse environmental impact to air quality from compliance with the proposed amendments. Staff is making this determination even though the amendments will not impact the intended goals of the initially adopted CHE Regulation – to attain 85 percent diesel PM and 75 percent NO_x emissions reductions relative to the 2006 baseline by 2020 – and there will be no actual increase in emissions due to the proposed amendments, merely that the emission reductions in the future will decrease at a slightly lower rate. Nonetheless, staff has concluded that potentially adverse impacts may result from a slight loss in emission reductions 2012 through 2016 associated with the amendments when compared to the emission reductions anticipated from the initially adopted regulation. This is a due to the following proposed amendments:

- Providing an additional two year extension times for compliance where no VDECS systems compatible with the in-use equipment are available.
- Allowing a two year low-use compliance extension.
- Providing an exemption of rural low-throughput ports.

Less Diesel PM and NO_x Emissions Reductions due to the Proposed Amendments for No VDECS Available, Low-Use Equipment, and the Low-Throughput Port Exemption

As discussed in Chapter IV, staff finds that there will potentially be a small decrease in diesel PM and NO_x emission reductions, compared to the reductions anticipated in the original rule, due to the proposed amendments that provide a two year compliance extension when no VDECS are available, the low-use compliance extension, and the exemption for low-throughput ports. The magnitude of the potential decrease in emission reductions is shown in Table VI-1.

The second column in Table VI-1, labeled, "Reductions Under the Rule", shows the diesel PM and NO_x emission reductions anticipated from the current rule without the proposed amendments. The third column labeled "Reductions due to the Amendments" show how much less reductions will be achieved with the proposed amendments. A negative value indicates that the proposed amendments will result in less reductions compared to the original rule.

Table VI-1 Statewide Emission Reductions Attributable to the Existing CHE Regulation and Reductions Attributable to the Proposed Amendments

Calendar Year	Reductions Under the Rule (tpd)		Reductions due to the Amendments (tpd)	
	PM	NO_x	PM	NO_x
2006	0.00	0.00	0.000	0.00
2007	0.02	0.38	0.000	0.00
2008	0.04	0.55	0.000	0.00
2009	0.06	0.65	0.000	0.00
2010	0.11	1.37	0.000	0.00
2011	0.17	2.15	0.000	0.00
2012	0.20	2.34	-0.005	-0.13
2013	0.22	2.77	-0.004	-0.12
2014	0.23	3.07	-0.001	-0.13
2015	0.22	3.02	0.004	-0.11
2016	0.21	2.75	0.012	-0.05
2017	0.19	2.50	0.018	0.02
2018	0.16	2.17	0.020	0.05
2019	0.14	1.84	0.020	0.05
2020	0.12	1.50	0.019	0.05
Total	2.07	27.05	0.084	-0.37

Note: Positive numbers indicate emissions reduction,
Negative numbers indicate emissions increase

Staff anticipates less emission reductions due to the proposed amendments for diesel PM in 2012 through 2014 and for NO_x in 2012 through 2016. However, the magnitude of the change is very small. For example, looking at calendar year 2012 in Table VI-1, staff estimates that the proposed amendments would result in 0.005 tpd less diesel PM reductions and 0.13 tpd less NO_x reductions. What this means is that in 2012, with the proposed amendments, diesel PM reductions would be 0.195 tpd instead of 0.20 tpd and NO_x reductions would be 2.21 tpd instead of 2.34 tpd.

The table also shows (in "Total" row) that future year emission reductions due to the proposed amendments will, overall, result in greater diesel PM reductions than anticipated in the original rule. Over the 2006 through 2020 time period, the proposed amendments will result in 0.084 tpd more diesel PM reductions but 0.37 less NO_x reductions compared to the original rule. However, from 2017 through 2020, annual NO_x emissions will be greater in each year with the amendments than if the original rule were unchanged.

C. Reasonably Foreseeable Mitigation Measures

CEQA requires an agency to identify and adopt feasible mitigation measures that would minimize any significant adverse environmental impact. In this section, ARB staff discusses the mitigation measures that were identified to achieve cost-effective emission reductions while providing CHE owners/operators with additional compliance flexibility.

Potential Mitigation Measures for the Proposed Amendments Allowing No VDECS Available and Low-Use Compliance Extensions

Staff has identified three feasible mitigation measures that will reduce or eliminate the adverse impacts due to the proposed amendments that provide a two year compliance extension when no VDECS are available and the low-use compliance extension. The mitigation measures include: limiting the duration of the extensions, allowing the Executive Officer (EO) to limit the number of low-use extensions per facility, and adding other proposed amendments that will provided emission reductions, beyond those anticipated in the original rule, which will "offset" the impacts of the proposed amendments that would be causing reductions in emission benefits.

The current "No VDECS Available" extension is limited to two years. The proposed amendment would allow up to two additional years for situations where a suitable VDECS is not available. Limiting the duration of the extension to a maximum of four years will partially mitigate the air quality impact of the proposed amendment, because at the end of the extension period, the equipment will either need to be removed from service, replaced with a lower-emissions engine or equipment, or have a VDECS installed. Any of these options will significantly reduce emissions in the future. Further, extending the final compliance date of this equipment may in fact allow the installation of newer, cleaner engines that will become available in the future or new VDECS that may become available in the next few years. Thus, both the PM and NO_x emissions would partially be mitigated by the compliance of equipment at the end of the extension period. Further, the proposed mitigation amendments would require that if a suitable VDECS becomes available during the time period of the extension, ARB would notify the equipment owner/operator, who would be required to install a VDECS within six months; or otherwise bring the equipment into compliance with the CHE Regulation.

The low-use extension is also a limited duration extension. This extension is available for a maximum of two years. At the end of this time period, the owner of the equipment must retire the equipment, replace it with a new engine or equipment, or install a VDECS. As with the "No VDECS Available" extension, the duration of emissions increase is limited, which provides partial mitigation of any increase. Further, to mitigate the potential for numerous extensions at one location, the proposed amendments would incorporate an adaptive management approach to mitigation by giving the EO the authority to limit the number of low-use extensions allowed at individual locations.

We have also included a proposed amendment that would provide additional emission reductions beyond what was required by the original rule. The original rule requires that in-use non-yard truck equipment comply with Tier 4 emission standards by specified dates. ARB subsequently learned that engine manufacturers are certifying some new engines used in CHE to Tier 4 family emission limits (FEL) that are certified to alternate (Alt) PM and Alt NO_x emissions limits. The FEL Alt PM standards allow for emissions that are approximately ten times higher than the non-FEL Tier 4 PM standards. These Alt PM standards are essentially equivalent to Tier 3 PM standards.

In estimating emission reductions from the CHE Regulation, as initially adopted, staff assumed that all Tier 4 engines would be certified to the non-FEL Tier 4 PM standards. If engines certified to these Alt PM standards are introduced into California's ports and intermodal rail yards as Tier 4 engines, emission reductions anticipated with the adoption of the original regulation will be lost. To address this problem, staff is proposing that if engines certified to the Alt PM standards are used at ports or intermodal rail yards, these engines would be treated as if they were Tier 3 engines, and owners/operators would be required to retrofit this equipment with the highest level VDECS available within one year of purchase, lease, or rental. The amendment requiring the use of VDECS on these engines would achieve additional emission reductions that would offset and mitigate potential emission increases from the above-described exemptions for "No VDECS Available" and low-use equipment. The total PM emission reductions from this proposed amendment to require VDECS on FEL Alt PM Tier 4 engines, between the 2012 and December 31, 2020, will be greater than the potential "increase" in emission due to the extensions discussed above.

Additionally, we are including a proposed amendment that would require owners/operators to annually monitor the engine exhaust opacity and provide restorative repair or maintenance if the measured opacity is higher than empirically derived levels for properly maintained engines. An ARB study showed that in-use engine PM emissions from diesel engine fleets that are not well maintained can be significantly higher than the certification levels would indicate. Measuring engine exhaust opacity is a tool that can be used to identify high levels of visible emissions that are an indication that the engine is not operating as designed and that engine maintenance or repair is needed. This proposed amendment would assist owners/operators keep diesel engine emissions within the anticipated design or certification level. While the reduction in diesel PM due to this amendment is not quantifiable, it would provide a measure of mitigation for the short term PM increases in the 2012 to 2014 time frame.

Potential Mitigation Measures for Proposed Rural Low-Throughput Port Exemption

By exempting low-throughput ports in rural areas from the requirements of the CHE Regulation, future anticipated emissions reduction for the single ports that will qualify for the exemption would not be achieved. Two mitigation strategies have been identified to reduce the impact of this proposed amendment. The first mitigation measure would require off-road engines at an exempted port to be subject to ARB's Off-Road In-Use Equipment Regulation. The second measure would require equipment with on-road engines to be subject to the On-Road Truck and Bus Regulation. However, the requirements of these regulations would not achieve the same level of emission reduction in the future or on the same timeline as if this equipment remained subject to the CHE Regulation.

As part of the proposed amendments, staff is employing an adaptive management strategy for the port exemption. The proposed amendments would establish cargo throughput and community population trigger levels which, if exceeded, would require all CHE at the port to come into full compliance with the CHE Regulation within three years. If this were to occur, the emission reductions anticipated in the original rule would be fully realized.

Staff was unable to identify other reasonably foreseeable mitigation measures that could further lessen the potential environmental impacts while meeting the need to provide owners/operators at the Port of Humboldt Bay with needed economic and technical flexibility to comply with the purposes and objectives of the CHE Regulation.

D. Reasonably Foreseeable Alternative Means of Compliance with the Proposed Amendments

Below staff discusses alternative means of compliance with the propose amendments.

No Project Alternative

This alternative would eliminate the identified potential adverse impact associated with the two extension provisions and the low-throughput port exemption. It would, however, negatively impact overall diesel PM emission reductions by eliminating the proposed requirements on FEL engines that would achieve approximately 0.13 tons per day of emission reductions. Most importantly, the No Project Alternative would not address legitimate economic issues associated with equipment where control systems are not available and where equipment is used less than 200 hours per year. There are cases where specialty equipment is needed to unload certain cargo, such as steel and massive wire coils. This specialty equipment is used infrequently but is necessary for these cargos and would be very expensive to replace. Further, it does not address equity issues since a similar provision has been included in ARB's on-road and off-road rules. Lastly, the no project alternative, also would not address the economic issues at the Port of Humboldt Bay. Both the local air district and the port authority have requested relief from the CHE Regulation due to the identified significant impact that the regulation, as initially adopted, will have on the Port of Humboldt Bay businesses. For these reasons, staff rejected this alternative.[9]

[9] While exemptions were provided in these other rules, the CHE Regulation is providing extensions rather than exemptions due to the environmental justice issues associated with a captive fleet surrounded by residential communities.

Reducing the Duration of the Extension Period

This alternative would limit the duration of the "No VDECS Available" extension to one additional year rather than two and limit the low-use extension to one year. This alternative would eliminate the potential adverse air quality impacts for both PM and NO_x due to the proposed extensions because any increases in emissions due to a one-year extension would be effectively off-set by the additional emission reductions from the Tier 4 FEL engine amendment requiring the retrofitting of such engines one-year after introduction at a port or intermodal rail yard.

This alternative would reduce the economic relief that the two-year extensions would have provided by approximately 50 percent, from $7.6 million to $3.8 million, because equipment owners would have to purchase new equipment at the end of the one year. This could potentially have a significant adverse economic impact on some operators, particularly smaller operators. From a program administration and new product development standpoint, staff found that a one-year extension from the CHE Regulation compliance requirement would not be sufficient to address the needs of the regulation in that it would not provide sufficient time for development and verification of new emission control strategies, the underlying purpose of the additional extension years. In staff's opinion, the two additional years provided by the proposed amendments would provide the time needed, for newer, cleaner engines and VDECS to come onto the market, which would result in additional long-term environmental benefits.

The proposed alternative to shorten the "No VDECS Available" and low-use extensions to one year would not address the increased emissions that would result from granting the low-throughput port exemption that applies to the Port of Humboldt Bay and would not off-set any increased emissions resulting from exempting the port. Neither the proposed two-year extensions nor the alternative one-year extensions would address the special economic and environmental circumstances facing that port. Of course, it goes without saying that if the relief of the low-throughput exemption were not provided and the port were able to remain in operation, the limited one-year "No VDECS Available" and low-use extensions that Port of Humboldt CHE could use would substantially lessen the environmental impacts that would otherwise be incurred from granting the low-throughput exemption.

Because the alternative limiting extensions to one year would not address the underlying purposes of the proposed amendments, staff rejected this alternative.

Allow fleet averaging instead of extensions

This alternative would allow for a fleet-wide averaging program instead of allowing for extensions where no VDECS is available or for low-use equipment. This alternative would eliminate the potential adverse air quality impact associated with the "No VDECS Available" and low-use extensions, since, under this alternative, extensions would not be allowed. Instead under the fleet averaging alternative, owners/operators would be able to comply by managing the introduction of lower emissions equipment with higher emissions equipment to ensure that an overall fleet-wide average would be met.

The level of economic relief may be less than under the proposed amendments but difficult to quantify. It may be an economically viable approach for some companies but not others, particularly since we are several years into the implementation of the rule. To allow fleet-wide averaging now, would require significant changes to the regulation and require significant time and effort to address a multitude of issues that would arise regarding compliance, including issues of equity for those owners/operators who have invested significant capital in meeting the originally adopted regulation. Moreover, the fleet average plan may not provide the emissions and flexibility benefits envisioned by the extensions, especially for smaller operators. Those benefits include time to allow new VDECS to come into the market and additional time to work through Cal OSHA safety issues.

For the reasons, outlined above, this alternative would not be intended as an alternative to the low-throughput port exemption, would not address the special economic and environmental issues facing the Port of Humboldt Bay, and would not eliminate the potential adverse air quality impact associated with the low-throughput port exemption. For all of the above reasons, staff rejected this alternative.

ARB staff concludes that the proposed amendments provide the most effective and least burdensome approach to reducing the public's exposure to diesel PM, NO_x, and other air pollutants emitted from diesel-fueled cargo handling equipment and at the same time ensuring the action is technically and economically feasible. Additionally, the compliance responses to these alternatives would not be expected to have any greater or lesser impact on environmental factors other than air emissions.

E. Summary

In summary, staff has determined that between 2012 and December 31, 2020, the proposed amendments, taken as a whole, would provide greater diesel PM reductions than the original rule, fully mitigating the potential adverse impacts of the proposed "No VDECS Available" and low-use extension amendments. However, the proposed mitigation will not fully offset the NO_x emissions "increase" anticipated from the proposed extensions.

Concerning the Low-Throughput Port Exemption, staff finds that the diesel PM and NO_x emission reductions anticipated by the initially adopted CHE Regulation will not be realized. The transfer of equipment at an exempted low-throughput port to the Off-Road In-Use Equipment and On-Road Truck and Bus regulations and the adaptive management proposal may lessen the identified environmental impacts but will not fully avoid the significant or potentially significant impacts. The mitigation measures identified above for the "No VDECS Available" and low-use extensions would not mitigate the impacts at an exempted low-throughput port because the equipment at the port would no longer be subject to the CHE Regulation.

Staff has also found that no reasonably foreseeable alternatives to the amendments proposed would be able to avoid or further lessen the emissions impact of the amendments without jeopardizing the compliance flexibility and potential long-term benefits from development of cleaner, more efficient engines and VDECS that would be achieved from the amendments.

Because the NO_x impacts due to the proposed extension amendments, and the diesel PM and NO_x impacts due the low-throughput port exemption would not be fully mitigated, staff finds that there is a potential for a significant adverse air quality impact due to the proposed amendments. Prior to taking any formal action on the proposed amendments, ARB would have to determine whether overriding consideration exist meriting approval of the amendments.

In balancing the benefits of the proposed amendments against the unavoidable adverse environmental effects, staff weighed the fact that there would be no actual increase in emissions due to the proposed amendments merely that the emission reductions in the future will decrease at a slightly lower rate. Staff weighed this impact against the flexibility that the amendments would provide for compliance and the benefits that would potentially result in both the near and long term. Staff estimates that the two extensions would result in a cost savings to CHE owners of approximated $7.6 million dollars over the next several years and provide flexibility for specialty equipment and small operators. Staff believes that this cost savings and needed flexibility would provide a level of relief, particularly to smaller operators. And, would provide additional time for development and refinement of cleaner, more durable engines and VDECS.

In the case of the low-throughput port exemption, staff finds that the economic impact of taking this action would outweigh the small air quality disbenefit (0.007 tpd PM and 0.14 tpd NO_x). The only port that is likely to qualify for this exemption is the Port of Humboldt Bay. This port is operating well below its historic level due to the recession and it is not anticipated that the port will return to its historic levels for many years. The Port of Humboldt Bay handles approximately 0.2 percent of California's annual port throughput. This port primarily serves the local lumber industry, has had a very difficult time responding to the impacts of the economic downturn due to the close tie of the lumber industry to housing. The North Coast Unified Air Quality Management District (North Coast) and the Humboldt Bay Harbor, Recreation, and Conservation District (Humboldt Bay District) have requested that ARB exempt the Port of Humboldt Bay from the current CHE Regulation. The North Coast is in attainment for ozone and does not contribute to any downwind violations. Staff estimates that the proposed exemptions would provide a saving of about $1 million for port owners/operators. Without the proposed amendment operations at this port would likely be further reduced or eliminated altogether.

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Appendix A

Proposed Regulation Order: Title 13, Proposed Amendments to the Regulation for Mobile Cargo Handling Equipment at Ports and Intermodal Rail Yards

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PROPOSED FINAL REGULATION ORDER

AMENDMENTS TO THE REGULATION FOR MOBILE CARGO HANDLING EQUIPMENT AT PORTS AND INTERMODAL RAIL YARDS

Amend title 13, California Code of Regulations (CCR) section 2479.
Proposed amendments are shown in underline to indicate additions and ~~strikeout~~ to indicate deletions.

Section 2479. Regulation for Mobile Cargo Handling Equipment at Ports and Intermodal Rail Yards.

(a) Purpose

The purpose of this regulation is to reduce diesel particulate matter (PM) and criteria pollutant emissions from compression ignition (CI) mobile cargo handling equipment that operate at ports and intermodal rail yards in the state of California.

(b) Applicability

Except as provided in subsection (c), the regulation would apply to any person who conducts business in California who sells, offers for sale, leases, rents, purchases, owns or operates any CI mobile cargo handling equipment that operates at any California port or intermodal rail yard. <u>Mobile cargo handling equipment propelled by engines certified to a cycle other than the diesel cycle, i.e. otto cycle engine, are not subject to this section.</u>

(c) Exemptions

(1) The requirements of this section do not apply to<u>:</u>

<u>(A)</u> mobile cargo handling equipment that do not operate at a port or intermodal rail yard;

(~~2~~<u>B</u>) ~~The requirements of this section do not apply to~~ portable CI engines;

~~(3) The requirements of subsections (e), (f), (g), (h), and (i) do not apply to mobile cargo handling equipment that are not used to handle cargo at any time but are used for transporting personnel or fuel delivery. Examples include, but are not limited to, fuel delivery trucks operating solely at the terminal to deliver fuel to terminal equipment and vans and buses used to transport personnel;~~

(~~4~~<u>C</u>) ~~The requirements of this section do not apply to~~ military tactical support cargo handling equipment;

(D) equipment used solely to support construction activities at a port or intermodal rail yard;

(~~5~~E) ~~The requirements of this section do not apply to~~ mobile cranes as defined in subsection (d)(3~~3~~9); ~~and~~

(~~5~~F) ~~The requirements of this section to not apply to~~ sweepers as defined in subsection (d)(~~54~~63); and

(G) rented, leased, or contracted equipment brought onto a port or intermodal rail yard to perform unexpected repairs that are not routine in nature or due to predictable maintenance activities.

(~~3~~2) The requirements of subsections (e) through (j) do not apply to mobile cargo handling equipment that are used exclusively for transporting personnel or delivering fuel to equipment or vehicles on terminal or rail yard property. Examples include, but are not limited to, fuel delivery trucks operating solely at the terminal to deliver fuel to terminal equipment and vans and buses used to transport personnel.

(3) The requirements of subsection (e)(1)(B) do not apply to:

(A) a replacement engine for an engine that has failed during its warranty period and replaced per the warranty provisions.

(B) non-yard truck cargo handling equipment that is owned, leased, or rented by an owner or operator of a port terminal or intermodal rail yard and has been moved from one port terminal or intermodal rail yard to another port terminal or intermodal rail yard under the control of the same owner or operator and has received approval for such transfer under subsection (k) below.

(d) Definitions

For purposes of this section, the definitions of Health and Safety Code section 39010 through 39060 shall apply except to extent that such definitions may be modified by the following definitions that apply specifically to this regulation:

(1) "Alternative Diesel Fuel" means any fuel used in a CI engine that is not commonly or commercially known, sold, or represented by the supplier as diesel fuel No. 1-D or No. 2-D, pursuant to the specifications in ASTM D975-81, "Standard Specification for Diesel Fuel Oils," as modified in May 1982, which is incorporated herein by reference, or an alternative fuel, and does not require engine or fuel system modifications for the engine to operate, although minor modifications (e.g., recalibration of the engine fuel control) may enhance performance. Examples of alternative diesel fuels include, but are not limited to, biodiesel that does not meet the definition of CARB diesel fuel; Fischer-Tropsch fuels; emulsions of water in diesel fuel; and fuels with a fuel additive, unless:

(A) the additive is supplied to the engine fuel by an on-board dosing mechanism, or

(B) the additive is directly mixed into the base fuel inside the fuel tank of the engine, or

(C) the additive and base fuel are not mixed until engine fueling commences, and no more additive plus base fuel combination is mixed than required for a single fueling of a single engine.

(2) "Alternative Fuel" means natural gas, propane, ethanol, methanol, gasoline (when used in hybrid electric mobile cargo handling equipment only), hydrogen, electricity, fuel cells, or advanced technologies that do not rely on diesel fuel. "Alternative fuel" also means any of these fuels used in combination with each other or in combination with other non-diesel fuel.

(~~2~~3) "Alternate PM Standard" means one of the Family Emissions Limits (FEL) standards that are currently available to engine manufacturers under title 13, California Code of Regulations (CCR), section 2423. Alternate standards are of limited duration and may be selectively applied to total or partial engine family production volumes.

(~~3~~4) "Basic Container Handling Equipment" means mobile cargo handling equipment, other than yard trucks, bulk cargo handling equipment, and RTG cranes, used to handle cargo containers. Basic Container Handling Equipment includes but is not limited to top handlers, side handlers, reach stackers, straddle carriers, and forklifts.

(~~4~~5) "Bulk Cargo Handling Equipment" means mobile cargo handling equipment, other than yard trucks, basic container handling equipment, and RTG cranes, generally used to move non-containerized cargo, including but not limited to dozers, excavators, loaders, tractors, mobile cranes (excluding rubber-tired gantry cranes), aerial lifts, and sweepers.

(~~5~~6) "California Air Resources Board (CARB) Diesel Fuel" means any diesel fuel that meets the specifications of vehicular diesel fuel, as defined in title 13 CCR, sections 2281, 2282, and 2284.

(~~6~~7) "Carbon Monoxide (CO)" is a colorless, odorless gas resulting from the incomplete combustion of hydrocarbon fuels.

(8) "Cargo" means material, goods, or commodities that have been or will be transported to or from a port or intermodal rail yard by ship, train, truck, or other mode of transportation.

(~~7~~9) "Cargo Handling Equipment" means any off-road, self-propelled vehicle or equipment used at a port or intermodal rail yard to lift or move container, bulk, or liquid cargo carried by ship, train, or another vehicle, or used to perform maintenance and repair activities that are routinely scheduled or that are due to predictable process upsets. Equipment includes, but is not limited to, rubber-tired gantry cranes, yard trucks, top handlers, side handlers, reach stackers, forklifts, loaders, aerial lifts, excavators, and dozers.

(~~8~~10) "Certified Off-road Diesel Engine" means an engine certified to California off-road engine emission standards under title 13 CCR, section 2423.

(11) "Class I Railroad" is a freight railway based on large revenues ($250 million or more) in comparison to the revenues of Class II (which ranges from greater than $20 million but less than $250 million) and Class III (less than $20 million) railways, as defined by the Surface Transportation Board.

(~~9~~12) "Certified On-road Diesel Engine" means an engine certified to California on-road diesel engine emission standards under title 13 CCR, section 1956.8.

(~~10~~13) "Compression Ignition (CI) Engine" means an internal combustion engine with operating characteristics significantly similar to the theoretical diesel combustion cycle. The regulation of power by controlling fuel supply in lieu of a throttle is indicative of a compression ignition engine. Any engine certified under the diesel cycle is included under the definition of a compression ignition engine.

(14) "Construction Activities" means any activities at a port or intermodal rail yard that is preparatory to or involved with the building, alteration, rehabilitation, demolition, or improvement of property, including, but not limited to, the following activities; grading excavation, loading, crushing, cutting, planning, shaping, or ground breaking.

(~~11~~15) "Contiguous Properties" means two or more parcels of land with a common boundary or separated solely by a public roadway or other public right-of-way.

(~~12~~16) "Diesel Fuel" means any fuel that is commonly or commercially known, sold, or represented by the supplier as diesel fuel, including any mixture of primarily liquid hydrocarbons (HC) - organic compounds consisting exclusively of the elements carbon and hydrogen - that is sold or represented by the supplier as suitable for use in an internal combustion, compression-ignition engine.

(~~13~~17) "Diesel-Fueled" means a CI engine fueled by diesel fuel, CARB diesel fuel, or jet fuel, in whole or part.

(~~14~~18) "Diesel Oxidation Catalyst (DOC)" means a catalyst promoting oxidation processes in diesel exhaust, and usually designed to reduce emissions of the organic fraction of diesel particulates, gas-phase HC, and CO.

(~~15~~19) "Diesel Particulate Filter (DPF)" means an emission control technology that reduces PM emissions by trapping the particles in a flow filter substrate and periodically removes the collected particles by either physical action or by oxidizing (burning off) the particles in a process called regeneration.

(~~16~~20) "Diesel Particulate Matter (Diesel PM)" means the particles found in the exhaust of diesel-fueled CI engines. Diesel PM may agglomerate and adsorb other species to form structures of complex physical and chemical properties.

(~~17~~21) "Dozer" means an off-road tractor, either tracked or wheeled, equipped with a blade.

(~~18~~22) "Emission Control Strategy" means any device, system, or strategy employed with a diesel engine that is intended to reduce emissions, including, but not limited to, diesel oxidation catalysts, selective catalytic reduction systems, fuel additives, diesel particulate filters, alternative diesel fuels, water emulsified fuels, and any combination of the above.

(~~19~~23) "Excavator" means an off-road vehicle consisting of a backhoe and cab mounted on a pivot atop an undercarriage with tracks or wheels.

(~~20~~24) "Executive Officer" means the Executive Officer of the California Air Resources Board or his/her designee.

(25) "Family Emissions Limits (FEL)" means an emission level that is declared by the manufacturer to serve in lieu of an emissions standard for certification purposes and for the averaging, banking, and trading program as defined in title 13, CCR, section 2423.

(~~21~~26) "Fleet" means the total number of mobile cargo handling equipment vehicles owned, rented, or leased by an owner or operator at a specific terminal or intermodal yard location.

(~~22~~27) "Forklift" means an off-road industrial truck used to hoist and transport materials by means of steel fork(s) under the load.

