Air Resources Board

PUBLIC MEETING AGENDA

May 25, 2006

9:00 a.m.

Agenda Items to be heard;

06-5-1: 06-5-2: 06-5-3:

06-5-4:

Visit our Web Site

@ www.arb.ca.gov

California Environmental Protection Agency

ELECTRONIC BOARD BOOK

California Environmental Protection Agency

Air Resources Board

PUBLIC MEETING AGENDA

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

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

May 25, 2006
9:00 a.m.

Item #

06-5-1: Report to the Board on a Health Update: Staff Actions to Address Indoor Ozone Generators Sold as Air Purifiers

Some appliances sold as indoor air cleaners or purifiers purposely emit ozone, purportedly to clean the air. Manufacturers of such "ozone generators" often falsely claim that these devices eliminate bacteria, mold, and chemical contaminants from the air, and can help allergies, asthma, and other health conditions. However, research shows that ozone is emitted from these devices at levels harmful to health. Staff initially briefed the Board on this matter in January 2005. Staff will report on actions that have been taken to address ozone generators.

06-5-2: Public Hearing to Consider the Amendments to the Dry Cleaning Airborne Toxic Control Measure

ARB staff recently evaluated the effectiveness of the Dry Cleaning ATCM. The evaluation showed that there are residual health risks associated with Perc emissions from dry cleaning operations, the best available control technology (BACT) for Perc dry cleaning operations has evolved, more effective ventilation systems exist, and alternative technologies are available and viable. Accordingly, ARB staff is proposing amendments to the Dry Cleaning ATCM. The proposed amendments are designed to further protect public health by phasing out the use of Perc in co-residential facilities, implementing siting criteria for new facilities, phasing out the use of the more emissive Perc technologies in existing facilities, restricting the use of other TACs, and requiring enhanced ventilation for new and existing facilities that use a solvent that contains a TAC.

06-5-3: Public Hearing to Consider Proposed Amendments of Vapor Recovery System Certification and Test Procedures for Gasoline Marketing Operations at Service Stations

In this rulemaking staff is proposing amendments to revise the performance specifications for vent valves without increasing emissions, clarify the certification process for new, modified and renewed systems and components and adjust regulation implementation dates to conform to administrative actions. Staff is also proposing that the State Water Resources Control Board be included in the certification process to ensure certified vapor recovery systems also meet the underground storage tank statutory requirements of a new law that passed in 2004 (AB 2955).

06-5-4: Public Hearing to Consider Adoption of New Emission Standards, Fleet Requirements and Test Procedures for Forklifts and other Industrial Equipment

Staff is proposing amendments to California's existing off-road large spark-ignition engine regulations to harmonize with existing U.S. EPA emission standard requirements in 2007, establish more stringent emission standard requirements in 2010, and establish fleet average requirements for operators of LSI fleets beginning in 2009 and becoming more stringent in 2011 and 2013. The proposal contains an alternative compliance option for agricultural fleets to address issues specific to that industry. It also contains a verification procedure for retrofit control systems.

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

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

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

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

TO SUBMIT WRITTEN COMMENTS ON AN AGENDA ITEM IN ADVANCE OF THE MEETING:

CONTACT THE CLERK OF THE BOARD, 1001 I Street, 23rd Floor, Sacramento, CA 95814 (916) 322-5594
FAX: (916) 322-3928
ARB Homepage: www.arb.ca.gov

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

- **For individuals with sensory disabilities, this document is available in Braille, large print, audiocassette or computer disk. Please contact ARB's Disability Coordinator at 916-323-4916 by voice or through the California Relay Services at 711, to place your request for disability services.**

- **If you are a person with limited English and would like to request interpreter services to be available at the Board meeting, please contact ARB's Bilingual Manager at 916-323-7053.**

THE AGENDA ITEMS LISTED ABOVE MAY BE CONSIDERED IN A DIFFERENT ORDER AT THE BOARD MEETING.

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

California Environmental Protection Agency

Air Resources Board

PUBLIC MEETING AGENDA

INDEX

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

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

May 25, 2006
9:00 a.m.

California Environmental Protection Agency 1

Air Resources Board

Evaluation of Ozone Emissions From Portable Indoor "Air Cleaners" That Intentionally Generate Ozone

Staff Technical Report
to the
California Air Resources Board

May 5, 2006

Arnold Schwarzenegger
Governor

AUTHORS

Tom Phillips, M.S.
Chris Jakober
Research Division

Report Reviewed by:

Peggy Jenkins, Manager
Indoor Exposure Assessment Section
Research Division

Richard Bode, Chief
Health and Exposure Assessment Branch
Research Division

Bart Croes, PE, Chief
Research Division

ACKNOWLEDGMENTS

We wish to thank Ken Stroud, Peter Ouchida, Steve Aston, Andy Cowell, and Mac McDougall of ARB's Monitoring and Laboratory Division, who conducted the tests of the ozone generators for this project and provided useful review and observation. We also acknowledge Michael Robert of ARB's Research Division; Mark Mason, U.S. EPA; Richard Corsi and Jeff Siegel, University of Texas, Austin; and a number of other researchers who shared their knowledge, experience, and insights with us.

DISCLAIMER

The mention of commercial products, their source, or their use in connection with material presented in this report is not to be construed as actual or implied endorsement of such products by the State of California.

ALTERNATIVE FORMS OF REPORT

If you are a person with a disability and desire to obtain this document in an alternative format, please contact Jacqueline Cummins at (916) 445-0753 or jcummins@arb.ca.gov. TTY/TDD/Speech-to-speech users may dial 7-1-1 for the California Relay Service.

This report is also available electronically on ARB's website at: http://www.arb.ca.gov/research/indoor/ozone.htm.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

ACRONYMS

ACRONYM	DEFINITION
AAQS	ambient air quality standard
AER	air exchange rate
ARB	California Air Resources Board
CADR	clean air delivery rate
Cal/EPA	California Environmental Protection Agency
CO	carbon monoxide
CO_2	carbon dioxide
DHS	California Department of Health Services
FDA	U.S. Food and Drug Administration
NO_2	nitrogen dioxide
NO_X	oxides of nitrogen
O_2	oxygen molecule, two atoms of oxygen (stable)
O_3	ozone, three atoms of oxygen (reactive)
RH	relative humidity
RSD	relative standard deviation
T	temperature
U.S. EPA	U. S. Environmental Protection Agency
UV	ultraviolet

UNITS

ft	feet
ft^2	square feet
l/min	liters per minute (flow rate)
m^2	square meter
m^3	cubic meter
µm	micron; a unit of length equal to one millionth of a meter; a micrometer
µg	microgram (one-millionth of a gram)
µg/s	micrograms per second
$\mu g/m^3$	micrograms per cubic meter (concentration)
mg	milligrams (one-thousandth of a gram)
mg/hr	milligrams per hour
%	percent
ppb	parts per billion (such as one grain of sand in a billion grains of sand)
ppm	parts per million (such as one grain of sand in a million grains of sand)

EXECUTIVE SUMMARY

Public concern about indoor air has resulted in a growing market for the sale of devices to reduce indoor pollution and improve indoor air quality. Several manufacturers are marketing ozone generators — appliances labeled as indoor "air purifiers" or "air cleaners" that intentionally generate ozone, the primary component of smog. The limited research available shows that these devices can emit large quantities of ozone that result in indoor ozone concentrations well above the health-based state and federal ambient air quality standards for ozone. At elevated levels, ozone can cause difficulty breathing, exacerbate asthma, and damage the lungs in sensitive individuals. Due to concern about potential unhealthful ozone exposures, Air Resources Board (ARB) staff tested four models of ozone generators in order to measure the room concentrations that would result through the use of these devices, and to obtain current emissions data.

Several manufacturers of ozone generators have stepped up the marketing of their products in California and the U.S. in recent years, taking out full page advertisements in major city newspapers, and developing extensive websites. They generally claim that their products produce "safe" levels of ozone that remove indoor air pollutants such as particles, gases, allergens, viruses, odorous compounds, mold, and bacteria. In fact, ozone has no effect on most pollutants, kills mold only at much higher levels, and reacts with some gases to produce significant increases in other pollutants, such as formaldehyde and ultrafine particles, which are also harmful to health.

Staff tested four models of ozone generators that are widely marketed in California. The room tests were conducted in a small room furnished with a desk and chair, under temperature, humidity, and air exchange conditions common in homes. The devices were operated according to manufacturers' instructions, with a few adjustments due to facility limitations. Prior to the room concentration tests, measurements were made at 2, 6, 12, and 24 inches from the face of each device to locate the major output stream for each and identify the range of emissions in preparation for the room concentration tests. After the room concentration tests were completed, emission rates were measured using non-reactive ducting.

The results (Table ES-1) show that all of the models tested produce room concentrations that exceed health-based standards and can pose a serious risk to health. The Biozone® 500, the Prozone® Whole House, and the Prozone® Compact produced room concentrations that substantially exceed both the California Ambient Air Quality Standards (CAAQS) of 90 parts per billion (ppb), 1-hour average, and 70 ppb, 8-hour average, for ozone. They also would exceed the U.S. Food and Drug Administration (FDA) standard of 50 ppb that applies to medical devices (devices for which the manufacturers make health-related claims). In addition, the Alpine Air XL-15 / LA Lightning Air RA 2500 unit exceeded the 70 ppb CAAQS and the FDA standard of 50 ppb when set at a medium setting (ozone output for a 1,000 square foot area). This unit was not tested at its highest setting, but has been shown in other studies (e.g., Mason *et al.*, 2000) to produce room levels over 300 ppb at its highest settings.

The Prozone® Whole House unit produced the highest room concentrations measured when operated in the continuous mode – over 400 ppb, more than four times the 1-hour CAAQS of 90 ppb. Although the continuous mode is designed for an unoccupied home with greater volume than the test room in this study, consumers could naively operate the unit in this mode when their home is occupied, which would result in extremely high ozone exposures. Additionally, when operated for 15 minutes per hour as recommended by the manufacturer for occupied spaces, the Prozone® still produced unhealthy ozone levels: concentrations reached 90 ppb within 7 minutes, and the maximum 60-minute average was 119 ppb, well above the CAAQS.

The face test results and the emission test results correlate reasonably well with the room concentration results. The face test results at 2 inches from the face of the air cleaners range from 379 to 1287 ppb across the four models tested. At 24 inches from the face, the Alpine Air/Lightning Air unit and the Prozone® Whole House device clearly exceed health-based standards, with levels well over 300 ppb. Emission rates ranged from 0.29 to 94 mg/h.

The results of this study demonstrate that the use of "air cleaners" that intentionally emit ozone can result in room concentrations that exceed state and national health-based standards. California agencies currently do not have regulatory authority to address the problem of ozone emissions from ozone generators, and current federal and industry standards have not been effective in addressing this problem.

Table ES-1. Summary Results

Manufacturer and Model	Operational Setting	Maximum 60-minute average room concentration (ppb)	Minutes to reach 70 ppb (8-hr std)	Minutes to reach 90 ppb (1-hr std)
Alpine Air XL-15 / LA Lightning Air RA 2500	Low	1[a]	NA[b]	NA
	Medium	88	28	NA
Biozone® 500	Low	96	42	135
	High	99	111	162
Prozone® Whole House	Intermittent	119	6	7
	Continuous	435	6	7
Prozone® Compact A	On	109	18	31
Prozone® Compact B[c]	On	149	15	20

a) Unit was set at low fan, with Ozonator turned to lowest setting.
b) NA: unit never reached the level indicated.
c) A second Prozone® Compact unit was purchased to test for between-unit variability.

1. INTRODUCTION

A number of manufacturers are marketing appliances labeled as "air purifiers" or "air cleaners" that intentionally generate ozone, the primary component of smog. These devices, called "ozone generators", most often use metal plate electrodes or needle electrodes to create electrical discharges that produce ozone, typically in large quantities. Operation of these devices in the confined spaces of homes and commercial buildings has long been known to cause unhealthful ozone exposures – elevated room ozone concentrations above the health-based state and federal ambient air quality standards for ozone. The current California Ambient Air Quality Standards (CAAQS) for ozone are 90 parts per billion (ppb) for a 1-hr averaging time, and 70 ppb for an 8-hr averaging time; the parallel federal standard is 80 ppb for an 8-hr average.

However, few measurements have been obtained from current models of ozone generators, which have proliferated in recent years. Also, manufacturers have made further claims that these products emit safe levels of ozone. Accordingly, to obtain data from current models, Air Resources Board (ARB) staff tested several models of ozone generators currently marketed in California. The results are presented below, along with background information on ozone generators.

2. BACKGROUND

Ozone, a highly reactive compound composed of three oxygen atoms, can damage the lungs and airways. It inflames and irritates respiratory tissues, and can worsen asthma symptoms in persons with asthma. It causes symptoms such as coughing and chest tightness, and impairs breathing. Elevated exposures can cause permanent lung damage, and repeated exposure can even increase the risk of premature death in persons with poor health. Ozone also damages plants and materials, such as paint, walls, and flooring. Ozone is the primary component of smog, and has been recognized and regulated as a serious outdoor pollutant for many years.

The manufacturers of ozone generators often claim that "safe" levels of ozone can remove indoor air pollutants such as particles, gases, allergens, viruses, odorous compounds, mold, and bacteria. In fact, ozone only reacts with some gases of concern (aromatic hydrocarbons such as benzene) and with terpenes, such as limonene and pinene. These reactions produce significant increases in other pollutants such as formaldehyde and ultrafine particles, which can be harmful to health (Boeniger, 1995; Nazaroff and Weschler, 2004; Hubbard *et al.*, 2005). While ozone reduces a few odorous compounds, more importantly it fatigues the olfactory sense and reduces one's ability to smell odors; thus ozone masks odors more than removes them. Finally, ozone is effective against mold and bacteria on building material surfaces only at extremely high levels – well over 5,000 ppb – and even those levels do not denature or remove microbial residues and spores in building materials (Foarde *et al.*, 1997).

Ozone generators are typically sold through the internet and by independent distributors, not via retail establishments. Each year, the ARB and the California Department of Health Services receive numerous calls from the public concerning the safety and effectiveness of ozone-emitting air cleaners, and questions regarding the claims made by the manufacturers or distributors.

Data on currently available models of ozone generators are limited to a small number of scientific journal articles, U.S. Environmental Protection Agency (U.S. EPA) test reports, and manufacturers' product test data. A test home study by researchers at the U.S. EPA found that an ozone generator could produce indoor ozone levels up to three times the CAAQS of 90 ppb averaged over one hour (Mason *et al.*, 2000). In a full-scale test chamber at relatively high air exchange rates of five air changes per hour, Chen and Zhang (2004) found that two ozone generator models produced ozone concentrations above 100 ppb within 4-6 hours of use. These limited data indicate that ozone generator emissions in confined areas elevate room concentrations of ozone above threshold health values, and thus pose substantial health risks.

State agencies currently do not have regulatory authority to address the problem of ozone emissions from ozone generators, and current federal and industry programs have not been effective at preventing the production and continued sale of ozone generators. Since the late 1970s, the U.S. Food and Drug Administration (FDA, 2005a) has had an ozone standard for air cleaners that are medical devices, i.e., those marketed with health claims. The FDA standard for medical devices is a maximum of 50 ppb ozone in the air circulating through the device or in an enclosed space that is designed for human occupancy, but the specific test protocols are not well defined. Non-compliant devices cannot be used in hospitals, medical offices, or other occupied spaces. The FDA (2005a,b) requires listing and labeling for these devices, including the smallest room area allowed when using the device. However, the FDA has conducted very little enforcement concerning health and germicidal claims and product labels for air cleaners. The U.S. Consumer Product Safety Commission can potentially regulate air cleaners that are marketed without health claims; it has not developed any regulations in this area (Thomas, 2005).

Underwriters Laboratory, Inc. (UL), a product-testing organization, has developed Standard 867 for testing electrostatic air cleaners. Section 37 of the standard provides a test for ozone that limits room ozone concentrations to 50 ppb at 2 inches from the face of the device after 24 hours of operation, but the test method includes a faulty background calculation that allows some high-emitting air cleaners that produce unhealthy ozone levels to pass the test (Niu *et al.*, 2001a,b; Chen and Zhang, 2004; Siegel, 2005). Th is is of concern for some electrostatic precipitators and ionizers, devices which remove particles from the air using electronic technology that emits ozone as a by-product, usually in much lower levels than purposeful ozone generators. Also, air cleaners can be approved under UL 867 without the ozone emissions test completed. UL standards are voluntary, so manufacturers of ozone generators and some other air cleaners do not pursue UL certification.

Ozone treatment is recognized as an effective means of purifying water, but not as a means of cleaning indoor air. Extensive expert testimony in the successful lawsuit by the federal government against Alpine Air and Living Air, two ozone generator manufacturers, confirmed the almost complete lack of effectiveness of ozone for indoor air treatment (FTC, 2002). More recently, Chen and Zhang (2004) confirmed that the two ozone generators did not effectively remove volatile organic compounds from a test room, except for limonene, which reacts quickly with ozone to produce formaldehyde. ARB, the California Department of Health Services (DHS), the U.S. EPA, and other public health agencies and groups have strongly warned against using so-called air cleaners that intentionally emit ozone.

3. OBJECTIVES AND TECHNICAL APPROACH

The goal of this project was to determine the potential impact of popular ozone generators on indoor ozone levels, particularly under common conditions most likely to result in elevated ozone levels, and to assess the results for their potential impacts on human health. The specific objectives were to:

1. Determine short-term indoor air concentrations of ozone in a room where ozone generators are operated per manufacturers' directions.

2. Determine ozone emission rates from those appliances.

3. Compare the results to health-based ozone standards, and where feasible, to industry test standards, literature results, and other information to assess the potential impact of ozone generators on indoor air quality and human health.

We selected four models of ozone generators for testing (see Table 1). Because reliable sales data for ozone generators (and most air cleaners) are not available for California or the U.S., the models most often mentioned in public inquiries to ARB and widely marketed in California were selected for testing. The models were obtained through normal marketing channels: manufacturers' websites, and a distributor's website on e-Bay. We included a second unit of model no. 4 (Prozone® Compact) to test the variability between units of the same model. The purchase price of these models ranged from $190 to $497.

Existing test methods for ozone emissions from air cleaners have various limitations, and government agencies in North America have neither certified these methods nor developed their own. Consequently, we developed three test protocols after reviewing the scientific literature and consulting researchers in this field, as follows:

1. Face Test. Measure ozone concentrations near the exterior exhaust face of each ozone generator unit to identify the primary emission point and direction for ozone, and to roughly characterize the near-source dispersion of the ozone.

2. Room Test. Measure ozone concentrations for a few hours with the ozone generator operated at different settings, in a small, partly furnished test room to simulate conditions in a small room in a home.

3. Emission Test. Measure ozone emission rates directly from the ozone generator unit using inert ductwork attached to the unit.

The specific methods, results, and discussion for each of these three tests of each ozone generator model are presented below. For all tests, ozone concentrations were measured with an API 400 Ozone analyzer. Its ozone sample probe is made of stainless steel, which is connected to a glass manifold, which is then connected to the ozone analyzer via Teflon® tubing. A second API ozone analyzer was used to measure background ozone concentrations in the building for the room and emission rate tests.

Table 1. Ozone Generator Model Descriptions

Unit #	Model	Purchase Price ($)	Floor Space or Time Rating; Recommended Settings [a]	Additional Features [a]
1	Alpine XL-15 / Lightning Air RA 2500	495	100-2500 ft^2. Hospitals, nursing homes, day care centers, and doctors' offices included. Adjust to meet user needs, sensitivities; reduce setting if user smells ozone. Normally keep ozone at modest levels, adjust to higher levels to remove odors. Users sensitive to ozone can use a timer and operate at higher setting when they are away from home.	Ionizer
2	Biozone® 500	190	Up to 500 ft^2. If ozone smell is too strong, lower the fan speed or run time, increase room air circulation, move the unit to other location. Do not place directly in the face of a person or pet.	Negative ion generator
3	Prozone® Whole House	497	No more than 15 min/hr in continuously occupied rooms. Use continuous mode only in unoccupied rooms. Cleans 400 ft^2 room in one hour. Consult physician first if user has a respiratory problem such as asthma.	Ultraviolet Lamp
4A, 4B	Prozone® Compact, duplicate units A & B	227 [b]	Use 30 minutes or less initially if sensitive to ozone. Contact physician first if user has a respiratory problem such as asthma.	None

a. From product brochures that came with appliances. The instruction items selected are those most pertinent to ozone production and human exposure.
b. This item was discounted when it was bought with the Prozone® Whole House unit (Unit 3).

Commonly accepted quality control and quality assurance procedures were followed. All monitoring equipment and data acquisition equipment underwent a system audit by ARB's Monitoring and Laboratory Division (MLD) audit staff before testing began. The monitoring equipment received daily zero and span checks by MLD staff during testing, in accordance with standard ARB methods. To minimize contamination of the air cleaners, they were stored in their shipping boxes in the warehouse except when they were being tested or being fitted for the custom duct adaptor at a fabrication shop. Two duplicate units of one air cleaner model were obtained to identify between-unit variability. Repeated tests on the same unit at the same settings were not conducted due to time and resource limitations; however, results for the various settings for each unit were reviewed to identify any inconsistent results.

4. FACE TESTS

A. Face Test Methods

In preparation for the room and emissions tests, ozone concentrations were measured at all faces of each appliance's face vent(s) in order to locate the major air stream output and direction for each appliance. Measurements were made at 2, 6, 12, and 24 inches away from the vertical or horizontal face. The measurements were made for 10 minutes at the different appliance settings for ozone output, as described in Table 2. Some of these settings differ from those used in the later room and emission tests.

B. Face Test Results

Summaries of the face test results are presented in Table 2 and Figure 1. All of the ozone generators had face ozone concentrations in excess of 375 ppb at a distance of 2 inches from the exhaust face, and three units (1, 3 and 4) exceeded 1,000 ppb at a distance of 2 inches, when operated at the high settings. Despite the added dilution at 6 inches distance, concentrations remained at or in excess of about 700 ppb for Units 1, 3 and 4. Concentrations at the 12 inch distance decreased by about 50% or more for all units except Unit 1. The measurements made at 24 inches from the unit's face still resulted in ozone concentrations in excess of 370 ppb for Units 1 and 3. It should be noted that the "Ozonator" setting for Unit 1 during these tests was for 2,500 ft^2, the highest ozone setting, which was adjusted to a lower setting for the room tests to follow.

C. Face Test Discussion

This quick screening approach easily identified the ozone generator models with the largest emissions, the primary point of ozone emissions from each unit, the major flow direction, and the range of concentrations that might be encountered in the room and emission tests. The results at 2-12 inches clearly identified Units 1, 3 and 4 as high emitters when operated at the high settings for ozone production, but only Units 1 and 3 were identified as such by the results at 24 inches. Variability, expressed as percent relative standard deviation (RSD), was less than 10% for most of the ozone generators examined at the four different distances. The Biozone® 500 was a major exception, under both fan settings at 6, 12 and 24 inch distances, where the variability ranged from 11-60%. Additionally the Prozone® Compact also exceeded 10% variability at 24 inches, with a RSD of 44%. This suggests that more than 10 minutes of sampling may be necessary to get a precise measurement in this test, in order to characterize inherent fluctuations in the ozone generating device itself and fluctuations in the air currents and dispersion near the ozone monitor probe.

The face test measurement results at 2-24 inches showed that the ozone concentrations dropped off rapidly with distance. The one exception was that for Unit 1 with the fan on high speed and the ozonator set at 2,500 ft^2 ozone concentrations did not decline noticeably until 12 inches away. This suggests that fan speed can be important in increasing near-source exposure.

This screening approach worked well to locate the peak emissions near the face of the units and characterize the decline in ozone concentrations with distance from the face. The face test results indicate that at their high settings, and after just a few minutes of operation, the Alpine Air/Living Air and the Prozone® Whole House devices produce ozone levels that clearly exceed CAAQS and FDA standard levels at a distance of 24 inches from the face.

Table 2. Results from Exploratory Ozone Generator Face Testing

			Ozone Concentration at Varying Distances from Unit Face (ppb) [b,c]			
Test ID	**Model**	**Operational Setting**	**2"**	**6"**	**12"**	**24"**
1LH [a]	Alpine XL-15 / Living Air 2500	2,500 ft^2; Fan at Low speed	1287	1171	907	567
1HH [a]		2,500 ft^2; Fan at High speed	781	718	580	373
2L	Biozone® 500	Fan at Low speed	438	95	11	11
2H		Fan at High speed	379	144	43	13
3H	Prozone® Whole House	Continuous mode (System on; Timer inactive; UV on)	1030	815	577	389
4	Prozone® Compact B	On mode (no user-defined controls)	1134	695	304	61

a. The 2,500 ft^2 Ozonator setting was also used in the emission rate tests, but not in the room tests.
b. Concentrations are 10-minute averages after the unit has been operating for at least 10 minutes.
c. For the face tests, values have not been adjusted for differences in background ozone levels, which ranged from 0-25 ppb during the testing.

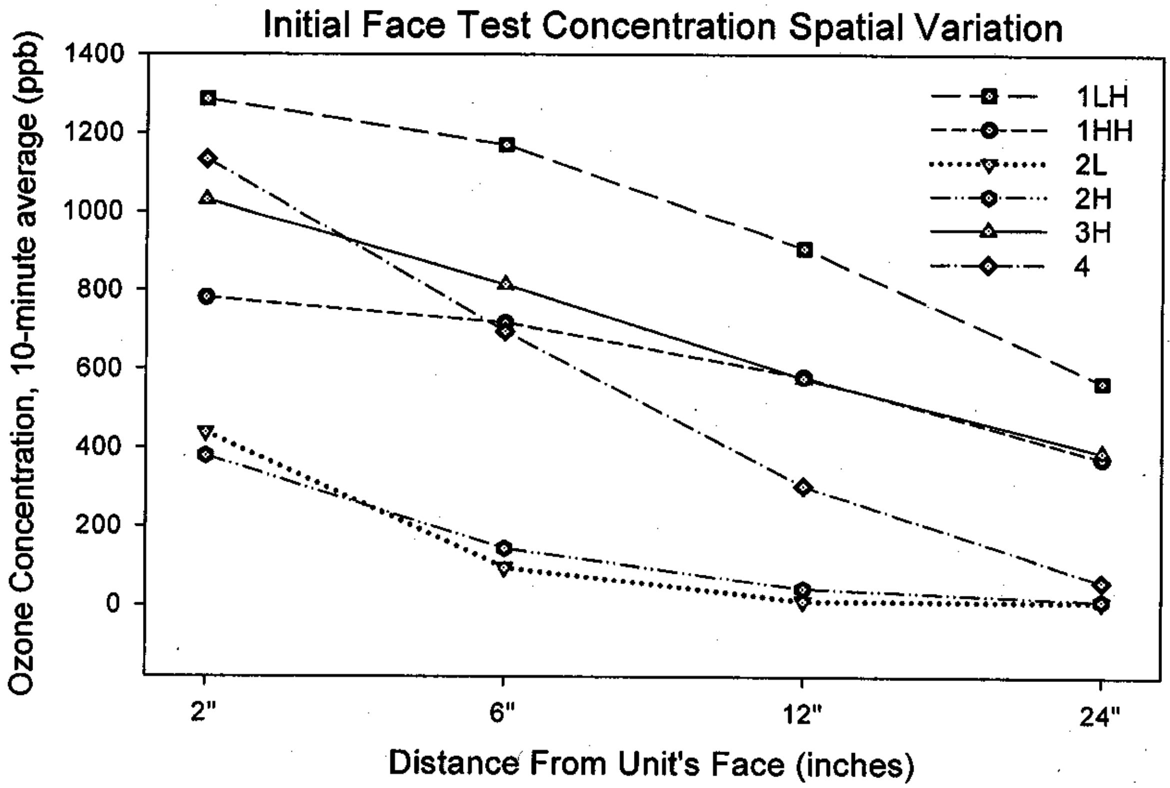


Figure 1. Concentration Profiles for Face Tests

5. ROOM TESTS

A. Room Test Methods

1. Test Room Characteristics

The test room was a small office approximately 8 ft. wide, 11 ft. long, and 8 ft. high (88 ft^2, volume of about 20 m^3), the size of a small bedroom or home office. The room is located in a warehouse building in Sacramento, California, about 1,000 meters from any major freeway or surface street. The room was furnished with an office desk made of hard wood and laminated composite wood, and one upholstered desk chair with a high back. The room had linoleum flooring, and painted wallboard construction for the walls and ceiling. A 6-foot fluorescent light fixture was mounted in the ceiling. The room had no air supply or return registers, and no large openings other than the door. All power cords and air sampling lines were run through an 8-inch hole in the door's center, which was sealed with duct tape. The adjoining warehouse space was conditioned, and its doors were kept closed during the tests in this study. Two adjoining bathrooms had automatic exhaust fans, which were turned off during the testing.

We selected a target range of 0.3-0.5 indoor-outdoor air changes per hour for the air exchange rate (AER) for the room tests. This range reflects common conditions for older single-family homes in California without open windows or mechanical ventilation in operation. Compared to newer homes in California, older single-family homes tend to have less airtight exterior shells, and they often have additional air exchange when the central heating or cooling system is operating because the system has substantial air leakage in its ductwork. This range does not reflect comparable "closed" conditions for new homes, which can have indoor-outdoor air exchange rates of 0.1 air changes per hour or less when closed up. Thus, the target AER range is realistic for California homes, and does not provide conditions that would result in an overestimation of ozone concentrations from the ozone generators tested.

In order to provide the target AER of about 0.3-0.5 air changes per hour, any suspected air leakage paths were sealed. The door frame was sealed with one-half inch wide, closed cell foam weather-stripping. In addition, two-inch wide duct tape was used to seal the edges of the door, the gap around the ceiling light fixture, and both horizontal edges and vertical gaps of the baseboard vinyl coving.

2. Air Exchange Rate Testing

The AER of the test room was measured on three consecutive days prior to the start of the room tests. Once the ozone generator room tests began, the room AER was measured once a week. The room AER was measured using the single zone tracer gas decay method of ASTM Standard E741, with carbon dioxide (CO_2) gas as the tracer gas (Persily, 2000). CO_2 gas from a cylinder was injected into the room center with the door closed. CO_2 concentrations were measured inside the test room, and in the warehouse during the pre-tests, using a TSI QTrak Plus. Once the CO_2 concentration reached more than 3,000 ppm (usually much higher) in the test room, the CO_2 source was turned off. The decay of measured CO_2 concentration over time was used to calculate the dilution (by room ventilation) with "replacement" air using the empirical equation shown below. A decay period of 30 minutes was chosen to obtain an accurate measurement.

The initial and end concentrations of CO_2 were used to calculate the AER of the test room as follows, assuming no change in CO_2 concentrations in the adjoining space:

AER = Air exchange rate (number of air exchanges per hour, h^{-1})
= [ln C (t1) - ln C (t2)] / (t2 - t1) (Persily, 2000)

where:
ln = Natural log
C = Concentration (dimensionless)
t1 = Time at start of measurement period (hours in decimal fraction form)
t2 = Time at end of measurement period (hours in decimal fraction form)

The results of the AER testing are shown in Table 3. Both the initial AERs on the three days prior to the room tests of the ozone generators and the AERs measured during the test periods were stable – they ranged from 0.25 to 0.28 AER. The measured AERs during the test periods averaged 0.27 air changes per hour. This AER was slightly below our target level of 0.3-0.5 per hour. This method assumes no significant change in CO_2 concentrations in the adjoining space during the testing, and that the concurrent CO_2 concentrations were much less in the adjoining space than those utilized for the AER measurement. The adjoining space did not contain any combustion sources or other notable sources of CO_2, so levels were assumed to be near the average of 358 ppm measured in the warehouse during the pre-tests, a reasonably low amount relative to the room CO_2 concentrations, which ranged from about 2,900 ppm to 4,900 ppm.

Table 3. Summary of Room Air Exchange Rate Tests

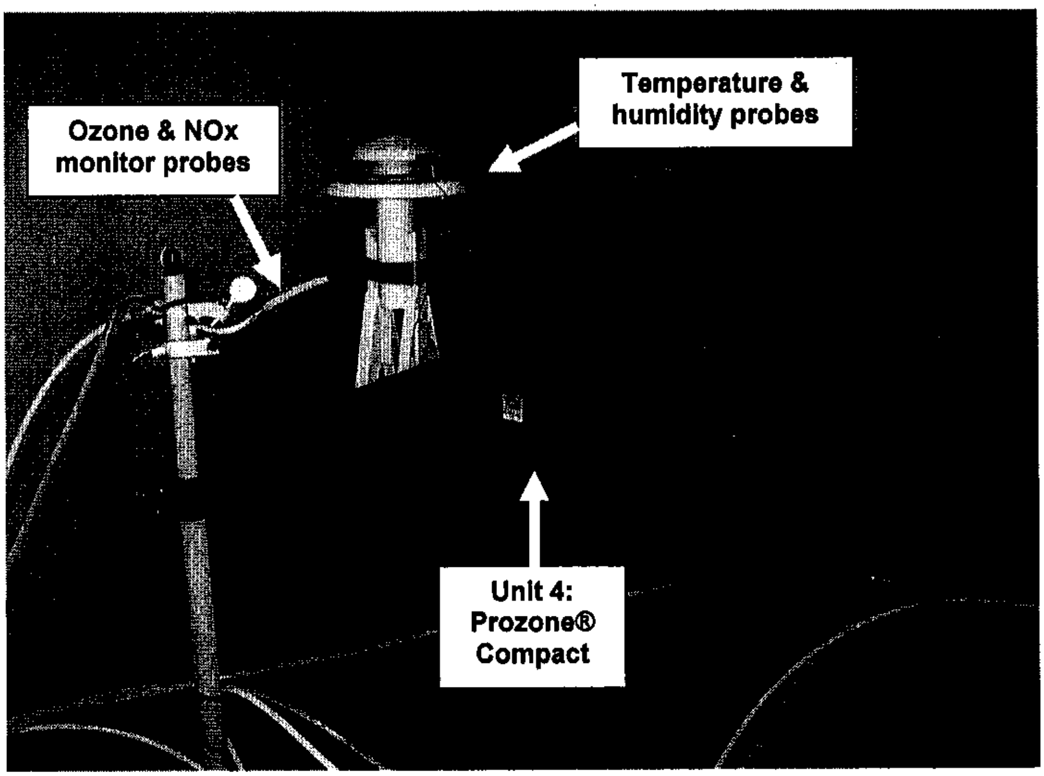
Date	Room Test #	AER (air exchange rate; air changes per hour)
6/23/05	Pre-test	0.27
6/24/05	Pre-test	0.25
6/27/05	Pre-test	0.28
Pretest Average		**0.27**
7/12/05	1L, 3L, 3LA, 3H, 4, 4D	0.28
7/25/05	1H, 2L, 2H	0.25
Test Average		**0.27**

3. Appliance Set-up and Room Air Measurements

Room tests were conducted during daytime hours on weekdays between July 5 and August 1, 2005. Prior to appliance testing, background ozone concentrations were monitored in the test room and the adjacent open area for 30 minutes to characterize initial background conditions. At the completion of background ozone monitoring, appliance testing began. The appliance was placed in a central location in the room on top of a desk, 3 feet from the wall, at a height of approximately 2.5 feet off the floor. Photographs were taken showing the placement of appliances during room testing. User instructions from the manufacturers were considered in selecting the location and settings for each appliance.

The room-sampling probe for ozone was situated four feet above the floor to approximate the average "breathing zone height" for adults either sitting or standing. The probe was located about 3 feet from the appliance, toward the center of the room, to simulate the position of a room occupant who is sitting or sleeping near the air cleaner.

The appliance was then remotely started at one of the pre-selected settings. These settings included a low output setting, a high output setting, and a low output setting plus the use of an additional operating feature, if appropriate, as shown in Table 4. For each test, the appliance was run until ozone levels in the room reached steady state (defined as the maintenance of constant ozone levels within $\pm$ 5% for 30 minutes), or for 3 hours if steady state was not achieved at each setting. After steady state or 3 hours was reached, the appliance was turned off by remote switch, and the monitoring was continued until the room ozone level returned to ambient levels. In addition, the test room was monitored before and during the room tests for NO, NO_2, NOx, room temperature, and relative humidity. After each test period, room air was fully vented out of the building.



Test room set-up with Prozone® Compact

B. Room Test Results and Discussion

The results of the room tests for the four different units at different operational settings are summarized in Table 4 and Figures 2, 3 and 4, and discussed below for each unit. Figure 2 shows all test results on one graph; Figures 3 and 4 show those same results for the high vs. low tests separately, so that the results for the lower settings can be shown on a lower scale. Figures 5-8 present the results for each model of ozone generator individually. All of these figures show the minute-by-minute ozone concentrations measured during each test. The rapid increase in ozone levels is seen on the left hand side of the figures, and the rapid decline when the ozone generator is turned off at the end of each test is clearly seen on the right hand side of the figures. The figures also show the duration of the steady-state or near steady-state levels throughout the center of the figures, except for one unit which was operated on a 15-minute per hour intermittent cycle. This is discussed further below.

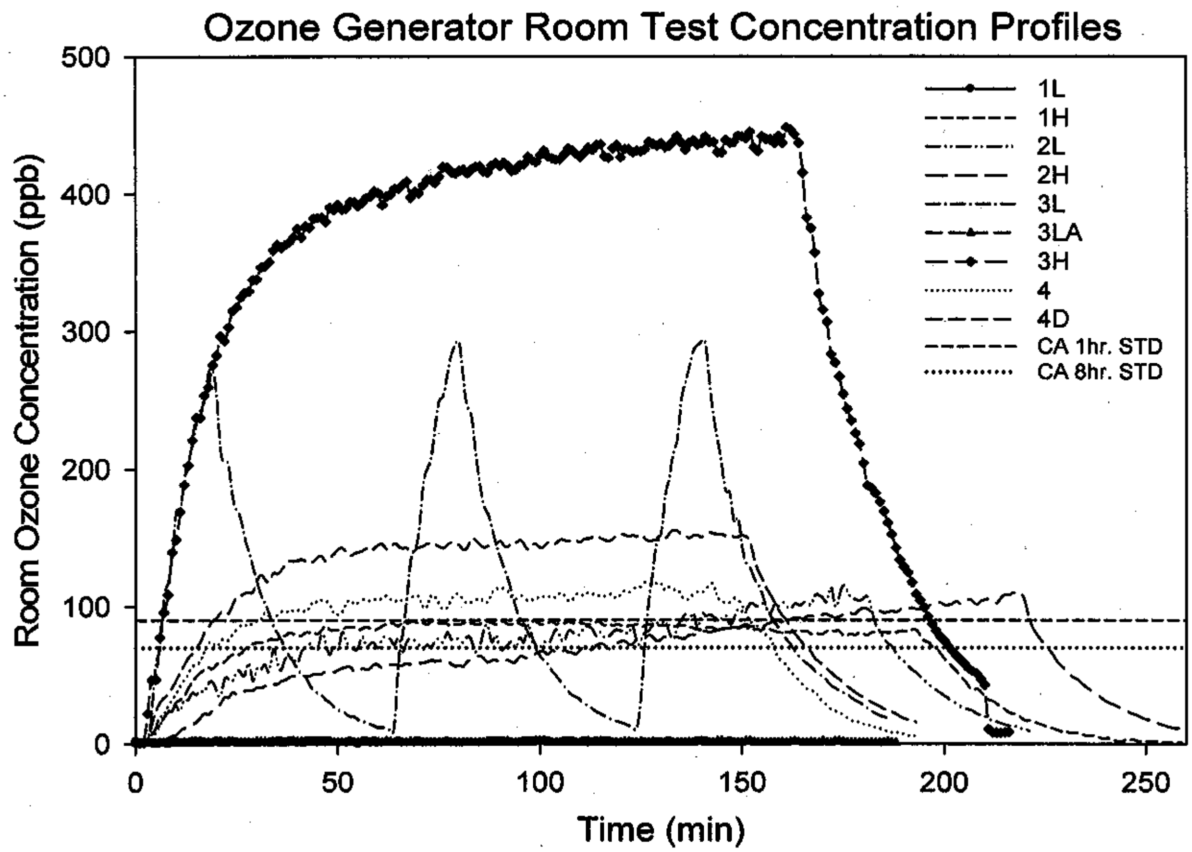


Figure 2. Concentration Profiles for Room Tests

Figures 2-4 show that all but two of the tests (1L and 3LA) produced ozone concentrations that exceeded at least one of the CAAQSs, and one device, the Prozone® Whole House model, produced exceptionally high levels of ozone. Figure 3, with the results from tests using the medium or high operational settings only, shows that the three Prozone units all exceeded the CAAQS quickly, within about 30 minutes, while the Biozone® 500 and Alpine/Lightning Air units exceeded the CAAQS after a longer period of time. Figure 4, with the results from the low operational setting tests, shows that "low" is a relative term only: the two Prozone devices clearly exceeded the CAAQS, one very quickly.

Table 4. Ozone Concentration Data for Ozone Generator Room Tests

			Room O_3 Concentration (ppb)		Time (min)				Background Ozone Concentration (ppb)
Test ID	**Manufacturer and Model**	**Operational Setting**	**Max 1-min AVG**	**Max 60-min AVG**	**To Reach 90 ppb**	**Above 90 ppb (1hr STD)**	**To Reach 70 ppb**	**Above 70 ppb (8hr STD)**	**Entire Test AVG**
1L	Alpine XL-15 / Living Air 2500	100 ft^2; Fan at Low speed [a]	2	1	NA	NA	NA	NA	5.3
1H [d]		1,000 ft^2; Fan at high speed [b]	89	88	NA	NA	28	170	0.8
2L	Biozone® 500	Fan at Low speed	115	96	135	48	42	146	3.4
2H		Fan at High speed	110	99	162	60	111	115	4.6
3L	Prozone® Whole House	Timed output mode (System on; Timer mode at 15 min/hr) [c]	291	119	7	27, 29, 31	6	31, 32, 37	11.8
3LA		UV mode only (Germicidal UV on; Timer inactive)	2	1	NA	NA	NA	NA	1.0
3H [d]		Continuous mode (Timer inactive)	448	435	7	190	6	196	3.0
4 [d]	Prozone® Compact A	On (no user-defined controls)	118	109	31	121	18	140	3.3
4D [d,e]	Prozone® Compact B	On (no user defined controls)	155	149	20	141	15	152	11.6

a. Ozonator dial setting of 100 ft^2 was the lowest possible setting.
b. Ozonator dial setting of 1,000 ft^2 was the mid-range setting.
c. Manufacturer recommends no more than 15 minutes of operation per hour for occupied areas. The series of three values represents values for the three 1-hour cycles of operation observed.
d. Ozone concentration reached "steady-state" in these 3-hour tests.
e. Duplicate test of Unit 4B, under the same operating conditions as for Unit #4A in Test 4.