(~~23~~28) "Fuel Additive" means any substance designed to be added to fuel or fuel systems or other engine-related engine systems such that it is present in-cylinder during combustion and has any of the following effects: decreased emissions, improved fuel economy, increased performance of the engine; or assists diesel emission control strategies in decreasing emissions, or improving fuel economy or increasing performance of the engine.

(~~24~~29) "Heavy-duty Pilot Ignition Engine" means an engine designed to operate using an alternative fuel, except that diesel fuel is used for pilot ignition at an average ratio of no more than one part diesel fuel to ten parts total fuel on any energy equivalent basis. An engine that can operate or idle solely on diesel fuel at any time does not meet this definition.

(~~25~~30) "Hydrocarbon (HC)" means the sum of all hydrocarbon air pollutants.

(~~26~~31) "In-Use" means a CI engine that is not a "new" CI engine.

(~~27~~32) "Intermodal Rail Yard" means any transportation facility, owned or operated by a Class I Railroad, which is primarily dedicated to the business of ~~rail and/or~~ intermodal rail operations where cargo is transferred to or from a train and any other form of conveyance, such as train to ship, ship to train, train to truck, or truck to train.

(~~28~~33) "Lease" means a contract by which one conveys cargo handling equipment for a specified term and for a specified rent.

(~~29~~34) "Level" means one of three categories of Air Resources Board-verified diesel emission control strategies as set forth in title 13, CCR, section 2701 et seq: Level 1 means the strategy reduces engine diesel particulate matter emissions by between 25 and 49 percent, Level 2 means the strategy reduces engine diesel particulate matter emissions by between 50 and 84 percent, and Level 3 means the strategy reduces engine diesel particulate matter emissions by 85 percent or greater, or reduces engine emissions to less than or equal to 0.01 grams diesel PM per brake horsepower-hour.

(~~30~~35) "Loader" means any type of off-road tractor with either tracks or rubber tires that uses a bucket on the end of movable arms to lift and move material; can be also referred to as a front-end loader, front loader, skid steer loader, backhoe, rubber-tired loader, or wheeled loader.

(36) "Low-throughput Port" means a port that has a two-year average annual cargo throughput of less than one million tons per year, not including petroleum products, as reported by the U.S. Army Corps of Engineers, Waterborne Commerce Statistics Center.

(~~31~~37) "Military Tactical Support Cargo Handling Equipment" means cargo handling equipment that meets military specifications, owned by the U.S. Department of Defense and/or the U.S. military services, and used in combat, combat support, combat service support, tactical or relief operations, or training for such operations.

(~~32~~38) "Minimum Use Requirement" means an agreement, as part of state or local incentive funding programs or written agreement between mobile cargo handling equipment owners or operators and the Ports of Long Beach, Los Angeles, or Oakland, to use an emission control device on mobile cargo handling equipment for a specified minimum number of years and/or hours.

(~~33~~39) "Mobile Crane" means a mobile machine, other than a rubber-tired gantry crane, with a hoisting mechanism mounted on a specially constructed truck chassis or carrier; a mobile crane can either be a single-engine crane or a two-engine crane.

(~~34~~40) "Model Year" means the CI engine manufacturer's annual production period, which includes January 1st of a calendar year, or if the manufacturer has no annual production period, the calendar year.

(~~35~~41) "Newly Purchased, Leased, or Rented Cargo Handling Equipment" means mobile cargo handling equipment~~,~~ or a diesel-fueled CI engine installed in mobile cargo handling equipment~~,~~ that is newly purchased, rented, ~~or~~ leased, or otherwise brought onto a port or intermodal rail yard by an owner or operator on or after January 1, 2007, and is operated at a port or intermodal rail yard in the state of California after January 1, 2007.

(~~36~~42) "Nitrogen Oxides (NOx)" means compounds of nitric oxide (NO), nitrogen dioxide (NO_2), and other oxides of nitrogen, which are typically created during combustion processes and are major contributors to smog formation and acid deposition.

(~~37~~43) "Non-Methane Hydrocarbons (NMHC)" means the sum of all HC air pollutants except methane.

(~~38~~44) "Non-Yard Truck Mobile Cargo Handling Equipment" means all mobile cargo handling equipment other than yard trucks.

(~~39~~45) "Ocean-going Vessel" means a commercial, government, or military vessel meeting any one of the following criteria:

(A) a vessel with a "registry" (foreign trade) endorsement on its United States Coast Guard certificate of documentation, or a vessel that is registered under the flag of a country other than the United States;
(B) a vessel greater than or equal to 400 feet in length overall (LOA) as defined in 50 CFR § 679.2, as adopted June 19, 1996;
(C) a vessel greater than or equal to 10,000 gross tons (GT ITC) per the convention measurement (international system) as defined in 46 CFR 69.51-.61, as adopted September 12, 1989; or
(D) a vessel propelled by a marine compression ignition engine with a per-cylinder displacement of greater than or equal to 30 liters.

(~~40~~46) "Off-Road Engine" means an engine used in an off-road vehicle, or piece of equipment, including a certified on-road diesel engine.

(~~41~~47) "Off-Road Vehicle or Equipment" means any non-stationary device, including registered motor vehicles, powered by an internal combustion engine or motor, used primarily off the highways to propel, move, or transport persons or property.

(48) "Opacity" means the fraction of a beam of light, expressed in percent, which fails to penetrate a plume of smoke.

(49) "Otto cycle Engine" means a type of engine with operating characteristics significantly similar to the theoretical Otto combustion cycle. The primary means for controlling power output in an Otto cycle engine is by limiting the amount of air and fuel that can enter the combustion chambers of the engine. Gasoline-fueled engines are Otto cycle engines.

(~~42~~50) "Owner or Operator" means any person that owns or operates a port terminal or intermodal rail yard subject to the requirements of this section, including but not limited to:

(A) an individual, trust, firm, joint stock company, business concern, partnership, limited liability company, association, or corporation including but not limited to, a government corporation; and

(B) any city, county, district, commission, the state or any department, agency, or political subdivision thereof, any interstate body, and the federal government or any department or agency thereof to the extent permitted by law.

(~~43~~51) "Particulate Matter (PM)" means the particles found in the exhaust of CI engines, which may agglomerate and adsorb other species to form structures of complex physical and chemical properties.

(~~44~~52) "Port" is a publically or privately owned property located at a harbor or along a waterway where marine and port terminals typically load or unload water-borne commerce onto and from ocean-going vessels; a port includes all property within the physical boundaries of the port or demarcated as the port on city or county land maps as well as other contiguous or adjacent properties owned or operated by the port. ~~means a place, which typically consists of different terminals, where cargo is loaded onto and unloaded from ocean-going vessels primarily.~~ A port includes military terminals that operate cargo handling equipment when located as part of, or on contiguous properties with, non-military terminals.

(~~45~~53) "Portable CI Engine" means a compression ignition (CI) engine designed and capable of being carried or moved from one location to another. Indicators of portability include, but are not limited to, wheels, skids, carrying handles, dolly, trailer, or platform. Portable engines are not self-propelled.

(~~46~~54) "Purchased" means the date shown on the front of the cashed check, the date of the financial transaction, or the date on the engine purchasing agreement, whichever is earliest.

(~~47~~55) "Railcar Mover" means an off-road vehicle fitted with rail couplers and capable of traveling on both roads and rail tracks.

(~~48~~56) "Reach Stacker" means an off-road truck-like cargo container handler that uses an overhead telescopic boom that can reach across two or more stacks of cargo containers and lift the containers from the top.

(~~49~~57) "Registered Motor Vehicle" means a yard truck or other cargo handling vehicle that is registered as a motor vehicle under Vehicle Code section 4000, et seq.

(~~50~~58) "Rent" means payment for the use of mobile cargo handling equipment for a specified term.

(~~51~~59) "Retirement" or "Retire" means an engine or vehicle that will be taken out of service by an owner or operator, ~~and~~ will not be operated at any port or intermodal rail yard in the State of California by the same or different owner or operator, and will not be replaced with a new engine or vehicle. The engine may be sold outside of California or scrapped.

(~~52~~60) "Rubber-tired Gantry Crane or RTG Crane" means an off-road overhead cargo container crane with the lifting mechanism mounted on a cross-beam supported on vertical legs which run on rubber tires. RTG cranes do not include gantry cranes that operate on steel wheels and rails.

(61) "Safe" means cargo handling equipment that can be operated with little or no additional risk of operational accidents due to, but not limited to, installation of verified diesel emission control strategies that impair the operator's operational vision to the front and sides or change vehicle balance. An Executive Officer determination regarding safe use shall be consistent with California and federal safety regulations and rulings.

(~~53~~62) "Side Handler or Side Pick" means an off-road truck-like cargo container handler that uses an overhead telescopic boom to lift empty or loaded cargo containers by grabbing either two top corners on the longest side of a container, both arms of one side of a container, or both top and bottom sides of a container.

(~~54~~63) "Sweeper" means an off-road vehicle with attached brushes underneath that sweep the ground and pick up dirt and debris.

(~~55~~64) "Terminal" means a facility, including one owned or operated by the Department of Defense or the U.S. military services, that operates cargo handling equipment at a port or intermodal rail yard.

(~~56~~65) "Tier 4 Off-road Emission Standards" means the emission standards promulgated by the United States Environmental Protection Agency in "Control of Emissions of Air Pollution from Nonroad Diesel Engines and Fuel; Final Rule" (Vol. 69, No. 124 Fed. Reg. pp. 38957-39273, June 29, 2004) which harmonize with the final amended emission standards for newly manufactured off-road engines approved by the Air Resources Board on December 12, 2004.

(~~57~~66) "Top Handler or Top Pick" means an off-road truck-like cargo container handler that uses an overhead telescopic boom to lift empty or loaded cargo containers by grabbing the top of the containers.

(67) "Two-year Average Annual Cargo Throughput" means the arithmetic average of the annual cargo throughput, not including petroleum products, as reported by the U.S. Army Corps of Engineers, Waterborne Commerce Statistics Center, for the most recently reported calendar year and the calendar year immediately preceding that year.

(68) "Urban Area" means a densely developed territory that contains 50,000 or more people as defined by the latest U.S. Census Bureau census.

(~~58~~69) "Verification Procedure, Warranty and In-Use Compliance Requirements for In-Use Strategies to Control Emissions from Diesel Engines (Verification Procedure)" means the Air Resources Board (ARB) regulatory procedure codified in title 13, CCR, sections 2700-2710, which is incorporated herein by reference, that engine manufacturers, sellers, owners, or operators may use to verify the reductions of diesel PM and/or NOx from in-use diesel engines using a particular emission control strategy.

(~~59~~70) "Verified Diesel Emission Control Strategy (VDECS)" means an emission control strategy, designed primarily for the reduction of diesel PM emissions, which has been verified pursuant to the "Verification Procedure for In-Use Strategies to Control Emissions from Diesel Engines" in title 13, California Code of Regulations, commencing with section 2700.

(71) "Warranty Period" means the period of time and/or mileage that the vehicle, engine, or part is covered by the engine manufacturer's new engine warranty provisions.

(72) "Water-borne Commerce" means the movement of materials, goods or commodities using vessels or other craft plying upon navigable waters of the United States.

(~~60~~73) "Yard truck" means an off-road mobile utility vehicle used to carry cargo containers with or without chassis; also known as utility tractor rig (UTR), yard tractor, yard goat, yard hostler, yard hustler, or prime mover.

(e) Requirements

(1) Newly Purchased, Leased, or Rented Equipment Performance Standards:

(A) Yard Trucks:

1. Except as provided in subsection (c), on or after January 1, 2007, no owner or operator shall operate any newly purchased, leased, or rented yard trucks unless they are equipped with the following types of engines:

   a. Yard trucks that are registered as motor vehicles shall be equipped with engines that meet the on-road emission standards as specified in title 13, California Code of Regulations, section 1956.8, for the model year in which the yard trucks and engines were newly purchased, leased, or rented.

   b. Yard trucks that are *not* registered as motor vehicles shall be equipped with engines:

i. that are certified to the on-road emission standards set forth in title 13, CCR, section 1956.8; for the model year in which the yard trucks and engines were newly purchased, leased, or rented; or
ii. that have been certified to meet the final Tier 4 off-road emission standards for the rated horsepower.

(B) Non-Yard Truck Cargo Handling Equipment:

1. ~~Except as provided in subsection (c), o~~On or after January 1, 2007, no owner or operator shall operate any newly purchased, leased, or rented non-yard truck vehicle~~s~~ or equipment ~~unless they meet the following: a. Non-yard truck mobile cargo handling equipment~~ that are registered as motor vehicle~~s~~ for on-road use unless they are ~~shall be~~ equipped with engines that meet the on-road emission standards as specified in title 13, ~~California Code of Regulations~~ CCR, section 1956.8, for the model year in which the non-yard truck mobile cargo handling equipment and engines were newly purchased, leased, or rented.

~~b~~ 2. On or after January 1, 2007, no owner or operator shall operate any newly purchased, leased, or rented ~~N~~non-yard truck mobile cargo handling equipment that are *not* registered as motor vehicles for on-road use unless ~~shall be equipped with engines~~:

~~i.~~ a. They are equipped with engines ~~that have been~~ certified to meet the on-road emission standards as specified in title 13, ~~California Code of Regulations~~ CCR, section 1956.8 for the model year in which the non-yard truck mobile cargo handling equipment and engines were newly purchased, leased, or rented~~;~~ or ~~ii. that have been certified to meet the~~ Tier 4 off-road emission standards as specified in title 13, CCR section 2423(b)(1)(B) for the model year and rated horsepower of the newly purchased, leased, or rented non-yard truck mobile cargo handling equipment engines; or

~~c.~~ 3. ~~i~~If an owner or operator cannot comply with one of the compliance options of a. ~~(b)~~ above because it is not available for the specific application and equipment type, the non-yard truck mobile cargo handling equipment ~~shall be~~ are equipped with engines ~~that have been~~ certified to meet the highest available level off-road diesel engine emission standards as specified in title 13, ~~California Code of Regulations~~ CCR, section 2423 for the rated horsepower and model year in which the equipment were newly purchased, leased, or rented, provided the owner or operator must install the highest level VDECS available within one year after the purchase, lease, or rental of the equipment, or within 6 months of when a VDECS becomes available, if that occurs after one year after the purchase, lease, or rental.

4. Alternatively, the owner or operator may elect to equip the non-yard truck mobile cargo handling equipment with engines or power systems

that can be demonstrated to the Executive Officer to meet the Tier 4 off-road NOx and PM emissions standards as specified in title 13, CCR section 2423(b)(1)(B) for the rated horsepower and model year of the year manufactured by one of the methods below:

a. The results from using the test methods in subsection (n) or an alternative test method approved by the Executive Officer,
b. The certification test data or other emissions test data of the engine manufacturer for that engine;
c. Emissions test data derived from another in-use engine that is configured and used in a substantially similar way to the engine;
d. Emissions test data used to meet the regulatory requirements of ARB's Verification Procedure; or
e. Emissions test data used to meet the requirements for U.S. EPA certification of systems providing remanufacture to a cleaner standard

5. If non-yard truck cargo handling equipment not registered for on-road use have been purchased with engines complying with one of the options of subsection (e)(1)(B)2. above but there is a manufacturer's delay in delivery, and if no comparable compliant cargo handling equipment are is available for lease, then the owner or operator may lease comparable non-yard truck mobile cargo handling equipment that are equipped with engines that have been certified to meet the highest available level off-road diesel engine emission standards as specified in title 13, California Code of Regulations, section 2423 for the rated horsepower and model year in which the equipment are leased, provided the owner or operator provides the following to the Executive Officer:

a. Identification of the equipment type and application, including required engine horsepower,
b. Purchase order, letter, or other form of documentation that demonstrates that the owner/operator has entered into a contract to purchase equipment with engines certified to subsection (e)(1)(B)2. and includes the anticipated delivery date, and
c. Documentation from representatives of equipment and/or engine manufacturers supporting claim of non-availability, including anticipated date of availability.
d. Equipment may be leased or rented for up to a six month period or until purchased equipment are available, whichever is longer.

(2) *In-Use Performance Standards for Yard Trucks*

(A) In accordance with the schedule set forth below in paragraph (e)(2)(B), no owner or operator shall operate an in-use yard truck covered by this regulation at a port or intermodal rail yard unless the engine meets the performance requirements set forth below:

1. Is certified to 2007 or later on-road emission standards for the model year of the year purchased as specified in title 13, California Code of Regulations, section 1956.8; ~~or~~
2. Is certified to final Tier 4 off-road emission standards for the rated horsepower; or
3. Is equipped with a VDECS or OEM aftertreatment controls that results in emissions less than or equal to the diesel PM and NOx emission standards for a certified final Tier 4 off-road diesel engine of the same horsepower rating.

4. Annually per the following procedure, does not exceed the maximum opacity levels as provided in subsections (e)(2)(A)4.a. through g. below. For equipment retrofitted with a VDECS the opacity of engine-out exhaust must be measured with VDECS removed, such as when VDECS is removed for cleaning. Equipment with OEM aftertreatment controls should not remove the aftertreatment control when testing engine opacity levels.

   a. The opacity shall be measured during the preconditioning and test phases with a smoke meter consistent with Society of Automotive Engineers "Surface Vehicle Recommended Practice, Snap Acceleration Smoke Test Procedure for Heavy-Duty Powered Vehicles" (SAE J1667).(February 1996), which is incorporated by reference herein, and as specified in subsection (e)(2)(A)4.g. The results shall be recorded continuously on the chart recorder during each snap-idle cycle.
   b. Opacity is to be measured according to the following procedure:

      i. Preparation Phase. The yard truck shall be placed at rest, with the transmission in neutral, and the yard truck properly restrained to prevent any rolling motion.
      ii. Preconditioning Phase. The yard truck shall be put through a snap-idle cycle two or more times until two successive measured smoke levels are within five (5) opacity percent of each other. The smoke meter shall be rechecked prior to the preconditioning sequence to determine that its zero and full scale reading are adjusted according to specifications in section 5.4.2 of SAE J1667.
      iii. Test Procedure Phase. The yard truck shall be put through the snap-idle cycle three times.
      iv. The maximum instantaneous value recorded by the chart recorder shall be recorded as the maximum opacity reading.
      v. The test opacity to determine the compliance with subsection (e)(2)(A)4.e. shall be the average of the two meter readings with the least difference in opacity values. If all three readings have successive equivalent differences between them, the test opacity shall be the average of the three readings.

c. If the opacity exceeds the following limits, the equipment is to be taken out of service and repaired. The information is to be recorded as specified subsection (i)(1)(D)9. A post-repair opacity test is to be performed to determine if the measured opacity is within the requirements in subsection (e)(2)(A)4.e. Equipment must be repaired such that it meets these opacity requirements before putting it back into service.

d. If the post-repair opacity measure is 5 opacity percent higher than the opacity requirement in subsection (e)(2)(A)4.e., it shall be taken out of service. It may be returned to service if it can be repaired so that the post-repair opacity is no more than 5 opacity percent greater than the requirement in subsection (e)(2)(A)4.e.

e. Opacity requirements:
No yard truck shall exceed the smoke opacity levels provided below when tested in accordance with this section.

i. Yard trucks powered by a non-certified diesel-fueled engine or an engine certified to a U.S. EPA PM emissions limit of great than 0.40 grams/brake horsepower-hour (g/bhp-hr) PM shall not exceed 55 percent smoke opacity when tested in accordance with this section.
ii. Yard trucks powered by a diesel-fueled engine certified to a U.S. EPA PM emissions limit greater than or equal to 0.31 but less than or equal to 0.40 g/bhp-hr PM shall not exceed 45 percent smoke opacity when tested in accordance with this section.
iii. Yard trucks powered by a diesel-fueled engine certified to a U.S. EPA PM emissions limit of greater than or equal to 0.21 but less than or equal to 0.30 g/bhp-hr PM shall not exceed 35 percent smoke opacity when tested in accordance with this section.
iv. Yard trucks powered by adiesel-fueled engine certified to a U.S. EPA PM emissions limit of greater than or equal to 0.11 but less than or equal to 0.20 g/bhp-hr PM shall not exceed 25 percent smoke opacity when tested in accordance with this section.
v. Yard trucks powered by a diesel-fueled engine certified to a U.S. EPA PM emissions limit of greater than or equal to 0.05 but less than or equal to 0.10 g/bhp-hr PM shall not exceed 15 percent smoke opacity when tested in accordance with this section.
vi. Yard trucks powered by a diesel-fueled engine certified to a U.S. EPA PM emissions limit of less than 0.05 g/bhp-hr PM shall not exceed 5 percent smoke opacity when tested in accordance with this section.

f. Individuals conducting opacity tests must have completed training conducted by the California Council on Diesel Education and

Technology and obtained certification on the proper administration of the SAE J1667 test procedure.

g. The smoke opacity measurement equipment shall consist of a light extinction type smoke meter that has an optical detection unit, a control/indicator unit, and a strip chart recorder.

i. The smoke meter shall comply with the specifications provided in section 6 of the SAE J1667 procedure and shall be calibrated according to specifications in section 7 of the SAE J1667 procedure.

h. Initial phase-in for fleets of five or more yard trucks. Fleets of five or more yard trucks shall test the yard trucks in the fleet for smoke opacity in accordance with the requirements of (e)(2)(A)4.a. through g. above pursuant to the following schedule:

i. at least 25 percent of the fleet's yard trucks within 180 calendar days of the effective date for these regulations;
ii. at least 50 percent of the fleet's yard trucks within 270 calendar days of the effective date for these regulations;
iii. at least 75 percent of the fleet's yard trucks within 365 calendar days of the effective date for these regulations;
iv. the fleet's remaining yard trucks within 455 calendar days after the effective date for these regulations.
v. for fleets of one to four yard trucks shall test at least one yard truck within 180 days of the regulation becoming effective, and one yard truck in each subsequent 90 day calendar day period, until all yard trucks in the fleet have been tested.

i. If it can be demonstrated that complying with the requirements of subsection (e)(2)(A)4. is not feasible due to the engine/equipment configuration then an alternative method of compliance may be used if approved by the EO. In approving a request for use of an alternative method, the Executive Officer will consider whether the owner/operator is able to demonstrate that alternative method will be able to detect increases in soot accumulation rates in the aftertreatment control device and be able to provide needed maintenance and repair.

(B) Compliance Schedules for In-Use Yard Trucks

1. All owners or operators of three or fewer yard trucks shall comply with subsection (e)(2) according to the schedule in Table 1:

Table 1: Compliance Schedule for In-Use Yard Truck Fleets of Three or Less[1]

Off-road without VDECS Installed by December 31, 2006

Model Year	Compliance Deadline
Pre-2003	Dec. 31, 2007
2003	Dec. 31, 2010
2004	Dec. 31, 2011
2005	Dec. 31, 2012
2006	Dec. 31, 2013

Off-road with VDECS Installed by December 31, 2006

Model Year	Compliance Deadline
Pre-2003	Dec. 31, 2008
2003	Dec. 31, 2011
2004	Dec. 31, 2012
2005	Dec. 31, 2013
2006	Dec. 31, 2014

On-road without VDECS Installed by December 31, 2006

Model Year	Compliance Deadline
Pre-2000	Dec. 31, 2007
2000	Dec. 31, 2008
2001	Dec. 31, 2009
2002	Dec. 31, 2010
2003	Dec. 31, 2011
2004	Dec. 31, 2012
2005	Dec. 31, 2013
2006	Dec. 31, 2014

On-road with VDECS Installed by December 31, 2006

Model Year	Compliance Deadline
Pre-2000	Dec. 31, 2008
2000	Dec. 31, 2009
2001	Dec. 31, 2010
2002	Dec. 31, 2011
2003	Dec. 31, 2012
2004	Dec. 31, 2013
2005	Dec. 31, 2014
2006	Dec. 31, 2015

2. All owners or operators of four or more yard trucks shall comply with subsection (e)(2) according to the schedule in Table 2:

[1] The model year in Tables 1 and 2 refers to the newer of the engine model year or the equipment model year.

Table 2: Compliance Schedule for In-Use Yard Truck Fleets of Four or More[2]

Off-road without VDECS Installed by December 31, 2006

Model Year	% of Model Year	Compliance Deadline
Pre-2003	Greater of 3 or 50%	Dec. 31, 2007
	100%	Dec. 31, 2008
2003	Greater of 3 or 25%	Dec. 31, 2010
	50%	Dec. 31, 2011
	100%	Dec. 31, 2012
2004	Greater of 3 or 25%	Dec. 31, 2011
	50%	Dec. 31, 2012
	100%	Dec. 31, 2013
2005	Greater of 3 or 25%	Dec. 31, 2012
	50%	Dec. 31, 2013
	100%	Dec. 31, 2014
2006	Greater of 3 or 25%	Dec. 31, 2013
	50%	Dec. 31, 2014
	100%	Dec. 31, 2015

Off-road with VDECS Installed by December 31, 2006

Model Year	% of Model Year	Compliance Deadline
Pre-2003	Greater of 3 or 50%	Dec. 31, 2008
	100%	Dec. 31, 2009
2003	Greater of 3 or 25%	Dec. 31, 2011
	50%	Dec. 31, 2012
	100%	Dec. 31, 2013
2004	Greater of 3 or 25%	Dec. 31, 2012
	50%	Dec. 31, 2013
	100%	Dec. 31, 2014
2005	Greater of 3 or 25%	Dec. 31, 2013
	50%	Dec. 31, 2014
	100%	Dec. 31, 2015
2006	Greater of 3 or 25%	Dec. 31, 2014
	50%	Dec. 31, 2015
	100%	Dec. 31, 2016

On-road without VDECS Installed by December 31, 2006

Model Year	% of Model Year	Compliance Deadline
Pre-2000	Greater of 3 or 25%	Dec. 31, 2007
	50%	Dec. 31, 2008
	100%	Dec. 31, 2009
2000	Greater of 3 or 25%	Dec. 31, 2008
	50%	Dec. 31, 2009
	100%	Dec. 31, 2010
2001	Greater of 3 or 25%	Dec. 31, 2009
	50%	Dec. 31, 2010
	100%	Dec. 31, 2011
2002	Greater of 3 or 25%	Dec. 31, 2010
	50%	Dec. 31, 2011
	100%	Dec. 31, 2012
2003	Greater of 3 or 25%	Dec. 31, 2011
	50%	Dec. 31, 2012
	100%	Dec. 31, 2013
2004	Greater of 3 or 25%	Dec. 31, 2012
	50%	Dec. 31, 2013
	100%	Dec. 31, 2014
2005	Greater of 3 or 25%	Dec. 31, 2013
	50%	Dec. 31, 2014
	100%	Dec. 31, 2015
2006	Greater of 3 or 25%	Dec. 31, 2014
	50%	Dec. 31, 2015
	100%	Dec. 31, 2016

On-road with VDECS Installed by December 31, 2006

Model Year	% of Model Year	Compliance Deadline
Pre-2000	Greater of 3 or 25%	Dec. 31, 2008
	50%	Dec. 31, 2009
	100%	Dec. 31, 2010
2000	Greater of 3 or 25%	Dec. 31, 2009
	50%	Dec. 31, 2010
	100%	Dec. 31, 2011
2001	Greater of 3 or 25%	Dec. 31, 2010
	50%	Dec. 31, 2011
	100%	Dec. 31, 2012
2002	Greater of 3 or 25%	Dec. 31, 2011
	50%	Dec. 31, 2012
	100%	Dec. 31, 2013
2003	Greater of 3 or 25%	Dec. 31, 2012
	50%	Dec. 31, 2013
	100%	Dec. 31, 2014
2004	Greater of 3 or 25%	Dec. 31, 2013
	50%	Dec. 31, 2014
	100%	Dec. 31, 2015
2005	Greater of 3 or 25%	Dec. 31, 2014
	50%	Dec. 31, 2015
	100%	Dec. 31, 2016
2006	Greater of 3 or 25%	Dec. 31, 2015
	50%	Dec. 31, 2016
	100%	Dec. 31, 2017

[2] The model year in Tables 1 and 2 refers to the newer of the engine model year or the equipment model year.

a. for each compliance deadline, the percentage of yard trucks (25 percent, 50 percent, or 100 percent) that must meet the requirements of subsection (e)(2) is determined based on the total population of yard trucks for a specific model year or model year group (i.e., pre-2000 or pre-2003, depending upon whether the equipment is characterized as on- or off-road) that exist in the owner's or operator's yard truck fleet as of January 1 of the first compliance deadline year for that model year or model year group; and

b. if the number of yard trucks is not a whole number, conventional rounding practices apply (i.e., if less 0.5, round down; if 0.5 or greater, round up).