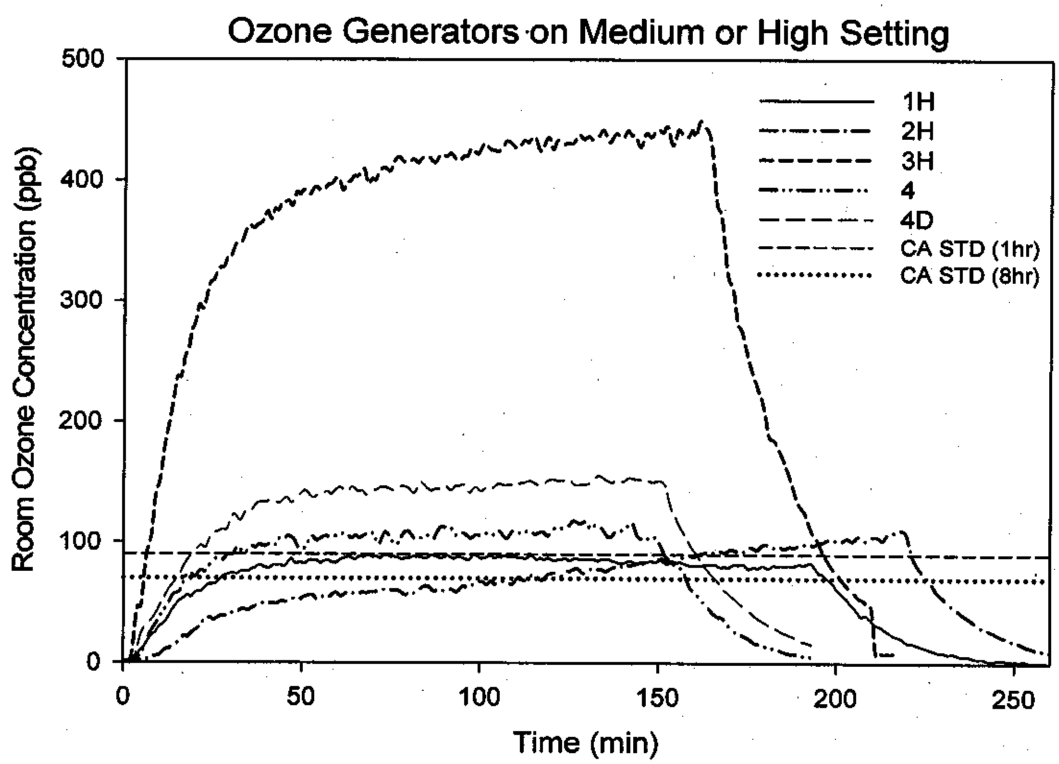


Figure 3. Room Concentration Profiles for Medium and High Settings

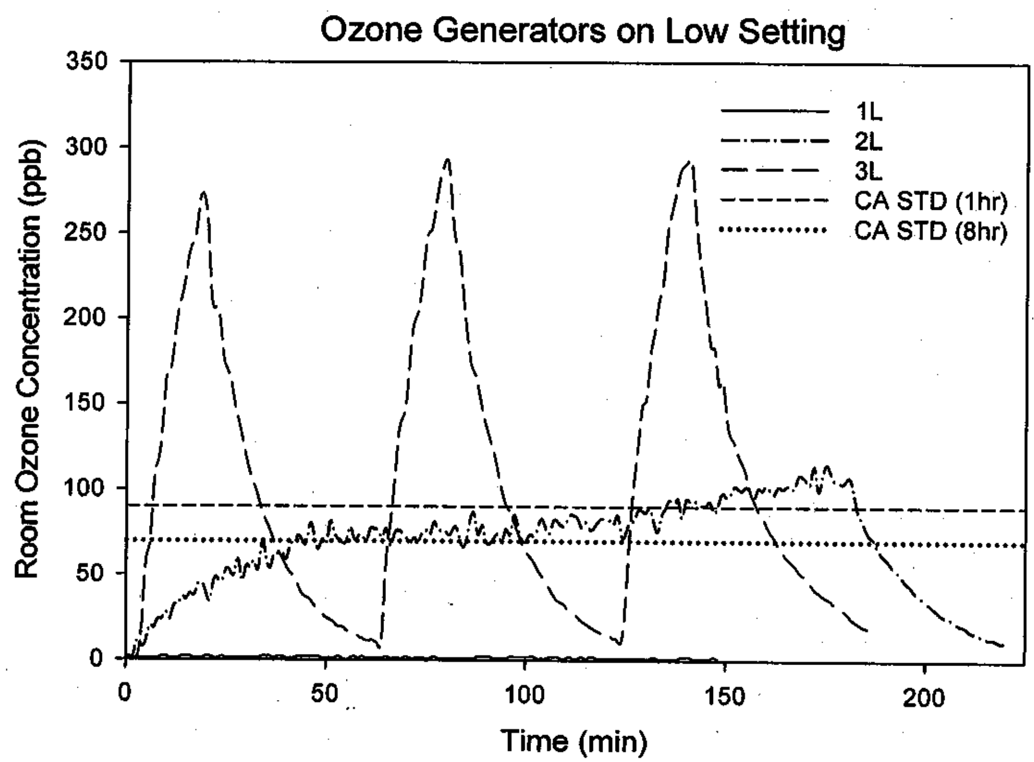


Figure 4. Room Concentration Profiles for Low Settings

Before discussing the individual units, it should be noted that steady-state concentrations within the three hours of testing were only attained in four of the nine room tests, as noted in Table 4. The failure of the tests to reach a steady-state room concentration was mainly in the tests with lower ozone concentrations and was likely due to several contributing factors. The first factor is the narrow operational definition of a steady-state concentration (less than $\pm$ 5% variability for 30 minutes) that was chosen at the beginning of the project. This small variability is difficult to attain when the accuracy of the ozone monitor alone is 2% RSD, when the background ozone concentrations begin to increase markedly (as in Test 3L), or when the monitoring time is limited (as it was in this study) and the air exchange rate is low. When the definition of steady state is expanded to ± 10%, then Test 2H met this criterion, and Test 2L nearly met the criterion. Other factors affecting room concentration variability may include slight short-term variability in AERs, differing ozone reaction/sorption loss rates (due to the condition of the room surfaces and furnishings at the time of each test), and background concentrations.

Additionally, steady state conditions were not attainable by design for Test 3L because the unit was cycling on for just 15 minutes per hour. Nonetheless, 1-minute maximum averages were nearly identical for the 2nd and 3rd cycles, and within $\pm$ 5% of each other (291 vs. 293 ppb), indicating a consistent oscillation in ozone concentrations. The first peak's value was 272 ppb, which was well within 10% of the other peak values.

1. Unit 1: Alpine Air Enhanced XL-15 / LA Lightning Air RA 2500

The time-resolved room concentration profiles for Unit 1, the Alpine Air XL-15/LA Lightning Air RA 2500, are shown in Figure 5. Unit 1 was examined at two different operational settings for the room tests: 100 ft^2 Ozonator setting with a low fan speed (Test 1L); and 1,000 ft^2 Ozonator setting with a high fan speed (Test 1H). The maximum 1-minute and 60-minute average ozone concentrations were similar in Test 1H: 89 vs. 88 ppb (see Table 4). This suggests that the short-term variation in ozone output for Unit 3 at this setting was small.

Room concentrations for Tests 1L and 1H were quite different. Test 1H attained a steady-state room concentration of 88 ppb within about 70 minutes. This concentration is very near the CAAQS level of 90 ppb for one hour. Under real-world conditions that occur in a number of California's larger cities during summer, with higher background ozone concentrations from outdoor air, room concentrations could exceed 90 ppb. The room concentrations in Test 1H exceeded the level of the 8-hr CAAQS of 70 ppb within about 30 minutes, as shown in Table 4. Had the testing time been extended, it is likely that the 1H setting would clearly have exceeded this standard. In addition, Test 1H concentrations exceeded the FDA room air standard of 50 ppb within about 20 minutes.

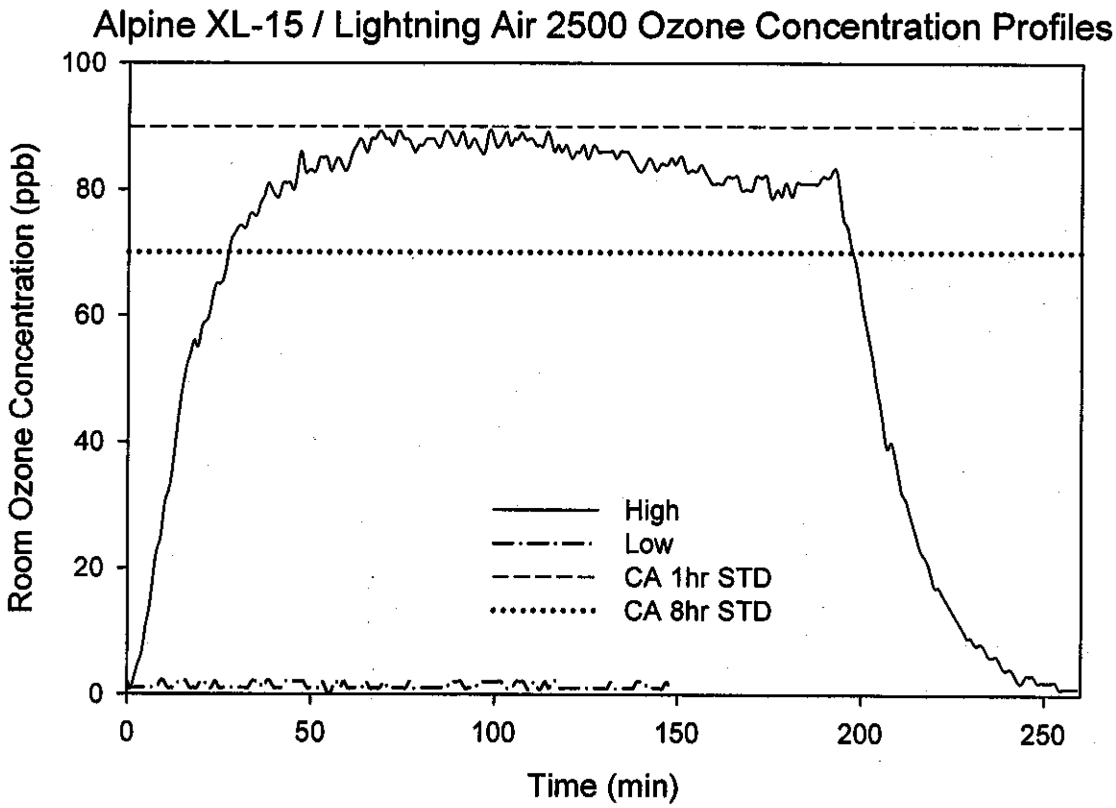


Figure 5. Ozone Concentration Profiles for Unit 1 Room Tests

Room concentrations for Test 1L were 1-2 ppb, below the average background concentration of 5 ppb measured outside the room in the warehouse. This low level was somewhat surprising, but may be attributable to a number of factors. The device may not actually produce any ozone at its lowest ozone setting. More likely, the device produces a very low amount of ozone that reacted quickly with other chemicals or surfaces in the test room.

The Alpine/Lightning Air unit can be operated at a much higher output than the operational settings used in our room tests. Other investigators (e.g., Mason *et al.*, 2000) have measured ozone levels above 300 ppb at its highest setting. Despite this, the manufacturer recommends this model for use in hospitals, nursing homes, doctors' offices, and day care settings, as well as other locations. The occupants of these types of buildings are those population groups most likely to be susceptible to the harmful effects of ozone. Further, FDA regulations prohibit the use of ozone generators in these types of buildings.

2. Unit 2: Biozone® 500

The time-resolved room concentration profiles for Unit 2, the Biozone® 500, are shown in Figure 6. Unit 2 was tested at both low (2L) and high (2H) fan speeds. The ozone output for this unit could not be adjusted; thus, the results for the two tests were very similar. The concentration profiles tracked each other fairly closely, with room concentrations rising faster in Test 2L, perhaps due to the lower fan speed, which would result in less air mixing and thus less rapid dilution and less reactivity. Neither test attained a steady-state room concentration, most likely due to the experimental protocol time restriction.

As shown in Table 4, both tests produced room ozone concentrations exceeding the levels of both the 1-hour and 8-hour CAAQS. The maximum 1-min average concentrations of ozone observed in Tests 2L and 2H were 115 ppb and 110 ppb, respectively. The maximum 60-minute averages were 96 and 99 ppb, respectively; both of these averages exceed the 1-hour CAAQS of 90 ppb. This standard was exceeded within 2 - 2.5 hours, and concentrations remained above that level until the end of the tests. Room ozone concentrations reached 70 ppb, the 8-hr CAAQS level, in less than 42 minutes in Test 2L, and 111 minutes in Test 2H. The still-rising room concentrations at the end of the tests suggest that both tests would have exceeded the 8-hr CAAQS if continued long enough. In addition, Test 2L and 2H concentrations exceeded the FDA room air standard of 50 ppb within about 30-50 minutes.

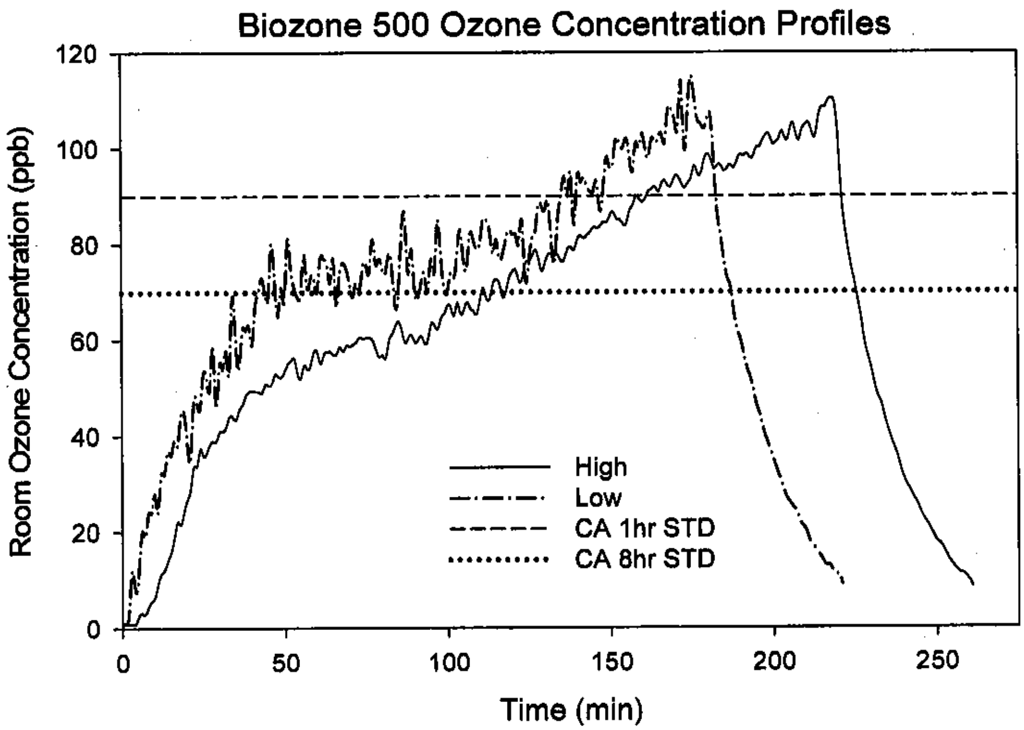


Figure 6. Ozone Concentration Profiles for Unit 2 Room Tests

3. Unit 3: Prozone® Whole House

The room concentration measurements were performed at three different operational settings for Unit 3, the Prozone® Whole House device: an intermittent output (15 min / per hour; Test 3L), germicidal mode (UV-only; Test 3LA), and continuous output (Test 3H). The results are shown in Table 4 and Figure 7. The use of this device on both its intermittent setting and its continuous setting resulted in levels of ozone several times higher than the CAAQS. The use of the germicidal UV function alone showed no ozone production; its ozone concentration in Figure 7 follows the horizontal axis.

The concentrations measured in 3L and 3H were very high. Test 3L had a maximum 1-min average concentration of 291 ppb, and a maximum 60-min average of 119 ppb, while 3H had a maximum 1-min average concentration of 448 ppb and a maximum 60-min average of 435 ppb. The 3H concentrations were the highest observed of all the room tests. Test 3H (continuous mode) produced ozone concentrations nearly 5 times the California 1-hour CAAQS, and exceeded the CAAQS for about 195 minutes of the test, which equates to 90% of the time that the unit was operated. In the 3L test, although the unit was emitting ozone for just 15 minutes of every hour (the left side of each of the three vertical peaks shown in Figure 7), room concentrations nonetheless exceeded the 1-hour CAAQS level within 6-7 minutes of starting the unit, and maintained concentrations above the 1-hour CAAQS for 27-37 minutes of each hour. Additionally, as can be seen on the left hand side of Figure 7, both the 3L and 3H concentrations exceeded the FDA room air standard of 50 ppb within about 5 minutes of starting the units.

The room ozone concentrations in the 3LA test were nearly equal to the average background ozone concentration of 2 ppb, indicating that no ozone was being emitted from the unit during the germicidal (UV) mode operation.

Based on the results obtained during the testing of Unit 3, it is obvious that the operation of this unit in a confined residential setting poses a serious public health risk. Because this particular unit is marketed for both single room coverage as well as whole house coverage, the potential exists for significant ozone exposure for any individual(s) occupying the same room as the unit while it is operating. This unit would violate the 8-hour CAAQS if operated on high for an 8-hour time period. It is also likely that operation in the 15-minute/hr cycling mode, which produced a maximum 60-minute average of 119 ppb in Test 3L, would also exceed the 8-hour CAAQS if the test were continued for 8 hours.

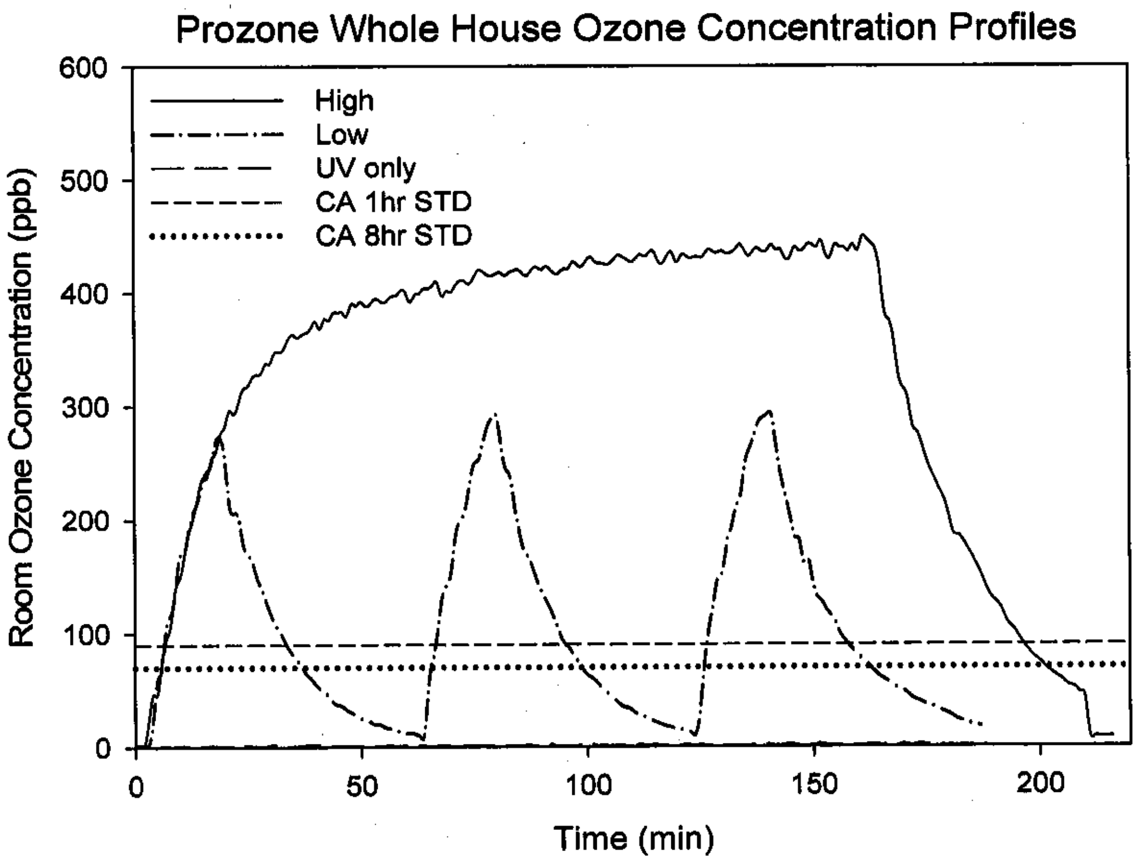


Figure 7. Ozone Concentration Profiles for Unit 3 Room Tests

4. Unit 4: Prozone® Compact

The Prozone® Compact h as only an on-off switch and no other controls that are accessible to the operator. Consequently, there were no high or low tests conducted for Units 4A and 4B: the devices were simply turned on. As shown in Figure 8, the general shapes of the concentration profiles for Units 4A (Test 4) and 4B (Test 4D) are very similar. Additionally, the slopes of the ozone increase at the start of the tests are nearly identical until the room ozone concentration reaches 70 ppb at about 15 minutes. At this concentration, the two curves deviate to different steady-state concentration maxima while maintaining a similar shape in their concentration profile.

As shown in Table 4, the maximum 1-min and 60-min average ozone concentrations measured were 118 and 109 ppb, respectively, for test 4, and 155 and 149 ppb, respectively, for test 4D. The measured concentrations exceeded the CAAQS for 2-2.5 hours depending upon the standard and test being considered. This corresponds to nearly 66% of the time each unit was in operation. Both units exceeded the FDA room air standard of 50 ppb within 15 minutes.

Agreement between the duplicate Tests 4 and 4D was moderate – the duplicate unit produced a room ozone concentration 49 ppb greater than that produced by Unit 4 at steady state, a 40% increase. Their room ozone concentrations were sufficiently different as to eliminate the ozone analyzer precision (2% RSD) as a significant source of variability between the two units. A portion of this variability can be attributed to differences in the background ozone concentrations for the different testing periods: Test 4 was conducted in the morning when background ozone levels averaged 3 ppb, and Test 4D was conducted that afternoon when background ozone levels averaged 12 ppb, an 8 ppb increase. The room conditions such as temperature and humidity varied only slightly throughout the day. The room set-up was not changed, but it is possible the air exchange rate of the room or other conditions varied a bit. The majority of the between-unit difference is most likely due to the difference in the background ozone, some unknown factors such as small differences in AER, and inherent variability between the two units examined,.

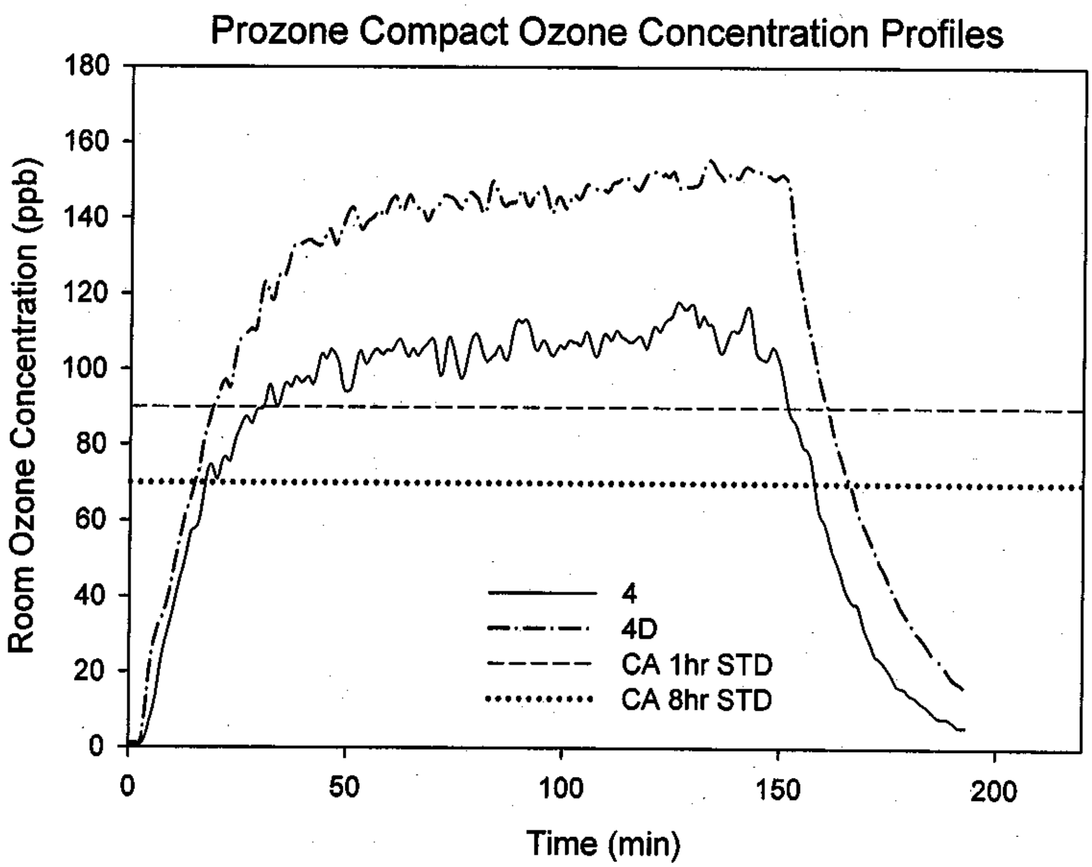


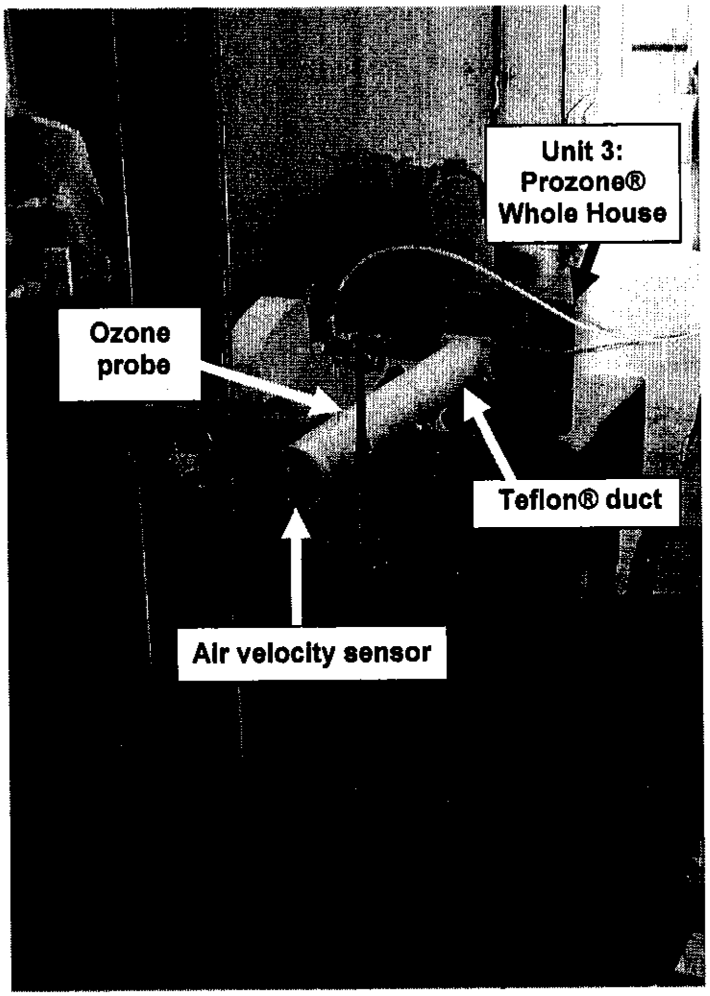
Figure 8. Ozone Concentration Profiles for Unit 4 Room Tests

6. EMISSIONS TESTS

A. Emission Test Methods

The emissions tests for each appliance were conducted in March, 2006, after completion of the room tests and after each appliance could be outfitted with custom ductwork for the emissions tests (discussed below). The emissions tests were conducted in the open, unoccupied area of the same warehouse building described previously. To avoid re-circulation of ozone to the appliance's air intake, a cross-draft was provided to the area by opening two opposing doors to the outside.

To allow measurements of ozone in a contained air volume, each appliance's exhaust air was directed into Teflon® ductwork that was custom designed to fit tightly over each unit's vent face. The duct was designed to direct the unconfined flow of air to the sampling port where ozone emissions could be monitored. The ductwork was circular, four inches in diameter, and 40 inches long. The ductwork was connected to the ozone generator using a custom Teflon® adapter, and all connections were made using stainless steel hardware to avoid reactivity losses of ozone.



Emissions Test Set-up with Prozone® Whole House

Standard source test methods from ARB (1999) were used as a guide for the emission rate measurements. Ozone emission concentrations were measured using an API 400 ozone analyzer, while a second API 400 ozone analyzer was used to monitor background ozone concentrations in the adjacent area of the building. The cross-section of the duct was traversed by sampling at eight pre-set locations within the duct (total of eight sampling points), with the probe kept perpendicular to the air flow. In order to ensure a well-mixed sample, the probe location was set at 8 duct-diameters length (32 inches) from the appliance face.

In addition, a K-type thermocouple measured the temperature of the ducted air. The ducted air was assumed to be at atmospheric pressure. Moisture content of the ducted flow was determined from psychrometric charts. The velocity of the air from the duct was measured with a hot-wire anemometer.

Measurements in the duct were taken at different appliance settings once the ozone concentrations and air velocity had reached a maximum level and were fairly stable. One-minute measurements of ozone were taken for five consecutive minutes at each of eight locations, and all 40 data points were averaged. Air velocity measurements taken at each sampling point also were averaged.

The emission rates, expressed in units of emitted ozone mass/time, were calculated by converting the measured ozone concentration in ppb units to mass/volume units, multiplying that value by the air flow rate through the duct, and converting the mass/volume units to units of milligrams/hour (mg/hr). All ozone concentrations were first corrected by subtracting the ambient (warehouse) ozone concentration. Assuming standard temperature and pressure, the conversions were accomplished using the following equations:

$$O_3 \text{ Mass/Volume } (\mu g/m^3) = (X \text{ ppb } O_3 \text{ measured in the duct}) \times (10^{-9}) \times (1 \text{ mole of gas}/24.46 \text{ liters}) \times (48.00 \text{ g } O_3/\text{mole}) \times (1000 \text{ liters}/m^3) \times 10^6 \ \mu g/g$$

$$\text{Air Flow Rate } (m^3/s) = (X \text{ m/s duct air velocity}) \times (0.0081 \text{ m}^2 \text{ duct area})$$

$$O_3 \text{ Emission Rate} = (X \ \mu g/m^3 \ O_3) \times (Y \ m^3/s \text{ flow rate}) = \mu g/s$$

$$O_3 \text{ Emission Rate in mg/hr} = \mu g/s \times (0.001 \text{ mg}/\mu g) \times (3600 \text{ s/hr}) = \text{Mass/time in mg/hr}$$

B. Emission Test Results and Discussion

Each of the units was examined to ascertain the ozone emission rate under operational settings generally analogous to the room test conditions. A summary of the results obtained in the emission rate tests is presented in Table 5. Figure 9 provides a graphical display of the ozone emission concentrations measured in the ducts, and Figure 10 shows the calculated ozone emission rate for each appliance and test condition in mg/hr.

Substantial variation was observed in the nine emission tests. The calculated ozone emission rates ranged over four orders of magnitude, from 0.079 – 94 mg/hr. In-duct ozone concentrations for all but two tests, when corrected for background, ranged from 153 – 1867 ppb. The other two tests, for the Alpine Air on low, and the Prozone Whole House on UV only, were 2 and 4 ppb, respectively. The measured air flow rates ranged from 0.0015 – 0.0167 m^3/s.

Table 5. Ozone Emission Rate Data

Test ID	Manufacturer and Model	Operational Setting	Measured Velocity (m/sec)	Volumetric Flow Rate (m^3/sec)	Corrected Ozone Emission Concentration (ppb) [a]	Ozone Emission Rate (mg/hr)
1L	Alpine XL-15	Ozonator at 100 ft^2; Fan at Low speed	1.26	0.0102	4	0.29
1H		Ozonator at 1,000 ft^2; Fan at Medium speed	1.60	0.0130	153	14
1LH		Ozonator at 2,500 ft^2; Fan at Low speed[b]	1.24	0.0100	1308	93
1HH		Ozonator at 2,500 ft^2; Fan at High speed[b]	2.06	0.0167	799	94
2L	Biozone® 500	Fan at Low	0.36	0.0029	502	10
2H		Fan at High	0.50	0.0041	327	9.4
3L	Prozone® Whole House	Timed output mode (System on; Timer mode at 15 min/hr) [c]	1.08	0.0087	520	32
3LA		UV mode only (Germicidal UV on; Timer inactive)	0.69	0.0056	2	0.079
3H		Continuous mode (Timer inactive)	1.13	0.0092	1359	88
4	Prozone® Compact, Unit A	On (no user-defined controls)	0.19	0.0015	1867	20
4D	Prozone® Compact, Unit B	On (no user defined controls)	0.19	0.0015	1727	19

a. Concentrations are the measured value minus the average background concentration on the day of testing.
b. No room tests were performed at these operational settings, but face test results are available,
c. Unit timer was set for 15 minutes of operation per hour, the maximum recommended by the manufacturer for occupied buildings.

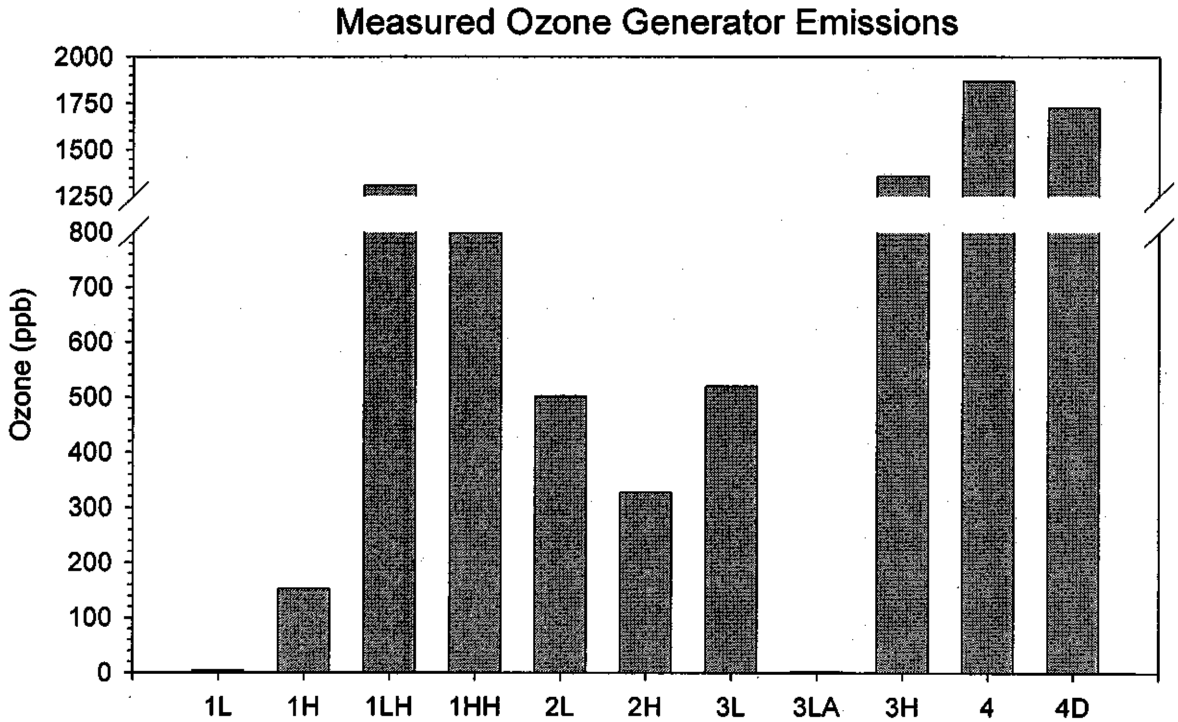


Figure 9. Measured Ozone Emission Concentrations (in Duct)

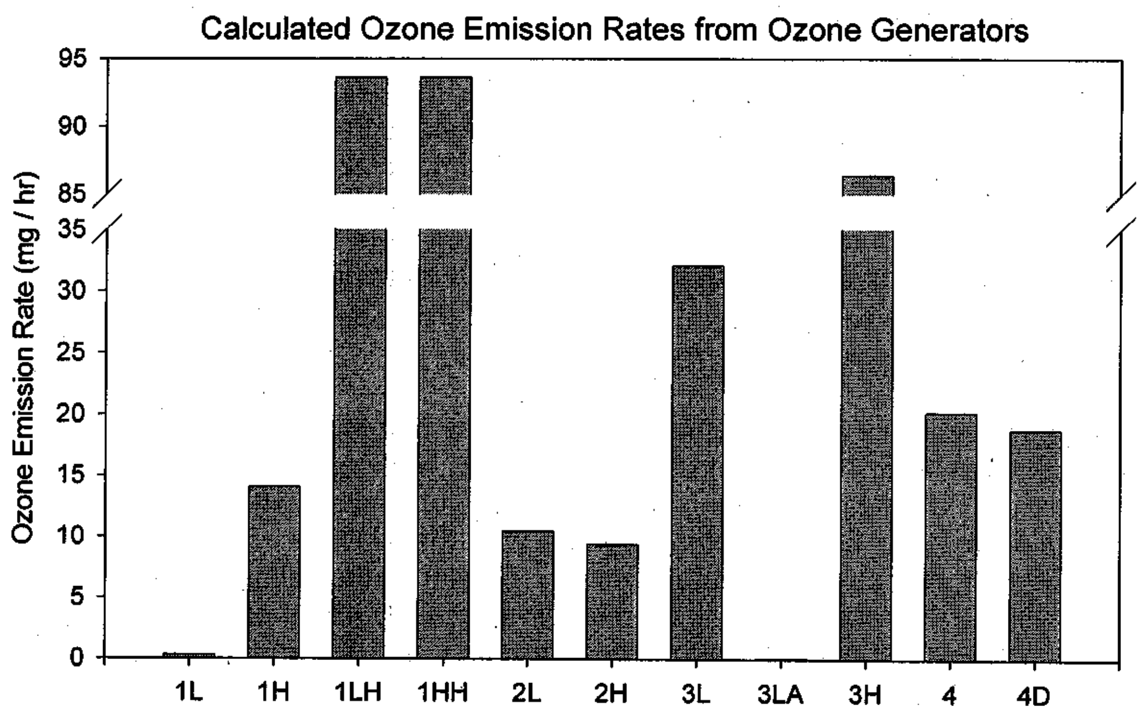


Figure 10. Calculated Ozone Emission Rates

The emission rate results can be used to model resultant concentrations in rooms and buildings under different ventilation and ozone removal conditions. The highest and mid-range emission rates for ozone are a public health concern because they can produce indoor ozone levels above the FDA standard and the 1-hour CAAQS. Using the test home results of Mason *et al.* (2000) as a basis, an ozone emission rate of 58 mg/hr in a 1200 ft^2 home can produce 158 ppb in the room with the ozone generator and 48 ppb in a distant room. The higher room concentration is three times the FDA standard of 50 ppb in room air. This suggests that an emission rate below about 15 mg/hr is needed to meet the FDA standard in this house, assuming outdoor ozone contributions are negligible. In the present study, this emission rate was exceeded in Tests 1LH and 1HH (maximum setting), Tests 3L and 3H, and Tests 4 and 4D, and was nearly exceeded in Tests 1H (14 mg/hr) and approached in Tests 2L and 2H (9-10 mg/hr).

The following sections examine each unit individually and compare the calculated emission rate to the results obtained in the room tests.

1. Unit 1: Alpine Air / Lightning Air

The emission results obtained from Tests 1L and 1H under the 100 ft^2 and 1,000 ft^2 settings, respectively, were very different, as expected. Test 1L yielded one of the lowest ozone emission rates observed, 0.29 mg/hr. Test 1H yielded an ozone emission rate of 14 mg/hr, in the low-medium range among all tests. The Test 1H emission rate is 48 times that of Test 1L, rather than the 10-fold factor in the square foot settings of the Ozonator. This indicates that the Ozonator control knob does not have an accurate, linear response in producing ozone.

Figures 9 and 10, and Table 5 also show results for the two emission tests that were conducted in addition to those using the appliance settings in the room tests: Test 1LH and Test 1HH. Both tests were conducted at the maximum Ozonator setting of 2,500 ft^2, and at low and high fan speeds, respectively. As expected, both tests yielded nearly identical ozone emission rates, 93 and 94 mg/hr, which were the highest values among all the tests. The emission test results for the Alpine/Lightning Air unit at the maximum setting of 2,500 ft^2 were similar to those of the Prozone® Whole House unit in continuous mode – 94 vs. 88 mg/hr, respectively.

In comparing the emission test results to the room test results, these two sets of results were consistent for Unit 1 under the same appliance settings. Test 1L produced very low ozone emission rates and very low ozone room concentrations (1-2 ppb). The higher emission rate for the 1H setting agrees with the elevated room concentrations measured (89 ppb maximum 1-minute average). Similar to the relationship between the emission rates, the 1H room concentration is approximately 45 times higher than for the 1L setting. The agreement between the room test results and the emission rate measurements strengthens the validity of both sets of measurements.

2. Unit 2: Biozone® 500

The emission rate measurements for Unit 2 were made under the same low and high operational setting as in the room tests, Tests 2L and 2H, respectively. The ozone emission rates for these two tests were quite similar: 10 mg/hr and 9.4 mg/hr, respectively. These emission rates agree with the measured room concentrations, 115 ppb and 110 ppb (maximum 1-minute average) for the 2L and 2H room tests, respectively. The low:high ratio for the emission rates and for the room concentrations for unit 2 reveals a similar result of 1.05 and 1.06, respectively. This close agreement between these ratios for emission rates and the room concentrations provides further confidence in both data sets.

3. Unit 3: Prozone® Whole House

Unit 3 was examined under the three operational settings used in the room tests: Tests 3L, 3LA and 3H room tests. Unit 3 had an emission rate of 88 mg/hr in Test 3H for the continuous mode, one of the highest emission rates in the study. For Test 3L, the intermittent setting, the emission rate was 32 mg/hr, mid-range among all the tests. For test 3LA, germicidal UV only, the emission rate was 0.079, the lowest among all tests. The volumetric flow rates of Unit 3 for the low and high setting were similar, 0.0087 and 0.0092 m^3/s, respectively, while that for the germicidal UV-only setting was significantly lower at 0.0056 m^3/s.

The emission rate for the high setting of 88 mg/hr is more than 4 times higher than for any other unit examined except for Unit 1 at the maximum setting. The low setting (32 mg/h) is 1.5 times higher than any other unit except for Unit 1 at the maximum setting. One major caveat is that the low setting produces ozone for 15 minutes each hour (25% of the hour), but maximum ozone levels were produced in 16 of the 40 minutes of sampling. This indicates that the emission rates reported above are overestimates for a 1-hour operating cycle, because the emission test was not conducted for a full hour. The fact that the room concentrations and determined emission rates for the high and low settings of unit 3 were the highest for both data sets adds confidence to the results obtained.

4. Unit 4: Prozone® Compact

The emission rate measurements made for Unit 4 were obtained from two identical units. The first unit tested, corresponding with room test 4, was determined to emit ozone at 20 mg/hr while the second unit, corresponding with room test 4D, had an emission rate of 19 mg/hr. These emission rates are mid-range among all the tests. The volumetric flow rate was 0.0015 m^3/s for both of the units.

Given the excellent agreement between the determined emission rates it is surprising that the room test concentrations differed by about 30%. However the differences in the room test concentrations are likely due to differences in room conditions at the time of each test, such as the higher background in the 4D test when the data were collected in the afternoon versus the 4 test when the data were obtained in the morning, small differences in AER, and other factors. The close agreement in the emission rate tends to indicate that the variability between units is minimal.

7. SUMMARY AND CONCLUSIONS

This study confirmed that ozone generators sold as "air cleaners" and operated as recommended by the manufacturer can produce room ozone concentrations near or above the 1-hour CAAQS of 90 ppb, the 8-hour CAAQS of 70 ppb, and the FDA room air standard of 50 ppb. All four models tested in this study exceeded acceptable concentrations of ozone at their medium or high settings; only one model did not exceed the standards at its low setting, and one other model did not emit ozone when operated with only the UV feature turned on. In addition, some models operated at the whole-house or high settings produced very high ozone emission rates and consequently very high room concentrations – up to 5 times the 1-hour CAAQS of 90 ppb. Exposures to ozone concentrations at these elevated levels can cause acute and chronic health effects among building occupants, especially the persons with asthma or other respiratory diseases, and young children.

The face test worked well as a range-finding approach. It was able to locate the peak concentrations near the face of the units and characterize the decline in ozone concentrations with distance from the face. However, the ranking by ozone concentration was different between the measurements at 2 and 6 inches, as shown in Figure 1, indicating that such face testing is not appropriate for accurately and consistently estimating the impact of ozone generators on indoor air quality.

The emission test results are generally consistent with those of the room tests. The results of the emission tests indicate that all of the ozone generators could produce indoor air levels in a home that exceed the FDA standard of 50 ppb in room air and the 1-hour and 8-hr CAAQS.

We conclude that the use of ozone generators in enclosed spaces presents a serious public health risk from exposure to ozone and its toxic by-products. The use of such devices in close proximity to people cannot be justified based on any purported air cleaning or germicidal properties of ozone. Furthermore, even if operated according to manufacturer's instructions, the safe operation of these devices by the general public cannot be ensured, especially those devices that have extremely high emission rates for ozone.

REFERENCES

ARB, 1999. Methods for Determining Compliance with District Nonvehicular (Stationary Source) Emission Standards, Volume 1. Stationary Source Criteria Pollutant Test Methods. Amended July 1, 1999. http://www.arb.ca.gov/testmeth/vol1/vol1.htm, Updated April 27, 2005.

Boeniger MF, 1995. Use of Ozone Generating Devices to Improve Indoor Air Quality, *J Am. Ind. Hygiene Assoc*, 56:590-598.

Chen W and Zhang JS, 2004. Effectiveness of portable air cleaners for control of volatile organic compounds. Presented at CIB World Building Congress 2004, Toronto, Canada, May 2-7, 2004.