(3) *In-Use Performance Standards for Non-Yard Truck Mobile Cargo Handling Equipment*

(A) In accordance with the schedule set forth in subsection (e)(3)(C), no owner or operator shall operate non-yard truck mobile cargo handling equipment covered by this regulation unless they meet all of the following:

1. Use one of the Compliance Options for each vehicle or equipment in the active fleet as specified in ~~paragraph~~subsection (e)(3)(B) per the compliance schedule listed in Table 3 in subsection (e)(3)(C); ~~and~~

2. Adherence to any special ~~circumstances~~ requirements that may apply when a diesel emission control strategy is used as a Compliance Option as specified in subsection (g); and

3. Annually per the following procedure, does not exceed the maximum opacity levels as provided in subsections (e)(3)(A)3.a. through g. below. For equipment retrofitted with a VDECS the opacity of engine-out exhaust must be measured with VDECS removed, such as when VDECS is removed for cleaning. Equipment with OEM aftertreatment controls should not remove the aftertreatment control when testing engine opacity levels.

   a. The opacity shall be measured during the preconditioning and test phases with a smoke meter consistent with Society of Automotive Engineers "Surface Vehicle Recommended Practice, Snap Acceleration Smoke Test Procedure for Heavy-Duty Powered Vehicles" (SAE J1667).(February 1996), which is incorporated by reference herein, and as specified in subsection (e)(3)(A)3.g. The results shall be recorded continuously on the chart recorder during each snap-idle cycle.

   b. Opacity is to be measured according to the following procedure:

i. Preparation Phase. The vehicle shall be placed at rest, with the transmission in neutral, and the vehicle properly restrained to prevent any rolling motion.

ii. Preconditioning Phase. The vehicle shall be put through a snap-idle cycle two or more times until two successive measured smoke levels are within five(5) opacity percent of each other. The smoke meter shall be rechecked prior to the preconditioning sequence to determine that its zero and full scale reading are adjusted according to specifications in section 5.4.2 of SAE J1667.

iii. Test Procedure Phase. The vehicle shall be put through the snap-idle cycle three times.

iv. The maximum instantaneous value recorded by the chart recorder shall be recorded as the maximum opacity reading.

v. The test opacity to determine the compliance with subsection (e)(3)(A)3.e. shall be the average of the two meter readings with the least difference in opacity values. If all three readings have successive equivalent differences between them, the test opacity shall be the average of the three readings.

c. If the opacity exceeds the requirements established in section (e)(3)(A)3.e, the equipment is to be taken out of service and repaired. The information is to be recorded as specified subsection (i)(1)(D)9. A post-repair opacity test is to be performed to determine if the measured opacity is within the requirements in subsection (e)(3)(A)3.e. Equipment must be repaired such that it meets these opacity requirements before putting it back into service.

d. If the post-repair opacity measure is greater than 5 percent higher than the opacity requirement in subsection (e)(3)(A)3.e., it shall be taken out of service. It may be returned to service if it can be repaired so that the post-repair opacity is no more than 5 percent greater than the requirement in subsection (e)(3)(A)3.e.

e. Opacity requirements:

i. No cargo handling equipment shall exceed the smoke opacity levels provided below when tested in accordance with this section.Non-yard truck cargo handling equipment powered by a non-certified diesel-fueled engine or an engine certified to a U.S. EPA PM emissions limit of greater than 0.40 g/bhp-hr PM shall not exceed 55 percent smoke opacity when tested in accordance with this section.

ii. Non-yard truck cargo handling equipment powered by a diesel-fueled engine certified to a U.S. EPA PM emissions limit of greater than or equal to 0.31 but less than or equal to 0.40 g/bhp-hr PM shall not exceed 45 percent smoke opacity when tested in accordance with this section.

iii. Non-yard truck cargo handling equipment powered by a diesel-fueled engine certified to a U.S. EPA PM emissions limit of greater than or equal to 0.21 but less than or equal to 0.30 g/bhp-hr PM shall not exceed 35 percent smoke opacity when tested in accordance with this section.
iv. Non-yard truck cargo handling equipment powered by a diesel-fueled engine certified to a U.S. EPA PM emissions limit of greater than or equal to 0.11 but less than or equal to 0.20 g/bhp-hr PM shall not exceed 25 percent smoke opacity when tested in accordance with this section.
v. Non-yard truck cargo handling equipment powered by a diesel-fueled engine certified to a U.S. EPA PM emissions limit of greater than or equal to 0.05 but less than or equal to 0.10 g/bhp-hr PM shall not exceed 15 percent smoke opacity when tested in accordance with this section.
vi. Non-yard truck cargo handling equipment powered by a diesel-fueled engine certified to a U.S. EPA PM emissions limit of less than 0.05 g/bhp-hr PM shall not exceed 5 percent smoke opacity when tested in accordance with this section.

f. Individuals conducting opacity tests must have completed training conducted by the California Council on Diesel Education and Technology and obtained certification on the proper administration of the SAE J1667 test procedure.

g. The smoke opacity measurement equipment shall consist of a light extinction type smokemeter that has an optical detection unit, a control/indicator unit, and a strip chart recorder.

i. The smokemeter shall comply with the specifications provided in section 6 of the SAE J1667 procedure and shall be calibrated according to specifications in section 7 of the SAE J1667 procedure.

h. Initial phase-in for fleets of five or more. Fleets of five or more non-yard truck equipment shall test the non-yard truck equipment for smoke opacity in accordance with the requirements of (e)(3)(A)3.a. through g. above pursuant to the following schedule:

i. at least 25 percent of the fleet's non-yard truck equipment within 180 calendar days of the effective date for these regulations;
ii. at least 50 percent of the fleet's non-yard truck equipment within 270 calendar days of the effective date for these regulations;
iii. at least 75 percent of the fleet's non-yard truck equipment within 365 calendar days of the effective date for these regulations;

iv. the fleet's remaining non-yard truck equipment within 455 calendar days after the effective date for these regulations.

v. for fleets of one to four non-yard truck equipment, shall test at least one piece of non-yard truck equipment within initial 180 days of the regulation becoming effective, and one piece of non-yard truck equipment in each subsequent 90 day calendar day period, until all non-yard truck equipment in the fleet have been tested.

i. engines that operate at constant speed and variable load may comply with the requirements of subsection (e)(3)(A)3. using an alternative method as approved by the EO.

j. If it can be demonstrated that complying with the requirements of subsection (e)(3)(A)3. is not feasible due to the engine/equipment configuration then an alternative method of compliance may be used if approved by the EO. In approving a request for use of an alternative method, the Executive Officer will consider whether the owner/operator is able to demonstrate that the alternative method will be able to detect increases in soot accumulation rates in the aftertreatment control device and be able to provide needed maintenance and repair.

~~3~~4 Maintenance of all records as specified in subsection (i); and

~~4~~5 Continuous Compliance. An owner or operator is required to keep all mobile cargo handling equipment operating in California in compliance with the requirements of this regulation at all times.

(B) Compliance Option. Each owner or operator shall use one of the following Compliance Options on each engine or vehicle in his fleet as required by the implementation schedule listed in Table 3 in subsection (e)(3)(C):

1. Basic Container Handling Equipment:

a. An engine or power system, including a diesel, alternative fuel, or heavy-duty pilot ignition engine, certified to either the 2007 or later model year on-road emission standards for the year manufactured as specified in title 13, CCR, section 1956.8, or the Tier 4 off-road emission standards as specified in title 13, CCR section 2423(b)(1)(B) for the rated horsepower and model year of the year manufactured; ~~or~~

b. An engine or power system certified to the on-road emission standards for the year manufactured as specified in title 13, CCR, section 1956.8, or certified to the Tier 2, ~~or~~ Tier 3, or Tier 4 Alternate PM off-road diesel engine standards, as specified in title 13, CCR section 2423(b)(2)(B), for the rated horsepower and model year of the year manufactured, and used in conjunction with the highest level VDECS that is verified for a specific engine family and model year. If the highest level VDECS used is Level 1, the engine or power system must meet the certified Tier 4 off-road emission standards as specified in title 13, CCR section 2423(b)(1)(B), or be equipped with a Level 3 VDECS by December 31, 2015; ~~or~~

c. An engine or power system either certified to the Tier 1 off-road diesel engine standard, as specified in title 13, CCR, section 2423, or manufactured prior to implementation of the Tier 1 off-road diesel engine standard, both of which must be used in conjunction with the highest level VDECS that is verified for the specific engine family and model year. If the highest level VDECS used is Level 1 or Level 2, the engine or power system must meet the certified Tier 4 off-road emission standards as specified in title 13, CCR section 2423(b)(1)(B) or be equipped with a Level 3 VDECS by December 31, 2015~~.~~; or

d. An engine or power system that can be demonstrated to the Executive Officer to meet the Tier 4 off-road NOx and PM emissions standards as specified in title 13, CCR section 2423(b)(1)(B) for the rated horsepower and model year of the year manufactured by one of the methods below:
   i. the results from using the test methods in subsection (n) or an alternative test method approved by the Executive Officer,
   ii. the certification test data or other emissions test data of the engine manufacturer for that engine;
   iii. emissions test data derived from another in-use engine that is configured and used in a substantially similar way to the engine;
   iv. emissions test data used to meet the regulatory requirements of ARB's Verification Procedure; or
   v. emissions test data used to meet the requirements for U.S. EPA certification of systems providing remanufacture to a cleaner standard.

2. Bulk Cargo Handling Equipment:

a. An engine or power system, including a diesel, alternative fuel, or heavy-duty pilot ignition engine, certified to either the 2007 or later model year on-road emission standards for the year manufactured as specified in title 13, CCR, section 1956.8, or the Tier 4 off-road emission standards as specified in title 13, CCR section

2423(b)(1)(B) for the rated horsepower and model year of the year manufactured; ~~or~~

b. An engine or power system certified to the on-road emission standards for the year manufactured as specified in title 13, CCR, section 1956.8, or certified to the Tier 2, ~~or~~ Tier 3, or Tier 4 Alternate PM off-road diesel engine standards, as specified in title 13, CCR section 2423(b)(2)(B), for the rated horsepower and model year of the year manufactured, and used in conjunction with the highest level VDECS that is verified for a specific engine family and model year. If the highest level VDECS used is Level 1, the engine or power system must meet the certified Tier 4 off-road emission standards as specified in title 13, CCR section 2423(b)(1)(B), or be equipped with a Level 3 VDECS by December 31, 2015; ~~or~~

c. An engine or power system either certified to the Tier 1 off-road diesel engine standard, as specified in title 13, CCR, section 2423, or manufactured prior to implementation of the Tier 1 off-road diesel engine standard, both of which must be used in conjunction with the highest level VDECS that is verified for the specific engine family and model year. If the highest level VDECS used is Level 1, the engine or power system must meet the certified Tier 4 off-road emission standards as specified in title 13, CCR section 2423(b)(1)(B) or be equipped with a Level 3 VDECS by December 31, 2015; or.

d. An engine or power system that can be demonstrated to the Executive Officer to meet the Tier 4 off-road NOx and PM emissions standards as specified in title 13, CCR section 2423(b)(1)(B) for the rated horsepower and model year of the year manufactured by one of the methods below:
   i. the results from using the test methods in subsection (m) or an alternative test method approved by the Executive Officer,
   ii. the certification test data or other emissions test data of the engine manufacturer for that engine;
   iii. emissions test data derived from another in-use engine that is configured and used in a substantially similar way to the engine;
   iv. emissions test data used to meet the regulatory requirements of ARB's Verification Procedure; or
   v. emissions test data used to meet the requirements for U.S. EPA certification of systems providing remanufacture to a cleaner standard

3. Rubber-Tired Gantry Cranes:

a. An engine or power system, including a diesel, alternative fuel, or heavy-duty pilot ignition engine, certified to either the 2007 or later model year on-road emission standards for the year manufactured as specified in title 13, CCR, section 1956.8, or the Tier 4 off-road emission standards as specified in title 13, CCR section 2423(b)(1)(B) for the rated horsepower and model year of the year manufactured; or

b. An engine or power system certified to the on-road emission standards for the year manufactured as specified in title 13, CCR, section 1956.8, or certified to the Tier 2, ~~or~~ Tier 3, or Tier 4 Alternate PM off-road diesel engine standards, as specified in title 13, CCR section 2423(b)(2)(B), for the rated horsepower and model year of the year manufactured, and used in conjunction with the highest level VDECS that is verified for a specific engine family and model year; or

c. An engine or power system either certified to the Tier 1 off-road diesel engine standard, as specified in title 13, CCR, section 2423, or manufactured prior to implementation of the Tier 1 off-road diesel engine standard, both of which must be used in conjunction with the highest level VDECS that is verified for the specific engine family and model year. If the highest level VDECS used is Level 1 or Level 2, the engine or power system must meet the certified Tier 4 off-road emission standards as specified in title 13, CCR section 2423(b)(1)(B) or be equipped with a Level 3 VDECS by the latter of model year plus 12 years or December 31, 2015~~.~~; or

d. an engine or power system that can be demonstrated to the Executive Officer to meet the Tier 4 off-road NOx and PM emissions standards as specified in title 13, CCR section 2423(b)(1)(B) for the rated horsepower and model year of the year manufactured by one of the methods below:
   i. the results from using the test methods in subsection (m) or an alternative test method approved by the Executive Officer,
   ii. the certification test data or other emissions test data of the engine manufacturer for that engine;
   iii. emissions test data derived from another in-use engine that is configured and used in a substantially similar way to the engine;
   iv. emissions test data used to meet the regulatory requirements of ARB's Verification Procedure; or
   v. emissions test data used to meet the requirements for U.S. EPA certification of systems providing remanufacture to a cleaner standard.

(C) Compliance Schedule for Non-Yard Truck Mobile Cargo Handling Equipment

1. All owners or operators of non-yard truck mobile cargo handling equipment shall comply with subsection (e)(3) according to the schedule in Table 3:

Table 3: Compliance Option Compliance Schedule for Non-Yard Truck In-Use Mobile Cargo Handling Equipment

	Compliance Date[~~4~~3]				
		Non-Yard Truck Fleets of 4 or More			
Engine Model Years	**Non-Yard Truck Fleets of 3 or Fewer**	**First 3 or 25% (whichever is greater)**	**50%**	**75%**	**100%**
pre-1988	2007	2007	2008	2009	2010
1988-1995	2008	2008	2009	2010	2011
1996-2002	2009	2009	2010	2011	2012
2003-2006	2010	2010	2011	2012	2013

a. for each compliance deadline, the percentage of non-yard truck equipment (25 percent, 50 percent, or 100 percent) that must meet the requirements of subsection (e)(3) is determined based on the total population of non-yard truck equipment for a specific model year group (i.e., pre-1988) that exist in the owner's or operator's non-yard truck fleet as of January 1 of the first compliance deadline year for that model year group; and

b. if the number of non-yard truck equipment is not a whole number, conventional rounding practices apply (i.e., if less 0.5, round down; if 0.5 or greater, round up).

c. the owner or operator may modify the engine compliance schedule set forth in Table 3 to allow older model-year engines to be brought into compliance prior to newer model year engines so long as the total number of engines brought into compliance each year is the same as that set forth in Table 3.

(4) Fuel Requirements

(A) Except as provided for in subsection (c), on or after January 1, 2007, no owner or operator of cargo handling equipment shall fuel the equipment with any fuel unless the fuel is one of the following:

1. CARB Diesel Fuel; or

~~4~~ 3 Compliance date refers to December 31st of the year indicated.

2. An alternative diesel fuel that meets the requirements of the Verification Procedure; or
3. An alternative fuel; or
4. CARB Diesel Fuel used with fuel additives that meets the requirements of the Verification Procedure; or
5. Any combination of (e)(4)(A)1. through (e)(4)(A)4. above.

(B) Owners or operators choosing to use alternative diesel fuels in mobile cargo handling equipment to meet the requirements of subsections (e)(2) and (e)(3) shall:

1. Maintain records in accordance with subsection (i); and
2. Use only fuel that is a VDECS alternative diesel fuel in mobile cargo handling equipment at ports or intermodal rail yards in California; and
3. Permanently affix a label in clear view near the fill spout that identifies the proper fuel that is required to be in compliance; and
4. In the event that the owner or operator decides to revert to using CARB diesel fuel, the operator shall comply with the requirements of subsections (e)(2) and (e)(3) within 10 days of discontinuation of alternative diesel fuel use. Within 10 days of discontinuation, the owner or operator shall notify the Executive Officer in writing of this change in fuel use and shall include an update to any annual report submitted to comply with subsection~~s~~ (j).

(C) Owners or operators that retrofit mobile cargo handling equipment with a VDECS that requires certain fuel properties to be met in order to achieve the required PM reduction or PM emissions shall only fuel the subject mobile cargo handling equipment with fuel that meets these specifications. In addition, owners or operators that choose a VDECS that requires certain fuel properties to be met in order to prevent damage to the VDECS or an increase in toxic air contaminants, other harmful compounds, or in the nature of the emitted PM, shall only fuel the subject mobile cargo handling equipment with fuel that meets these specifications.

(f) Compliance Extensions

An owner or operator may be granted an extension to a compliance deadline specified in subsection (e) for one of the following reasons. If a compliance extension is granted by the Executive Officer, the owner or operator shall be deemed to be in compliance provided all of the conditions of ~~as specified by~~ the Executive Officer's authorization are met. Unless specifically stated, compliance extensions may not be combined or used consecutively, and only one compliance extension type may be granted per engine or vehicle.

(1) *Compliance Extension for an Engine Near Retirement.* If an owner or operator has applied a Compliance Option to its fleet pursuant to the schedule set forth in Table 3 of subsection (e), and the next engine subject to the Compliance Options is scheduled to be retired from the active fleet within one year of the applicable compliance deadline, the owner or operator does not need to apply a Compliance Option to that engine for up to one year, provided the owner or operator maintains appropriate records and documentation, as specified in subparagraph (i)(1)(F), regarding the assigned retirement date and the engine is retired on or before the assigned date. If upon inspection, ARB finds the aforementioned conditions to have not been met, the engine would be in noncompliance from the date that compliance would otherwise have been required under the schedule set forth in Table 3 of subsection (e).

(2) *Compliance Extension Based on No Verified Diesel Emission Control Strategy for Non-Yard Truck Mobile Cargo Handling Equipment.* If the Executive Officer has not verified a diesel emission control strategy or one is not commercially available for a particular engine and equipment combination, an annual extension in compliance, up to a maximum of ~~two~~ <u>four</u> years, may be granted by the Executive Officer. The Executive Officer shall grant the extension upon determining that the following circumstances have been met:

(A) The owner or operator has applied to the Executive Officer for a compliance extension for an engine ~~six months~~ <u>60 days</u> prior to each compliance deadline specified in subsection (e)(3)(C) and provided sufficient documentation to meet the conditions set forth below. The owner or operator may, ~~six months~~ <u>60 days</u> prior to the expiration of the extension, apply for an additional one-year extension. In such a case, the owner or operator shall once again be required to show to the Executive Officer's satisfaction that the conditions set forth below have been met:

1. Establish that it has applied a Compliance Option specified in subsection (e)(3) to all applicable engines in its fleet for which a Compliance Option is feasible pursuant to the schedule set forth in Table 3 of subsection (e),
2. Identify each engine for which an extension is requested by engine serial number; engine manufacturer, model year, family, and series; and type of mobile cargo handling equipment, for which a specific diesel emission control strategy would jeopardize the original engine warranty and a statement from the engine manufacturer or authorized dealer stating the original engine warranty would be jeopardized; or
3. Identify each engine and equipment or vehicle combination for which an extension is requested by engine serial number; engine manufacturer, model year, family, and series; and type of mobile cargo handling equipment, for which no diesel emission control strategy is commercially available and a list of manufacturers that have been contacted with their responses to a request to purchase, and

4. Describe the reason(s) for the request for a compliance extension for each engine or engine and equipment or vehicle combination. Reasons may include that the application of VDECS precludes safe operation.

(B) If, at any time during the provided extension, a safe and feasible VDECS becomes commercially available for the engine, the owner or operator must install the VDECS, or otherwise comply with subsection (e)(3), within six months of the ARB notification of the verification of the VDECS.

(3) *Use of Experimental Diesel Particulate Matter Emission Control Strategies for Non-Yard Truck Mobile Cargo Handling Equipment.* An annual compliance extension may be granted by the Executive Officer for the use of an experimental, or non-verified, diesel PM emission control strategy if a VDECS is not available, ~~or if~~ the owner or operator can demonstrate that an existing VDECS is not safe or feasible for their equipment or application, or use of the non-verified control strategy is needed to generate data to support verification of the control strategy. The owner or operator shall keep documentation of this use in records as specified in paragraph (i)(1)(G). Each mobile cargo handling equipment engine will be considered to be in compliance for the duration of the experiment, until the extension expires. The owner or operator must bring the mobile cargo handling equipment into compliance prior to the end of the annual compliance extension. The Executive Officer may grant the extension upon determining that the owner or operator has met the conditions specified below:

(A) The engine owner or operator has applied to the Executive Officer for a compliance extension ~~six months~~ 60 days prior to each compliance deadline, including annually if the owner or operator wishes to continue with the experimental controls. The application must include emissions data demonstrating the experimental control achieves at least a Level 1 diesel PM emission reduction through:
1. off-road engine certification test data for the cargo handling equipment engine;
2. engine manufacturer test data;
3. emissions test data from a similar engine;
4. emissions test data used in meeting the requirements of the Verification Procedure for the emission control strategy implemented; or
5. emissions testing conducted under the following conditions:
   a. baseline testing may be conducted with the emission control strategy in place, provided the test sample is taken upstream of the emission control strategy;
   b. control strategy testing shall be performed on the cargo handling equipment engine with full implementation of the emission control strategy;
   c. the percent change from baseline shall be calculated as the baseline emissions minus control strategy emissions, with the difference being

divided by the baseline emissions and the result expressed as a percentage;

d. the same test method shall be used for determining both baseline emissions and control strategy emissions; and

e. diesel PM, NOx, CO, HC, NMHC, and CO_2 testing shall be done in accordance with one of the following methods:

   i. International Organization for Standardization (ISO) 8178 Test procedures: ISO 8178-1: 1996(E) ("ISO 8178 Part 1"); ISO 8178-2: 1996(E) ("ISO 8178 Part 2"); and ISO 8178-4: 1996(E) ("ISO 8178 Part 4"), which are incorporated herein by reference; or

   ii. Title 13, California Code of Regulations, section 2423, "Exhaust Emission Standards and Test Procedures – Off-Road Compression Ignition Engines," which is incorporated herein by reference.

(B) The application for extension must include the following: explanation demonstrating that the highest level VDECS are not feasible or safe for the specific equipment or application (if applicable), identification of each engine (serial number, engine manufacturer, model year, family, and series), description of the emission control system to be demonstrated, emissions data required in (A) above, ~~the~~ contact information for the emission control system supplier, and a letter ~~of intent~~ from the supplier stating that they intend to apply for verification of the experimental system;

(C) The owner or operator must bring the mobile cargo handling equipment into compliance prior to the end of the compliance extension period;

(D) If VDECS are available, or become available during the extension period, and are determined to be feasible or safe for the specific engine and equipment type, the owner or operator must demonstrate that the experimental control achieves equivalent to or better than a Level 1 VDECS; and

(E) No experimental diesel particulate matter emission control strategy may be used on mobile cargo handling equipment after December 31, 2015.

(4) *Compliance Extension for Equipment Manufacturer Delays.* An owner or operator who has purchased new equipment in order to comply with subsection (e), including an owner or operator who has been granted a compliance extension per subsections (f)(2), (f)(3), or (f)(5), will be considered to be in compliance if the new equipment has not been received due to manufacturing delays, as long as the following conditions are met:

(A) The equipment was purchased, or the owner or operator and seller had entered into contractual agreement for the purchase, at least six months prior to the required compliance date as specified in subsection (e); and

(B) Proof of purchase, such as a purchase order or signed contract for the sale, including engine specifications for each applicable equipment, must be maintained by the owner or operator and provided to an agent or employee of ARB upon request.

(5) *Compliance Extension for Yard Trucks Having VDECS with Minimum Use Requirements.* If VDECS were installed on a yard truck prior to December 31, 2005, and the minimum use requirements of the VDECS, as established under a public funding program, is later than the compliance date as specified in subsection (e)(2)(B), an exemption from compliance may be extended to three years beyond the installation date of the VDECS if the following conditions are demonstrated by the owner or operator:

(A) The VDECS was installed using funding from a public agency; and

(B) The funding program stipulated minimum use requirements that would expire after the required compliance date as specified in subsection (e)(2)(B).

(6) *Compliance Extension for Non-yard Truck Equipment Operated Less Than 200 Hours Annually.*

(A) The Executive Officer shall grant an annual compliance extension up to a maximum of two years for engines operated less than 200 hours annually upon determining that the owner or operator has met the following conditions:

1. Installed a non-resettable hour meter on each engine for which the compliance extension is requested
2. Submitted an application that may cover one or more engines to the Executive Officer for a compliance extension at least 60 days prior to each compliance deadline specified in subsection (e)(3)(C) ;
3. Identified in the application the engine manufacturer, serial number model year, and engine family and series of each engine for which an extension is requested;(4) Provided documentation, either from non-resettable hour meters, fuel records, or some other credible method for tracking engine operation; that the engines covered by the application have not been operated more than 200 hours in the preceding year.

(B) The owner or operator shall maintain records of annual use for each engine granted a compliance extension under this subsection for the duration of the extension in the vehicle associated with that engine.

(C) The owner or operator shall report annually the annual hours of operation for each engine granted a compliance extension under this subsection for the duration of the extension.

(D) The Executive Officer may elect not to grant a low-use extension for more than two engines in a single fleet or for more than two percent of a fleet, whichever is greater. The Executive Officer's election to limit the number of engines granted a low-use extension will consider the impact on public health based on an evaluation of the following information:

1. number of equipment granted a low-use extension
2. hours of operation of the equipment
3. estimated engine emissions levels
4. proximity of the equipment to off-site residences

(E) If the engine is operated annually for more than 200 hours, the extension is automatically revoked and the engine must cease operation until the owner or operator brings the engine into compliance with subsection (e)(3). .

(g) Diesel Emission Control Strategy Special Circumstances

An owner or operator shall maintain the original level of the elected Compliance Option for each engine once that engine is required to be in compliance, and is not required to upgrade to a higher level of Compliance Option, except under specified special circumstances, as follows:

(1) In the event of a failure or damage of a diesel emission control strategy, the following conditions apply:

(A) Failure or Damage during the Warranty Period. If a diesel emission control strategy fails or is damaged within its warranty period and the diesel emission control strategy manufacturer or authorized dealer determines it cannot be repaired, the owner or operator shall replace the diesel emission control strategy with either the same level diesel emission control strategy or another approved Compliance Option as defined in subsection (e)(3) within 90 days of diesel emission control strategy failure.