FDA (U.S. Food and Drug Administration), 2005a. 21 CFR 801.415, Maximum acceptable level of ozone. Revised April 1, 2005. http://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfcfr/CFRSearch.cfm?CFRPart=801.

FDA, 2005b. 21 CFR 801. Medical Devices. Labeling. Revised April 1, 2005. http://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfcfr/CFRSearch.cfm?CFRPart=801.

Foarde K, van Osdell D, Steiber R, 1997. Investigation of gas-phase ozone as a potential biocide. *Appl. Occup. Environ. Hyg.,* 12: 535–542.

FTC (Federal Trade Commission), 2002. Case List, Alpine Industries, Inc. and William J. Converse, U.S. v. (Eastern District of Tennessee), File No. C-3614. Washington, DC. http://www.ftc.gov/os/caselist/c3614.htm. Updated July 12, 2002. 1-877-FTC-HELP (382-4357).

Hubbard HF, Coleman BK, Sarwar G, Corsi RL, 2005. Effects of an ozone-generating air purifier on indoor secondary particles in three residential dwellings. *Indoor Air* 15: 432-444.

Mason MA, Sparks LE, Moore SA, Dolgov I, Perry RB, 2000, "Characterization of ozone emissions from air cleaners equipped with ozone generators and sensor and feedback control circuitry." In: *Engineering Solutions to Indoor Air Quality Programs Symposium*, Research Triangle Park, NC. VIP-98, A&WMA, July, 2000, pp. 254-269.

Nazaroff WW, and CJ Weschler, 2004. Cleaning products and air fresheners: Exposure to primary and secondary air pollutants. *Atmos Environ*, 38, 2841-2865.

Niu J, Tung TCW, and Burnett J, 2001a. Ozone emission rate testing and ranking method using environmental chamber. *Atmos Environ* 35: 2143-2151.

Niu JL, Tung TCW, and Burnett J, 2001b. Quantification of dust removal and ozone emission of ionizer air-cleaners by chamber testing. *J. Electrostatics*, 51-52: 20-24.

Persily A, 2000. Measuring Ventilation Performance. In: Spengler JD, Samet JM, McCarthy JF (eds.), *Indoor Air Quality Handbook*, Chapter 52, McGraw Hill, New York, NY.

Siegel JA, 2005. Implications of Portable Ion Generators: Particles and Ozone. Presented at 15th Annual Meeting of the International Society for Exposure Analysis, October 30 – November 3, 2005, Tucson, AZ.

Thomas, T., 2005. Personal communication from Trey Thomas, U.S. Consumer Products Safety Commission, to Peggy Jenkins, ARB.

GLOSSARY

TERM	DEFINITION
Air Changes per Hour, Air Exchange Rate	ACH, AER, the volume of air moved in one hour. One air change per hour in a room, home, or building means that the equivalent of the volume of air in that space will be replaced in one hour, typically with outdoor air.
Air Cleaners	These are devices designed to remove pollutants from a room. Air cleaners can be portable, or part of a central air system. Air cleaners can be mechanical, employing a filter to remove pollutants, or electronic using a small electrical charge to collect particles from air pulled through a device.
Air Fresheners	These devices are promoted to neutralize odors rather than remove pollutants. Products often emit a fragrance which diffuses into the air.
Air Flow Rate	The rate at which air moves into a space. Expressed in units of air changes per hour or cubic feet per minute.
Allergen	A chemical or biological substance (e.g., pollen, animal dander, or house dust mite proteins) that induces an allergic response.
Ambient Air Quality Standard (AAQS)	An acceptable level of air pollution that defines clean air. Standards are designed to protect the public from the harmful effects of traditional pollutants in outdoor air.
Asthma	A chronic disease of lung tissue which involves inflamed airways, breathing difficulty, and an increased sensitivity to allergens and contaminants in the air.
Ozone Generator	An appliance that intentionally emits ozone but is advertised as an "air cleaner" or "air purifier".
Quality Control (QC)	Internal checks on the operation of sample collection and/or sample analysis. Methods for determining the operation include blanks, spiked samples, flow checks, and duplicate samples. QC measures can be used to determine accuracy, bias, and precision of the data reported.
Relative Humidity	The measure of moisture in the atmosphere, expressed as a percent of the maximum moisture the air can hold at a given temperature.
Ventilation	The process of intentionally supplying and removing air by natural or mechanical means to and from any space.

TITLE 17. CALIFORNIA AIR RESOURCES BOARD

NOTICE OF PUBLIC HEARING TO CONSIDER AMENDMENTS TO THE CONTROL MEASURE FOR PERCHLOROETHYLENE DRY CLEANING OPERATIONS

The Air Resources Board (ARB or Board) will conduct a public hearing at the time and place noted below to consider adopting amendments to the existing dry cleaning regulation to further reduce emissions of perchloroethylene (Perc) from dry cleaning operations.

DATE:	May 25, 2006
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. on May 25, 2006, and may continue to 8:30 a.m., May 26, 2006. Please consult the agenda for the meeting, which will be available at least ten days before May 25, 2006, to determine the day on which this item will be considered.

For individuals with sensory disabilities, this document is available in Braille, large print, audiocassette, or computer disk. Please contact ARB's Disability Coordinator at (916) 323-4916 by voice or through the California Relay Services at 711, to place your request for disability services. An interpreter will be available at the public hearing for those who wish to give testimony in Korean. For Korean translation please contact Ms. Linda Keifer at (916) 323-4327 or lkeifer@arb.ca.gov. If you are a person with limited English in a language other than Korean and would like to request interpreter services, please contact ARB's Bilingual Manager at (916) 323-7053.

INFORMATIVE DIGEST OF PROPOSED ACTION AND POLICY STATEMENT OVERVIEW

Sections Affected: Proposed amendments to section 93109, title 17, California Code of Regulations (CCR).

Background: In 1991, ARB identified Perc as a toxic air contaminant (TAC). As required by State law, ARB then evaluated the need to reduce the emissions of Perc. In 1993, the Board found there was a need to reduce Perc emissions and approved a regulation to reduce emissions from Perc dry cleaning operations (title 17, California Code of Regulations, section 93109). In general, control measures are based on the best available control technology (BACT) or a more effective control method in

consideration of cost and risk, among other factors. The regulation sets forth the requirements for Perc dry cleaning equipment, operations and maintenance, recordkeeping, and reporting.

As permitted under State law, in 2002, the South Coast Air Quality Management District (South Coast AQMD) amended its Rule 1421, Control of Perchloroethylene Emissions from Dry Cleaning Systems (Rule 1421). These amendments prohibit new or relocated Perc dry cleaning facilities and will phase out the use of Perc in existing dry cleaning operations by December 1, 2020 within the South Coast AQMD. Rule 1421 required converted machines to be phased out by July 1, 2004. In addition, all existing Perc dry cleaners in the South Coast AQMD are required to use secondary control and comply with Rule 1402, Control of Toxic Air Contaminants from Existing Sources, which limits the lifetime cancer risk from a facility to no more than 25 in a million, by November 1, 2007. Prior to December 1, 2020, if an existing facility chooses to replace its existing machine with a new Perc machine, the facility would need to purchase a secondary control machine and comply with Rule 1401, New Source Review of Toxic Air Contaminants. Rule 1401 limits the lifetime cancer risk from a facility to less than 10 in a million.

In 2003, ARB began a technical evaluation of ARB's existing regulation. As a result of the evaluation, ARB found that more can be done to reduce emissions of Perc from dry cleaning operations. The proposed amendments to the regulation would reduce emissions of Perc from dry cleaning operations by one ton per day throughout California through the use of currently available BACT. This would correspond to a reduction in Perc emissions of approximately 40 percent and would result in a reduction of risk by up to 80 percent.

Description of the Proposed Regulatory Action: The proposed amendments to the regulation are designed to use currently available emission reduction technologies to further reduce the public's exposure to Perc from dry cleaning operations. The amended regulation will impact the type of equipment being used in the Perc dry cleaning industry. The existing regulation prohibits the use of transfer, vented, and self-service machines. The proposed amended regulation will, over time, expand this prohibition to include 1) the use of primary control and converted dry cleaning machines; 2) secondary control dry cleaning machines that have not been certified by the ARB; 3) drying cabinets; and 4) dip tank operations in Perc dry cleaning facilities. Also, new co-residential Perc facilities will be prohibited. Existing co-residential facilities will be required to phase out their use of Perc dry cleaning machines.

Existing Perc facilities will be required to use BACT, which the proposal identifies as an integral secondary control Perc dry cleaning machine, or an alternative non-Perc cleaning system. New Perc facilities will be required to use integral secondary control dry cleaning machines and have a 300 feet buffer zone. Additionally, for dry cleaning operations that use a solvent that contains a TAC other than Perc, the proposed regulation will require facilities to install, operate, and maintain BACT as required by applicable air pollution control or air quality management district (local air district) rules

or regulations. If there is no local air district rule or regulation the facilities will be required to submit to and have approved by the local air district a control method or methods that achieve reductions in the risk associated with the TAC that equal or exceed the reductions for Perc.

In addition, the proposed amended regulation will require all Perc dry cleaning facilities to be equipped with enhanced ventilation systems. Facilities will be given a choice to utilize one of the following: a local ventilation system, a partial vapor barrier room, or a full vapor barrier room. Perc wastewater treatment also requires BACT. Facilities are given the choice to have their wastewater hauled away by a registered hazardous waste transporter, which is regulated in California by a federally authorized State program under the responsibility of the California Department of Toxic Substances Control (DTSC), or treated in a Perc wastewater treatment unit that meets specific requirements.

The proposed amendments to the existing regulation will also require some additional recordkeeping and reporting, and good operating practices. The testing requirements have been amended to be specific to secondary control systems for Perc dry cleaning machines and to clarify the documentation that manufacturers must submit in order to receive ARB certification.

The staff will be presenting these proposed amendments to the Board for consideration. After considering the proposed amendments, the alternatives discussed below, and the public comments, the Board may choose to adopt these amendments or alternative requirements.

Description of Alternatives: The Board may consider alternative approaches to the proposed amendments to the dry cleaning regulation. These alternatives span a range of approaches. The Board could choose to prohibit the use of Perc in new or existing dry cleaning operations by specified dates, either as has been done in the South Coast AQMD rule or through a more effective option. Since one common alternative to the use of Perc involves the release of smog-forming emissions, the Board could also prohibit the use of machines that emit smog-forming emissions as a mitigating action associated with restricting the use of Perc. Non-toxic and non-smog forming alternatives are also available (for example, water-based cleaning and carbon dioxide cleaning). Given these alternatives, the Board could consider requirements related to the use of only non-toxic and non-smog forming emissions by specified dates. The Board could also consider shortening specified dates in the regulation which require certain emission control requirements to be implemented. Finally, the Board could consider specifying risk thresholds above which Perc dry cleaning facilities could not operate, similar to the South Coast AQMD requirements.

COMPARABLE FEDERAL REGULATIONS

The U.S. EPA promulgated technology-based emissions standards to control emissions of Perc from dry cleaning facilities. The current California regulation was granted

federal equivalency on May 21, 1996 (Volume 61, Federal Register, page 25397). Currently, U.S. EPA is accepting comments on a proposed rule to revise standards to limit emissions of Perc from existing and new dry cleaning facilities. Based on the preliminary proposals, staff is confident that the emissions-related requirements of the proposed amended regulation are more stringent than U.S. EPA's proposed rule.

AVAILABILITY OF DOCUMENTS AND AGENCY CONTACT PERSONS

The Board staff has prepared a "Staff Report: Initial Statement of Reasons for the Proposed Amendments to the Control Measure for Perchloroethylene Dry Cleaning Operations" (Staff Report) for the proposed regulatory action, which includes a summary of the potential environmental and economic impacts of the proposal, if any.

Copies of the Staff Report and the full text of the proposed regulatory language may be obtained from the Public Information Office, Air Resources Board, 1001 I Street, Visitors and Environmental Services Center, 1st Floor, Sacramento, California 95814, (916) 322-2990 at least 45 days prior to the May 25, 2006, hearing. In addition, copies of the Executive Summary and the full text of the proposed regulatory language will be available in Korean. The Staff Report is also available on the internet at the website listed below, or by contacting the staff listed below.

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, Robert Krieger, Manager of the Emissions Evaluation Section, at (916) 323-1202 or by email at rkrieger@arb.ca.gov, or Mei Fong, Air Resources Engineer, at (916) 324-2570 or by email at sfong@arb.ca.gov.

Further, the agency representative and designated back-up contact persons to whom nonsubstantive inquiries concerning the proposed administrative action may be directed are Artavia Edwards, Manager, Board Administration & Regulatory Coordination Unit, (916) 322-6070, or Alexa Malik, Regulations Coordinator, (916) 322-4011. The Board has compiled a record for this rulemaking action, which includes all the information upon which the proposal is based. This material is available for inspection upon request to the contact persons.

This notice, the Staff Report, and all subsequent regulatory documents, including the FSOR, when completed, are available on the ARB Internet site for this rulemaking at www.arb.ca.gov/regact/perc06/perc06.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 and in specific detail in the Staff Report.

Pursuant to Government Code sections 11346.5(a)(5) and 11346.5(a)(6), the Executive Officer has determined that the proposed regulatory action will create costs or savings, as explained below, to a state agency or in federal funding to the State, costs or mandate to local agencies 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 Department of Corrections operates ten dry cleaning machines at ten correctional facilities in California. Nine of the ten dry cleaning machines are Perc machines and will likely require enhanced ventilation. Seven of the ten dry cleaning machines are Perc primary machines and will likely need to be replaced. In addition, secondary machines will be required to have sample ports installed. The Department of Corrections can comply with the amendments by either replacing their existing primary machines with secondary machines or with an alternative dry cleaning process. Depending on the alternative chosen and whether the Department of Corrections has already budgeted for changing out the machines, a switch can result in either a net savings or net increase in cost when compared to current Perc dry cleaning.

The proposed regulatory action will not affect federal funding to the State.

The ARB will be preparing an implementation guidance document and assisting the local air districts with implementation and technical issues related to the amended control measure. The development of the guidance document and most of the assistance to the local air districts will be a one-time cost that will be incurred during fiscal year 2006-2007 or 2007-2008. The estimated cost to ARB would be one quarter of a person/year, or approximately $25,000. All implementation costs from this rulemaking action would be absorbed within the existing ARB budget.

The proposed amendments to the regulation will require the local air districts to annually report to ARB the total Perc purchases made by the dry cleaning industry in addition to implementation and enforcement activities. The estimated cost impact for the first fiscal year is between $29,000 and $46,000, and the estimated cost impact for the first three years is between $840,000 and $1,300,000. This estimate is based on local air district assessment of the cost to enforce the proposed amendments. It is anticipated that the local air districts will be able to absorb this additional cost impact within their existing budgets and resources. However, should additional resource be necessary, the local air districts have legal authority under Health and Safety Code Section 40510 and 42311 to levy service charges, fees, or assessments sufficient to fund the requirements of this proposed regulation.

In developing this regulatory proposal, the ARB staff evaluated the potential economic impacts on representative private persons or businesses. The cost impact on the businesses varies depending on how much a facility is already in compliance with the

requirements of the proposed regulation and the decision of the Board. However, the ARB staff has estimated the cost impacts that a representative private person or business would necessarily incur in reasonable compliance with the proposed requirements. The estimated cost impact for a typical dry cleaner includes initial costs ranging from no cost impact (facility is in full compliance) to $23,000 for the incremental cost of a new integrated secondary control machine.

There are about 860 secondary control Perc machines in California outside of the South Coast AQMD. Some of these facilities may already be in compliance with all the requirements of the proposed amendments and, therefore, may not incur additional initial costs. However, most of the facilities will incur an annual cost to arrange for enhanced leak checks and drum concentration checks as specified by the proposed amendments. Assuming that the local air districts already conduct routine inspections of dry cleaning facilities due to the requirements of the existing Dry Cleaning ATCM, the increased time to conduct the new inspections is two person-hours and a cost of about $20 annually.

We estimate an annual ongoing cost savings of about $500 for the typical dry cleaner that purchases a secondary machine. This is calculated from cost savings due to reduced Perc usage, maintenance cost for the secondary control, and cost for the annual leak check. However, for the facilities that opted to use a hydrocarbon dry cleaning process, it is estimated that there would be an annual ongoing cost savings of about $1,100, mostly due to lowered solvent cost.

The proposed amendments to the regulation will have some additional requirements for testing and certification of integral secondary control machines. This will impact machine manufacturers. We estimate that each certification will incur additional costs ranging from $600 to $3,400. This estimate accounts for additional labor, electricity, and gas costs.

The Executive Officer has made an initial determination that the proposed regulatory action will not have a significant statewide adverse economic impact, apart from the impacts described above, directly affecting businesses, including the ability of California businesses to compete with businesses in other states, or on representative private persons.

In accordance with Government Code section 11346.3, the Executive Officer has determined that the proposed regulatory action may have a significant effect on the creation or elimination of jobs within the State of California, the creation of new businesses or elimination of existing businesses within the State of California, or the expansion of businesses currently doing business within the State of California. Some marginal dry cleaning businesses may not have the capital necessary to comply with the amendments, which may result in closure. In order to minimize the economic impact to dry cleaners and minimize the likelihood of facility closures, the proposed amendments to the regulation include a phase-out period which allows dry cleaners, in

most cases, to maximize the remaining useful life of their non-complying dry cleaning machines.

The Executive Officer has also determined, pursuant to title 1, CCR, section 4, that the proposed regulatory action will affect small businesses.

In accordance with Government Code sections 11346.3(c) and 11346.5(a)(11), the Executive Officer has found that the reporting requirements of the regulation which apply to businesses are necessary for the health, safety, and welfare of the people of the State of California.

Before taking final action on the proposed regulatory action, the Board must determine that no reasonable alternative considered by the Board or that has otherwise been identified and brought to the attention of the Board would be more effective in carrying out the purpose for which the action is proposed or would be as effective and less burdensome to affected private persons than the proposed action.

A detailed assessment of the economic impacts of the proposed regulatory action can be found in the Staff Report.

SUBMITTAL OF COMMENTS

The public may present comments relating to this matter orally or in writing at the hearing, and in writing or by e-mail before the hearing. To be considered by the Board, written submissions must be received **no later than 12:00 noon, May 24, 2006**, and addressed to the following:

Postal mail is to be sent to:

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

Electronic submittal : http://www.arb.ca.gov/lispub/comm/bclist.php **no later than 12:00 noon, May 24, 2006**.

Facsimile submissions are to be transmitted to the Clerk of the Board at (916) 322-3928 and received at the ARB **no later than 12:00 noon, May 24, 2006**.

The Board requests but does not require 30 copies of any written submission. Also ARB requests that written, facsimile, and e-mail statements be filed at least ten days prior to the hearing so that ARB staff and Board Members have time to fully consider each comment. The ARB 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 the ARB in Health and Safety Code sections 39600, 39601, 39650, 39655, 39656, 39658, 39659, 39665, and 39666, Health and Safety Code; sections 7412 and 7416, title 42, United States Code. Reference: Health and Safety Code sections 39650, 39655, 39656, 39658, 39659, and 39666, Health and Safety Code; sections 7412 and 7414, title 42, United States Code; Sections 63.320, 63.321, 63.323, and 63.324, title 40, Code of Federal Regulation

HEARING PROCEDURES

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

Following the public hearing, ARB may adopt the regulatory language as originally proposed or with 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 that the regulatory language as modified could result from the proposed regulatory action. In the event that such modifications are made, the full regulatory text, with the modifications clearly indicated, will be made available to the public for written comment at least 15 days before it is adopted.

The public may request a copy of the modified regulatory text from the ARB's Public Information Office, Air Resources Board, 1001 I Street, Visitors and Environmental Services Center, 1st Floor, Sacramento, California 95814, (916) 322-2990.

CALIFORNIA AIR RESOURCES BOARD

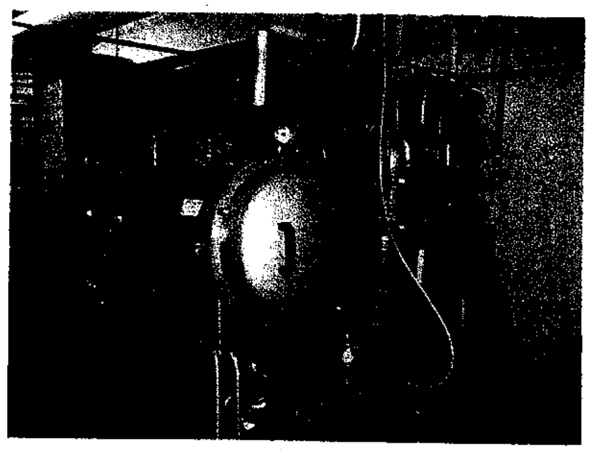
Catherine Witherspoon
Executive Officer

Date: March 28, 2006

California Environmental Protection Agency

AIR RESOURCES BOARD

STAFF REPORT: INITIAL STATEMENT OF REASONS FOR THE PROPOSED AMENDMENTS TO THE CONTROL MEASURE FOR PERCHLOROETHYLENE DRY CLEANING OPERATIONS



Stationary Source Division
Emissions Assessment Branch

Release Date: April 7, 2006

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 CONTROL MEASURE FOR PERCHLOROETHYLENE DRY CLEANING OPERATIONS

To be considered by the Air Resources Board on May 25, 2006 at:

California Environmental Protection Agency
Byron Sher Auditorium
1001 I Street
Sacramento, California

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

State of California
AIR RESOURCES BOARD

PROPOSED AMENDMENTS TO THE CONTROL MEASURE FOR PERCHLOROETHYLENE DRY CLEANING OPERATIONS

Staff Report

Prepared by:

Mei Fong (Lead)
Hafizur R. Chowdhury
Sonia Villalobos
Michele Houghton
Greg Harris
Michelle Komlenic

Reviewed by:

Richard A. Boyd II, Manager, Process Evaluation Section
Robert Krieger, Manager, Emissions Evaluation Section
Daniel E. Donohoue, Chief, Emissions Assessment Branch
Robert D. Barham, Ph.D., Assistant Chief, Stationary Source Division
Robert D. Fletcher, Chief, Stationary Source Division

April 2006

ACKNOWLEDGMENTS

The ARB would like to acknowledge the assistance of the following individuals, agencies, and organizations for their participation and assistance:

Office of Legal Affairs, ARB,	Diane Moritz Johnston
Monitoring and Laboratory Division, ARB	Micheal Orbanosky
Monitoring and Laboratory Division, ARB	Angus Macpherson
Monitoring and Laboratory Division, ARB	David Todd
Research Division, ARB	Reza Mahdavi
Stationary Source Division, ARB	Carolyn Suer
Stationary Source Division, ARB	Susie Chung
Stationary Source Division, ARB	Steven Yee
Office of Environmental Health Hazard Assessment	Dr. James Collins
Department of Health Services	Dr. Julia Quint
Sanitation District of Los Angeles County	Ann Heil
Institute for Research and Technical Assistance	Dr. Katy Wolf
California Cleaners Association	Sandra Giarde
Blackburn's Consulting & Training	Bob Blackburn
Halogenated Solvents Industry Alliance	Stephen P. Risotto
Urban & Environmental Policy Institute	Peter Sinsheimer
GreenEarth® Cleaning	James E. Douglas
ExxonMobil Chemical	Arlean Medeiros
Kelleher Equipment Supply, Inc.	Kelly Kelleher Casares

The ARB staff would also like to extend their gratitude to the numerous dry cleaners that provided ARB staff with dry cleaning information, participated in meetings, and demonstrated dry cleaning operations to ARB staff.