(B) Failure or Damage Outside of Warranty Period. If a diesel emission control strategy fails or is damaged outside of its warranty period, and it cannot be repaired, the owner or operator shall apply a Compliance Option within 90 days, as defined in subsection (e)(3).

(h) Alternative Compliance Plan for Non-Yard Truck Cargo Handling Equipment

(1) Requirements

(A) The purpose of this subsection is to allow any person ("person" or "applicant") subject to this regulation the option of complying with the requirements of this subsection (~~h~~ k) in lieu of the requirements of subsection (e)(3). Under this subsection (~~h~~ k), alternative emission control strategies (AECS) can be implemented as an alternative compliance plan (ACP), provided they result in no greater emissions, expressed in pounds, of diesel PM and NOx from the non-yard truck cargo handling equipment, over the applicable calendar year, relative to the emissions that would have occurred under subsection (e)(3).

(B) An applicant wishing to participate in an ACP may include one or more non-yard truck cargo handling equipment in the ACP, but the applicant shall only include equipment that the person owns or operates under their direct control at the same port or intermodal rail yard.

(C) No cargo handling equipment shall be included in more than one ACP.

(D) AECS may include, but are not limited to:

1. equipment engine modifications,
2. exhaust treatment control,
3. engine repower,
4. equipment replacement, and
5. use of alternative fuels or fuel additives.

(E) The ACP application demonstrating compliance with this subsection shall contain, at a minimum, the following information:

1. the company name, address, and contact information;
2. the equipment subject to the ACP, including equipment and engine make, model, and serial numbers, and other information that uniquely identify the equipment;
3. documentation, calculations, emissions test data, or other information that establishes the diesel PM and NOx reductions, expressed in pounds, from non-yard truck cargo handling equipment will be equivalent to or greater than the emission reductions that would have been achieved upon compliance with subsection (e)(3);
4. the proposed recordkeeping, reporting, monitoring, and testing procedures that the applicant plans to use to demonstrate continued compliance with the ACP.

(F) Emission reduction calculations demonstrating equivalence with the requirements of subsection (e)(3) shall only include diesel PM and NOx emissions from non-yard truck cargo handling equipment that operate at the California port or intermodal rail yard to which the ACP applies.

(G) Any owner or operator subject to an approved ACP shall maintain operating records in a manner and form as specified by the Executive Officer in the approved ACP. Required records may include, but are not limited to, information on hours of operation, fuel usage, maintenance procedures, and emissions test results. Such records and reports shall be retained for a period of not less than three (3) years and shall be submitted to the Executive Officer in the manner specified in the approved ACP and upon request by the Executive Officer.

(H) Emission reductions included in an ACP shall not include reductions that are otherwise required by any local, State, or federal rule, regulation, or statute, or that are achieved or estimated from equipment not located at the specific port or intermodal rail yard to which the ACP applies.

(I) No person may operate any non-yard truck cargo handling equipment under an ACP unless the applicant has first been notified in writing by the Executive Officer that the ACP application has been approved. Prior to such approval, applicants shall comply with the provisions of this section, including the requirements in subsection (e)(3).

(2) *Application Process*

(A) Applications for an ACP shall be submitted in writing to the Executive Officer for evaluation.

(B) The Executive Officer shall establish an Internet site ("ACP Internet site") in which all documents pertaining to an ACP application will be made available for public review. The Executive Officer shall also provide a copy of all such documents to any person upon request ("interested party(ies)"). The Executive Officer shall provide two separate public comment periods during the ACP application process, as specified in this subsection (~~h~~ k)(2).

(C) Completeness Determination

Within 15 days after receiving an ACP application(s), the Executive Officer shall notify the applicant whether the application is deemed sufficiently complete to proceed with further evaluation. If the application is deemed incomplete, the notification shall identify the application's deficiencies. The Executive Officer shall have an additional 15-day period for reviewing each set of documents or information submitted in response to an incompleteness determination. Nothing in this subsection prohibits the Executive Officer from requesting additional information from the applicant, during any part of the ACP application process, which the Executive Officer determines is necessary to evaluate the application.

(D) Notice of Completeness and 30-Day First Public Comment Period

After an ACP application has been deemed complete, the Executive Officer shall provide a 30-day public comment period to receive comments on any element of the ACP application and whether the Executive Officer should approve or disapprove the ACP application based on the contents and merits of the application. The Executive Officer shall notify all interested parties of the following:

1. the applicant(s);
2. the start and end dates for the 30-day first comment period; and
3. the address of the ACP Internet site where the application is posted.

The Executive Officer shall also make this notification available for public review on the ACP Internet site.

(E) Proposed Action and 15-Day Second Public Comment Period

Within 30 days after the first public comment period ends, the Executive Officer shall notify the applicant and all interested parties of ARB's proposed approval or disapproval. This notification shall propose to approve the application as submitted, disapprove the application, or approve the ACP application with modifications as deemed necessary by the Executive Officer. The notification shall identify the start and end dates for the 15-day second public comment period. During the second public comment period, any person may comment on the Executive Officer's proposed approval or disapproval of the ACP application and any element of the application. The Executive Officer shall also make this notification available for public review on the ACP Internet site.

(F) Final Action

Within 15 days after the second public comment period ends, the Executive Officer shall take final action to either approve or deny an ACP application and shall notify the applicant accordingly. If the application is denied or modified, the Executive Officer shall state the reasons for the denial or modification in the notification. The notification to the applicant and approved ACP, if applicable, shall be made available to the public on the ACP Internet site. In addition, the Executive Officer shall consider and address all comments received during the first and second public comment periods, and provide responses to each comment on the ACP Internet site.

(G) Notification to the Executive Officer of Changes to an Approved ACP

The applicant shall notify the Executive Officer in writing within 30 days upon learning of any information that would alter the emissions estimates submitted during any part of the ACP application process. If the Executive Officer has reason to believe that an approved ACP has been granted to a person that no longer meets the criteria for an ACP, the Executive Officer may, pursuant to subsection (~~h~~ k)(3) below, modify or revoke the ACP as necessary to assure that the applicant and subject non-yard truck cargo handling equipment will meet the emission reduction requirements in this section.

(3) Revocation or Modification of Approved ACPs

With 30-days notice to the ACP holder, the Executive Officer may revoke or modify, as needed, an approved ACP if there have been multiple violations of the ACP provisions or the requirements of the approved ACP; or if the Executive Officer has reason to believe that an approved ACP has been granted that no longer meets the criteria or requirements for an ACP or the applicant can no longer comply with the requirements of the approved ACP in its current form. Public notification of a revocation or modification of an approved ACP shall be made available on the ACP Internet site.

(i) Recordkeeping Requirements

Beginning December 31, 2006, an owner or operator of mobile cargo handling equipment shall maintain the following records or copies of records at port and intermodal rail yard facilities where applicable. The owner or operator shall provide the following records for inspection to an agent or employee of ARB upon request, including copies of these records at the department's expense, for all mobile cargo handling equipment subject to compliance with the regulation:

(1) *Records Kept at Terminal.* The owner or operator shall keep the following records accessible either in hard copy format or computer records at the terminal where the mobile cargo handling equipment normally resides:

(A) Owner or Operator Contact Information
1. Company name
2. Contact name, phone number, address, e-mail address
3. Address of equipment

(B) Equipment and Engine Information
1. Make of equipment and engine
2. Model of equipment and engine
3. Engine family (if applicable)
4. Engine serial number
5. Year of manufacture of equipment and engine (if unable to determine, approximate age)
6. Rated brake horsepower
7. Control equipment (if applicable)

a. Type of diesel emission control strategy
b. Serial number of installed diesel emission control strategy
c. Manufacturer of installed diesel emission control strategy
d. Model of installed diesel emission control strategy
e. Installation date of installed diesel emission control strategy
f. Level of control (1, 2, or 3); if using a Level 1 or 2, include the reason for the choice
g. Documentation for Minimum Use Requirement Compliance Extension pursuant to paragraph (f)(5).

(C) Records of maintenance for each installed diesel emission control strategy

(D) Records of opacity testing results

1. Brand name and model of the opacity meter.
2. Dates of last calibration of the opacity meter and chart recorder.
3. Name of the smoke meter operator who conducted the test.
4. Name and address of the contracted smoke test facility or vehicle repair facility that conducted the test (if applicable).
5. Applicability of smoke opacity standard for the tested vehicle.
6. Vehicle identification number, vehicle's engine model, engine make, engine model year, and test date.
7. Initial smoke test opacity levels (for three successive test readings).
8. Indication of whether the vehicle passed or failed the initial smoke test.
9. For vehicles that have failed the smoke test and been repaired, the following information:
   a. name of the mechanic
   b. date of the repair
   c. a statement identifying the nature of the repairs made
   d. an itemized list of parts used in the repair
10. Post-repair test date.
11. Post-repair smoke test opacity levels (for three successive test readings).
12. Indication of whether the vehicle passed or failed the post-repair smoke test.

(~~D~~E) Fuel(s) Used

1. CARB Diesel
2. Alternative diesel fuel (specify)
3. Alternative fuel (specify)
4. Combination (dual fuel) (specify)
5. Other (specify)

(~~E~~F) Operation Information

1. Describe general use of engine
2. Typical load (percent of maximum bhp rating)
3. Typical annual hours of operation

4. If seasonal, months of year operated and typical hours per month operated

(~~F~~G) For each engine for which an owner or operator is claiming an exemption pursuant to paragraph (f)(1), the retirement date correlated to the information in paragraph (i)(1) above

(~~G~~H) For each engine for which an owner or operator is claiming an extension pursuant to paragraph (f)(3), the records of the test plan, including start and end dates of the experiment; diesel particulate matter emission control strategy manufacturer name and contact information (representative, address, and phone number); name and type of experimental diesel particulate matter emission control strategy; and targeted data to be generated by experiment, correlated to the information in paragraph (i)(1) above

(~~H~~I) For each engine for which an owner or operator is claiming an extension pursuant to paragraph (f)(4), the purchase order or signed contract between the owner or operator and seller of the new equipment that has been purchased in order to comply with subsection (e)

(~~I~~J) A statement of compliance, prepared beginning January 1, 2007, and renewed each January 1 thereafter until January 1, 2016, certifying that the owner's or operator's engines are in compliance as required, including the following:

1. "The mobile cargo handling equipment at terminal (insert terminal name and name of port or intermodal rail yard) are in compliance with title 13, California Code of Regulations, section 2479;" and
2. The owner's or operator's name, business address, business telephone; and
3. The signature of the owner or operator or its agent and date signed.

(2) *Records Kept in Mobile Cargo Handling Equipment.* For each mobile cargo handling equipment, the owner or operator shall keep the following information affixed to the driver's side door jamb, or another readily accessible location known by the owner or operator of each mobile cargo handling equipment, in the form of a legible and durable label or in an alternative form approved by the Executive Officer or designee that is immediately accessible at the time of inspection by the enforcement agency:

(A) For each installed diesel emission control strategy, label information as specified in title 13, CCR, section 2706(g), and the installation date; or

(B) For each mobile cargo handling equipment that has installed a certified on-road or off-road engine in order to comply with subsection (e), the engine make, model, and installation date; or

(C) Engine model year and planned compliance date; or

(D) Engine model year and retirement date for an engine for which an owner or operator is claiming an extension pursuant to paragraph (f)(1); or

(E) Engine model year and beginning and end date for which an owner or operator is claiming an extension pursuant to paragraph (f)(2): or

(F) Engine model year and beginning and ending date of the test plan for an engine for which an owner or operator is claiming an extension pursuant to paragraph (f)(3); or

(G) Engine model year and date of purchase of replacement engine or equipment for which an owner or operator is claiming an extension pursuant to paragraph (f)(4); or

(H) Engine model year, date of installation of VDECS, and supporting documentation for public funding program, for the engine and equipment for which an owner or operator is claiming an extension pursuant to paragraph (f)(5).

(I) Documentation, either from non-resettable hour meters, fuel records, or some other credible method for tracking engine operating hours approved by the Executive Officer, that the engine has not been operated more than 200 hours in the preceding year.

(3) Each owner or operator shall maintain these records for each mobile cargo handling equipment until it is sold outside of the State of California or is no longer used at a port or intermodal rail yard in the State of California. If ownership is transferred, the seller shall convey the records to the buyer.

(j) Reporting Requirements

(1) *Compliance Plan*. By January 31, 2007, each owner or operator of in-use mobile cargo handling equipment subject to the requirements of subsection (e) shall provide the following information to the Executive Officer:

(A) Information listed in paragraph (i)(1), and

(B) An identification of the planned control strategy (Compliance Plan) for each mobile cargo handling equipment listed in paragraph (i)(1) that, when implemented, will result in compliance with subsection (e). If applicable, the information should include the Executive Order number issued by the Executive Officer for a VDECS that has been approved by the Executive Officer through the Verification Procedure. The Compliance Plan is not binding and can be changed by the owner or operator prior to the required compliance date(s).

(2) *Demonstration of Compliance*. By no later than the earliest applicable compliance date specified in subsections (e)(2)(B) or (e)(3)(C), for each in-use cargo handling equipment subject to the requirements of subsection (e), the owner or operator shall provide the following information to the Executive Officer:

(A) Information listed in (i)(1), and
(B) An identification of the control strategy implemented for each mobile cargo handling equipment in accordance with the requirements of subsection (e) for purposes of demonstrating compliance.

(3) *Annual Reporting.* Each terminal owner or operator shall submit an annual report to the Executive Officer by January 31, 2007, and by each January 31 annually, through 2016 as described below:

(A) Company name;
(B) Contact name, phone number, address, e-mail address;
(C) Address of equipment, including name of port or intermodal rail yard where equipment is operated;
(D) The population, as of January 1 of that year, of equipment in each yard truck model year group and each non-yard truck model year group; and
(E) A signed affidavit stating the completeness and accuracy of the annual report.
(F) An owner or operator that claims an extension pursuant to paragraph (f)(6) shall submit the following information to ARB for each engine which an extension is granted annually:

1. Engine serial number,
2. Engine manufacturer,
3. Engine model year,
4. Engine family and series, and.
5. Annual hours of operation as measured by the engine's hour meter.

(4) *Reporting for Off-Road Equipment that Does Not Handle Cargo at any Time.* Each terminal owner or operator to whom subsection (c)(3) applies, shall submit a report to the Executive Officer by January 31, 2007, as described below:

(A) Owner or Operator Contact Information
1. Company name
2. Contact name, phone number, address, e-mail address
3. Address of equipment

(B) Equipment and Engine Information
1. Make of equipment and engine
2. Model of equipment and engine
3. Engine family (if applicable)
4. Engine serial number
5. Year of manufacture of equipment and engine (if unable to determine, approximate age)
6. Rated brake horsepower
7. Control equipment (if applicable)

a. Type of diesel emission control strategy
b. Serial number of installed diesel emission control strategy
c. Manufacturer of installed diesel emission control strategy
d. Model of installed diesel emission control strategy
e. Installation date of installed diesel emission control strategy
f. Level of control (1, 2, or 3)

(C) Fuel(s) Used
1. CARB Diesel
2. Alternative diesel fuel (specify)
3. Alternative fuel (specify)
4. Combination (dual fuel) (specify)
5. Other (specify)

(D) Operation Information
1. Describe general use of engine
2. Typical load (percent of maximum bhp rating)
3. Typical annual hours of operation
4. If seasonal, months of year operated and typical hours per month operated

(k) Executive Officer Approval to Transfer Non-Yard Truck Mobile Cargo Handling Equipment Between Two Facilities.

The Executive Officer shall allow an owner or operator of a port terminal or intermodal rail yard to transfer non-yard truck cargo handling equipment owned, leased, or rented by the owner or operator between two port terminals or intermodal rail yards under the control of the same owner or operator upon request from the owner or operator and if,

(1) The two facilities that the equipment is being transferred from and to are under the same control;
(2) The equipment transfer will not be used to meet the requirements of this section at the facility the equipment is being transferred from;
(3) The transferred equipment must be brought into compliance with the requirements of subsection (e)(3) before the equipment is put into operation at the new location; and
(4) The transfer plan is submitted to the Executive Officer for review 30 days prior to the planned transfer and the Executive Officer determines that the plan does not result in a significant increase in public health impacts based on an evaluation of the following information:

(A) number of equipment to be transferred
(B) hours of operation of equipment
(C) estimated engine emissions levels
(D) proximity of new location to off-site residences

(5) The transfer plan must include the following information:

(A) Owner/operator Contact Information
1. Company name
2. Contact name, phone number, address, e-mail address
3. Address of equipment

(B) Equipment and Engine Information
1. Make of equipment and engine
2. Model of equipment and engine
3. Engine family (if applicable)
4. Engine serial number
5. Year of manufacturer of equipment and engine (if unable to determine, approximate age)
6. Rated brake horsepower
7. Estimated annual hours of operation (at both the equipment's original and new locations)
8. Control equipment (if applicable)

a. Type of diesel emission control strategy (DECS)
b. Serial number of installed DECS
c. Manufacturer of installed DECS
d. Model of installed DECS
e. Installation date of installed DECS
f. Level of control (1, 2, or 3)

(C) Facility address and phone number where equipment originally operated

(D) Facility address and phone where equipment is to be transferred

(E) Anticipated transfer date

(l) Equipment at Rural Low-Throughput Ports

The requirements of this entire section do not apply to equipment at low-throughput ports that are no closer than 75 miles from an urban area. If a low-throughput port subsequently exceeds the two-year average annual cargo throughput limit set in (d)(36), or the population in the surrounding community increases to exceed 50,000 persons, each owner or operator of cargo handling equipment at that port needs to submit a plan for compliance to the Executive Officer within six months of the port being notified of the exceedance. The compliance plan must include the information listed in subsections (j)(1)(A) and (B) and include compliance dates no later than 3 years from notification of the exceedance.

(~~k~~m) Right of Entry

An agent or employee of the Air Resources Board has the right of entry to port and intermodal rail yard cargo handling facilities for the purpose of inspecting on-road and off-road cargo handling equipment and their records to determine compliance to these regulations.

(n) Test Methods

The following test methods are approved by the Executive Officer when testing for diesel PM, NO_x, CO, HC, NMHC, and CO_2. The testing must be done with the applicable method specified in the following procedures: International Organization for Standardization (ISO) 8178-2: 1996(E)("ISO 8178 Part 2"); (2) ISO 8178-4: 1996(E)("ISO 8178 Part 4"); and applicable methods and procedures specified in 40 CFR Part 94 (as amended in 2007), all of which are incorporated herein by reference, or 40 CFR Part 89, 40 CFR Part 1039, or 40 CFR Part 1065 for nonroad (off-road) engines, as those parts existed on September 22, 2011. Each of the procedures specified in this subsection is incorporated by reference herein.

(~~l~~o) Prohibitions

No person who is engaged in this State in the business of selling to an ultimate purchaser, or renting or leasing new or used mobile cargo handling equipment, including, but not limited to, manufacturers, distributors, and dealers, shall sell, offer for sell, import, deliver, purchase, receive, or otherwise acquire a new or used mobile cargo handling equipment for the purpose of selling, renting, or leasing in California, that does not meet the performance requirements of this regulation.

(~~m~~p) Severability

If any subsection, paragraph, subparagraph, sentence, clause, phrase, or portion of this regulation is, for any reason, held invalid, unconstitutional, or unenforceable by any court of competent jurisdiction, such portion shall be deemed as a separate, distinct, and independent provision, and such holding shall not affect the validity of the remaining portions of the regulation.

(~~n~~q) Submittal of Documents

~~(A)~~ (1) All documents required under this regulation to be submitted to the Executive Officer shall be submitted as follows:

California Air Resources Board
Stationary Source Division, Cargo Handling Equipment
P.O. Box 2815
Sacramento, California 95812-2815

~~(B)~~ (2) An alternative method, including electronic submittals, may be approved by the Executive Officer.

NOTE: Authority cited: sections 39600, 39601, 39618, 39658, 39659, 39667, 39674, 39675, 42400, 42400.1, 42400.2, 42400.3, 42400.3.5, 42400.6, 42402, 42402.1, 42402.2, 42402.3, 42402.4, 42410, 43013, 43018, Health and Safety Code. Reference: sections 39618, 39650, 39658, 39659, 39667, 39674, 39675, 42400, 42400.1, 42400.2, 42400.3, 42400.3.5, 42400.6, 42402, 42402.1, 42402.2, 42402.3, 42402.4, 42410, 43013, and 43018. ~~Health and Safety Code.~~

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Appendix B

Emissions Inventory Methodology

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I. EMISSIONS INVENTORY DEVELOPMENT FOR CARGO HANDLING EQUIPMENT

A. Overview

Cargo handling equipment can be a significant source of diesel particulate matter (PM) emissions in communities near ports and intermodal rail facilities. To reduce diesel particulate matter (PM) emissions in these communities CARB passed a regulation requiring reductions in emissions from cargo handling equipment. With proposed amendments to that regulation staff is updating the inventory with a wealth of new information collected since 2005. These new sources of information include the regulatory reporting data which provides an accounting of all the cargo handling equipment (CHE) in the state including their model year, horsepower and activity. In addition, the Ports and Los Angeles and Long Beach have been conducting annual emissions inventories, and a number of the major rail yards and other ports in the state have completed individual emissions inventories. The methodology discussed here reflects updated population and activity, the impact of the recession on growth, and engine load. Emissions estimates were developed for six equipment classes associated with California's 14 ports 16 and intermodal rail yards. The updated inventory and emissions model, Cargo Handling Emissions Inventory Model, or CHEI, and the CHEI Working Files are posted on ARB's web site at http://www.arb.ca.gov/ports/cargo/cheamd2011.htm. (ARB, 2011f), (ARB,2011o)

B. Methodology for Estimating Emissions

The emissions from each type of equipment covered by the CHE regulation are calculated using the following equation:

Emissions = Pop * HP * LF * Activity * EF

Where:

Pop =	Equipment population
HP =	Maximum rated horsepower (hp)
LF =	Load factor
Activity =	Activity or annual operation (hr/yr)
EF =	Emission factor (g/hp-hr)

The equation above is applied to each piece of equipment, and the results summed to provide the emissions inventory. To estimate emissions in future years, staff projects a baseline population of vehicles into the future by modeling turnover and purchasing characteristics. These projections are modeled in a Microsoft Access database that projects future populations and emissions based on location-specific characteristics and behavior, economic forecasts, and ARB's regulatory requirements. This forecasting module is described in detail in chapter III of this appendix. The baseline inventory and the inputs to the equation above are described in section I.C below.

C. Emissions Inventory Inputs

1. Population

After the CHE rule was adopted in December, 2005, the regulation required all ports and rail yards with applicable vehicles to submit equipment inventories to ARB by January 31, 2007. (ARB, 2005c) The reporting forms required information such as vehicle make, model and serial number, and also usage characteristics such as hours used and average load factor during operation. These reports provided a new inventory of equipment for 2006 that serves as a baseline population for the updated inventory model.

The equipment population estimated for the original inventory developed in 2005 was based on a survey of ports and rail yards that ARB distributed in December, 2004 and a separate survey in 2001 and 2002 from the Port of Los Angeles and Port of Long Beach. (ARB, 2005b) The equipment population at the ports of Los Angeles and Long Beach represent over half of the population of cargo handling equipment in California. The combined surveys provided information on approximately 2,000 pieces of equipment, and the results were scaled upwards to estimate the total population of equipment in the state. This updated inventory is based on regulatory reporting data that accounts for all equipment in the state and therefore requires no scaling. ARB received equipment reports from 72 companies that operate at the 14 ports and 16 rail yards covered by the regulation. Table I-1 details the count of equipment reported by facility.

Table I-1: Population of Equipment by Facility

Location	Port/Rail	Population
Port of Los Angeles	P	1424
Port of Long Beach	P	1307
Port of Oakland	P	600
BNSF Los Angeles	R	274
Port of Stockton	P	145
Port of Hueneme	P	96
UPRR ICTF	R	86
BNSF San Bernardino	R	83

Location	Port/Rail	Population
San Diego Port & Railyard	P	66
Port of San Francisco	P	61
UPRR LA/Commerce	R	51
Port of Richmond	P	48
UPRR Oakland	R	35
BNSF Stockton	R	33
UPRR LATC	R	29
Port of Sacramento	P	28
BNSF Oakland	R	26
UPRR Lathrop	R	23
BNSF Commerce	R	22
UPRR City of Industry	R	20
Port of Redwood City	P	20
BNSF Fresno	R	9
Other Bay Area Ports & Railyards	P	8
BNSF Richmond	R	4
Port of Humboldt Bay	P	19
Total		**4517**

Table I-2 and Table I-3 show the combined population of equipment in ports and rail yards, respectively, and compares the totals against the original inventory population estimates for calendar year 2006.

Table I-2: Calendar Year 2006 Equipment Population for All Ports

Equipment Type	Original Inventory	Updated Inventory
Yard Tractor	2115	1861
Forklift	461	712
Container Handling Equipment	529	500
Crane	278 (All Cranes)	253 (RTG Only)
Construction Equipment	134	192
Other General Industrial Equipment	41	149
Total	**3558**	**3667**

Table I-3: Equipment Population for All Rail Yards

Equipment Type	Original Inventory	Updated Inventory
Yard Tractor	326	507
Crane	82 (All Cranes)	89 (RTG Only)
Forklift	24	66
Container Handling Equipment	30	25
Other General Industrial Equipment	5	15
Construction Equipment	1	3
Total	**468**	**705**

As shown in the preceding tables, the updated population for ports is very close to the original inventory estimates, only 2 percent higher overall. The population for rail yards, however, is 51 percent higher than the original inventory.

This new data provided not only an updated count of equipment, but also allowed staff to improve the inventory with updated location-specific characteristics, such as equipment age. Table I-4 compares the updated average age of equipment based on the reporting data against the averages age from the original inventory. The data shown for the original inventory below is the averages ages in 2006. Because the baseline for the original inventory was calendar year 2004, the averages in the table are shown after the impact of two years of attrition predicted by the original inventory model. This comparison is useful in showing the difference in the expected average age of equipment in the original inventory and the average ages from the reporting data. The significant difference seen in expected average and the average age reported to ARB not only impacts the baseline population, but also lead to revised projections of turnover and vehicle purchasing that more closely model real world conditions.

Table I-4: Average Equipment Age by Type in Calendar Year 2006

Equipment Type	Original Inventory	Updated Inventory
Yard Tractor	3.6	4.6
Forklift	4.1	12.7
Container Handling Equipment	5.2	5.9
Crane	7	6.7 (RTG Only)
Construction Equipment	5.4	13.6
Other General Industrial Equipment	4.6	13.1
Total	**4.2**	**7.1**

Overall, the updated inventory demonstrates a minor increase in overall population, but a shift to a significantly older average vehicle age.

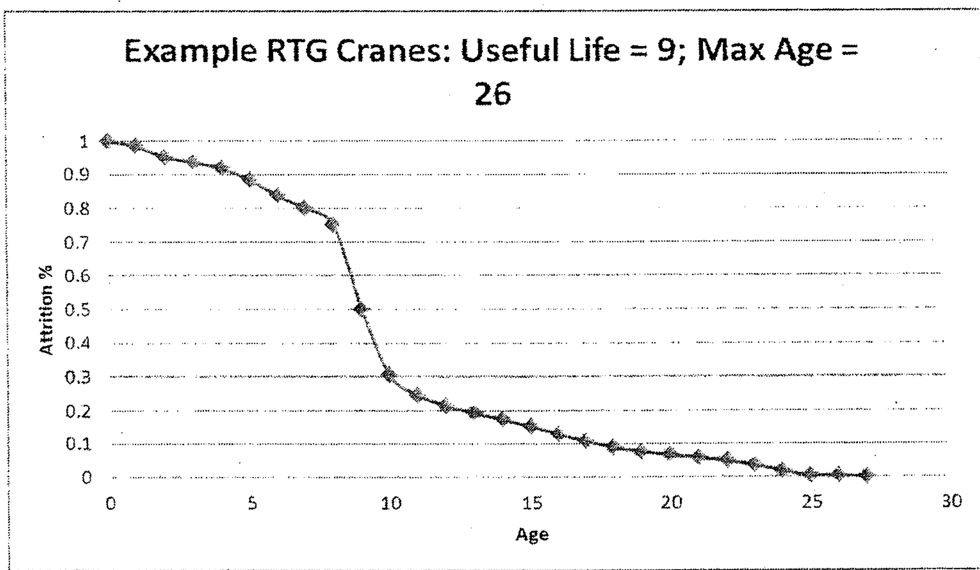
2. Turnover

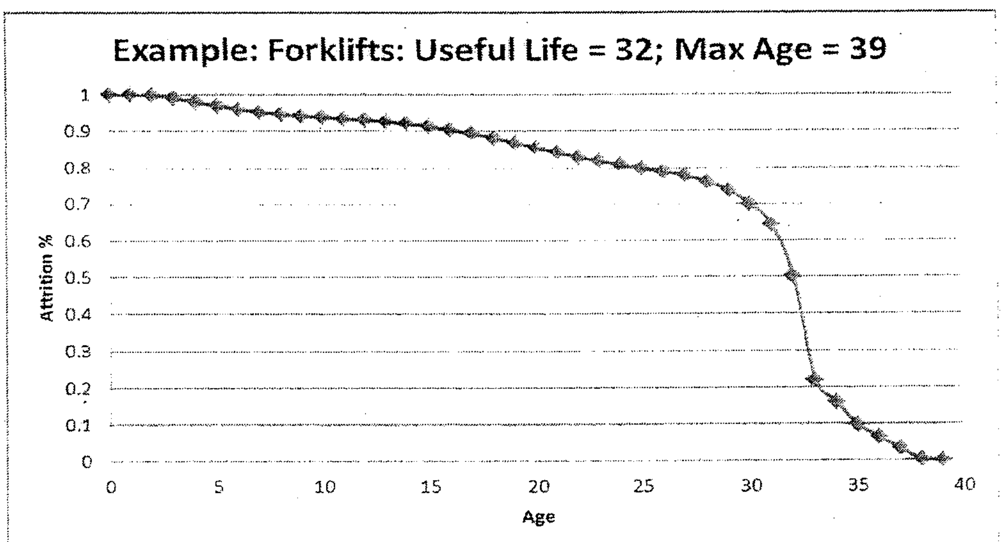
Turnover is a function that describes the relationship between equipment age and the proportion of equipment that has been removed from the port or rail yard fleet. These vehicles may leave a specific port/rail yard because of scrappage or because they are being sold to another fleet. The function is expressed in terms of a fraction of vehicles by age that remains in the population. The average lifetime varies by the type of equipment and the location. For this updated inventory staff relied on the turnover rate curves as defined by U.S. Environmental Protection Agency (U.S. EPA). (USEPA, 2005) U.S. EPA provides equations for which the user defines the useful life and maximum age of the equipment. Useful life is defined as the age where 50% of the vehicles have been turned over and the maximum life is the age at which all the vehicles have left the specific port or rail yard fleet. The application of these turnover functions was tailored to align with our understanding of the useful life information included in the reporting data.

In order to reflect location-specific turnover characteristics staff developed useful life and maximum life inputs based on groups of fleets with similar average age equipment. For example, all yard tractor at ports and rail yards with an average age around 5 years follow the same turnover trends whereas yard tractor fleets with an average around 10 years follow their own turnover trend. This way, smaller fleets which are difficult to model can follow the trends of similarly-aged larger ones. The assumption is that equipment with similar averge age will have the same turnover rates. The categorizations for these groupings can be found in Appendix A.

Turnover rates follow a traditional s-curve, but the shape of the curve is defined by the useful life and maximum life. Based on the age distributions developed from the grouped data in the table above staff identified the useful life as 1.5 times the average age of the equipment. The maximum age was defined as the 98th percentile of the age distribution. The following graphs are examples of the s-curves for RTG cranes with an average age of 6 and forklifts with an average age of 21. As you can see for this example location, RTG cranes are generally turned over by age 10. In the other example location, forklifts are maintained until almost 35 years old.

Figure I-1: Example Turnover Rates for Cranes and Forklifts





Turnover Curve Development

The turnover functions, or s-curve, developed for this updated inventory are specific to individual locations and equipment type characteristics and were developed in three steps: (1) Group similar fleets into the same category; (2) Develop a Business As Usual (BAU) age distribution; (3) Stretch or compress the curve so turnover models the BAU distribution. The result is that locations with a similar average age will follow the turnover rates.

(1) Group similar fleets into the same category

Since some equipment types at ports and rail yards have small populations, staff grouped locations with similar characteristics together. Different equipment types, however, were never modeled using the same turnover rates since the data shows that the different CHE equipment types are too unique to have the same turnover assumptions. Locations that were grouped together were based on average vehicle age into a (L)ow, (M)edium, (H)igh, or (O)ver-high category (see Appendix A). For example, all the equipment given a 'High' average age designation are used to develop the same BAU age distribution, which will be discussed in more detail later.

(2) Develop a Business As Usual (BAU) age distribution

Once the categories have been established, many different sources of population data are compiled to develop an age distribution that represents business as usual in the absence of the regulation. To develop this BAU age distribution staff relied on the regulatory reporting database (ARB, 2005c), the annual inventories for the Port of Los Angeles/Port of Long Beach (Starcrest, 2010a) (Starcrest 2010b), the 2005 Port of Oakland inventory (Environ, 2008), the 2005 Railyard Health Risk Assessment inventories (ARB, 2008), and ARB's 2004 CHE equipment survey. (ARB, 2005b) The BAU age distributions were developed from a polynomial fit of the data. These curves are then used for turnover and purchasing and are unique to each *category* of equipment type shown in Appendix A.

(3) Stretch or compress the curve so turnover models the BAU distribution

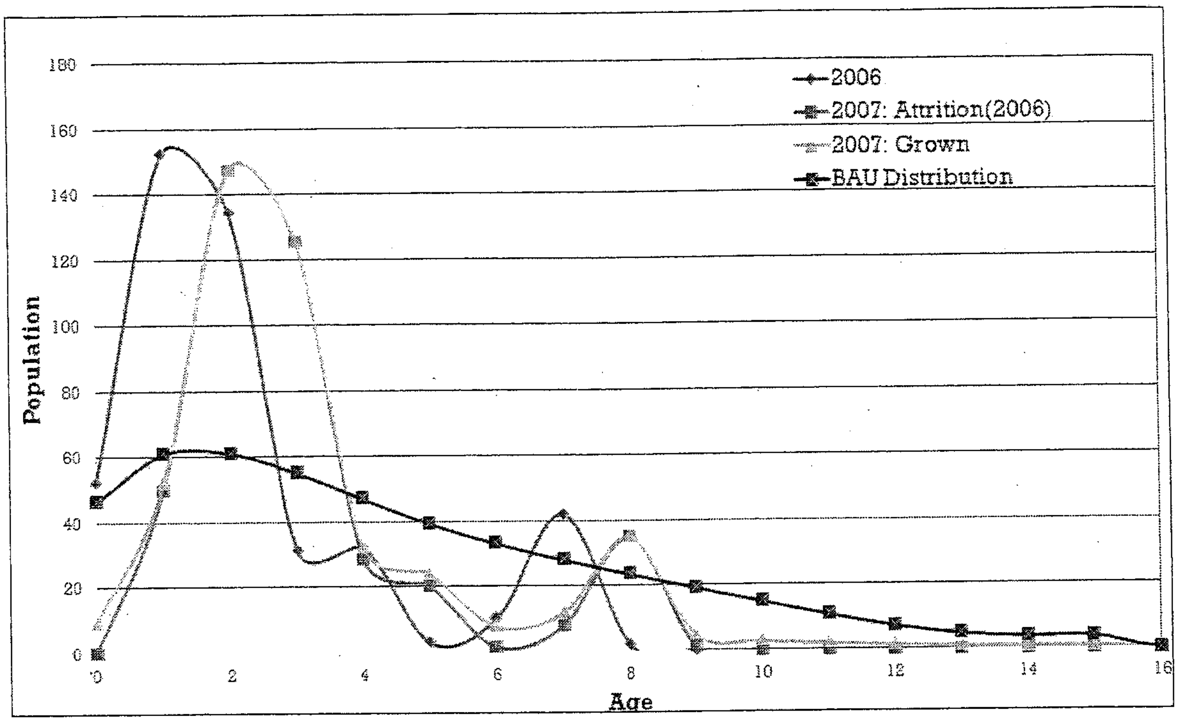
The useful life of the turnover function was determined to be at 1.5 times the average age of the BAU distribution because this is where the distributions had a significant drop off in population. It was also observed that the model preserved BAU well at this useful life. The max life was placed at the 98th percentile of the population data. Any equipment that was reported older than this had a very large standard deviation from what was normal; increasing the max age to include these outliers would result in a population much older than anticipated.

3. Purchasing

The other component of equipment turnover is purchasing. Purchasing is very specific to each port and rail yard. Some locations maintain vehicles that are very young and thus purchase young vehicles while other maintain older equipment and thus purchase older vehicles. Since the updated inventory developed for these amendments is location-group and equipment-specific purchasing behavior was necessary at this level of detail.

In order to establish purchasing habits for each location-group an historically average baseline age distribution was developed. This distribution, hereby referred to as the 'business as usual age distribution' was estimated from 2001-2007 historical equipment inventory data (see Turnover Curve Development above). This age distribution represents the age distribution of the equipment at that location in the absence of the rule and recession. This distribution was used as a target age distribution in projecting fleet turnover in the absence of the recession and regulation. The distribution of vehicle purchases was determined by the business as usual age distribution for the baseline inventory. New vehicle purchases under the rule inventory were dictated by the rule requirements. The example for yard trucks below helps to illustrate the concept. The blue line is the 2006 age distribution. After attrition is applied the resulting population (the dark green line with boxes) is a year older and smaller as a result of vehicles leaving the fleet (turnover). To determine the age of vehicles purchased the business as usual (BAU) age distribution is used to distribute new vehicle purchases among the ages where the attrited 2007 population is below the business as usual population. These purchases are added to the 2007 attrited population resulting in the 2007 grown population (light green line with triangles). In reality this adjustment takes into account both purchasing and necessary modifications to turnover rates where the estimated turnover assumptions don't exactly match fleet behavior. Over time the base year age distribution will move towards resembling the business as usual age distribution.

Figure I-2: Purchasing Example for 2006 to 2007 population change



Purchasing Distribution

After turnover has been applied to a given population purchasing is distributed among model years to eventually reestablish the BAU age distribution. These purchases enter the fleet at a specific location as a result of turnover and growth and are accomplished in two steps: (1) Calculating the number of total vehicles that need to be purchased; and (2) Distributing the purchases so the BAU distribution is eventually reestablished.

(1) Calculating the number of total vehicles that need to be purchased

The total number of vehicles that need to be purchased is a function of the number retired and the expected growth from one year to the next. The growth of a population is calculated by multiplying the count of equipment before retirement by a growth factor (see '6. Growth & Recovery' for details on growth factors).

(2) Distributing the results so the BAU distribution is reestablished into the future

The total number of vehicles purchased is distributed among model years so that each age bin gets relatively closer to the BAU distribution. If an age bin is already above the BAU distribution there is no purchasing for that bin. The percentage of vehicles given to each bin is chosen so that each gets proportionally closer to BAU. For example, if 3 vehicles are to be distributed between age 3 and age 5 which have populations of 8 and 10 respectively, and BAU has these populations both at 12 vehicles, then the age 3 bin gets 2 vehicles and age 10 bin gets 1 vehicle.

4. Engine Load Factor

Engine load is the average operational level of an engine in a given application as a fraction or percentage of the engine manufacturer's maximum rated horsepower. Since emissions are directly proportional to engine horsepower, load factors are used in the inventory calculations to adjust the maximum rated horsepower to normal operating levels.

In 2006 the Port of Los Angeles and Port of Long Beach conducted a study of engine load for yard trucks. (Starcrest, 2008a) (Starcrest, 2008b) In 2009, a similar study was performed for cranes operated at both ports. (Starcrest, 2010a) (Starcrest, 2010b) Both studies demonstrated that the load factor used in the original inventory was too high. The result was that the load factor for yard trucks was reduced to 0.39, and to 0.2 for RTG cranes. Load factors for excavators were updated from 0.57 to 0.55, as excavators were combined with the 'Tractor/Loader/Backhoe' category into the 'Construction Equipment' category of CHE, with a shared load factor of 0.55. Table I-5 below displays the load factor in the original inventory and the updated load factors.

In the original inventory, the load factors for each equipment type were taken from the ARB OFFROAD model. (ARB, 2007) For all other CHE equipment types except yard trucks and RTG cranes this remains the best available data.

Table I-5: Engine Load Factors

Equipment	Original Inventory	Updated Inventory
Yard Tractor	0.65	0.39
RTG Crane	0.43	0.2
Excavator	0.57	0.55
Forklift	0.30	0.30
Material Handling Equip	0.59	0.59
Other General Industrial Equip	0.51	0.51
Tractor/Loader/Backhoe	0.55	0.55

5. Activity

Background

The activity or annual operation of off-road equipment is measured in annual average hours of use and varies by equipment type and age. Since the original rulemaking a number of new data sources have become available. These data show, Figures I-3 and I-4 below, that there are differences in activity by location as well as differences in activity as the equipment ages. These differences have been analyzed and taken into account in this updated inventory.

Activity profiles for CHE in the original rulemaking inventory were estimated using data from a CARB survey of ports and rail yards in 2004. (ARB, 2004) Activity data were collected from 69 owner/operators statewide and captured operating hours for approximately 2,000 pieces of equipment. These data were aggregated to represent typical activity of specific equipment types at ports and rail yards as shown in Table I-6.

Table I-6: Activity Values for CHE in Original Inventory

	Annual Hours	
Equipment Type	**Port**	**Rail Yard**
Crane	1371	1632
Excavator	2222	1162
Forklift	1098	803
Material Handling Equip	2388	2388
Other General Industrial Equip	693	1632
Sweeper/Scrubber	872	872
Tractor/Loader/Backhoe	755	755
Yard Tractor	2536	1289

Figure I-3: Yard Truck Annual Hours by Location (2006)

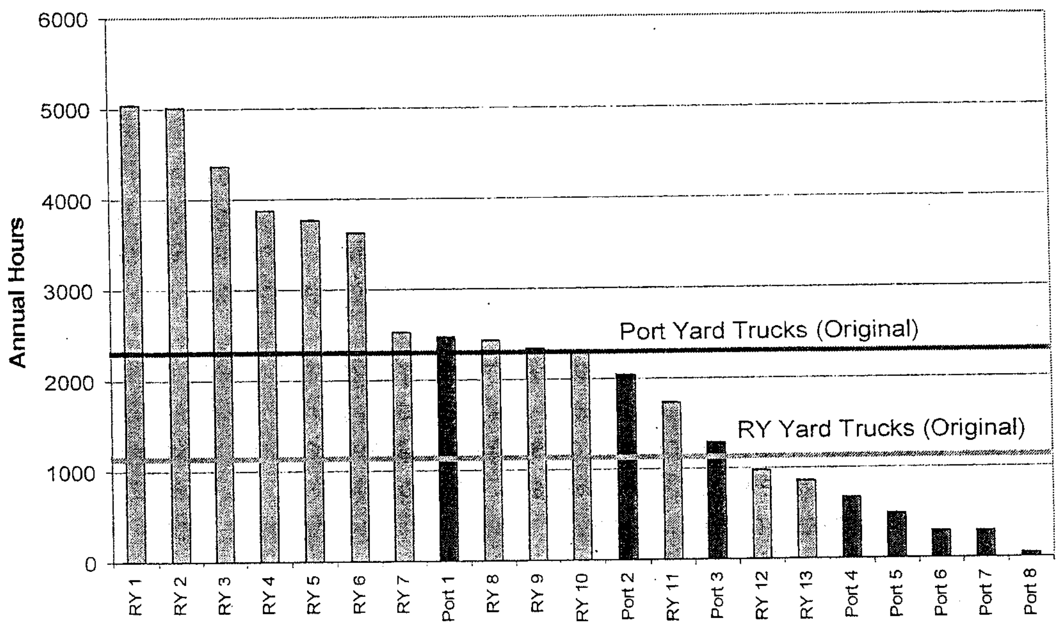
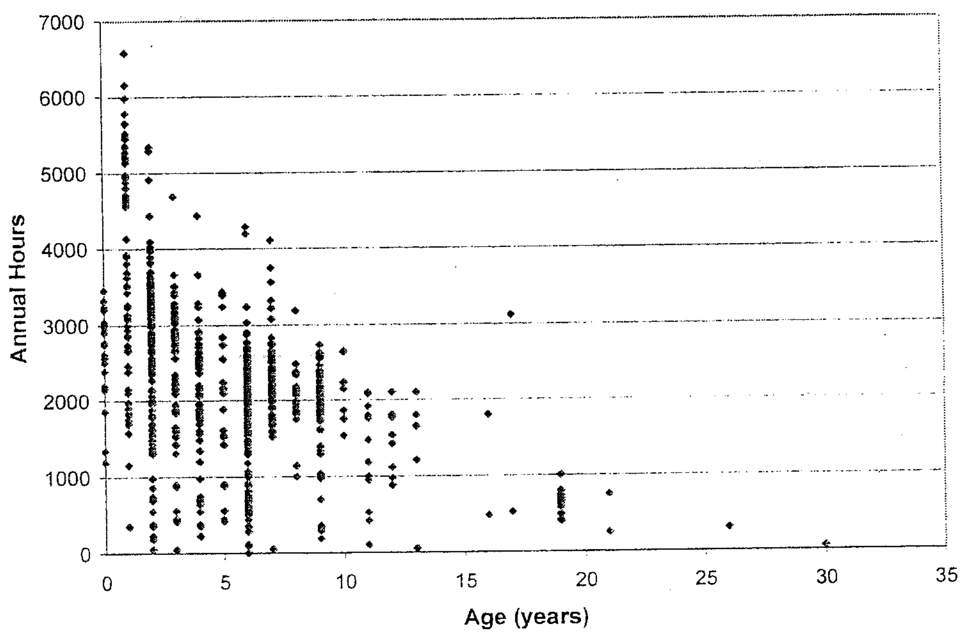


Figure I-4: Activity by Age for Yard Tractors in a California Port



Data Sources

Since the original CHE emissions inventory was developed in 2005, new data sources for CHE activity have become available. These new data sources are the basis for the activity values in the new emissions inventory and are described below.

CHE Regulation Reporting Data: As part of the 2006 CHE regulation, fleet owners and operators of CHE were required to submit information to CARB regarding equipment populations and hours of use. (ARB, 2005) Data were collected for over 4,000 pieces of equipment.

Rail Yard Health Risk Assessments (HRA): As part of the rail yard emission reduction program, health risk assessments were initiated in 2005 to determine the relative risk of exposure to diesel particulate matter in the proximity of 17 intermodal rail yards. As part of the assessment, activity data were collected for over 400 pieces of cargo handling equipment. (ARB, 2008)

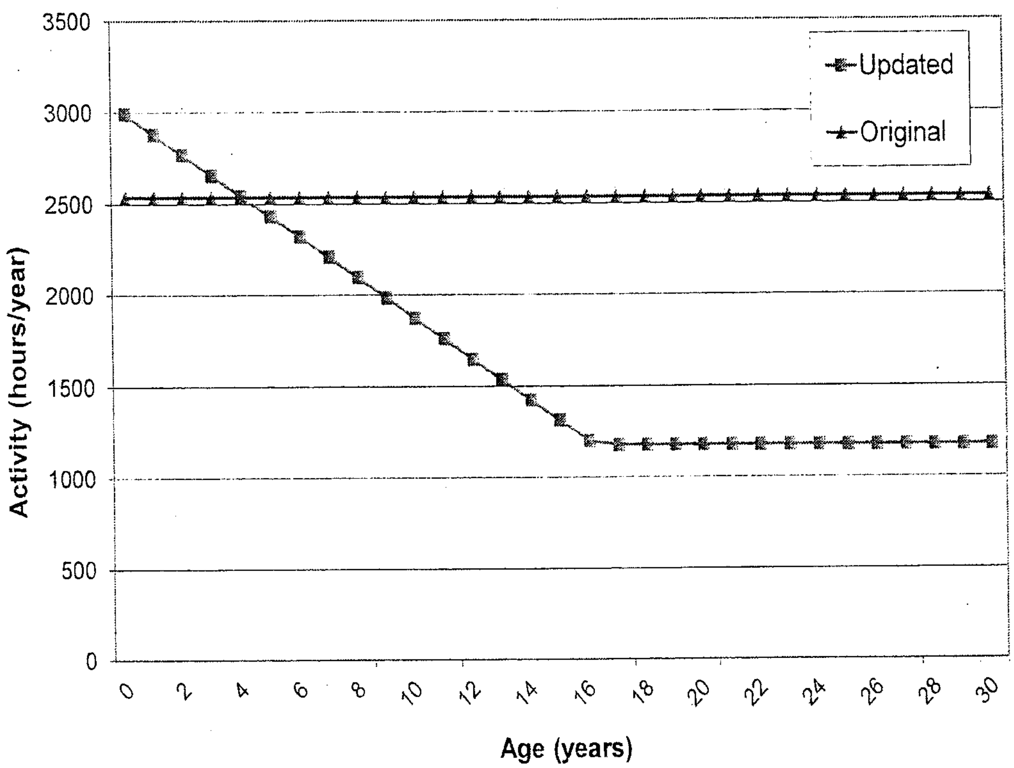
Starcrest/ENVIRON Port Emissions Inventories: CHE emissions inventories for the past several years have previously been developed by the Starcrest consulting group for the Ports of Los Angeles, Long Beach and San Diego. In addition, the ENVIRON consulting group developed a CHE emissions inventory for the Port of Oakland in 2005. (Environ, 2008) As part of the emission inventory development process, activity data for several thousand pieces of equipment were collected at each of these ports. For the current inventory, calendar year 2006 activity data from these consulting reports were used as new sources of activity data. (Starcrest, 2008a) (Starcrest, 2008b) (Starcrest, 2008c)

Methodology

Depending on the equipment type and location, staff used either one of two methods to develop activity profiles. For those locations where use was determined to be a function of age an appropriate activity profile was developed. For those locations where activity was not determined to be a function of age an average activity was employed. These two methods are described below.

Trend Method: For this method, staff identified those equipment types displaying a significant decreasing trend in activity by age. Significant decreasing trends were identified by plotting all the available activity data described previously for each equipment type and location and performing a linear regression. The trend was considered significant it the slope was negative (i.e. decreasing activity by age) and contained a t-value greater than the critical t value at the 95% confidence level. In these cases, the trend line equation was used to calculate the activity by age profile for the specific equipment type and location. In order to ensure that the activity values never became zero due to the decreasing trend line, staff determined an inflection point (i.e. age) where activity ceased to decrease and became constant. The first step was to identify the age that represented twice the average age of the equipment types in a given location. Staff then calculated the average activity of all available data for the specific equipment type above this age. The point at which the decreasing trend line intersected this activity value was then used to define the activity by age profile for the specific equipment type and location. Figure I-5 shows an example activity by age profile for yard tractors at the Port of Los Angeles using the new methodology as well as the activity by age profile in the previous inventory.

Figure I-5: Activity by Age Profile for POLA Yard Tractors



Average Method: For those equipment types where there was no significant trend, the average of all activity values was assigned to specific equipment type and location. In other words, one activity value was assigned to the equipment type regardless of how old the equipment was.

Results

Using the above methodologies, staff calculated the overall average hours by equipment type. The results are shown in Tables I-7 and I-8 for ports and rail yards, respectively. For comparison purposes, the average activity values used in the previous emissions inventory are also shown.

Table I-7: Average Activity Values at Ports

Equipment Type	Original Inventory (for 2006) (hours/year)	Updated Inventory (2006) (hours/year)
Construction Equipment	1,084	1,497
Container Handling Equipment	2,388	1,884
Forklift	1,098	701
Other General Industrial Equipment	693	1,265
RTG Crane	1,371	1,574
Yard Tractor	2,536	2,020
All Equipment	**2,159**	**1,656**

Table I-8: Average Activity Values at Rail Yards

Equipment Type	Original Inventory (for 2006) (hours/year)	Updated Inventory (2006) (hours/year)
Construction Equipment	755	141
Container Handling Equipment	2,388	1,705
Forklift	803	2,234
Other General Industrial Equipment	1,632	1,024
RTG Crane	1,632	3,398
Yard Tractor	1,289	4,627

6. Growth & Recovery

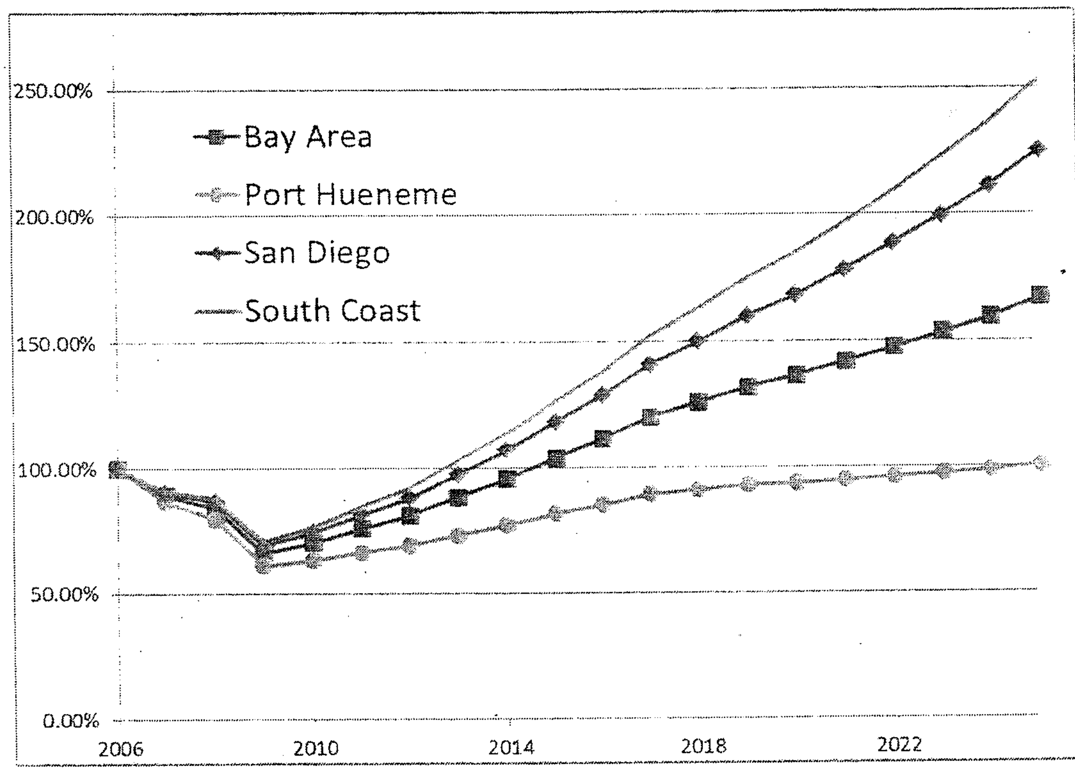
The growth factors used to estimate cargo handling equipment emissions in future years was based on growth factors from ARB's Ocean-Going vessel (OGV) inventory for container, bulk, general and reefers vessels. Information on these growth factors can be found in the OGV technical appendix. (ARB, 2011l)

The economic recession that officially started in December of 2007 and ended in June 2009 was the most severe since the Great Depression, and had a severe impact on industries throughout California. To forecast activity following the recession, three recovery scenarios were considered to encompass the possible rates of growth of "fast", "slow", and "average". The fast recovery scenario assumes that total activity would return to projected historically average levels in 2017 and then grow at the historical average rate. A return to trend by 2017 was based on the Congressional Budget Office forecast which indicated that real gross domestic product at a nationwide level will converge with potential gross domestic product trends no later than 2015. This forecast was modified with the assumption that California's recovery will lag the nation by several years, yielding the 2017 recovery date assumed for the fast recovery scenario. For the slow recovery scenario, staff assumed that activity would be permanently depressed relative to historical levels, but continue to grow at historical rates. The average scenario is the average of the fast and slow scenarios.