ARB staff would also like to recognize all of the local air quality and air management districts (air districts) and would especially like to thank the following air districts for their assistance during the regulatory process.

Bay Area Air Quality Management District
Mojave Desert Air Quality Management District
Santa Barbara County Air Pollution Control District
South Coast Air Quality Management District
Sacramento Metropolitan Air Quality Management District
The California Air Pollution Control Officers Association Enforcement Managers Committee
The California Air Pollution Control Officers Association Air Toxics and Risk Managers Committee

STAFF REPORT: INITIAL STATEMENT OF REASONS FOR THE PROPOSED AMENDMENTS TO THE CONTROL MEASURE FOR PERCHLOROETHYLENE DRY CLEANING OPERATIONS

TABLE OF CONTENTS

APPENDICES

Appendix A:	Proposed Amended Regulation Order: Airborne Toxic Control Measure for Emissions of Perchloroethylene From Dry Cleaning Operations
Appendix B:	Health Risk Assessment Methodology for Dry Cleaning Operations
Appendix C:	Summary of the Differences Between the Current and Proposed Revised ATCM
Appendix D:	List of Toxic Air Contaminants in California
Appendix E:	Glossary of Definitions, Selected Terms, and Acronyms

LIST OF TABLES

LIST OF FIGURES

State of California
AIR RESOURCES BOARD

Staff Report: Initial Statement of Reasons for the Proposed Amendments to the Control Measure for Perchloroethylene Dry Cleaning Operations

Executive Summary

I. INTRODUCTION

This Executive Summary presents the Air Resources Board (ARB or Board) staff's Proposed Amendments to the Airborne Toxic Control Measure for Emissions of Perchloroethylene (Perc) from Dry Cleaning Operations (Dry Cleaning ATCM). The proposed amendments are designed to further protect public health by reducing Perc emissions from dry cleaning operations in California. The staff will be presenting these proposed amendments to the Board for consideration on May 25, 2006. After considering the proposed amendments, the alternatives discussed below, and the public comments, the Board may choose to adopt these amendments or alternative requirements.

In 1991, the Board identified Perc as a toxic air contaminant (TAC) under California's Toxic Air Contaminant Identification and Control Program (Health and Safety Code (HSC) section 39650 *et. seq.*). In that process, the Board found that no threshold exposure level could be identified below which adverse health effects would not be expected. As a result of its identification, HSC section 39665(a) requires ARB to prepare a report on the need to control Perc and adopt appropriate measures. On October 14, 1993, the Board adopted the Dry Cleaning ATCM. This regulation is codified in title 17 of the California Code of Regulations, section 93109. The Dry Cleaning ATCM sets forth the equipment, operations and maintenance, recordkeeping, and reporting requirements for dry cleaning operations.

In 2003, staff performed an evaluation of the effectiveness of the Dry Cleaning ATCM. The evaluation found that, as a result of the Dry Cleaning ATCM, Perc emissions from dry cleaning operations have been reduced by about 70 percent. However, the evaluation also showed that there are residual health risks associated with Perc emissions from dry cleaning operations, the best available control technology (BACT) for Perc dry cleaning operations has improved, more effective ventilation systems exist, and alternative technologies are available and viable.

As a result of this evaluation, staff is proposing amendments to the Dry Cleaning ATCM. The proposed amendments are designed to further protect public health by requiring a 300 foot separation between new Perc facilities and a sensitive receptor, phasing out the use of Perc in co-residential facilities, phasing out the use of the more emissive Perc technologies in existing facilities, restricting the substitution of other TACs, and requiring enhanced ventilation for new and existing facilities that use Perc.

The proposed amendments are not expected to impact Perc dry cleaners in the South Coast Air Quality Management District (South Coast AQMD). In 2002, the South Coast AQMD amended Rule 1421, Control of Perchloroethylene Emissions from Dry Cleaning Systems (Rule 1421), to prohibit new Perc dry cleaning facilities and to completely phase out the use of Perc for dry cleaning by December 1, 2020. However, if the Board adopts alternatives to the proposed amendments, those amendments could impact dry cleaners in the South Coast AQMD.

Presented below is a summary which briefly describes the proposed amendments to the Dry Cleaning ATCM, provides an overview of the dry cleaning industry and technologies, presents emissions and risk from dry cleaning operations, and discusses the potential impacts from implementation of the proposed amendments. For simplicity, the discussion below is presented in question and answer format using commonly asked questions about the proposed amendments to the Dry Cleaning ATCM. This summary provides only a brief discussion on the topics. The reader is directed to subsequent chapters in the main body of the report for more detailed information.

II. SUMMARY OF PROPOSED ATCM

1. <u>What would the proposed amended Dry Cleaning ATCM require</u>?

The proposed amended Dry Cleaning ATCM has specific requirements depending on whether the facility is existing or new. A summary of the major requirements of the proposed amendments is shown in Table ES-1. For existing co-residential facilities (facilities that share a wall with, or are located in the same building as, a residence), the proposed amendments require that Perc machines be phased out of operation by July 1, 2010. For all other existing facilities, the proposed amendments require that the more emissive Perc technologies (i.e., converted, primary, and add-on secondary machines) be replaced with integral secondary machines. The phase out of these machines is to begin July 1, 2009, for all machines that are 15 years old or older (manufactured in 1994 or earlier). For each subsequent year, Perc machines must be replaced with an integral secondary machine (or non-Perc alternative) as they become 15 years old. However, if the Perc facility is within 100 feet (30 meters) of a sensitive receptor, the Perc machine must be replaced with an integral secondary machine (or non-Perc alternative) when it is 10 years old or by July 1, 2010, whichever is later. By July 1, 2016, only integral secondary Perc machines will be allowed. In addition, existing facilities are required to install one of three types of enhanced ventilation systems. These enhanced ventilation systems include a local ventilation system, a partial vapor barrier room, or a full vapor barrier room. The compliance date for enhanced ventilation installation is July 1, 2009, if the facility is within 100 feet from a sensitive receptor. If the facility is 100 feet or greater from a sensitive receptor, the compliance date for enhanced ventilation is July 1, 2010.

Table ES-1. Summary of Major Requirements of the Proposed Amendments

Applicability	Facility Type	Requirements
Applies to any person who owns, operates, manufactures or distributes dry cleaning equipment in California that uses Perc or any other dry cleaning solvent that contains a TAC.	**Co-residential Facility** (Any facility that shares a wall with a residence or is located within the same building.)	No co-residential facility shall install any dry cleaning equipment which uses Perc. Perc machines will need to be phased out by July 1, 2010.
	Existing Facility (Any facility that operated Perc dry cleaning equipment prior to July 1, 2007.)	Converted, primary and add-on secondary Perc machines: • If the facility is 100 feet or more from a sensitive receptor - Replace with integral secondary control machines (or non-Perc alternative) by July 1, 2010, or when the machine is 15 years old, whichever is later; • If the facility is within 100 feet of a sensitive receptor - Replace with integral secondary control machines (or non-Perc alternative) by July 1, 2009, or when the machine is 10 years old, whichever is later; • Complete phase out of all converted, primary, and add-on secondary machines by July 1, 2016. Installation of enhanced ventilation according to the following schedule: - By July 1, 2009, if the facility is within 100 feet from a sensitive receptor. - By July 1, 2010, if the facility is 100 feet or greater from a sensitive receptor.
	New Facility (A facility that did not operate any dry cleaning equipment using Perc or any solvent that contains a TAC prior to July 1, 2007. Facility relocations shall be considered new facilities.)	Use of BACT for Perc operations - integral secondary control machine and enhanced ventilation. Must be at least 300 feet from a sensitive receptor, and must be outside of and at least 300 feet from the boundary of a residential zone. Facilities that use a solvent that contains a TAC other than Perc will need to install, operate and maintain BACT as required by applicable local air district rules or regulations or achieve reductions in risks associated with the TAC's usage that equals or exceeds the reductions for Perc if there is no local air district rule or regulation.

For new co-residential facilities, the proposed amendments prohibit the use of Perc. For all other new Perc facilities, the proposed amendments will require the use of best available control technology (BACT). For new Perc facilities, BACT is proposed to be an integral secondary control machine that operates with an enhanced ventilation system. New Perc facilities also need to have a 300-foot separation zone (see Table ES-1). Facilities that use a solvent that contains a TAC other than Perc will need to install, operate, and maintain BACT as required by applicable local air district rules or regulations. In the absence of a local air district rule or regulation, the facility will need to submit and have approved by the district a control method or methods that achieve reductions in risk equal to or exceeding the reductions that would be required for a Perc facility under the proposed ATCM. Good operating practices and recordkeeping and reporting requirements are included for both new and existing facilities.

III. OVERVIEW OF THE DRY CLEANING INDUSTRY

Typically, dry cleaners are considered small businesses and most employ fewer than five employees. More than 50 percent employ two or less as full-time employees. Dry cleaners are typically located in shopping centers. Perc is the solvent most widely used by the dry cleaning industry in California. The 2003 ARB survey results indicate that there are about 5,000 dry cleaning facilities in the State and about 4,300 of them use Perc as the solvent and about two percent are co-residential facilities. More than 95 percent of the cleaning facilities have only one dry cleaning machine. About 40 percent of the Perc machines will be 15 years old or older (manufactured on or before 1994) in 2009. The remaining 60 percent are less than 15 years old.

1. <u>What types of dry cleaning technologies are used</u>?

Over 85 percent of dry cleaning facilities use Perc as the cleaning solvent. There are three types of Perc dry cleaning machines in use: machines converted from vented to closed-loop (converted), closed-loop machines with primary control (primary control), and secondary control machines. Secondary control machines are separated into primary machines that added on secondary controls (add-on secondary control) and closed-loop machines with integral primary and secondary controls (secondary control or integral secondary control). In this proposal, BACT is an integral secondary control machine with enhanced ventilation for both new and existing facilities.

The second most common solvents in use are high flash point synthetic hydrocarbon solvents manufactured by ExxonMobil (DF-2000™ Fluid) and by Chevron (EcoSolv® Fluid). Other hydrocarbon solvents being used include: PureDry® (PureDry), Shell Sol 140 HT (Shell 140), and Stoddard Solvent (Stoddard). The most advanced hydrocarbon machines may use any of the hydrocarbon solvents mentioned. ARB staff estimated that about 400 dry cleaners in California are currently using hydrocarbon solvents. All hydrocarbon solvents are classified as volatile organic compounds (VOCs).

In addition to hydrocarbon solvents, dry cleaners are also using other technologies such as decamethylcyclopentasiloxane (D_5), Rynex™(Rynex 3), Carbon Dioxide Cleaning (CO_2), Professional Wet Cleaning (wet cleaning), and Green Jet® (Green Jet). Volatile methyl siloxane or D_5 is an odorless, colorless liquid. It is present in the GreenEarth® (GreenEarth) dry cleaning solvent. GreenEarth solvent is mostly used in hydrocarbon machines and is not classified as a VOC. The Office of Environmental Health Hazard Assessment (OEHHA) is currently evaluating the toxicity testing data submitted by GreenEarth. Rynex 3 is a mixture of substituted aliphatic glycol ethers with limited toxicity data. It is also classified as a VOC.

Wet cleaning, an alternative to dry cleaning that was first introduced in 1991, differs from commercial laundering in several aspects. Wet cleaning uses computer-controlled washers and dryers with detergents that have been specially formulated for the process. Finishing equipment includes pressing and tensioning units. The tensioning units are used to touch-up, stretch, reform, and finish the garments. Wet cleaning systems use non-toxic, biodegradable detergents, which are approved for disposal into the sewer.

Cleaning with CO_2 is a process that operates within a pressurized, and therefore relatively costly, machine. The CO_2 used in this process is an industrial by-product from existing operations, primarily anhydrous ammonia (fertilizer) production. There is no net increase in the amount of CO_2 emitted; therefore, this process does not contribute to global warming.

Finally, the Green Jet machine cleans and dries garments in a single computer-controlled unit using a mist of water and detergent to clean the garments. The process is more suitable for lightly-soiled garments. Table ES-2 shows the number of facilities that are using Perc and alternative technologies based on ARB's 2003 facility survey. Table ES-3 shows an updated number of facilities that are using non-toxic and non-smog forming technologies.

Table ES-2. Number of Dry Cleaning Facilities Statewide and Existing Technologies

Statewide Facility Estimates	**Number of Facilities**[1]	**Percent (%)**[2]
Dry cleaning facilities	5,040	n/a
Perc dry cleaning facilities	4,290	85
Mixed facilities (Perc + Alternative)	190	4
Non-Perc facilities	550	11
DF-2000 (hydrocarbon)	400	8
GreenEarth	90	2
Others (PureDry, Rynex 3, Stoddard, and other high flash point hydrocarbon solvent)	60	1

1. Values are generally rounded to the nearest 10 and are based on 2003 Facility Survey.
2. Values are generally rounded to the nearest integer.

Table ES-3. Number of Dry Cleaning Facilities Statewide Using Non-Toxic and Non-Smog Forming Technologies

Non-Toxic and Non-Smog Forming Facilities[1]	Number of Facilities[1]	Percent (%)[2]
Water-based Cleaning including Professional Wet Cleaning	49	~1
Professional Wet Cleaning Demonstration Facilities	20	<1
CO_2 Cleaning	5	<1

1. Based on 2006 information. Professional wet cleaning demonstration facilities may also be included in water-based cleaning.

Since the Rule 1421 amendments and district grant program have been in effect in the South Coast AQMD, there were about 80 percent new hydrocarbon machines, about 10 percent new GreenEarth machines, and about 10 percent wet or CO_2 cleaning installed in the South Coast. Most of the wet and CO_2 cleaning facilities received grants.

2. How effective are the current dry cleaning technologies?

The overall cleaning ability of a process depends on soil chemistry, textile fabric type, transport medium (aqueous vs. non-aqueous), chemistry of the additives (detergents and surfactants), the use of spotting agents, and process considerations (e.g., time, temperature, and mechanical actions). Most of the dry cleaning technologies can handle delicate garments and clean oil-based and water-soluble stains. Table ES-4 provides a comparison of cleaning performance for the various dry cleaning solvents.

Table ES-4. Summary of Cleaning Performance of Dry Cleaning Solvents

Solvent	Cleaning Performance
Perc	Aggressive, oil-based stains, most water-based stains, silks, wools, rayons. Not good for delicates.
Stoddard	Less aggressive than Perc for oil-based stains. Can handle delicate garments.
PureDry	Less aggressive than Perc for oil-based stains. Can handle delicate garments.
Shell 140	Less aggressive than Perc for oil-based stains. Can handle delicate garments.
EcoSolv	Less aggressive than Perc for oil-based stains. Can handle delicate garments.
DF-2000	Less aggressive than Perc for oil-based stains. Can handle delicate garments
Green Jet (DWX-44 detergent)	Less aggressive than Perc. More effective in cleaning sugar, salt, perspiration stains. Good for delicates. Not good for heavily-soiled garments.
Rynex 3	Aggressive, cleans water-soluble and oil-based stains.
GreenEarth	Less aggressive than Perc for oil-based stains. Good for water-based stains, delicates.
CO_2	Good for all stains and most fabrics. Very effective in removing oils, greases, sweats.
Wet cleaning	Aggressive, good for both oil and water-based stains. Can handle delicate garments. Requires tensioning equipment and training for successful operation.

3. What types of ventilation control technologies are available?

The type of ventilation system used in a dry cleaning facility has a significant impact on the concentration of Perc emissions in the area near the facility. Most dry cleaning facilities use natural ventilation, window fans, or general ventilation. Natural ventilation relies on an open door and window for air circulation. Other facilities use window fans or general ventilation with large capacity fans on the roof of the facility to vent fugitive emissions.

Enhanced ventilation systems provide for better capture and dispersion of the Perc emissions, reducing the nearby outdoor concentrations. Three enhanced ventilation types have been used in the industry that are more effective in capturing fugitive emissions, at rates between 70 to 99 percent, and are required by the proposed amendments. The ventilation systems include local ventilation systems, partial vapor barrier rooms, and full vapor barrier rooms. A local ventilation system is one that uses a high capacity fan and exhaust apparatus, such as a fume hood, to vent fugitive emissions. A partial vapor barrier room is a room that encloses the back of the dry cleaning machine and has a high capacity fan to draw fugitive vapors through a stack for release outside. A full vapor barrier room is a room that completely surrounds a dry cleaning machine and is constructed of material resistant to diffusion of solvent vapors. A high capacity fan collects virtually all of the fugitive emissions and vents them through a stack above the building.

IV. POTENTIAL EMISSIONS AND RISK

1. How much Perc is being emitted by dry cleaning machines?

The amount of Perc being emitted by a typical dry cleaning facility differs depending on machine type. An average dry cleaner cleans about 47,000 pounds of material per year. Based on this, ARB staff estimates that a typical converted dry cleaning machine emits about 1,100 pounds of Perc in one year. Similarly, a typical primary machine emits about 800 pounds of Perc in one year and a typical secondary machine emits about 400 pounds of Perc in one year. Statewide, the dry cleaning industry uses 378,000 gallons and emits 222,000 gallons or about 3 million pounds of Perc per year. Dry cleaners use a majority of the Perc in California. Based on an estimate from the Perc manufacturers, about 80 percent of the Perc sold in California is used for dry cleaning operations.

2. What are the potential health effects associated with exposure to Perc?

Exposure to Perc may result in both cancer and noncancer (acute and chronic) health effects. The primary route of human exposure for these compounds is inhalation. In 1991, OEHHA performed an extensive assessment of the potential health effects of Perc. Reviewing available health effects data, OEHHA concluded that Perc is a potential human carcinogen with no identifiable threshold below which no carcinogenic effects are likely to occur. In 1998, the State of California, under Proposition 65, listed

Perc as a carcinogen. There are noncancer health effects from exposure to Perc that include headache, dizziness, rapid heartbeat, and liver and kidney damage.

In 1990, the U.S. Congress listed Perc as a hazardous air pollutant (HAP) in subsection (b) of section 112 of the Federal Clean Air Act. The U.S. EPA has classified Perc in Group B2/C, as a probable human carcinogen. The International Agency for Research on Cancer (IARC) has classified Perc in Group 2A, as a probable human carcinogen.

3. <u>What are the potential health impacts to individuals from existing PERC dry cleaning operations</u>?

To assess potential health impacts at existing dry cleaning operations, ARB staff conducted a health risk assessment using the methodology outlined in *The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments, August 2003* (OEHHA Guidelines). In conjunction with the OEHHA Guidelines, staff also followed the ARB's *Recommended Interim Risk Management Policy for Inhalation-Based Residential Cancer Risk* (ARB Interim Risk Management Policy). This policy was developed in consultation with OEHHA.

Table ES-5 provides estimates of the potential cancer risk for a resident living at 20, 30, or 100 meters from a Perc dry cleaning facility. Risk estimates are presented for converted machines and primary control machines with general ventilation and for secondary control machines with enhanced ventilation. Staff assumed an emission rate that would include 90 percent of all dry cleaners. The potential cancer risk levels for converted and primary machines are what we would expect for source complying with the current ATCM. The potential cancer risk level for secondary machines with enhanced ventilation are what we would expect for a source complying with the proposed ATCM.

Table ES-5. Potential Cancer Risk for High Perc Use Dry Cleaning Facilities[1]

Distance [meters (feet)][2]	Range of Potential Cancer Risk (chances per million)		
	Converted Machine with General Ventilation	Primary Control Machine with General Ventilation	Secondary Control Machine with Enhanced Ventilation
20 (66)	75	60	23
30 (100)	45	40	15
100 (330)	8	6	3

1. Assuming 90th percentile Perc usage and emissions (Perc emissions rates of 113 gallons per year for converted, 94 gallons per year for primary, and 61 gallons per year for secondary machines). The table includes results from three meteorological data sets (Fresno, Oakland (port), and San Diego (Miramar)). Results are for the inhalation pathway. Calculations assume a 70-year exposure duration and use the 80th percentile daily breathing rate. Enhanced ventilation is defined as a local ventilation system, a partial vapor barrier room, or a full vapor barrier room. All results are rounded.
2. Distances are presented from the building edge.

Table ES-6 provides an estimate of the percentage of facilities that have residents located within 20, 30, or 100 meters from the facility. As can be seen in the table, about 22 percent of the machines are at facilities that have a residence within 20 meters of the facility, 36 percent of machines are at facilities that have a residence within 30 meters, and 66 percent of all machines are at facilities that are within 100 meters of a residence.

Table ES-6. Percent of Perc Machines at Various Distances from Residences

Distance [meters (feet)]	Percent of Machines
< 20m (66ft)	22%
< 30m (100ft)	36%
<100m (330ft)	66%

Combining the information provided in Tables ES-5 and ES-6, shows that after implementation of the proposed amended ATCM, about 22 percent of the facilities would have potential cancer risks in the 20 to 25 in a million range, 14 percent of the facilities would have potential cancer risks in the 15 to 25 in a million range, and 30 percent of the facilities would have potential cancer risks of 5 to 15 in million range, and 34 percent of the facilities would have cancer risks of 5 in a million or less.

V. IMPACTS OF THE PROPOSED AMENDMENTS

1. <u>What are the environmental impacts of the proposed Dry Cleaning ATCM?</u>

The proposed amendments will significantly reduce Perc emissions from dry cleaning operations. The ARB staff estimates that, with full implementation of the proposed amended Dry Cleaning ATCM, Perc emissions from facilities will be reduced on average by about 40 percent or about 1 ton per day.

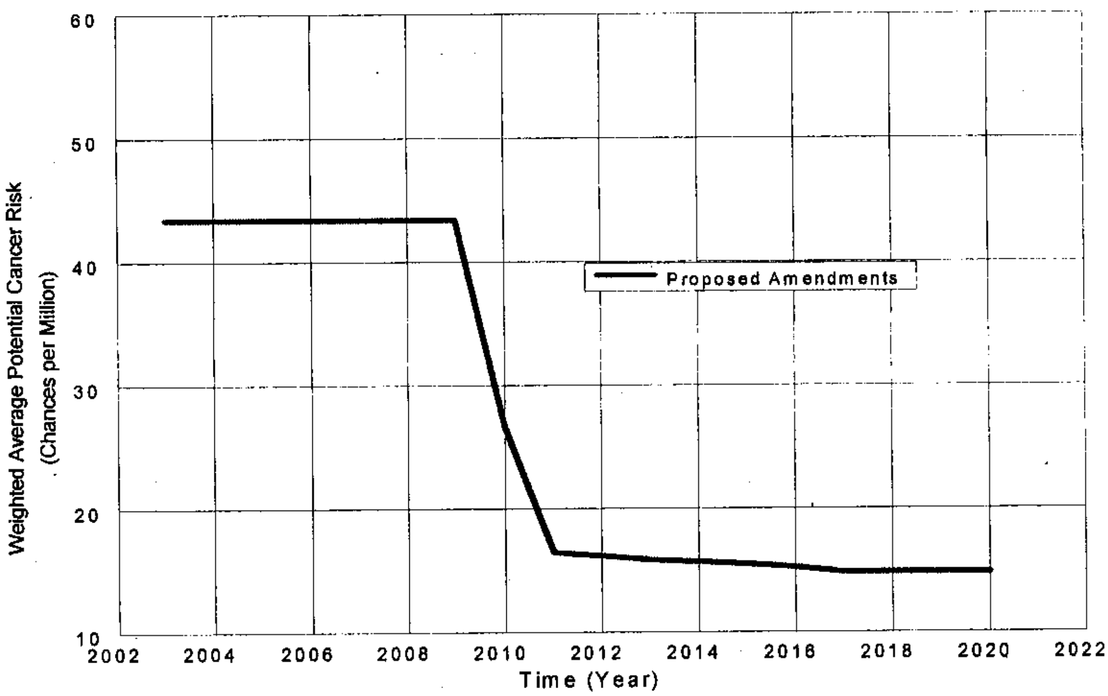
The proposed amendments also restrict the substitution of other dry cleaning solvents that contain a TAC. In addition to the Perc emission reductions, the amount of hazardous waste produced and the potential for soil and water contamination will also be reduced. It is estimated that, with full implementation, there will likely be an increase in VOCs due to the increase in use of hydrocarbon solvents. In order to comply with the proposed ATCM, the only situation where Perc cannot be used is in co-residential facilities. If only co-residential facilities switch to hydrocarbon as a result of the proposed ATCM, an increase in hydrocarbon emissions of about 0.02 tons per day (40 pounds per day) would occur.

2. What are the potential health impacts to individuals after implementation of the proposed amended Dry Cleaning ATCM?

The proposed amended Dry Cleaning ATCM will require a 300 foot separation between new Perc facilities and a sensitive receptor, phase-out the older Perc technologies, require the installation of enhanced ventilation for all Perc facilities, and phase-out the use of Perc in co-residential facilities. Figure ES-1 shows the current and projected average potential cancer risk after implementation of the proposed amended Dry Cleaning ATCM for facilities that use Perc in California. The figure uses potential risk results for a receptor at 20 meters.

Risk levels near facilities using conventional machines will be reduced by 70 percent. For facilities using primary machines risk levels will be reduced by 62 percent. For facilities using integral secondary control machines with enhanced ventilation emissions will be reduced by approximately 50 percent. Risk levels near co-residential facilities will be reduced by 100 percent. As shown in Figure ES-1, the overall weighted average risk reduction is expected to be about 65 percent.

Figure ES-1. Potential Cancer Risk at Perc Dry Cleaners Subject to the Proposed Amended ATCM[1]



1. Figure is based on potential risk estimates at 20 meters.

Staff looked at the impact of the proposed amendments on statewide exposure to Perc outside of the South Coast AQMD because South Coast AQMD is applying its own measure to prohibit Perc use in dry cleaning. On a regional basis, the proposed ATCM would reduce dry cleaning Perc emissions by about 40 percent. Based on recent monitoring data (2004), the average population weighted cancer risk from exposure to

Perc is estimated between 1 and 2 chances per million. When this reduction is added to the other Perc control actions adopted by the Board, an overall reduction of Perc emissions from the 2004 levels of approximately 66 percent is expected. After full implementation of the proposed Perc ATCM and with other Perc measures in place, the average potential cancer risk from exposure to ambient Perc is expected to drop below 1 chance per million.

3. How does the proposed amended Dry Cleaning ATCM impact the dry cleaners in the South Coast Air Quality Management District?

The proposed amendments, unless modified by the Board, are not expected to impact the dry cleaners in the South Coast Air Quality Management District (South Coast AQMD). In 2002, the South Coast AQMD amended Rule 1421, Control of Perchloroethylene Emissions from Dry Cleaning Systems (Rule 1421). These amendments prohibit new Perc dry cleaning facilities and phase out the use of Perc in existing dry cleaning operations by December 1, 2020. Rule 1421 required converted machines to be phased out by July 1, 2004. In addition, all existing Perc dry cleaners in the South Coast AQMD are required to use secondary control and comply with the South Coast AQMD Rule 1402, Control of Toxic Air Contaminants from Existing Sources, which limits the lifetime cancer risk from a facility to no more than 25 in a million, by November 1, 2007.

4. What are the potential health impacts to individuals from Perc alternatives?

The proposed amendments are expected to result in increased usage of alternative technologies and solvents. No adverse emission-related health impacts are expected with the use of wet cleaning or CO_2. However, there is relatively little health data available on some of the other alternatives to Perc and no California health values have been adopted. Based on a literature review, OEHHA has estimated several interim chronic noncancer reference exposure levels (RELs) and is continuing to follow the peer-reviewed literature on toxicity studies for the alternative solvents. The interim health values are not expected to result in adverse chronic noncancer impacts from the use of the alternatives. Currently, there are no cancer potency factors for Perc alternatives. However, the regulation addresses the use of TACs as Perc alternatives.

The most popular Perc alternative is a high flash point hydrocarbon solvent. A significant issue associated with increased usage of hydrocarbon solvents is increased VOC emissions. VOC emissions contribute to the formation of ozone. Ozone is linked to adverse health effects including respiratory irritation, asthma, and premature death.

5. What are the estimated economic impacts of the proposed amendments?

The ARB staff estimates the statewide cost for compliance with the proposed amendments to be approximately 16 million dollars over 15 years. This corresponds to an annualized cost (in 2005 dollars) of 1.6 million dollars per year from 2007 through 2021. This corresponds to an annual cost of about $680 per year over 15 years for the

2,300 affected facilities. The statewide costs are based on 2005 dollars and represent the capital cost of new equipment, good operating practices, and Perc savings from 2007 through 2021.

The cost for a typical business to comply with the proposed amendments varies depending on the facility type, machine age, distance to sensitive receptors and the extent that the facility is already in compliance with the proposed amendments. The total annual net cost over a 15-year period ranges from $380 to $2,420.

Cost-effectiveness is expressed in terms of control costs (dollars) per unit of Perc reduced (pounds). The cost-effectiveness for the proposed amendments is determined by dividing the total capital costs plus the annual recurring costs by the total pounds of Perc reduced during years 2007 to 2021. All costs are in 2005 equivalent expenditure dollars. Therefore, by dividing the annualized cost of 1.6 million dollars by the reduction in Perc of approximately 0.6 million pounds per year, staff estimates the overall cost-effectiveness of the proposed amendments to be about $2.60 per pound of Perc reduced.

6. <u>Are these economic impacts considered to be significant to individual dry cleaners?</u>

To look at the impact of the proposed ATCM on dry cleaning profits, staff used the change in the return on owner's equity (ROE). A decline in ROE of 10 percent or more is considered to indicate a significant adverse impact. Depending on the extent that a facility is already in compliance with the proposed amendments and the facility type, the proposed amended Dry Cleaning ATCM is expected to result in a decline of ROE ranging from 7 to 35 percent. For example, for a facility that already operates an integral secondary machine and only needs to add enhanced ventilation, the ROE is estimated to decline from 7 to 10 percent. A facility that must replace their dry cleaning machine with an integral secondary machine and enhanced ventilation (at the end of its useful life) is estimated to experience an ROE decline ranging from 10 to 35 percent. A facility that replaces Perc with other hydrocarbon technologies is estimated to experience an ROE decline ranging from 22 to 35 percent. This range of decline in ROE assumes no change in total sales and that the owner does not increase the cost they charge for cleaning to cover their costs. Based on this information, staff believes that the proposed amendments could have a significant adverse impact on the profitability of operators of dry cleaning businesses that are currently operating on marginal profitability if they are not able to pass their costs on to their customers.

For those facilities that replace their existing machine with a secondary machine when the existing machine is 15 years old, we estimate that the typical owner would have to charge an additional $0.65 (65 cents) per garment to recover the cost of the new secondary machines and enhance ventilation system within 5 years. For the same situation, except assuming the existing machine needs to be replaced when it is 10 years old, the additional charge per garment would be around $75 (75 cents). The owners of co-residential facilities would have to increase their cost per garment by about $0.90 (90 cents). The ability to pass on these costs would be dependent on local competition for dry cleaning services. If there is a relatively high density of dry cleaners in one area, and all of them do not have to upgrade their equipment, then the ability to recover cost may be constrained.

7. Is there financial assistance for dry cleaners who would like to replace their Perc dry cleaning systems?

The California State Legislature enacted Assembly Bill (AB) 998, which established the Non-Toxic Dry Cleaning Incentive Program. The Non-Toxic Dry Cleaning Incentive Program is composed of a grant program and a demonstration program. The objective of the grant program is to provide financial assistance ($10,000) to California dry cleaners who pay for a portion of the cost to replace their existing Perc dry cleaning systems with non-toxic and non-smog forming systems such as water-based (i.e., professional wet cleaning, Green Jet®, and cold water cleaning) and carbon dioxide (CO_2) cleaning systems. Another objective of this program is to provide 50 percent matching funds to cover the costs of a demonstration program to showcase professional non-toxic and non-smog forming dry cleaning technologies in the State.

The grant program for the dry cleaning industry began in April 2005. To date, ARB has awarded 14 grants to eligible dry cleaning recipients which total $140,000 in grant awards. The grant guidelines and application package are made available to all dry cleaners annually. Staff anticipates being able to fund approximately 20 grants per year.

VI. REGULATORY ALTERNATIVES

After considering the proposed amendments, the alternatives discussed below, and the public comments, the Board may choose to adopt the proposed amendments or alternative requirements or any combination thereof. Possible alternative approaches are discussed below.

1. Take No Action

This alternative would be to take no action to amend the Dry Cleaning ATCM. This alternative would continue the current situation where the public would continue to be exposed to current levels of Perc emissions.

2. Prohibit Use of Perc in Dry Cleaning Operations

This alternative would prohibit Perc use in dry cleaning by a specific date, either as has been done in the South Coast AQMD rule or through a more effective option. This approach would virtually eliminate the potential cancer risk from Perc dry cleaning. However, the alternative would likely result in significant increases in hydrocarbon emissions. Staff estimated that this approach would result in a more than doubling in the cost of the regulation. We estimate that the cost to clean a garment for a typical facility would have to increase by about $0.90 (90 cents) to recover the compliance cost.

3. Prohibit Use of Machines that Emit Toxic and Smog-forming Emissions

This alternative would prohibit Perc uses by a specific date as in Alternative 2 and also prohibit the use of machines that emit smog-forming emissions. Non-toxic and non-smog forming alternatives that are available include water-based cleaning and carbon dioxide cleaning. The cost impact of this alternative would be somewhat greater than Alternative 2 – more than seven times the proposed ATCM. We estimate that the cost to clean a garment for a typical facility would have to increase by an average of $1.40 to recover the compliance costs.

4. Shorten the Dates for Compliance with Amendment Requirements

This alternative would shorten the time frames in the regulation which require certain emission control requirements to be in place by specified dates. Shortening the time frames in the regulation would increase the cost of compliance. The amount of the increase would depend on what requirement is adjusted and how significant the change is in the compliance date. The main cost impacts beyond the proposed ATCM would be associated with the loss of residual value in existing machines due to accelerated replacement with integral secondary machines.

5. Use a Risk-Based Threshold Requirement to Achieve Emission Reductions

This alternative would establish risk-based thresholds that Perc dry cleaning facilities would have to meet. This could be similar to the South Coast AQMD requirements in Rule 1401 and 1402 that apply to dry cleaning facilities. This approach is administratively more challenging than the proposed ATCM. It would also require additional costs for facilities and the local air districts to implement this regulation.

VII. PUBLIC OUTREACH AND ENVIRONMENTAL JUSTICE

1. What actions did ARB staff take to ensure that the public and affected parties participated in the rulemaking process?

A public process that involves all parties affected by the proposed ATCM is an important component of the ARB actions. As part of ARB's outreach program, staff made extensive personal contacts with industry representatives, state and local regulatory agencies, environmental/pollution prevention and public health advocates, and other interested parties through site visits, meetings, telephone calls, and electronic mail. Staff developed a workgroup consisting of industry and environmental group representatives. Staff visited over 100 dry cleaning facilities, held 12 workgroup meetings, attended two evening meetings with the Northern California Korean Dry Cleaners-Laundry Association, and conducted four public workshops.

Staff made special efforts to have key materials translated into Korean and to have translator services available at the workshops. The materials translated included the proposed regulation, this Executive Summary, and the Hearing Notice. Additionally, to further increase the general public's participation in this assessment, staff made information available via ARB's website (*www.arb.ca.gov/toxics/dryclean/dryclean.htm*).

2. <u>How does the proposed amended Dry Cleaning ATCM relate to ARB's goals on Environmental Justice</u>?

ARB is committed to evaluating community impacts of proposed regulations including environmental justice concerns. Given that some communities experience higher exposure to toxic pollutants, it is a priority of ARB to ensure that full protection is afforded to all Californians. The proposed amended Dry Cleaning ATCM is not expected to result in significant negative impacts in any community. The proposed amended Dry Cleaning ATCM is designed to further reduce emissions of TACs, such as Perc, to residents and off-site workers living or working in communities near the affected facilities.

VIII. RECOMMENDATION

We recommend the Board approve the proposed amended Dry Cleaning ATCM presented in this report (Appendix A). The proposed amended Dry Cleaning ATCM will reduce Perc emissions by requiring a 300 foot separation between new Perc facilities and a sensitive receptor, phasing out Perc operations in co-residential facilities, requiring the use of BACT (integral secondary control machines with enhanced ventilation for existing and new facilities), and requiring siting criteria for new facilities. The proposed amended regulation will provide air quality benefits for all Californians, particularly those living near dry cleaning facilities. ARB staff believes the proposed amended regulation is technologically feasible and necessary to carry out the Board's responsibilities under State law.

I. INTRODUCTION

A. Overview

Perchloroethylene (Perc) is the solvent most commonly used by the dry cleaning industry to clean clothes or other materials, such as curtains, sleeping bags, blankets, comforters, and leather goods. Perc is emitted to the air from dry cleaning operations, which contribute to the public's exposure to Perc.

In 1991, the Air Resources Board (ARB or Board) identified this compound as a toxic air contaminant (TAC) under California's Toxic Air Contaminant Identification and Control Program (Health and Safety Code (HSC) section 39650 *et. seq.*). Once Perc was identified as a TAC, the ARB was required under HSC section 39666 to evaluate the need for a regulation to reduce emissions from Perc. State law requires that control measures for TACs without a Board-specified health based threshold exposure level be based on the best available control technology (BACT) or a more effective control method in consideration of cost and risk. Accordingly, on October 14, 1993, the Board adopted the Airborne Toxic Control Measure for Emissions of Perchloroethylene from Dry Cleaning Operations (Dry Cleaning ATCM). This regulation is codified in title 17 of the California Code of Regulations, section 93109. The Dry Cleaning ATCM sets forth the equipment, operations and maintenance, recordkeeping, and reporting requirements for dry cleaning operations.

Since 1993, ARB staff, in its tracking of the Dry Cleaning ATCM, has evaluated the effectiveness of the Dry Cleaning ATCM and has found that more can be done to reduce emissions of Perc from dry cleaning operations.

B. Purpose

The ARB continues to take actions to eliminate or reduce emissions of TACs to protect public health. These actions are important because sources of TACs are often located near homes or schools. While the ARB is developing new measures to continue the progress in reducing health risks from toxics in the air, we are also re-evaluating whether some of the control measures adopted in the past can be even more protective. ARB lists Perc as one of the top ten TACs that contribute the most to our overall statewide cancer risk. This ranking is based on ambient air measurements from ARB's monitoring network. Since Perc can be emitted from neighborhood dry cleaning shops and new cleaning technologies have emerged, a complete review of the existing Dry Cleaning ATCM has been conducted to assess the need for revisions to further protect public health.

In 2003, ARB began a technical evaluation of the existing Dry Cleaning ATCM. The purpose of the assessment was to determine whether the Dry Cleaning ATCM continues to be adequately protective of public health. The technical assessment is available under separate cover, entitled California Dry Cleaning Industry Technical Assessment Report (Technical Assessment Report) and was released February 2006.

This staff report discusses the dry cleaning technology assessment and provides the basis of our efforts to determine the effectiveness of the existing Dry Cleaning ATCM.

Information regarding the California dry cleaning industry was obtained from several surveys of the dry cleaning industry. The ARB staff developed the Dry Cleaning Facility Survey (Facility Survey) in cooperation with the California Cleaners Association, the Korean Dry Cleaners-Laundry Association, other industry representatives, and the local air pollution control and air quality management districts (local air districts). The Machine Manufacturers Survey was used to collect information about equipment and operation costs and other machine information. The Perc Solvent Distributor's Survey was used to collect information on the percentage of Perc that is used by the dry cleaning industry and to confirm Perc usage obtained from the dry cleaning facilities survey. Additionally, the Dry Cleaning Solvent Manufacturers Survey was used to obtain formulation information, which was shared with the Office of Environmental Health Hazard Assessment (OEHHA). Using this information, OEHHA provided ARB with its review of the health effects and toxicity of other alternative cleaning solvents that are discussed in this report.

The ARB staff conducted site visits of dry cleaning facilities and conducted emissions testing to enhance understanding of the California dry cleaning industry and the dry cleaning process. Staff visited several facilities in the State and collected relevant information (e.g., distance to receptors, ventilation practices, and solvent usage). Our testing included collecting and testing sludge from Perc and DF-2000™ Fluid (DF-2000) dry cleaning facilities, evaluating the effectiveness of Perc detectors, and measuring Perc concentrations around Perc dry cleaning machines and other locations in the facilities.

This Initial Statement of Reasons (ISOR) for the proposed amendments to the existing Dry Cleaning ATCM presents information on the current status of the dry cleaning industry in California. It also presents the exposure and health effects from the use of Perc in the dry cleaning industry. Finally, it will present the proposed amendments to the existing ATCM and the health, economic, and environmental impacts of these proposed amendments.

C. Summary of Changes to the Existing Dry Cleaning ATCM

Most significantly, the proposed changes to the existing Perc Dry Cleaning ATCM will impact the type of equipment being used in Perc dry cleaning facilities. Additionally, the proposed amendments will expand the applicability of the ATCM to include facilities that switch to a solvent that contains a TAC. The existing Perc Dry Cleaning ATCM prohibited the use of transfer, vented, and self-service machines. The proposed amended Dry Cleaning ATCM will include additional prohibitions for the use of new primary control machines, secondary control dry cleaning machines that have not been certified by the ARB, drying cabinets, and dip tank operations in Perc dry cleaning facilities. Also, new co-residential Perc facilities will be prohibited. Co-residential facilities will be required to phase out their Perc dry cleaning machines and existing facilities will be required to use best available control technology (BACT), which is proposed to be an integral secondary control dry cleaning machine or an alternative (non-Perc) cleaning system. New facilities will also be required to use integral secondary control dry cleaning machines, but in addition, these facilities will also have to comply with a siting requirement.

All Perc dry cleaning facilities will be required to install enhanced ventilation systems. Facilities will be given a choice to install one of the following: a local ventilation system; a partial vapor barrier room; or a full vapor barrier room. Each of these enhanced ventilation systems are more effective than what is required in the existing Dry Cleaning ATCM. Wastewater treatment also requires BACT. Facilities are given the choice to have their wastewater hauled away by a registered hazardous waste transporter, which is regulated in California by a federally authorized State program under the responsibility of the California Department of Toxic Substances Control (DTSC), or treated in a wastewater treatment unit that meets specific requirements.

The proposed changes to the existing Perc Dry Cleaning ATCM will also require some additional recordkeeping and reporting, good operating practices, testing, and manufacturer certification for secondary control systems. A more detailed discussion on the changes to the existing Perc Dry Cleaning ATCM can be found in Chapter II of this report.

D. Non-Toxic Dry Cleaning Grant and Demonstration Programs

The California State Legislature enacted Assembly Bill (AB) 998, which establishes the Non-Toxic Dry Cleaning Incentive Program. One objective of this program is to provide financial assistance to California dry cleaners who replace their existing Perc dry cleaning systems with non-toxic and non-smog forming systems such as water-based and carbon dioxide (CO_2) cleaning systems. Another objective of this program is to provide 50 percent matching funds to cover the costs of a demonstration program to showcase professional non-toxic and non-smog forming dry cleaning technologies in the State.

AB 998 requires the ARB to assess a three-dollar ($3) per gallon fee on the importers of Perc for dry cleaning operations beginning January 1, 2004. This fee will increase one dollar ($1) per gallon per year from 2005 through 2013. As required by the legislation, the majority of these funds will be used to establish a grant program to provide $10,000 grants to assist dry cleaners in switching to non-toxic and non-smog forming cleaning technologies. The balance of funds will be used to establish a demonstration program to showcase these technologies statewide. ARB is to ensure that at least 50 percent of the grant funds provided are awarded in a manner that directly reduces the public health risk associated with air contaminants in communities with the most significant exposure to air contaminants or localized air contaminants, or both, including, but not limited to, communities of minority populations or low-income populations, or both.