The impact of the recession was estimated from port call and TEU data. Given the uncertainty in forecasting emissions after such a deep recession, staff relied on the average recovery scenario. This scenario, for the years of interest for these regulatory amendments, is also supported by the most recent San Pedro Bay forecasts. The methodology is consistent with the In-Use On-Road and Off-Road rules.

The growth rates were aggregated according to ports and rail yards in the South Coast, San Diego, Bay Area, Hueneme and the North Coast and are shown in Figure I-6 below and in Appendix B.

Figure I-6: Growth Factors



<u>Economic Recovery Factors</u>

The age distribution of off-road diesel equipment has important implications for the emissions inventory. In general, an older vehicle will produce more emissions than a newer vehicle operating under the same conditions. In light of the economic recession, it is important to assess the impacts of the economy on sales of new off-road diesel equipment. Depending on the state of the economy in a given calendar year, one of several scenarios will occur regarding the sales of the new equipment. These scenarios will impact the relative proportion of the new model year equipment in the age distribution. These scenarios include:

- **New equipment sales are higher than expected equipment sales**. The proportion of the new model year equipment pieces in the age distribution will therefore be *higher* than the proportion in a baseline (no impact) age distribution.

- **New equipment sales are lower than expected equipment sales**. The proportion of the new model year equipment pieces in the age distribution will therefore be *lower* than the proportion in a baseline (no impact) age distribution.
- **New equipment sales are equal to expected equipment sales**. The proportion of the new model year equipment pieces will therefore be *equal* to the proportion in a baseline (no impact) age distribution age distribution.

The Off-Road In-Use Equipment Regulation emissions inventory incorporated these impacts by estimating the impact of new off-road diesel equipment sales on future age distributions. Staff did this by developing economic recovery factors, which are a measure of how much a port or rail yard's fleet ages over time. During times of economic recession, less new equipment is purchased and the average age of the fleet increases. As a result the average age of a given fleet increases comared to the base year. The economic recovery factors define the fleet average age in the future.

The method, however, relies on equipment sales and economic surrogate information such as gross domestic product (GDP). (ARB, 2010b) Without equipment sales information for CHE staff relied on the same methods used for the Off-Road In-Use Equipment Regulation. (ARB, 2010b) Since construction equipment sales were proportional to GDP it was assumed the CHE sales would follow trends in TEU throughput at the ports. Staff utilized the economic recovery factors developed for the Construction and Mining Category and dampened them according to the relative difference in the impacts of the recession on the industry. For example, the Ports of Los Angeles and Long Beach (LA/LB) saw a 25% drop in TEU while the construction industry experienced nearly a 50% drop in GDP. Therefore the economic recovery factors were halved to account for this difference in recessionary impacts. This is evident in Figure I-7 which shows both the LA/LB and Off-Road recovery factors. The LA/LB factors are about half of the Off-Road factors.

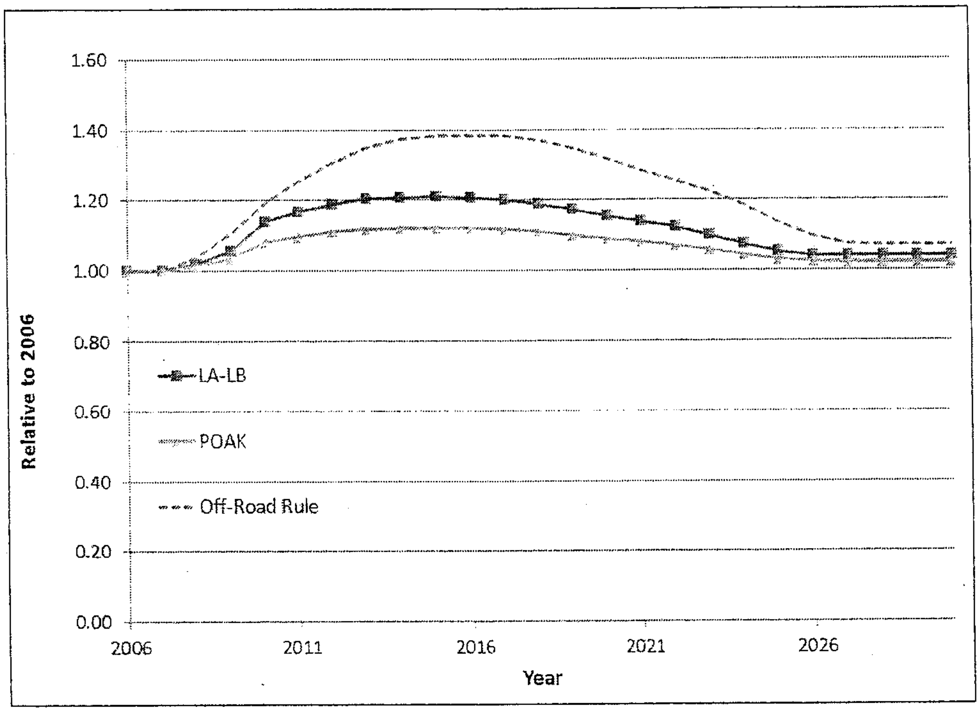
The Table I-9 shows the impacts of the recession for the combined ports of Los Angeles (POLA, 2010) and Long Beach (POLB, 2010), the Port of Oakland (POAK, 2010), and the Port of San Diego (AAPA, 2010):

Table I-9: Impacts of the Recession on TEU

Port	TEU Change 2006-2009
LA+LB	25%
POAK	14%
POSD	7%

For all ports the impact of the recession is less than that of the construction industry therefore the economic recovery factors for all these locations will be dampened relative to construction. The figure below (I-7) shows the economic recovery factors for these ports relative to the construction industry factors. Only the ports of Los Angeles, Long Beach, Oakland and San Diego were included in this assessment since they comprise the vast majority of the equipment in California.

Figure I-7: Impacts of the Recession Fleet Average Age



7. Emission Factors and Deterioration Rates

Emission factors are composed of zero-hour emission rates and deterioration rates. In the original inventory deteriorated emission factors were calculated with deterioration factors and useful life assumptions. This inventory relies on emission factors and deterioration rates from OFFROAD2007. Deteriorated emission factors can be calculated with the following equation:

EF = Zh + dr * CHrs

Where:
EF = Emission factor (g/bhp-hr)
Zh = Zero-hour emission rate when the equipment is new (g/bhp-hr)
Dr = Deterioration rate or the increase in zero-hour emissions as the equipment is used (g/bhp-hr2)
CHrs = Cumulative hours or total number of hours accumulated on the equipment; maximum value is equal to 12,000 hours

The diesel emission factors in the model are in grams per brake horsepower-hour and vary by fuel type, horsepower, and model year. To estimate fuel consumption, an emission factor is replaced with a brake-specific fuel consumption (BSFC) value (lb/hp-hr). BSFC values are used from the U.S. EPA NONROAD model. (USEPA, 2004)

Emission Factors

Emission factors for future years were based on the OFFROAD model which incorporates the impacts of new engine standards (Tier 3 and 4) for each year and horsepower range. The emission factors reflect any phase-in of emission standards allowed by the regulations establishing the new engine standards. Because the regulation is based on specific Tier requirements the OFFROAD2007 emission factors were updated to align with U.S. EPA horsepower bins.

Deterioration rates are in units of g/hp-hr^2 (grams per brake horsepower-hour-hour) and are defined as the change in emissions as a function of usage. These are based on the deterioration rates of on-highway diesel-powered engines with similar horsepower ratings. The rate of emissions changes over time as a result of wear on various parts of an engine due to use. It is assumed that at some point during the life of an equipment its engine would be rebuilt back to the standard of that particular emissions tier (varies by model year of the engine). As a result cumulative hours in the equation above is capped. In this inventory cumulative hours was capped at 12,000 hours, consistent with the Off-Road In Use Equipment Regulation, since no data was specifically available for CHE.

Emission factors for on-road engines in were based on a study that tested both on-road and off-road engines in yard tractors. (ARB, 2006) The factors in Table I-10 are applied to off-road emission factors to convert them to on-road emission factors.

Table I-10: On-Road Conversion Factors

MY	HP Bin	HC	CO	NO_x	PM
2003	175	0.33	1	0.44	0.70
2004	175	0.33	1	0.44	0.70
2005	175	0.33	1	0.44	0.70
2006	175	0.33	1	0.44	0.70
2007	175	0.33	1	0.69	0.70
2008	175	0.33	1	0.42	0.07
2009	175	0.33	1	0.42	0.07
2010	175	0.33	1	0.42	0.07
2011	175	0.33	1	0.07	0.07
2012	175	0.33	1	0.13	0.67
2013	175	0.33	1	0.13	0.67
2014	175	0.33	1	0.13	0.67
2015+	175	0.33	1	0.67	0.67
2003	300	0.33	1	0.44	0.70
2004	300	0.33	1	0.44	0.70
2005	300	0.33	1	0.44	0.70
2006	300	0.33	1	0.69	0.70
2007	300	0.33	1	0.42	0.07
2008	300	0.33	1	0.42	0.07
2009	300	0.33	1	0.42	0.07
2010	300	0.33	1	0.07	0.07
2011	300	0.33	1	0.13	0.67
2012	300	0.33	1	0.13	0.67
2013	300	0.33	1	0.13	0.67
2014+	300	0.33	1	0.67	0.67
2003	600	0.33	1	0.44	0.70
2004	600	0.33	1	0.44	0.70
2005	600	0.33	1	0.44	0.70
2006	600	0.33	1	0.69	0.70
2007	600	0.33	1	0.42	0.07
2008	600	0.33	1	0.42	0.07
2009	600	0.33	1	0.42	0.07
2010	600	0.33	1	0.07	0.07
2011	600	0.33	1	0.13	0.67
2012	600	0.33	1	0.13	0.67
2013	600	0.33	1	0.13	0.67
2014+	600	0.33	1	0.67	0.67

Emission Controls

A number of the state's deep-water ports have implemented cargo handling equipment emission reduction strategies using state funding, such as the Carl Moyer Program, or through port mechanisms. In addition the regulation requires the use of additional emission controls. The emissions inventory reflects the population of emission controlled equipment resulting from these programs. The reductions by emission control are consistent with the original inventory and are presented in Table I-11. These reductions are applied to the base emission rates. In some cases, such as O_2 Diesel, there are emissions disbenefits.

Table I-11: Emission Control Emissions Reductions (percent reduction)

Engine changes	HC	CO	NO_x	PM
DOC	0.7	0.7	0	0.3
DOC + O_2Diesel	0.48	0.73	0.02	0.44
DPF	0	0	0	0.85
O_2 Diesel	-0.75	-0.1	0.02	0.2

8. Fuel Correction Factors

California implemented diesel fuel regulations in 1993, which lowered the limits of aromatic compounds and the sulfur content of fuel marketed in California. The fuel correction factors (FCF) used in the emissions inventory model are dimensionless multipliers applied to the basic exhaust emission rates that account for differences in the properties of certification fuels compared to those of commercially dispensed fuels. In instances where engines or vehicles are not required to certify, the FCFs reflect the impact in changes of dispensed fuel over time as refiners respond to changes in fuel specific regulations compared to the fuel used to obtain the test data. The FCFs used in the model were specific to horsepower group and model year and were based on data described in a 2005 OFFROAD Modeling Change Technical Memo. (ARB, 2005d)

II. EMISSIONS INVENTORY RESULTS

The emission inventory for cargo handling equipment includes total emissions for the locations identified in Table I-1. The data in Table II-1 summarizes the statewide inventory of oxides of nitrogen (NO_x) and diesel particulate matter (PM) for 2006 by equipment type. Combined yard trucks, container handling equipment (top picks, sides picks, etc.), and cranes are responsible for approximately 85 percent of the emissions for all pollutants.

Table II-1: Emissions by Equipment Type (tons/day)

Calendar Year	Equipment Type	NO_x	PM
2006	Construction Equipment	1.03	0.046
2006	Container Handling Equipment	3.06	0.094
2006	Forklift	0.56	0.032
2006	Other General Industrial Equipment	0.54	0.030
2006	RTG Crane	1.23	0.038
2006	Yard Tractor	6.98	0.298

Table II-2: Calendar Year 2006 Emissions by Air District (tons/day)

District	NO_x	PM
Bay Area AQMD	1.91	0.080
Yolo/Solano AQMD	0.02	0.001
San Diego APCD	0.07	0.003
San Joaquin Valley Unified APCD	0.30	0.016
South Coast AQMD	11.06	0.436
Ventura APCD	0.04	0.002
North Coast Unified AQMD	0.02	0.0009

Table II-3: Emissions Inventory Statewide (tons per day)

Calendar Year	PM (tons/day)			NO_x (tons/day)		
	Baseline	Rule	Amendments	Baseline	Rule	Amendments
2006	0.54	0.54	0.54	13.4	13.4	13.4
2011	0.35	0.18	0.18	8.0	5.9	5.9
2014	0.30	0.08	0.08	7.3	4.2	4.3
2020	0.20	0.08	0.06	4.7	3.2	3.1

Table II-4: Emissions Inventory for South Coast Air Basin (tons per day)

Calendar Year	PM (tons/day)			NO_x (tons/day)		
	Baseline	Rule	Amendments	Baseline	Rule	Amendments
2006	0.44	0.44	0.44	11.1	11.1	11.1
2011	0.28	0.15	0.15	6.6	4.9	4.9
2014	0.24	0.07	0.06	5.9	3.4	3.5
2020	0.15	0.06	0.05	3.7	2.6	2.5

Table II-5: Emissions Inventory for San Francisco Air Basin (tons per day)

Calendar Year	PM (tons/day)			NO_x (tons/day)		
	Baseline	Rule	Amendments	Baseline	Rule	Amendments
2006	0.08	0.08	0.08	1.9	1.9	1.9
2011	0.05	0.03	0.03	1.1	0.9	0.9
2014	0.05	0.01	0.01	1.1	0.7	0.7
2020	0.03	0.01	0.01	0.8	0.5	0.5

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Appendix A

Categorization of Similar Equipment		
Equipment	Category	Location
Construction Equipment	H	Port of Humboldt Bay
Construction Equipment	H	Port of Richmond
Construction Equipment	H	Port of Stockton
Construction Equipment	H	UPRR Oakland
Construction Equipment	L	BNSF Stockton
Construction Equipment	L	Other Bay Area Ports & Railyards
Construction Equipment	L	Port of Long Beach
Construction Equipment	L	Port of Redwood City
Construction Equipment	L	Port of Sacramento
Construction Equipment	L	Port of San Francisco
Construction Equipment	L	San Diego Port & Railyard
Construction Equipment	M	Port of Los Angeles
Construction Equipment	M	Port of Oakland
Container Handling Equipment	H	BNSF Fresno
Container Handling Equipment	H	BNSF Los Angeles
Container Handling Equipment	H	BNSF Oakland
Container Handling Equipment	H	BNSF San Bernardino
Container Handling Equipment	H	Port of Hueneme
Container Handling Equipment	H	Port of San Francisco
Container Handling Equipment	H	Port of Stockton
Container Handling Equipment	H	San Diego Port & Railyard
Container Handling Equipment	H	UPRR City of Industry
Container Handling Equipment	H	UPRR ICTF
Container Handling Equipment	H	UPRR LA/Commerce
Container Handling Equipment	H	UPRR LATC
Container Handling Equipment	H	UPRR Lathrop
Container Handling Equipment	L	BNSF Stockton
Container Handling Equipment	L	Port of Long Beach
Container Handling Equipment	L	Port of Los Angeles
Container Handling Equipment	L	Port of Oakland
Container Handling Equipment	L	UPRR Oakland
Forklift	H	Port of Hueneme
Forklift	H	Port of Oakland
Forklift	H	Port of Sacramento
Forklift	H	UPRR LA/Commerce
Forklift	L	BNSF Fresno
Forklift	L	BNSF Oakland

Categorization of Similar Equipment		
Equipment	Category	Location
Forklift	L	BNSF San Bernardino
Forklift	L	BNSF Stockton
Forklift	L	Other Bay Area Ports & Railyards
Forklift	L	Port of Redwood City
Forklift	L	UPRR City of Industry
Forklift	L	UPRR ICTF
Forklift	L	UPRR LATC
Forklift	L	UPRR Lathrop
Forklift	L	UPRR Oakland
Forklift	M	BNSF Los Angeles
Forklift	M	Port of Long Beach
Forklift	M	Port of Los Angeles
Forklift	M	Port of Stockton
Forklift	O	Port of Humboldt Bay
Forklift	O	Port of Richmond
Forklift	O	Port of San Francisco
Forklift	O	San Diego Port & Railyard
Other General Industrial Equipment	H	BNSF Los Angeles
Other General Industrial Equipment	H	Port of Hueneme
Other General Industrial Equipment	H	Port of Long Beach
Other General Industrial Equipment	H	Port of Oakland
Other General Industrial Equipment	H	Port of Redwood City
Other General Industrial Equipment	H	Port of Richmond
Other General Industrial Equipment	H	Port of Sacramento
Other General Industrial Equipment	H	Port of Stockton
Other General Industrial Equipment	H	UPRR ICTF
Other General Industrial Equipment	H	UPRR Lathrop
Other General Industrial Equipment	H	UPRR Oakland
Other General Industrial Equipment	L	BNSF Stockton
Other General Industrial Equipment	L	Port of Los Angeles
Other General Industrial Equipment	L	San Diego Port & Railyard
Other General Industrial Equipment	L	UPRR LA/Commerce
RTG Crane	H	BNSF Fresno
RTG Crane	H	BNSF Richmond
RTG Crane	H	Other Bay Area Ports & Railyards
RTG Crane	H	Port of Hueneme
RTG Crane	H	Port of Oakland
RTG Crane	H	UPRR City of Industry
RTG Crane	H	UPRR LA/Commerce
RTG Crane	L	BNSF Commerce

Categorization of Similar Equipment		
Equipment	Category	Location
RTG Crane	L	BNSF Los Angeles
RTG Crane	L	BNSF San Bernardino
RTG Crane	L	BNSF Stockton
RTG Crane	L	Port of Long Beach
RTG Crane	L	Port of Los Angeles
RTG Crane	L	UPRR ICTF
RTG Crane	L	UPRR LATC
RTG Crane	L	UPRR Lathrop
RTG Crane	L	UPRR Oakland
Yard Tractor	H	BNSF Fresno
Yard Tractor	H	BNSF Oakland
Yard Tractor	H	BNSF Richmond
Yard Tractor	H	BNSF San Bernardino
Yard Tractor	H	Other Bay Area Ports & Railyards
Yard Tractor	H	Port of Hueneme
Yard Tractor	H	Port of Humboldt Bay
Yard Tractor	H	Port of Long Beach
Yard Tractor	H	Port of Los Angeles
Yard Tractor	H	Port of Oakland
Yard Tractor	H	Port of Redwood City
Yard Tractor	H	Port of Sacramento
Yard Tractor	H	Port of San Francisco
Yard Tractor	H	Port of Stockton
Yard Tractor	H	San Diego Port & Railyard
Yard Tractor	H	UPRR LA/Commerce
Yard Tractor	L	BNSF Commerce
Yard Tractor	L	BNSF Los Angeles
Yard Tractor	L	BNSF Stockton
Yard Tractor	L	UPRR City of Industry
Yard Tractor	L	UPRR ICTF
Yard Tractor	L	UPRR LATC
Yard Tractor	L	UPRR Lathrop
Yard Tractor	L	UPRR Oakland

Appendix B Growth Rates:

Area	Year	Growth Factor
Bay Area	2000	0.73
Bay Area	2001	0.77
Bay Area	2002	0.82
Bay Area	2003	0.86
Bay Area	2004	0.90
Bay Area	2005	0.95
Bay Area	2006	1.00
Bay Area	2007	0.89
Bay Area	2008	0.84
Bay Area	2009	0.66
Bay Area	2010	0.70
Bay Area	2011	0.76
Bay Area	2012	0.81
Bay Area	2013	0.88
Bay Area	2014	0.96
Bay Area	2015	1.04
Bay Area	2016	1.11
Bay Area	2017	1.20
Bay Area	2018	1.26
Bay Area	2019	1.32
Bay Area	2020	1.36
Bay Area	2021	1.42
Bay Area	2022	1.47
Bay Area	2023	1.53
Bay Area	2024	1.59
Bay Area	2025	1.67
Bay Area	2026	1.73
Bay Area	2027	1.80
Bay Area	2028	1.82
Bay Area	2029	1.83
Bay Area	2030	1.82
Port Hueneme	2000	0.99
Port Hueneme	2001	0.99
Port Hueneme	2002	0.99
Port Hueneme	2003	0.99
Port Hueneme	2004	1.00
Port Hueneme	2005	1.00
Port Hueneme	2006	1.00

Port Hueneme	2007	0.87
Port Hueneme	2008	0.80
Port Hueneme	2009	0.61
Port Hueneme	2010	0.63
Port Hueneme	2011	0.66
Port Hueneme	2012	0.69
Port Hueneme	2013	0.73
Port Hueneme	2014	0.77
Port Hueneme	2015	0.82
Port Hueneme	2016	0.85
Port Hueneme	2017	0.89
Port Hueneme	2018	0.91
Port Hueneme	2019	0.93
Port Hueneme	2020	0.94
Port Hueneme	2021	0.95
Port Hueneme	2022	0.96
Port Hueneme	2023	0.97
Port Hueneme	2024	0.99
Port Hueneme	2025	1.00
Port Hueneme	2026	1.02
Port Hueneme	2027	1.03
Port Hueneme	2028	1.05
Port Hueneme	2029	1.07
Port Hueneme	2030	1.08
San Diego	2000	1.05
San Diego	2001	1.04
San Diego	2002	1.03
San Diego	2003	1.02
San Diego	2004	1.02
San Diego	2005	1.01
San Diego	2006	1.00
San Diego	2007	0.90
San Diego	2008	0.86
San Diego	2009	0.69
San Diego	2010	0.74
San Diego	2011	0.81
San Diego	2012	0.88
San Diego	2013	0.97
San Diego	2014	1.07
San Diego	2015	1.18
San Diego	2016	1.29

San Diego	2017	1.41
San Diego	2018	1.50
San Diego	2019	1.60
San Diego	2020	1.68
San Diego	2021	1.78
San Diego	2022	1.88
San Diego	2023	1.99
San Diego	2024	2.11
San Diego	2025	2.25
San Diego	2026	2.38
San Diego	2027	2.52
San Diego	2028	2.69
San Diego	2029	2.87
San Diego	2030	3.04
South Coast	2000	0.73
South Coast	2001	0.77
South Coast	2002	0.81
South Coast	2003	0.86
South Coast	2004	0.90
South Coast	2005	0.95
South Coast	2006	1.00
South Coast	2007	0.91
South Coast	2008	0.88
South Coast	2009	0.71
South Coast	2010	0.77
South Coast	2011	0.84
South Coast	2012	0.92
South Coast	2013	1.03
South Coast	2014	1.13
South Coast	2015	1.26
South Coast	2016	1.38
South Coast	2017	1.52
South Coast	2018	1.63
South Coast	2019	1.75
South Coast	2020	1.85
South Coast	2021	1.97
South Coast	2022	2.09
South Coast	2023	2.22
South Coast	2024	2.37
South Coast	2025	2.53
South Coast	2026	2.69

South Coast	2027	2.86
South Coast	2028	3.06
South Coast	2029	3.27
South Coast	2030	3.48

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Appendix C

Cost Analysis – Basis for Calculations

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A. Methodology

The costs or savings for each amendment was evaluated based on the action allowed by the proposed amendment. The majority of the proposed amendments provided additional compliance flexibility and result in a cost savings to affected businesses. Some of these amendments allow a delay in capital expenditure, others allow an avoidance of capital expenditure. In cases where costs are delayed, savings is based on the capital expenditure and the cost of money for that expenditure over the delay time period. The cost of money was based on a real interest rate of 5 percent. All costs and savings were compared in net present value of 2011 dollars. This was calculated using the following equation:

Net Present Value = Future Cost x $1/(1+i)^n$
where i = real interest rate and n = future date – 2011.
A real interest rate of 5 percent was used.

Capital costs for retrofitting or purchasing equipment were based on costs for similar off-road equipment used in the cost analysis for the Off-Road In-Use Equipment Regulation. (ARB, 2010a) The costs for the purchase of RTG cranes were based on costs generated for the original CHE Regulation rulemaking. (ARB, 2005a) The equipment purchase costs include a premium cost for Tier 4 engines, as developed for the Off-Road Equipment Regulation. These costs are provided in Tables C-1, C-2 and C-3.

Table C-1: Retrofit Cost for Various Horsepower Engines

Horsepower Range	Retrofit Cost
Less than 50 hp	$16,750
50 hp – 125 hp	$17,588
125 hp – 175 hp	$19,733
175 hp – 300 hp	$24,796
300 hp – 400 hp	$28,763
400 hp and greater	$52,333

(ARB, 2010a) – Table F-1

Table C-2: Replacement Equipment with Tier 3 Engines

Horsepower Range	Replacement Cost
Construction Equipment	$1,000/hp
Container Handling Equipment	$797/hp
Forklift	$875/hp
Other General Industrial Equipment	$1,000/hp
RTG Crane (less than 600 hp)	$800,000/RTG
RTG Crane (600 hp or more)	$1,200,000/RTG

(ARB, 2007b) – Table XI-2

Table C-3: Replacement Tier 4 Engine Incremental Cost

Horsepower Range	Retrofit Cost
Less than 50 hp	$8,000
50 hp – 175 hp	$12,000
175 hp – 400 hp	$18,000
400 hp and greater	$30,000

(ARB, 2010a) – Table F-2

B. Statewide Costs

1. Additional time for equipment with "No VDECS Available"

This amendment provides for an additional two years of annual compliance extension for equipment for which VDECS is not available. The number of pieces of equipment, equipment type, and horsepower that would be eligible for this extension was predicted by the Cargo Handling Emissions Inventory model and emissions model working files. (ARB, 2011f) (ARB, 2011o) Worksheets with the calculations for the economic analysis are posted on ARB's web site at: http://www.arb.ca.gov/ports/cargo/cheamd2011.htm. (ARB, 2011g) The compliance costs were estimated for this equipment based on Tables C-1 through C-3 above.

For forklifts, it was assumed that 90 percent of the equipment would be replaced and 10 percent would be retrofitted. For all other CHE, it was assumed that half would be replaced and half would be retrofitted. These assumptions are summarized in Table C-4.

Table C-4: Retrofit and Replacement by Each Equipment Type for Proposed 2-Year "No VDECS Available" Compliance Extension

Equipment Type	Fleet Size	Percent Replace	Percent Retrofit	Replace ($million)	Retrofit ($million)	Total Cost ($million)
Construction Equipment	21	50%	50%	4.6	0.4	5.0
Container Handling Equipment	5	50%	50%	3.5	0.4	3.9
Forklift	275	90%	10%	41.6	0.7	42.3
Other General Industrial Equipment	11	50%	50%	1.2	0.2	1.4
Total	312	266.0	46.4	50.9	1.7	52.6

The percentages of the different types of equipment that would be brought into compliance at the end of the additional two-year compliance extension provided by the amendment are shown in Table C-5.

Table C-5: Timing of VDECS Replacement with Proposed "No VDECS Available" Amendment

Year	Construction Equipment	Container Handling Equipment	Forklift	Other General Industrial Equipment
2011	-	-	-	-
2012	-	-	-	-
2013	5.7%	20.5%	3.8%	5.3%
2014	15.4%	6.0%	13.1%	17.7%
2015	25.3%	25.8%	26.5%	26.1%
2016	26.6%	25.1%	28.4%	26.7%
2017	27.0%	22.6%	28.2%	24.2%
2018	-	-	-	-
	100.0%	100.0%	100.0%	100.0%

The costs to bring this equipment into compliance are shown in Table C-6 for the case with the amendment, and two years earlier in Table C-7, without the amendment.

Table C-6: Future and Present Value Costs to Retrofit or Replace Equipment Impacted by the Proposed "No VDECS Available" Amendment

Year	Construction Equipment	Container Handling Equipment	Forklift	General Industrial Equipment	Actual Costs	Present Value Cost in 2011 Dollars (5%)
2011	-	-	-	-	-	
2012	-	-	-	-	-	
2013	$284,732	$788,330	$1,618,655	$76,511	$2,768,228	$2,510,865
2014	$772,478	$232,210	$5,548,902	$256,465	$6,810,055	$5,882,782
2015	$1,265,986	$995,057	$11,219,524	$377,996	$13,858,563	$11,401,474
2016	$1,332,579	$969,207	$12,021,230	$386,136	$14,709,152	$11,525,006
2017	$1,346,281	$870,394	$11,935,825	$350,340	$14,502,840	$10,822,242
2018	-	-	-	-	-	-
Total	$5,002,056	$3,855,198	$42,344,136	$1,447,448	$52,648,838	$42,142,369

Table C-7: Present Value Cost to Retrofit without the Proposed "No VDECS Available" Amendment

Year	Construction Equipment	Container Handling Equipment	Forklift	General Industrial Equipment	Actual Costs	Present Value Cost in 2011 Dollars (5%)
2011	$284,733	$788,330	$1,618,655	$76,511	$2,768,229	$2,768,228
2012	$772,478	$232,210	$5,548,902	$256,465	$6,810,055	$6,485,767
2013	$1,265,986	$995,057	$11,219,524	$377,996	$13,858,563	$12,570,125
2014	$1,332,579	$969,207	$12,021,230	$386,136	$14,709,152	$12,706,319
2015	$1,346,281	$870,394	$11,935,825	$350,340	$14,502,840	$11,931,522
2016	-	-	-	-	-	-
2017	-	-	-	-	-	-
2018	-	-	-	-	-	-
Total	$5,002,057	$3,855,198	$42,344,136	$1,447,448	$52,648,839	$46,461,962

The savings, which are the difference between the net present value cost with the amendment and the net present value cost without the amendment are summarized in Table C-8.

Table C-8: Savings from Delayed Expenditure for Equipment with the Proposed "No VDECS Available" Amendment

Year	Equipment Eligible for No VDECS Available	Future Cost of Retrofit Without Amendment	Future Cost of Retrofit With Amendment	Present Value Cost Without Amendment	Present Value Cost With Amendment	Present Value (Savings)
2011	-	$2,768,229	-	$2,768,228	-	($257,364)
2012	-	$6,810,055	-	$6,485,767	-	($602,985)
2013	13	$13,858,563	$2,768,229	$12,570,125	$2,510,865	($1,168,651)
2014	42	$14,709,152	$6,810,055	$12,706,319	$5,882,782	($1,181,313)
2015	82	$14,502,840	$13,858,563	$11,931,522	$11,401,474	($1,109,280)
2016	88	-	$14,709,152	-	$11,525,006	-
2017	87	-	$14,502,840	-	$10,822,242	-
2018	-	-	-	-	-	-
Total	312	$52,648,839	$52,648,839	$46,461,962	$42,142,369	($4,319,593)

2. Add a safety provision for VDECS

   This is a clarification amendment and there are no associated costs or savings.

3. Low-use compliance extension

   As with the "No VDECS Available" provision discussed in section 1 above, this amendment allows the owners/operators to delay a capital expenditure for up to two years for equipment that is currently low-use.

   Similar to the "No VDECS Available" amendment analysis, the number of pieces of equipment, equipment type, and horsepower were predicted by the emissions inventory model. The cost of bringing the equipment into compliance was estimated at the end of the two year extension and at the original compliance date. The net present value of these future costs was then compared to calculate a cost savings.

   As with the previous amendment analysis, forklifts were assumed to be replaced at a rate of 90 percent of equipment and 10 percent would be retrofitted. For all other CHE, it was assumed that half would be replaced and half would be retrofitted. The numbers of equipment and compliance assumptions are summarized in Table C-9.

Table C-9: Savings Calculation for Proposed 2-Year Low-Use Compliance Extension

Equipment Type	Fleet Size	Percent Replace	Percent Retrofit	Replace ($million)	Retrofit ($million)	Total ($million)
Construction Equipment	22	50%	50%	3.9	0.4	4.3
Container Handling Equipment	13	50%	50%	2.3	0.3	2.6
Forklift	98	90%	10%	13.6	0.2	13.8
Other General Industrial Equipment	19	50%	50%	2.1	0.2	2.3
RTG Crane	23	50%	50%	13.3	0.6	13.9
Total	175	127.2	48.2	35.4	1.7	37.1

The percentages of the different types of equipment that would be brought into compliance at the end of the additional two-year compliance extension provided by the amendment are shown in Table C-10.

Table C-10: Distribution of VDECS Replacement Under Proposed Low-Use Amendment

Year	Construction Equipment	Container Handling Equipment	Forklift	Other General Industrial Equipment	RTG Crane
2011	-	-	-	-	-
2012	-	-	-	-	-
2013	44.1%	30.7%	58.2%	41.7%	29.0%
2014	32.7%	31.3%	31.1%	37.2%	35.5%
2015	23.2%	38.0%	10.7%	21.1%	35.5%
2016	-	-	-	-	-
2017	-	-	-	-	-
2018	-	-	-	-	-
	100.0%	100.0%	100.0%	100.0%	100.0%

The costs to bring this equipment into compliance are shown in Table C-11 for the case with the amendment, and two years earlier in Table C-12, without the amendment.

Table C-11: Present Value Cost to Retrofit With the Proposed Low-Use Amendment

Year	Construction Equipment	Container Handling Equipment	Forklift	General Industrial Equipment	RTG Crane	Actual Costs	Present Value Cost in 2011 Dollars (5%)
2011	-	-	-	-	-	-	-
2012	-	-	-	-	-	-	-
2013	$1,897,929	$803,707	$8,062,362	$988,749	$4,038,885	$15,791,632	$14,323,476
2014	$1,408,722	$819,574	$4,315,441	$880,965	$4,927,038	$12,351,740	$10,669,898
2015	$997,093	$997,343	$1,489,352	$499,754	$4,927,123	$8,910,665	$7,330,826
2016	-	-	-	-	-	-	-
2017	-	-	-	-	-	-	-
2018	-	-	-	-	-	-	-
Total	$4,303,744	$2,620,624	$13,867,155	$2,369,468	$13,893,046	$37,054,037	$32,324,200

Table C-12: Present Value Cost to Retrofit without Proposed Low-Use Amendment

Year	Construction Equipment	Container Handling Equipment	Forklift	General Industrial Equipment	RTG Crane	Actual Costs	Present Value Cost in 2011 Dollars (5%)
2011	$1,897,929	$803,707	$8,062,362	$988,749	$4,038,885	$15,791,632	$15,791,632
2012	$1,408,722	$819,574	$4,315,441	$880,965	$4,927,038	$12,351,740	$11,763,562
2013	$997,093	$997,343	$1,489,352	$499,754	$4,927,123	$8,910,665	$8,082,236
2014	-	-	-	-	-	-	-
2015	-	-	-	-	-	-	-
2016	-	-	-	-	-	-	-
2017	-	-	-	-	-	-	-
2018	-	-	-	-	-	-	-
Total	$4,303,744	$2,620,624	$13,867,155	$2,369,468	$13,893,046	$37,054,037	$35,637,431

The savings, which are the difference between the net present value cost with the amendment and the net present value cost without the amendment are summarized in Table C-13.

Table C-13: Savings from Delayed Expenditure Under Proposed Low-Use Amendment

Year	Equipment Required to comply Without Amendment	Cost of Compliance Without Amendment	Cost of Compliance With Amendment	Present Value Cost Without Amendment	Present Value Cost With Amendment	Present Value (Savings)
2011	86	$15,791,633	-	$15,791,633	-	($1,468,157)
2012	57	$12,351,740	-	$11,763,562	-	($1,093,664)
2013	33	$8,910,665	$15,791,633	$8,082,236	$14,323,476	($751,410)
2014	-	-	$12,351,740	-	$10,669,898	-
2015	-	-	$8,910,665	-	$7,330,826	-
2016	-	-	-	-	-	-
2017	-	-	-	-	-	-
2018	-	-	-	-	-	-
Total	176	$37,054,038	$37,054,038	$35,637,431	$32,324,200	($3,313,231)

4. Exempt equipment at low-throughput ports in NO_x-exempt areas not within 75 miles of an urban area

As with the "No VDECS Available" and the low-use provisions discussed in sections 1 and 3, above, this amendment allows the owners/operators at the Port of Humboldt Bay to avoid capital expenditures until 2019 to 2028 under the Off-Road In-Use Equipment Regulation. (ARB,2010a) We assumed that engines newer than 1996 model year would be retrofitted and that equipment with engines 1996 model year and older would be replaced.

Similar to the approach taken with the "No VDECS Available" and the low use provisions, we take a conservative approach to quantifying the savings, savings were estimated by comparing the cost to replace or retrofit equipment at the end of the initial two years extension to the cost at the end of the additional two year extension, all in 2011 dollars. The delayed expenditure for VDECS is based on the current estimated cost to retrofit various CHE and the horsepower of the respective engines as shown in Table C-1.

The alternative of replacing equipment would require a much higher expenditure which is deferred by taking the proposed exemption. The deferred cost for each type of CHE is calculated using current estimated equipment replacement cost shown in Table C-2 plus the additional cost for Tier 4 engines as shown in Table C-3.

The resulting savings are summarized in Table C-14.

Table C-14: Cost Savings for Proposed Low-Throughput Port Equipment Exemption

Fleet	Equipment	Engine Model Year	Max. Horse-power	CHE Compliance			Off-Road Compliance		
				Year	Cost in 2011 Dollars	Present Value**	Year	Cost in 2011 Dollars	Present Value**
A	Loader	1981	200	2011	$177,400	$177,400	2021	$177,400	$108,908
A	Loader	1981	375	2012	$316,875	$301,786	2022	$316,875	$185,270
A	Loader	1982	200	2011	$177,400	$177,400	2025	$177,400	$89,599
A	Loader	1987	215	2012	$189,355	$180,338	2026	$189,355	$91,083
B	Loader	1995	235	2011	$205,295	$205,295	2021	$205,295	$126,033
B	Loader	1987	410	2012	$353,770	$339,781	2022	$353,770	$208,596
B	Loader	2003	180	2011	$24,796	$24,796	N/A***	0	0
B	Loader	1990	250	2013	$217,250	$197,052	2028	$217,250	$94,785
B	Loader	1973	170	2011	$147,490	$147,490	2019	$147,490	$99,827
C	Loader	1981	375	2012	$316,875	$301,786	2019	$316,875	$214,473
C	Loader	2004	260	2011	$24,796	$24,796	N/A***	0	0
C	Log Loader	2005	135	2013	$17,588	$15,953	N/A***	0	0
C	Bulldozer	2003	120	2011	$17,588	$17,588	2028	$152,640	$66,596
C	Bulldozer	1985	300	2012	$369,600	$352,000	2022	$369,600	$216,097
C	Backhoe	2003	85	2011	$17,588	$17,588	2028	$72,605	$31,677
C	Dump Truck*	1996	400	2011	$15,000	$15,000	2012	$15,000	$14,286
C	Fork Lift	1990	120	2011	$83,520	$83,520	2027	$83,520	$51,274
Total Fleet Cost (Present Value**)				$2,579,569			$1,598,504		
Total Savings Under Off-Road vs. CHE Regulation							($981,065)		

* The dump truck has an on-road engine and therefore would be subject to On-Road Truck and Bus Regulation.

** "Present Value" indicates that actual future costs have been discounted to 2011 Present Value dollars, Present value = Cost x $1/(1+i)^n$, where i=5% and n=future date-2011.

*** These pieces of equipment are not required to retrofit because the fleet meets its fleet average target and/or has sufficient BACT carry-over retrofit credit under the Off-Road In-Use Equipment Regulation.

5. Require CHE opacity monitoring and set maximum allowable levels

This amendment would require annual opacity monitoring of the engine-out exhaust for all CHE engines. Tests for equipment retrofitted with VDECS could be scheduled when the VDECS is removed for cleaning and inspection. This amendment would result in incremental costs to owners/operators.

Owners/operators may opt to purchase the test equipment and train their mechanics to test the equipment themselves or to hire consultants to test the equipment. Costs have been estimated for each scenario to conduct opacity tests on every CHE. One scenario is to train and utilize terminal maintenance employees to conduct the testing. The other scenario is to hire a third-party.

The costs for in-house testing would include an initial capital investment of training mechanics to perform the opacity tests and to purchase an opacity test meter. These capital costs are in addition to yearly cost associated with testing each engine.

ARB staff estimated the cost for an opacity meters at approximately $5,500 each based on the experience of the ARB staff performing the opacity correlation study. (ARB, 2011i) It was assumed that each of the 140 terminals and rail yards would purchase a meter for a total industry cost of $770,000.

Training costs include the class tuition plus the labor cost for the mechanics to attend class. Two one-day (eight-hour) classes are required for certification in the test procedure. Labor rates are estimated at $100 per hour. The tuition for the training classes is $175 per one-day class. (CCDET, 2011) The training costs are summarized in Table C-15. The total cost for training is estimated to be $1,950 per mechanic.

Table C-15: Opacity Monitoring Training Costs (Per Mechanic)

Cost Category	Cost	Required	Cost for two 8-hour classes
Class tuition	$175/class	2 classes	$350
Labor rate	$100/hour	16 hours	$1,600
Total costs			$1,950

ARB staff assumed that each terminal would train two mechanics. It was assumed that there would be approximately 140 terminals and rail yards based on the initial number of facilities that reported under the CHE Regulation in 2005. Consequently, the total training costs for industry would be $546,000, as presented in Table C-16.

Table C-16: Opacity Monitoring Training Cost for Two Mechanics at 140 Facilities

Cost for two 8-hour classes	Mechanics Per Terminal	Number of Facilities	Training Cost
$1,950	2	140	$546,000

The total initial cost for training mechanics and purchasing opacity meters for each of approximately 140 terminals and rail yards is $1,316,000 as summarized in Table C-17.

Table C-17: Initial Costs for Mechanic Training and Opacity Meters

Cost Category	Initial Cost
Mechanic Training	$546,000
Opacity Meters	$770,000
Total Initial Cost	$1,316,000
Total Initial Cost, 2011$	$1,253,333

Testing an engine is estimated to take approximately 30 minutes. At a labor rate of $100/hour, this results in a cost of $50 per engine per year. (ARB, 2011j) The total estimated fleet cost is summarized In Table C-18:

Table C-18: Cost for Terminal Mechanics to Conduct Opacity Tests

Calendar Year	Non-Yard Truck Engines	Yard Trucks Engines	Total Engines	Mechanic Testing Cost Per Year	
				Future Cost	2011 $
2012	1,585	2464	4,049	$202,450	$192,810
2013	1606	2502	4,108	$205,400	$186,304
2014	1707	2660	4,367	$218,350	$188,619
2015	1841	2853	4,694	$234,700	$193,088
2016	1979	3042	5,021	$251,050	$196,704
2017	2137	3256	5,393	$269,650	$201,217
2018	2256	3419	5,675	$283,750	$201,656
2019	2383	3590	5,973	$298,650	$202,138
2020	2487	3732	6,219	$310,950	$200,441
Total					$1,762,977

The total estimated costs for terminals or rail yards to perform the opacity testing in-house would be the sum of the initial capital costs of $1.25 million plus the recurring cost of testing of $1.76 million dollars for a total of $3 million in 2011 dollars.

The industry cost for opacity testing was also estimated based on third-party costs for testing. Third-party costs to run opacity tests range from $30 to $60 per engine. (ARB, 2011k) (BNR, 2011) (CCS, 2011) ARB staff used the higher value of $60 per engine to estimate the opacity test costs of about $2 million in 2011 dollars over the 2012 to 2020 period, as summarized in Table C-19.

Table C-19: Cost for Consultants to Conduct Opacity Tests

Calendar Year	Non-Yard Truck Engines	Yard Trucks Engines	Total Engines	Consultant Testing Cost Per Year	
				Future Cost	2011$
2012	1,585	2464	4,049	$242,940	$231,371
2013	1606	2502	4,108	$246,480	$223,565
2014	1707	2660	4,367	$262,020	$226,343
2015	1841	2853	4,694	$281,640	$231,706
2016	1979	3042	5,021	$301,260	$236,045
2017	2137	3256	5,393	$323,580	$241,460
2018	2256	3419	5,675	$340,500	$241,987
2019	2383	3590	5,973	$358,380	$242,566
2020	2487	3732	6,219	$373,140	$240,529
Total					$2,115,572

Opacity testing costs are estimated to range from $2 to $3 million in 2011 dollars, based on the costs for terminals or rail yards to perform the tests themselves or hire a third-party for the testing.

Engines with monitored opacity levels greater than the limit consistent with their certification level would be required to be repaired. However, this repair cost would not result in additional costs as this would be maintenance required to keep the engine well maintained to operate as originally designed.

6. Allow demonstration of emissions equivalency

While this amendment provides for additional compliance flexibility, it is not estimated to provide any significant costs or savings.

7. Non-yard truck equipment transfers

Allowing owners/operators to move their non-yard truck equipment from port-to-port or rail yard-to-rail yard to provide operational flexibility will eliminate the need to purchase redundant equipment. This would result in a savings. The savings to industry would depend upon the number of transfers requested, the cost to purchase the equipment, and transportation costs if the equipment were moved.

The cost savings is estimated to be the difference between the cost to purchase a new piece of equipment and the cost to transport the equipment. ARB staff assumed a purchase cost of approximately $200,000 based on current population of equipment and current replacement costs. The transportation costs would depend on the type and size of equipment and the distance between terminals. The transportation cost could be significant. It is reasonable to assume that an owner/operator would not transfer older equipment if the transfer costs were more than 50 percent of the purchase price.

Therefore, ARB staff assumed that transportation costs were 50 percent of the purchase cost, or $100,000 per piece of equipment transferred.

ARB staff assumed that two pieces of equipment are required to be moved each year, over the period from 2012 to 2020. This would result in a net savings of $200,000 per year as summarized in Table C-20. The total savings, in 2011 dollars, would be $1.4 million.

Table C-20: Savings Due to Proposed Equipment Transfer Amendment

Calendar Year	Annual Transfers	Transfer Cost	Avoided Purchase Cost	Future (Savings)	Present Value Savings 2011 $
2012	2	$200,000	($400,000)	($200,000)	($190,476)
2013	2	$200,000	($400,000)	($200,000)	($181,406)
2014	2	$200,000	($400,000)	($200,000)	($172,768)
2015	2	$200,000	($400,000)	($200,000)	($164,540)
2016	2	$200,000	($400,000)	($200,000)	($156,705)
2017	2	$200,000	($400,000)	($200,000)	($149,243)
2018	2	$200,000	($400,000)	($200,000)	($142,136)
2019	2	$200,000	($400,000)	($200,000)	($135,368)
2020	2	$200,000	($400,000)	($200,000)	($128,922)
Total					($1,421,564)

8. Manufacturer delays for new equipment

While this amendment provides for additional compliance flexibility, it is not estimated to provide any significant costs or savings.

9. Warranty engine replacement

The uncertainty in how often situations utilizing this amendment would arise causes too much of an error band in any analysis of the savings. Consequently, no analysis of the savings was attempted for this amendment.

10. Treat Tier 4 Engines Certified to Alt PM Emissions Standards as Tier 3 Engines

Allowing owners/operators to utilize Family Emissions Limits (FEL) Alternative PM (Alt PM) engines with a requirement to retrofit them with Level 3 VDECS will impose an additional cost. It was estimated that about 224 FEL Alt PM engines would enter the CHE fleet. However, the number is actually dependent on the purchase choices of owners/operators. Owners/operators may be able to specify non-FEL Alt PM engines for their purchases and avoid this cost.

The number of FEL Alt PM engines that were estimated for each type of CHE equipment and estimated cost to retrofit with VDECS are summarized in Table C-21.

Table C-21: Cost of FEL VDECS Retrofit with the Proposed FEL Alt PM Amendment

Equipment Type	Number of Engines	Retrofit Cost ($ millions)
Construction Equipment	17	0.6
Container Handling Equipment	75	2.4
Forklift	70	1.7
Other General Industrial Equipment	14	0.4
RTG Crane	48	1.9
Total	224	7.0

The percentages of the different types of equipment powered by FEL engines that would require retrofit in the different years are shown in Table C-22.

Table C-22: Timing of FEL VDECS Replacement without the Proposed FEL Alt PM Amendment

Year	Construction Equipment	Container Handling Equipment	Forklift	Other General Industrial Equipment	RTG Crane
2011	-	-	-	-	-
2012	13.5%	20.5%	5.4%	14.0%	18.1%
2013	15.5%	19.9%	8.5%	14.9%	17.6%
2014	23.7%	24.2%	25.8%	23.0%	26.1%
2015	23.8%	19.7%	28.3%	24.7%	22.7%
2016	23.5%	15.7%	32.0%	23.4%	15.5%
2017	-	-	-	-	-
2018	-	-	-	-	-
	100.0%	100.0%	100.0%	100.0%	100.0%

The costs to bring this equipment into compliance with the amendment are shown in Table C-23. There is no requirement for compliance in the regulation in its current form. The cost associated with the amendment is simply the net present value of the year to year actual costs as summarized in Table C-23.

Table C-23: Present Value Cost to Retrofit Due to the Proposed FEL Alt PM Amendment

Year	Construction Equipment	Container Handling Equipment	Forklift	General Industrial Equipment	RTG Crane	Future Value cost	PV Cost in 2011 Dollars (5%)
2011	-	-	-	-	-	-	-
2012	$84,968	$493,227	$90,420	$56,533	$344,507	$1,069,656	$1,018,720
2013	$97,851	$479,427	$143,749	$59,933	$334,945	$1,115,905	$1,012,158
2014	$149,854	$582,530	$437,650	$92,813	$497,936	$1,760,783	$1,521,031
2015	$150,159	$474,321	$480,145	$99,765	$433,619	$1,638,008	$1,347,593
2016	$148,490	$376,818	$542,889	$94,272	$294,633	$1,457,101	$1,141,677
2017	-	-	-	-	-	-	-
2018	-	-	-	-	-	-	-
Total	$631,322	$2,406,323	1,694,853	403,315	1,905,639	7,041,340	$6,041,179

Table C-24: Cost for VDECS Retrofits Due to the Proposed FEL Alt PM Amendment

Year	Number of Engines Required to Comply Without Amendment	Future Cost of Retrofit With Amendment	Present Value Cost With Amendment
2011	-	-	-
2012	32	1,069,656	1,018,720
2013	34	1,115,905	1,012,158
2014	56	1,760,783	1,521,031
2015	53	1,638,008	1,347,593
2016	49	1,457,101	1,141,677
2017	-	-	-
2018	-	-	-
Total	224	7,041,452	6,041,179

The emissions benefit from the retrofit of the FEL Alt PM engines is provided in Table C-25. The estimated benefit for this amendment is estimated to be a total of 48 tons over the 2012 to 2020 time period. This benefit results in a cost-effectiveness of $63 per pound of PM with all costs attributed to the PM reduction.

Table C-25: Emission Reductions due to Proposed FEL Alt PM Engine Amendment

Calendar Year	PMAmd - PM Rule (Tons)
2011	
2012	-1.0
2013	-2.2
2014	-3.9
2015	-5.6
2016	-6.9
2017	-7.1
2018	-7.2
2019	-7.2
2020	-6.9
Total	-48.0

Note: Negative numbers indicate emission reduction

11. Add Flexibility to extension for experimental diesel PM emissions control

While this amendment provides additional flexibility for compliance, it is not anticipated to provide significant costs or savings.

12. Allow compliance schedule swapping

While this amendment provides additional flexibility for compliance, it is not anticipated to provide significant costs or savings.

C. Impact on Business

The statewide annual capital costs and savings are shown in Table C-26 for the amendments that would impact small and typical business, with the exception of the opacity monitoring amendment. The costs associated with the opacity monitoring amendment are primarily operating and maintenance (O&M) costs and so will be accounted for separately. The numbers of engines anticipated to be impacted by each of these amendments are also shown in the table. The amendment to exempt equipment at rural low-throughput ports is not included as it would not impact business at other ports.

Table C-26: Summary of Total Capital Costs/(Savings) Resulting from Proposed Amendments

Year	Additional 2 Years for VDECS	Low-Use Extension	Non-Yard Truck Transfers	Allow Tier 4 FEL Engines
Equipment Impacted	312	176	18	224
2011	($257,000)	($1,468,000)		
2012	($603,000)	($1,094,000)	($190,000)	$1,019,000
2013	($1,169,000)	($751,000)	($181,000)	$1,012,000
2014	($1,181,000)		($173,000)	$1,521,000
2015	($1,109,000)		($165,000)	$1,348,000
2016			($157,000)	$1,142,000
2017			($149,000)	
2018			($142,000)	
2019			($135,000)	
2020			($129,000)	
Total	**($4,319,000)**	**($3,313,000)**	**($1,421,000)**	**$6,042,000**

Note: Negative numbers in parenthesis indicate savings.
Note: Costs express in 2011 dollars at present value
Note: Values have been rounded

Impact on Small Business

Staff does not have access to financial records for most of the companies that are impacted by the CHE Regulation. However, in the survey conducted for the original rulemaking, the small business status of the survey respondents was determined by including a query on the ARB Survey for the owner of the equipment to indicate if their business was a small business as defined by California Government Code section 11342.610 (i.e. annual gross receipts of $1,500,000 or less for transportation and warehousing). Approximately 10 percent of the respondents identified themselves as small businesses.

The cost to a typical small business is derived from the type and number of equipment and number owned. Based on the ARB Survey made for the original rulemaking, the average small business owns 11 pieces of equipment. For the cost estimates, this average small business was selected to represent costs for a typical small business.

The statewide costs and equipment numbers in Table C-26 were used to estimate the cost or savings due to the different amendments during the overall time period of 2011 to 2020 and the initial time period, the current year and next two years (2011 through 2013).

For a small business, savings from the proposed amendment allowing non-yard truck equipment transfers are assumed not to be applicable. However savings from the "No VDECS Available" and the low-use equipment extensions as well as costs for retrofitting engines certified to the FEL Alt PM emission standards would impact these businesses.

The numbers of equipment estimated to be affected by these proposed amendments in a typical small fleet during the 2011 through 2020 time periods are shown in Table C-27. For the small business, with 11 pieces of equipment, it was assumed that it would have two pieces of equipment impacted by "No VDECS Available" extension and one piece each impacted by the low-use extension and FEL Alt PM retrofit requirments. Small business may have more need for the extensions due to their more limited resources.

Table C-27: Small Business Numbers of Equipment Affected by Proposed Amendments During 2011 through 2020

Small Business	11 CHE
# No VDECS	2
# Low-Use	1
# Equipment Transfers	0
# FEL engines	1

The 2011 through 2020 costs associated with the amendments are summarized in Table C-28 for a typical small business. These costs or savings were estimated based on prorating the overal costs or savings for the different amendments, provided in Table C-26, on a per engine basis. The opacity costs were estimated at $60 per engine per year for 9 years (2012 through 2020). The net cost over the 2011 through 2020 time period for small business is estimated to be a cost savings of $13,600, as shown in Table C-28.

Table C-28: Small Business Costs On-Going Costs/(Savings) During 2011 through 2020 as a Result of Proposed Amendments

Small Business	11 CHE
No VDECS	($27,700)
Low Use	($18,800)
Equipment Transfers	-
FEL engine	$ 27,000
Opacity	$ 5,940
Total	**($13,600)**

Note: Negative numbers in parenthesis indicate savings.
Costs express in 2011 dollars at present value
Values have been rounded

Initial Costs: The initial cost to small business is evaluated over the current year (2011) and the next two years (2012 and 2013). The initial cost is calculated by combining the costs and savings from the amendments over this time period. The annual on-going costs for opacity monitoring are accounted for separately. These costs and savings are a subset of the 2011 through 2020 costs provided above. The number of engines in the fleet that are estimated to be affected by the different amendments during the initial time period are shown in Table C-29 below. The associated costs or savings were estimated by prorating the costs in Table C-26 on a per engine basis as mentioned above.

Table C-29: Small Business Numbers of Equipment Affected by Proposed Amendments During 2011 through 2013

Small Business	11 CHE
# No VDECS	1
# Low-Use	1
# Equipment Transfers	0
# FEL engines	0

The net initial cost for a typical small business for the 2011 through 2013 time period is estimated to be a cost savings of $32,700, as shown in Table C-30.

Table C-30: Small Business Initial Costs/(Savings) During 2011 through 2013 As A Result of Porposed Amendments

Small Business	11 CHE
No VDECS	($13,900)
Low Use	($18,800)
Equipment Transfers	$ -
FEL engine	$ -
Total	**($32,700)**
Annual Operating and Maintenance: Opacity	**$660**

Annual Ongoing Costs: The annual on-going O&M costs for a small business are based on the proposed opacity monitoring. Opacity monitoring is assumed to be performed by a third party at a cost $60 per engine per year for small businesses. Based on an average fleet size of 11 CHE, the average small businesses annual ongoing costs are $660 per year.

The small business costs are summarized in Table C-31 below.

Table C-31: Summary Economic Impact on Small Business

Small business	11 CHE
Equipment Population	11
Initial Cost – Current and Next 2 Years	($32,700)
Overall Cost 2011-2020	($13,600)
Ongoing Annual Costs	$660

Note: Negative numbers in parenthesis indicate savings.
Note: Costs express in 2011 dollars at present value
Note: Values have been rounded

Impact on Typical Business

The cost to a typical business is derived using the same methodology as for small business. Based on the economic analysis for the original regulation, the typical port container terminal owns 77 pieces of equipment, a typical port bulk terminal owns 13 pieces of equipment, and a typical intermodal rail yard owns 24 pieces of equipment. The port container terminals operate the greatest number of CHE in California and therefore are being evauluated as a typical business affected by these amendments. Tables C-32 and C-34 summarize the equipment assumptions for the typical terminal for the overall time period of 2011 through 2020 and the initial time period, respectively. These assumptions are discussed in the following paragraphs.

While small businesses would not be expected to benefit from the non-yard truck equipment transfers amendment, a container terminal with 77 pieces of equipment may benefit from this amendment. Additionally, savings from the "No VDECS Available" and the low-use equipment extensions as well as costs for the FEL Alt PM engine retrofit requirement would also impact these businesses.

The opacity costs for this larger business are anticipated to include both intial capital costs, to purchase the opacity measurement device and train employees to perform this function, and annual on-going O&M costs. This results in a higher initial cost, but a slightly lower O&M cost of $50 per engine per year.

The number of low-use engines was limited to no more than two per business based on the option for ARB to limit the use of this extension. The estimated equipment affected by the amendments and associated costs and savings are shown in Tables C-32 and C-34, respectively. The statewide costs and equipment numbers from Table C-26 were used to estimate the cost or savings due to the different amendments during the overall time period of 2011 through 2020 and the initial time period (2011 through 2013), as shown in Tables C-33 and C-35, respectively.

Table C-32: Numbers of Equipment Affected by Proposed Amendments During 2011 through 2020 for a Typical Business

Typical Business	Container (77 CHE)
# No VDECS	4
# Low-Use	2
# Equipment Transfers	1
# FEL engines	4

Table C-33: Costs/(Savings) During 2011 through 2020 as a Result of Proposed Amendments for a Typical Business

Typical Business	Container (77 CHE)
No VDECS	($55,400)
Low-Use	($37,600)
Equipment Transfers	($79,000)
FEL engine	$108,000
Opacity	$44,000
Total	**($20,000)**

Note: Negative numbers in parenthesis indicate savings.
Note: Costs express in 2011 dollars at present value
Note: Values have been rounded

Initial Cost: The initial cost is evaluated over the current year (2011) and the next two years (2012 and 2013). The initial cost is calculated by combining the costs and savings from the amendments over this time period. These costs include the intial opacity monitoring costs to purchase equipment and train employees. However, the annual on-going O&M costs for opacity monitoring are accounted for separately.

As summarized in Table C-35, the initial cost, for the current year and next two years, result in a net cost savings of $28,800 as presented in Table C-37, expressed in 2011 dollars brought to present value.

Annual Ongoing Costs: The annual on-going O&M costs for a typical business are based on the required number of opacity tests. The opacity monitoring estimated cost is based on the assumption that this size of business will purchase the opacity measurement device and train employees, which results in a higher initial cost, included in Table C-35, but a slightly lower opacity test cost of $50 per engine per year. The average typical business annual ongoing O&M cost, based on a fleet inventory of 77 pieces of equipment, is $3,850 per year as shown in Table C-36.

All of the initial costs/savings for a typial business are summarized in Table C-37.

Table C-34: Typical Business Numbers of Equipment Affected by Proposed Amendments During 2011 through 2013

Typical Business	Container (77 CHE)
# No VDECS	2
# Low-Use	2
# Equipment Transfers	0
# FEL engines	1

Table C-35: Typical Business Initial Costs/(Savings) During 2011 through 2013 as Result of Proposed Amendments

Typical Business	Container (77 CHE)
No VDECS	($27,700)
Low-Use	($37,600)
Equipment Transfers	-
FEL engine	$27,000
Opacity Initial Cost	$9,500
Total	**($28,800)**

Note: Negative numbers in parenthesis indicate savings.
Note: Costs express in 2011 dollars at present value
Note: Values have been rounded

Table C-36: Annual Operating and Maintenance – Opacity Monitoring

Typical Business	Container (77 CHE)
Opacity Monitoring Cost	**$3,850**

Table C-37: Typical Business Costs

Typical business	Container (77 CHE)
Initial Cost – Current and Next 2 Years	($28,900)
Overall Cost – 2011-2020	($20,100)
Ongoing Annual Costs	($3,850)

Note: Negative numbers in parenthesis indicate savings.
Note: Costs express in 2011 dollars at present value
Note: Values have been rounded

D. Impact on Local Government

There are two local agencies that govern ports and also own equipment that will be impacted by the amendments. These local agencies, combined, own a total of 37 pieces of equipment based on the regulation reporting data.

The cost to these local agencies is derived from the type of equipment and number owned similar to the methodology used to calculate the effects on small and typical businesses. These etimates for the local agencies are shown in Tables C-38 through C-43. For these two agencies, combined, an overall savings of $37,900 from 2011 to 2020 would be estimated, as shown in Table C-39.

Table C-38: Local Agencies-Numbers of Equipment Affected by Proposed Amendments During 2011 through 2020

Proposed Amendment	Local Agency A (14 CHE)	Local Agency B (23 CHE)	Total (37 CHE)
# No VDECS	2	2	4
# Low-Use	2	1	3
# Equipment Transfers	0	0	0
# FEL engines	1	1	2

Table C-39: Local Agencies-On-Going Costs/(Savings) During 2011 through 2020 as Result of Proposed Amendments

Proposed Amendment	Local Agency A (14 CHE)	Local Agency B (23 CHE)	Total (37 CHE)
No VDECS	($27,700)	($27,700)	($55,400)
Low-Use	($37,700)	($18,800)	($56,500)
Equipment Transfers			
FEL engine	$27,000	$27,000	$54,000
Opacity	$7,600	$12,400	$20,000
Total	**($30,800)**	**($7,100)**	**($37,900)**

Note: Negative numbers in parenthesis indicate savings.
Note: Costs express in 2011 dollars at present value
Note: Values have been rounded

The initial capital costs for these agencies are shown in Tables C-40 and C-41. These initial capital costs are for bringing in-use equipment into compliance with the CHE Regulation. The compliance deadlines for the in-use equipment are at the end of the calendar year, December 31. Consequently, the capital costs for the 2011, 2012, and 2013 calendar years can be assumed to occur in the latter half of those years and can be applied as the capital costs for the fiscal years (FY) of 2011/2012, 2012/2013, and 2013/2014. The initial capital costs, for the 2011/2012 FY through the 2013/2014 FY are estimated to be a total cost savings of $84,000.

Table C-40: Local Agencies-Numbers of Equipment Affected by Proposed Amendments During 2011 through 2013

Proposed Amendment	Local Agency A (14 CHE)	Local Agency B (23 CHE)	Total (37 CHE)
# No VDECS	1	1	2
# Low-Use	2	1	3
# Equipment Transfers	0	0	0
# FEL engines	0	0	0

Table C-41: Local Agencies-On-Going Costs/(Savings) During 2011 through 2013 as Result of Proposed Amendments

Proposed Amendment	Local Agency A (14 CHE)	Local Agency B (23 CHE)	Total (37 CHE)
No VDECS	($13,900)	($13,900)	($27,700)
Low-Use	($37,600)	($18,800)	($56,500)
Equipment Transfers			
FEL engine			
Total	**($51,500)**	**($32,700)**	**($84,200)**

Note: Negative numbers in parenthesis indicate savings.
Note: Costs express in 2011 dollars at present value
Note: Values have been rounded

The annual ongoing O&M costs are estimated at $60 per engine per year. These costs are estimated to be approximately $2,200 per year, combined for the agencies, shown in Table C-42.

Table C-42: Local Agencies-Annual Operating and Maintenance – Opacity Monitoring

Proposed Amendment	Local Agency A (14 CHE)	Local Agency B (23 CHE)	Total (37 CHE)
Opacity Monitoring Cost	**$840**	**$1,380**	**$2,220**

The total initial costs, capital and O&M, for the 2011/2012 FY through the 2013/2014 FY, are the sum of the capital costs, shown in Table C-41 plus the O&M costs for these fiscal years. As mentioned above, the O&M costs are for the opacity monitoring of the equipment. The regulation includes a phase-in schedule for opacity monitoring, starting 180 days after the effective date of the regulation. If is it is assumed that the amendments become effective by the end of the 2011/2012 FY, then the opacity monitoring costs would start in the 2012/2013 FY. So two years of opacity monitoring costs must be added to the capital costs for the total costs to local agencies in the 2011/2012 through 2013/2014 FYs. This results in a net cost savings of approximately $80,000 for the local agencies for the fiscal years of 2011/2012 through 2013/2014. All of the costs are summarized in Table C-43.

Table C-43: Fiscal Effect on Local Agencies

Local Agencies	Local Agency A (14 CHE)	Local Agency B (23 CHE)	Total (37 CHE)
Equipment Population	14	23	37
Overall Cost 2011-2020	($30,800)	($7,100)	($37,900)
Initial Capital Costs – 2011/2012 FY through 2013/2014 FY	($51,500)	($32,700)	($84,200)
O&M Costs – 2011/2012 FY through 2013/2014 FY	$1,680	$2,760	$4,440
Total Costs – 2011/2012 FY through 2013/2014 FY	($49,820)	($29,940)	($79,760)

Note: Negative numbers in parenthesis indicate savings.
Note: Costs express in 2011 dollars at present value
Note: Values have been rounded

E. Alternatives

Alternative 1

The first alternative considered would be to provide three additional years of extension for engines for which there are no VDECS available instead of the proposal for two additional years extension. This alternative would extend the small emissions reduction delay an additional year and provide additional cost savings. A comparison is shown in Table C-44 of the predicted annual emissions, in tons, and cost savings with this alternative as compared to the proposed amendments. A net cost savings of approximately $2 million over the years from 2011 to 2020 would be realized with this alternative as compared to the proposed amendments. This delay would result in an additional increase in PM emissions of 6 tons and 81 tons increase in NO_x emissions.

The purpose of this amendment is to allow more time for technologies to become verified for use on CHE. Adding an additional year to the extension would extend the compliance delay out to 2018. Staff believes that this additional year of delay would not provide any significant benefits in terms of additional VDECS becoming verified. Tier 4 engines, which will not require retrofits for final compliance with the CHE Regulation if certified to the non-FEL standards, will be fully available by 2015 and the vast majority of CHE would have been brought into compliance. Consequently, there would be little incentive for VDECS manufacturers to continue verification efforts into this time frame. Therefore staff rejected this alternative because it is not responsive to the purpose of the amendment.

Table C-44: Alternative 1 Cost and Emissions Comparison

Year	Alternative 1: 3 Year No VDECs Extension			Proposed 2-Year No VDECs Extension		
	NO_x	PM	Cost	NO_x	PM	Cost
2010	1639	57		1639	57	
2011	1482	42	($377,000)	1482	42	($257,000)
2012	1384	30	($883,000)	1384	30	($603,000)
2013	1273	22	($1,712,000)	1272	22	($1,169,000)
2014	1192	20	($1,730,000)	1182	19	($1,181,000)
2015	1180	22	($1,625,000)	1159	20	($1,109,000)
2016	1148	22		1126	21	
2017	1095	22		1072	20	
2018	1035	21		1026	20	
2019	991	20		994	20	
2020	943	20		946	20	
Sum	**10241**	**199**	**($6,327,000)**	**10160**	**193**	**($4,319,000)**
Difference				**-81**	**-6**	**$2,008,000**

Note: Negative numbers in parenthesis indicate savings.
Note: Costs express in 2011 dollars at present value
Note: Values have been rounded

Alternative 2

Alternative 2 is similar to the proposed regulation, but would only affect the non-yard truck equipment purchased with FEL engines. This alternative would be to not require CHE engines certified to the FEL Alt PM emission standards to be retrofitted with highest level VDECS. The net PM emissions impact and cost savings for this alternative, as compared to the proposed amendments, is shown in Table C-45. This alternative would reduce costs by $6 million. The change in diesel PM reduction would be an increase of approximately 48 tons compared to the proposed amendments, during the same 2011 to 2020 timeframe. There would be no change in the NO_x emissions during this time frame. However, this alternative would possibly allow a significant population of engines not meeting the effective Tier 4 PM standards into the CHE inventory as new engines. Staff rejected this alternative because it would not meet the goals of the original CHE Regulation.

Table 7: Alternative 2 Emissions Comparison

Year	Emissions Reductions with Only FEL Amendment		
	NO_x (Tons)	PM (Tons)	FEL Costs
2010	0	0	
2011	0	0	
2012	0	-1.02	$1,018,000
2013	0	-2.24	$1,012,000
2014	0	-3.87	$1,521,000
2015	0	-5.51	$1,348,000
2016	0	-6.90	$1,142,000
2017	0	-7.12	
2018	0	-7.24	
2019	0	-7.22	
2020	0	-6.87	
Sum	**0**	**-48.0**	**$6,041,000**

Note: Costs express in 2011 dollars at present value
Note: Values have been rounded

References:

(ARB, 2005a) California Air Resources Board, *Initial Statement of Reason for Proposed Rulemaking, Regulation for Mobile Cargo Handling Equipment at Ports and Intermodal Rail Yards,* October 2005.

(ARB, 2010a) California Air Resources Board, *Propose Amendment to the Regulation for In-Use Off-Road Diesel-fueled fleets and the Off-Road Large Spark Ignition Fleet Requirements, Appendix F: Cost Methodology*, October 2010. http://www.arb.ca.gov/regact/2010/offroadlsi10/offroadappf.pdf

(ARB, 2007b) California Air Resources Board, *Technical Support Document: Proposed Regulation for In-Use Off-Road Diesel Vehicles, Section C: Methodology for Estimating Cost and Economic Impact*, April 2007. http://www.arb.ca.gov/regact/2007/ordiesl07/TSD.pdf

(ARB,2011f) California Air Resources Board. "Cargo Handling Emissions Inventory Model", July, 2011. http://www.arb.ca.gov/ports/cargo/cheamd2011.htm.

(ARB,2011o) California Air Resources Board. "Cargo Handling Emissions Inventory Model Working Files", July, 2011. http://www.arb.ca.gov//ports/cargo/cheamd2011.htm.

(ARB, 2011g) California Air Resources Board, Economic Analysis Worksheets, http://www.arb.ca.gov/ports/cargo/cheamd2011.htm, 2011.

(ARB, 2011i) California Air Resources Board, Personal correspondence, John Karim, July 21, 2011.

(CCDET, 2011) California Council on Diesel Education and Technology, June, 2011. http://www.arb.ca.gov/enf/hdvip/ccdet/ccdet.htm

(ARB, 2011j) California Air Resources Board, Personal correspondence, Ken Pope, June 9, 2011.

(ARB, 2011k) California Air Resources Board, Personal correspondence, John Karim, June 10, 2011.

(BNR, 2011) BNR Mechanical, Northern California Smoke Opacity Testing Rates, May, 2011.

(CCS, 2011) CARB Compliance Services, Smoke Test Pricing Information, May, 2011. http://www.carb-compliance.com/pricing.html

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Appendix D

VDECS Available for Installation on Cargo Handling Equipment

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VEDCES Available for Installation on Cargo Handling Equipment

When ARB verifies a diesel emissions control strategy (VDECS), the operational parameters of the engine(s) the device is verified for are spelled out in the Executive Order documenting the verification. The table below provides a list of the VDECS a CHE owner or operator can consider when planning to install an aftertreatment control device to comply with the CHE regulation. The device parameters provided include the level of control the device is verified to (Level 3 – greater than 85 percent, Level 2 – greater than 50 percent but less than 85 percent, Level 1 – greater than 25 percent but less than 50 percent), the device manufacturer, the device name (if applicable), and details about the required engine operating parameters necessary for that device. The operating parameters can include the type of equipment, the engine model year, the horsepower range, the certified diesel PM emissions limits, whether the engine has exhaust gar recycling or not, etc.

ARB staff highly recommend that a CHE owner or operator work closely with any aftertreatment control provider to ensure that the recommended device is the one that will match their engines and operate appropriately.

Currently Verified Diesel Emission Control Strategies (VDECS)
for Off-Road Engines

Level	Device	Details
3	Caterpillar DPF (passive)	1996-2005 MY; rubber-tired vehicles; 175-600hp; ≤13L; ≤0.2g PM; no EGR; 4-stroke; 240°C exhaust temp profile (40% of time); Tier 1 engines must be cert to ≥3.8g NMHC+NOx with PM NOx ratio ≥25;
	Cleaire Allmetal* (passive)	1996-2010 MY; specified engine families; tracked and rubber-tired vehicles; 150-600hp; 6.7-18.2L; 4-stroke; ≤0.2g PM; no EGR or DOC; 260°C exhaust temp profile (55% of time) for engines ≤0.15g PM
	Cleaire Lonestar* (passive DPF)	1996-2009 MY; rubber-tired vehicles; 150-350hp; 5.9-11L; ≤0.12g PM; no EGR; 4-stroke; 260°C exhaust temp profile (70% of time)
	Cleaire Phoenix* (active DPF)	1996-2010 MY; rubber-tired vehicles; 3.4-12L; 100-450 hp; ≤0.20g PM; no EGR or DOC; 4-stroke
	DCL Mine-X Sootfilter (passive DPF)	1996-2010 MY; rubber-tired vehicles; 100-1000hp; ≤0.2g PM; no EGR or DOC; 4-stroke
	ECS Combifilter (active DPF)	Through 2007 MY; ≤0.45g PM; ≤12L; no EGR or DOC; requires plug-in; ≤600 hp; 4-stroke
	ECS Purifilter* (passive)	1996-2008 MY; 4-stroke; 50-750hp heavy heavy-duty; ≤0.2g PM; no EGR; temp profile requirements
	ESW Canada ThermaCat (active DPF)	1996-2010 MY; 4-stroke; 100-350hp; 5-15.2L; ≤0.2g PM; no EGR or DOC
	HUSS FS-MK Series DPF (active)	Through 2010 MY; no DOC or external EGR; excluded engine family list
2	Rypos ActiveDPF/C	Both diesel-electric and diesel-hydraulic rubber tired gantry (RTG) cranes; CARB diesel; biodiesel.
1	ECS: AZ Purifier & Purimuffler (DOC)	1996-2002 MY Cummins, Navistar, Case, and Komatsu; 4-stroke
	Extengine: DOC + SCR	1991-1995 MY Cummins 5.9L engine
	Vycon REGEN System: Energy Storage Device	Tier 0, 1, 2, 3 RTG cranes only
	Donaldson: 6000+ Spiracle (DOC + crankcase filter)	1996-2003 MY specific Case, Caterpillar, Cummins, Detroit, Komatsu; 150-600hp; 4-stroke; turbocharged

* Conditionally verified.

NOTES:
- If retrofitting to comply with Cargo Handling Equipment regulation, highest level available VDECS is required.
- Conditionally verified devices may be used for regulatory compliance.
- VDECS are not currently an option for yard trucks.
- Other restrictions and/or limitations may apply; please refer to the Executive Order and/or Verification Letter for each device.
- Please view the source for the most accurate, up-to-date information, requirements, and limitations: http://www.arb.ca.gov/diesel/verdev/vt/cvt.htm (ARB, 2011m) & http://www.arb.ca.gov/diesel/verdev/level3/level3.htm
- EGR = exhaust gas recirculation;
- DOC = diesel oxidation catalyst
- Searchable verification database: http://www.arb.ca.gov/diesel/verdev/vdb/disclaimer.php

References:

(ARB, 2011m) California Air Resources Board, *Verification Procedure – Currently Verified,* July 2011.

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Appendix E

List of Acronyms and Abbreviations

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AB	Assembly bill
ARB, or the Board	Air Resources Board
APCO	Air Pollution Control Officer
ATCM	Airborne Toxic Control Measure
ACP	Alternative Compliance Plan
Alt	Alternative emissions standard
BACT	Best available control technology
Bhp	Brake horsepower
°C	Degrees Celsius
CalOSHA	California Division of Occupational Safety and Health
CAPCOA	California Air Pollution Control Officers Association
CARB	California Air Resource Board
CCAA	California Clean Air Act
CCR	California Code of Regulations
CHEESM	Cargo Handling Equipment Emissions Simulation Model
CO	Carbon monoxide
CO_2	Carbon dioxide
CHE	Cargo Handling Equipment
CHAPIS	Community Health Air Pollution Information System
CEQA	California Environmental Quality Act
CI	Compression ignition
CNG	Compressed natural gas
CCEEB	Council for Economic and Environmental Balance
CRT	Continuously Regenerating Trap
DECS	Diesel Emission Control System or Strategy
DOC	Diesel Oxidation Catalyst
DOF	Department of Finance
DTSC	California Department of Toxic Substances Control
$/lb	Dollars per pound
DPF	Diesel particulate filter
Diesel PM	Diesel Particulate Matter
DRRP or Diesel Risk Reduction Plan	Risk Reduction Plan to Reduce Particulate Matter Emissions from Diesel-Fueled Engines and Vehicles Risk Reduction Plan
ECS	Emissions Control System
EO	Executive Officer of the Air Resource Board
EQIP	Environmental Quality Incentives Program
°F	Degrees Fahrenheit
FEL	Family Emissions Limit
FTF	Flow-through filter
g/bhp-hr	Grams per brake horsepower-hour
>	Greater than
Humboldt Bay District	Humboldt Bay Harbor, Recreation, and Conservation District
HC	Hydrocarbon
HRA	Health Risk Assessment
H&SC or HSC	California Health and Safety Code
ISOR	Initial Statement of Reasons

≤	Less than or equal to
LAER	Lowest Achievable Emission Rate
LNG	Liquefied natural gas
LPG	Liquefied petroleum gas
Low sulfur diesel fuel	Diesel fuel with less than 15 ppmw sulfur content
MECA	Manufacturers of Emissions Control Association
$\mu g/m^3$	Microgram per cubic meter
NAAQS	National Ambient Air Quality Standard
North Coast	North Coast Unified Air Quality Management District
NMHC	Non-methane hydrocarbons
NFPA	National Fire Protection Association
NO	Nitrogen oxide
NO_2	Nitrogen dioxide
NO_x	Oxides of nitrogen
OEHHA	Office of Environmental Health Hazard Assessment
PEMS	Portable emissions measurement system
PM	Particulate matter
PM_{10}	Particulate Matter range 10 microns or less in diameter
$PM_{2.5}$	Particulate Matter range less then 2.5 microns in diameter
PMA	Pacific Maritime Association
POLA	Port of Los Angeles
POLB	Port of Long Beach
ppmvd	Parts per million, volume dry
PTSD	Planning and Technical Support Division of ARB
PSD	Prevention of Significant Deterioration
ROE	Return on Owner's Equity
ROG	Reactive Organic Gases
RTG	Rubber-tired Gantry Crane
SAE	Society of Automotive Engineers
SCR	Selective Catalytic Reduction
SIC	Standard Industrial Classification
SIP	State Implementation Program
SRP	Scientific Review Panel
SCAQMD	South Coast Air Quality Management District
SDCAPCD	San Diego County Air Pollution Control District
SJVAPCD	San Joaquin Air Pollution Control District
SMAPCD	Sacramento Metropolitan Air Quality District
SSD	Stationary Source Division of ARB
SO_x	Oxides of sulfur
SOF	Soluble Organic Fraction
TAC	Toxic air contaminant
TEU	Twenty-foot equivalent unit
THC	Total Hydrocarbons
Tpd	Tons per day
UL	Underwriters Lab
U. S. ACE	United States Army Corps of Engineers

U. S. EPA	United States Environmental Protection Agency
VDECS	Verified Diesel Emission Control Strategy
WCSC	U.S. ACE, Water-borne Commerce Statistics Center

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