The grant program for the dry cleaning industry began in April 2005. To date, ARB has awarded 14 grants to eligible dry cleaning recipients for a total of $140,000. Among these grants, 12 dry cleaners replaced their Perc machines with water-based cleaning systems and 2 dry cleaners installed CO_2 cleaning systems. The 2006 grant guidelines and application package is now available to all dry cleaners to apply for the grant. The application deadline is May 5, 2006.

Due to insufficient funding from Perc fee collections for the first year, ARB was unable to implement the demonstration program. Currently, ARB is in the process of establishing the program to showcase non-toxic and non-smog forming dry cleaning technologies. Soon, interested stakeholders can submit demonstration proposals to ARB for consideration. The information for both the grant and demonstration program is available on our website at *www.arb.ca.gov/toxics/dryclean/ab998.htm.*

E. Regulatory Authority

California's air toxics program, established under California law by Assembly Bill 1807 (Statutes 1983, Chapter 1047) and set forth in HSC sections 39650 through 39675, mandates the identification and control of air toxics in California. The identification phase of the air toxics program requires the ARB, with participation of other State agencies, such as OEHHA, to evaluate the health impacts of, and exposure to, substances and to identify those substances that pose the greatest health threat as TACs. The ARB's evaluation is made available to the public and is formally reviewed by the Scientific Review Panel (SRP) on Toxic Air Contaminants established under HSC section 39670. Following the ARB's evaluation and the SRP's review, the Board may formally identify a substance as 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 local air districts, and in consultation with affected sources and interested parties, to prepare a report on the need and appropriate degree of regulation for the substance.

F. Summary of Regulations Affecting Dry Cleaners

1. Airborne Toxic Control Measures

Once ARB has evaluated the need and appropriate degree of regulation for a TAC, State law (HSC section 39666) requires ARB to evaluate the need for regulations to reduce TAC emissions to the maximum extent feasible in consideration of cost, risk, and other factors specified in HSC section 39665. To date ARB has adopted two ATCMs that pertain to Perc dry cleaning operations: the ATCM for Emissions of Perc from Dry Cleaning Operations (Dry Cleaning ATCM); and the Environmental Training Regulation for Perc Dry Cleaning Operations. Both regulations were adopted on October 14, 1993.

2. AB 2588 "Hot Spots" Program

Assembly Bill 2588 (Statutes 1987, Chapter 1252,), *Air Toxics "Hot Spots" Information and Assessment Act* ("Hot Spots" Program), was enacted in September 1987. This Hot Spots Program supplements the Air Toxics Program by requiring a statewide air toxics inventory, notification of people exposed to a significant health risk, and facility plans to reduce these risks.

Under the Hot Spots Program, stationary sources are required to report the types and quantities of certain substances that their facilities routinely release into the air. Senate Bill 1731 (SB 1731), which amends the Hot Spots Program, requires ARB to provide assistance to smaller businesses to develop and apply risk reduction techniques. The goal of the Hot Spots Program is to collect emissions data indicative of routine predictable releases of toxic substances to the air, identify facilities having localized impacts, evaluate health risks from exposure to the emissions, notify nearby residents of significant risks, and, due to SB 1731, reduce risk below the local air district established level of significance.

Information gathered from this program has complemented ARB's existing TAC program by locating sources of substances that were not under evaluation and by providing exposure data needed to develop regulations for control of toxic pollutants. Additionally, the program has been a motivating factor for facility owners to voluntarily reduce their facility's toxic emissions. Dry cleaners have been identified as facilities subject to the Air Toxics Hot Spots Program. Currently, the California Air Pollution Control Officers Association is developing an industry-wide risk assessment for dry cleaners. The purpose of this industry specific assessment is to assist both the local air districts and facilities with the emissions inventory and risk assessment requirements of the Hot Spots program.

3. National Emission Standards for Hazardous Air Pollutants

In the federal Clean Air Act Amendments of 1990, the United States Environmental Protection Agency (U.S. EPA) identified Perc as a hazardous air pollutant (HAP) because of its known or possible adverse effects on human health or the environment. In 1993, and as a result of State legislation Assembly Bill 2728, the Board designated federal HAPs as TACs (HSC section 39658(b)). Therefore, Perc is a TAC both because it has been identified by the Board through the TAC identification and control program and because it is a HAP.

In 1993, the U.S. EPA promulgated technology-based emissions standards to control emissions of Perc from dry cleaning facilities. The National Emission Standards for Hazardous Air Pollutants was based on the application of equipment and work practice standards. On May 21, 1996, the current California Dry Cleaning ATCM was granted federal equivalency (Volume 61, Federal Register, page 25397). Federal equivalency means that the U.S. EPA has determined that the California Dry Cleaning ATCM is equivalent to, more effective than, the federal dry cleaning regulation. As a result, dry cleaning in California need only comply with the California Dry Cleaning ATCM. Currently, U.S. EPA is accepting comments on a proposed rule to revise their 1993 standards to limit emissions of Perc from existing and new dry cleaning facilities. Based on the preliminary proposals, staff is confident that the emissions-related requirements of the proposed amended Dry Cleaning ATCM are more stringent than U.S. EPA's proposed rule.

4. Other State Regulations

California dry cleaners are regulated either directly or indirectly by other government environmental agencies in addition to ARB and the local air districts. The Regional Water Quality Control Boards regulate Perc discharges into State waters from local sanitation districts that process wastewater discharge by dry cleaners. The California Department of Industrial Relations/Division of Occupational Safety and Health (CAL/OSHA) regulates Perc in the workplace environment.

Dry cleaners are also regulated by DTSC for the storage, disposal, and treatment of hazardous waste. As mentioned earlier, DTSC is given the responsibility to regulate hazardous waste in California as a federally authorized State program. Solid waste consists of cartridge filters and spent carbon; liquid wastes consist of separator water, still bottoms, and condensate from steam presses and from the carbon desorption process. Typically, hazardous wastes are picked up by a licensed hazardous waste hauler or Perc recycler for disposal or treatment.

To protect worker safety, CAL/OSHA has established a permissible exposure limit (PEL) for Perc of 25 parts per million by volume (ppmv). The PEL is the maximum, eight-hour, time-weighted average Perc concentration for occupational exposure. CAL/OSHA also requires employee training on procedures for the safe handling of hazardous substances in the workplace and the health effects of those substances. However, the CAL/OSHA requirements do not apply to the smallest owner-operated facilities with no employees.

5. Local Agencies

a. Local Air Districts

In California, 14 out of 35 local air districts have specific regulations for Perc dry cleaners. The remaining local air districts have adopted or implemented the existing ARB Dry Cleaning ATCM. As required, all local air district rules are at least as stringent as the ARB Dry Cleaning ATCM. The local air districts with Perc dry cleaning regulations are: Antelope Valley Air Quality Management District (AQMD), Bay Area AQMD, El Dorado County AQMD, Imperial County Air Pollution Control District (APCD), Kern County APCD, Lake County APCD, Mendocino County APCD, North Coast Unified AQMD, Northern Sonoma County APCD, San Joaquin Valley APCD, San Luis Obispo County APCD, South Coast AQMD, Ventura County APCD, and Yolo-Solano AQMD. Some of these local air districts, plus a number of other local air districts, also have rules or policies that affect the permitting of new sources of air toxics, including Perc dry cleaning facilities. The Bay Area and South Coast AQMDs both have rules that are notably more stringent when compared to ARB's existing Dry Cleaning ATCM.

The Bay Area AQMD's Regulation 11, Rule 16 has expanded their requirements to include dry cleaners that use other synthetic solvents, like the hydrocarbon solvents. Under the Bay Area rule dry cleaners in co-residential facilities are required to use secondary control and install vapor barrier rooms. In addition, existing and new non-residential facilities are required to install enhanced ventilation. Although, the Bay Area AQMD's rule is more stringent compared to the Dry Cleaning ATCM, it will not be as stringent as the ARB proposed Dry Cleaning ATCM as amended.

In 2002, the South Coast AQMD amended its Rule 1421, Control of Perchloroethylene Emissions from Dry Cleaning Systems (Rule 1421). These amendments prohibit new or relocated Perc dry cleaning facilities and will phase out the use of Perc in existing dry cleaning operations by December 1, 2020 within the South Coast AQMD. Rule 1421 required converted machines to be phased out by July 1, 2004. In addition, all existing Perc dry cleaners in the South Coast AQMD are required to use secondary control and comply with Rule 1402, Control of Toxic Air Contaminants from Existing Sources, which limits the lifetime cancer risk from a facility to no more than 25 in a million, by November 1, 2007. Prior to December 1, 2020, if an existing facility chooses to replace its existing machine with a new Perc machine, the facility would need to purchase a secondary control machine and comply with Rule 1401, New Source Review of Toxic Air Contaminants. Rule 1401 limits the lifetime cancer risk from a facility to less than 10 in a million. The ARB's proposed amendments to the Dry Cleaning ATCM may require additional recordkeeping and reporting requirements.

b. <u>Local Publicly-Owned Treatment Works</u>

The dry cleaning process generates wastewater containing trace amounts of Perc. This waste is generated from water separators, steam presses, and desorption of carbon adsorbers. In the past, the Perc-laden water was discharged into the sewer. However, that practice has been phased out by the local publicly-owned treatment works (POTWs) in the State. A dry cleaner may be held liable for direct Perc discharges if Perc escapes from the sewer system and migrates into the groundwater. In this situation, dry cleaners and local POTWs can be held liable for cleanup and abatement under the California Water Code. In most areas of the State, local POTWs have established their own Perc discharge limits to avoid possible liability resulting from Perc contaminated wastewater entering groundwater via the sewer collection system (ARB, 2006a).

II. SUMMARY OF THE PROPOSED AMENDED CONTROL MEASURE

This chapter provides the basis for the proposed amendments and summarizes the proposed changes to the Dry Cleaning ATCM. The complete text of the proposed Dry Cleaning ATCM is provided in Appendix A.

A. Basis and Rationale for the Proposed Amended Control Measure

The Board approved the current Dry Cleaning ATCM in 1993. The measure reduced public exposure to Perc emissions from dry cleaning facilities through the use of BACT and operator training. The Dry Cleaning ATCM phased out the more emissive Perc technologies (i.e., transfer and vented machines), set requirements for training, good operating and maintenance practices, and recordkeeping and reporting. The implementation of the Dry Cleaning ATCM resulted in lower Perc emissions from dry cleaning facilities and, in turn, reduced public exposure to Perc in California by 70 percent.

California HSC section 39658(b)(3) states that if the Board implements an ATCM applicable to the substances and later finds that the purposes set forth are not achieved by the ATCM, the Board may revise the ATCM to achieve those purposes. The Board may revise an ATCM only if it finds that the reduction in risk to the public health that will be achieved by the revision justifies the burden that will be imposed on persons who are in compliance with the ATCM previously implemented.

In 2003, an evaluation of the Dry Cleaning ATCM was conducted to compare Perc dry cleaning to the available alternatives and determine whether the Dry Cleaning ATCM continues to adequately protect public health. The evaluation showed that some members of the public that live very close to Perc dry cleaning facilities continue to be exposed to elevated levels of Perc. The evaluation also showed that less emissive Perc dry cleaning technology has been proven and is available, that enhanced ventilation systems have been proven and are effective to reduce near source Perc exposure, and that alternatives to Perc dry cleaning are available and viable. The proposed amendments to the Dry Cleaning ATCM will further reduce potential health impacts for residents and off-site workers living or working near dry cleaning facilities by reducing Perc emissions from dry cleaning operations, limiting the potential use of any identified TAC as an alternative dry cleaning solvent, and requiring enhanced ventilation for Perc dry cleaning operations.

To further reduce Perc emissions and risks, ARB staff is proposing amendments to the Dry Cleaning ATCM. The proposed amendments will require the phase out of Perc in co-residential dry cleaning. For existing Perc dry cleaning facilities, the proposed amendments will require the use of better control equipment, that is, integral secondary controls. The proposed amendments will also require enhanced ventilation systems for all Perc facilities. New Perc dry cleaning facilities will need to meet siting criteria that assure they are not located in residential areas. For new dry cleaning operations that use a solvent that contains a TAC other than Perc, the proposed regulation will require facilities to install, operate, and maintain BACT as required by applicable air pollution control or air quality management district (local air district) rules or regulations. If there is no local air district rule or regulation, the facilities will be required to submit to and have approved by the local air district a control method or methods that achieve reductions in the risk associated with the TAC that equal or exceed the reductions for Perc.

B. Changes to the Existing Dry Cleaning ATCM

There are additional requirements for each type of facility (i.e., co-residential, existing, and new). Elevated Perc levels in residential areas have been attributed to co-residential Perc facilities (those that share a common wall, floor, or ceiling with a residence, or located within the same building with a residence). For existing co-residential facilities, the proposed amendments will phase out Perc dry cleaning technologies by July 1, 2010. This phase out of Perc dry cleaning equipment will virtually eliminate the Perc risk from co-residential facilities.

For existing facilities (those that started Perc dry cleaning operations before July 1, 2007), the proposed amendments will phase out the more emissive Perc machines (i.e., converted machines, primary machines, and add-on secondary machines) and require installation of enhanced ventilation systems (i.e., local ventilation system, partial vapor barrier room, or full vapor barrier room). If the existing facilities are 100 feet or more from a sensitive receptor, all machines that are 15 years or older (manufactured in 1995 or earlier) will need to phase out of these machines by July 1, 2010. For each subsequent year, these more emissive Perc machines must be replaced with integral secondary control machines (or non-Perc alternatives) as they become 15 years old. However, if the Perc facility is within 100 feet (30 meters) from a sensitive receptor, the Perc machine must be replaced with an integral secondary control machine (or non-Perc alternative) when it is 10 years old or by July 1, 2009, whichever is later. By July 1, 2016, all Perc facilities shall install an integral secondary control machine (or a non-Perc alternative). In addition, existing facilities are required to install one of three types of enhanced ventilation systems: local ventilation systems, partial vapor barrier rooms, or full vapor barrier rooms.

For new co-residential facilities (those that start operations on or after July 1, 2007), the proposed amendments will prohibit the use of Perc. For all other new Perc facilities, the proposed amendments will require the use of BACT. For new Perc facilities, BACT is proposed to be an integral secondary control machine that operates with an enhanced ventilation system. New Perc facilities must also be located at least 300 feet from a sensitive receptor or an area designated for residential use. Facilities that use a solvent that contains a TAC other than Perc will need to install, operate, and maintain BACT as required by applicable local air district rules or regulations or achieve reductions in the risk associated with the TAC's usage that equals or exceeds the reductions for Perc if there is no local air district rule or regulation.

New and existing facilities will also be required to perform annual leak checks using a Perc detector that gives a quantitative result, install sampling ports on secondary machines and conduct subsequent annual measurements of Perc concentrations within the drum. These facilities must also have a spare lint filter and a spare set of gaskets on site, and meet the specific requirements for wastewater treatment units if they choose to use a wastewater treatment unit.

Good operating practices and recordkeeping and reporting requirements are included for both new and existing facilities that use Perc or another TAC.

C. Summary of the Proposed Amended Control Measure

This section summarizes the proposed amendments to the Dry Cleaning ATCM. The complete text of the proposed amended ATCM is provided in Appendix A. For a summary of the differences between the current and proposed amended ATCM, see Appendix C.

1. Applicability

The proposed amendments to the Dry Cleaning ATCM apply to any person who owns, operates, manufactures, or distributes dry cleaning equipment that uses Perc or an identified TAC. A TAC means an air contaminant that has been identified by the Air Resources Board under sections 93000 and 93001 of title 13, California Code of Regulations, or under title 42, United States Code, section 7412(b) and its implementing federal regulations. A list of TACs can be found in Appendix D.

2. Prohibitions

Under the proposed amendments to the Dry Cleaning ATCM, the owner/operator of a facility shall not operate any of the following types of equipment related to Perc dry cleaning operations: a transfer machine, including any reclaimer or other device in which materials that have been previously dry cleaned with Perc are placed to dry; a vented machine; a self-service dry cleaning machine; a converted machine or a primary control machine installed after July 1, 2007; a drying cabinet; and a secondary control system that has not been certified by the ARB. In addition, the owner/operator of a facility may no longer perform dip tank operations with Perc.

The Perc dry cleaning machines that are prohibited have been shown to be more emissive compared to integral secondary control machines (CARB, 2006). The use of drying cabinets and dip tank operations are prohibited because they involve the transfer of Perc-laden material which contributes to fugitive Perc emissions. In addition, a secondary control system that has not been certified by the ARB was prohibited to ensure proper performance of secondary control machines.

3. Requirements for Co-residential Facilities

A "co-residential" facility is any dry cleaning facility that shares a common wall, floor, or ceiling with a residence or is located within the same building as a residence. For the purposes of this regulation, residence means any dwelling or housing which is owned, rented, or occupied by the same person for a period of 180 days or more, excluding short-term housing such as a motel or hotel room rented and occupied by the same person for a period of less than 180 days.

For existing co-residential facilities, the proposed amendments will phase out Perc dry cleaning technologies by July 1, 2010. For new co-residential facilities (those that start operation on or after July 1, 2007), the proposed amendments will prohibit the use of Perc. In addition, all co-residential facilities are required to follow good operating practices as specified in the proposed regulation and outlined in Part 8 of this section.

4. New Facilities

A new facility is defined as a facility that did not operate any dry cleaning equipment using Perc or any solvent that contains a TAC prior to July 1, 2007. Facility relocations will be considered new facilities for the purposes of the proposed regulation.

For all new Perc facilities, the proposed amendments will require the use of BACT. For these facilities, BACT is proposed to be an integral secondary control machine that operates with an enhanced ventilation system. The enhance ventilation system can be a local ventilation system, a partial vapor barrier room, or a full vapor barrier room. In addition, all new Perc facilities must be located at least 300 feet from a sensitive receptor, and located outside of and at least 300 feet from the boundary of an area zoned for residential use. Sensitive receptor means any residence; any educational resource for minors including, but not limited to, schools or preschools for kindergarten through twelfth grade or early childhood education; and any facility licensed under Health and Safety Code division 2, commencing with section 1200, for health care or community care including, but not limited to, hospitals, clinics, skilled nursing, long-term care, adult day care, foster and small family homes, child care centers, and family day care homes.

All new facilities that use a solvent that contains a TAC other than Perc will need to install, operate, and maintain BACT as required by applicable local air district rules or regulations or achieve reductions in the risk associated with the TAC's usage that equals or exceeds the reductions for Perc if there is no local air district rule or regulation. In addition, all new Perc facilities are required to follow the good operating practices outlined in Part 8 of this section.

5. Requirements for Existing Facilities

An existing facility is defined as any facility that operated Perc dry cleaning equipment prior to July 1, 2007.

For existing facilities, the proposed amendments require that the more emissive technologies (i.e., converted, primary, and add-on secondary machines) be replaced with integral secondary control machines. For existing facilities that do not have an integral secondary control machine, the compliance schedule is as follows:

- If the facility is 100 feet or more from a sensitive receptor, the facility shall install an integral secondary control machine (or non-Perc alternative) by July 1, 2010, or when the primary, converted, or add-on secondary control machine is 15 years of age, whichever comes later.

- If the facility is within 100 feet or more from a sensitive receptor, the facility shall install an integral secondary control machine (or non-Perc alternative) by July 1, 2009, or when the primary, converted, or add-on secondary control machine is 10 years of age, whichever comes later.

- All facilities that have not already done so because of the two requirements above shall install an integral secondary control machine (or non-Perc alternative) by July 1, 2016.

In addition, all existing facilities will be required to install an enhanced ventilation system which includes a local ventilation system, a partial vapor barrier room, or a full vapor barrier room. The compliance date for enhanced ventilation installation is July 1, 2009, if the facility is within 100 feet from a sensitive receptor. If the facility is 100 feet or more from a sensitive receptor, the compliance date for enhanced ventilation is July 1, 2010. Existing facilities will also be required to follow the good operating practices outlined in the Part 8 of this section.

6. Enhanced Ventilation

ARB staff has determined that ventilation technologies exist today that are more effective at reducing the public's Perc exposure than those technologies that existed at the time the original Dry Cleaning ATCM was approved and implemented. Therefore, the proposed amended ATCM requires new and existing facilities to install enhanced ventilation systems, such as a local ventilation system, a partial vapor barrier room, or a full vapor barrier room, as part of BACT to further reduce residual risk and protect public health. Enhanced ventilation systems have been demonstrated to be effective in capturing fugitive emissions. Based on testing, they have been shown to capture 70 to 99 percent of the fugitive emissions and are currently in use at co-residential and other facilities in the Bay Area AQMD (AVES, 2000). More detailed information on enhanced ventilation can be found in Chapter III of this report.

7. Integral Secondary Control Systems

Under the proposed amended ATCM, BACT for use with Perc is defined as operation with an enhanced ventilation system and using a machine with an integral secondary control system or secondary control machine. An integral secondary control system is a device or apparatus that is designed and offered as an integral part of the dry cleaning machines when they are produced and sold. A secondary control system in the industry today is typically a carbon adsorber composed of an activated carbon bed contained in a housing. The secondary control system reduces the concentration of Perc in the recirculating air at the end of the drying cycle to 300 ppmv or below, beyond the level achievable with a refrigerated condenser alone. All Perc machines in new facilities and all Perc machines in existing facilities will need to have integral secondary control systems.

The manufacturer must test all secondary control systems to determine if they meet all of the applicable requirements listed in the proposed amendments (Appendix A). These are the same requirements that are required by the Dry Cleaning ATCM. However, to ensure proper performance of all certified machines, when testing a particular dry cleaning machine model that is available in various capacities and carbon weights, the proposed amended ATCM requires that testing to be conducted on the configuration with the largest ratio of drum capacity to weight of the carbon. The ratio calculation is included in the proposed amended regulation. Also, test results may not be attributed to a replacement dry cleaning machine that has been reconfigured.

Test conditions for primary control, add-on secondary control, and drying cabinets are proposed to be deleted because the amended regulation would no longer approve dry cleaning equipment in these categories. The amendments require that integral secondary control systems shall be tested by the manufacturer on closed-loop machines with the primary control system operating normally. The following procedures are proposed to be added to better reflect possible operating conditions in the industry. The weight of materials shall be recorded for each test. Each test shall be conducted during the cleaning of one load of materials, after running 80 percent of the manufacturer's recommended number of loads before carbon regeneration. The machine shall be filled to no less than 85 percent of its capacity for each test. Also, at least 70 percent of the load to be cleaned must consist of woolen or absorbent padded material.

Revisions to the certification procedures for the manufacturers of integral secondary control systems are proposed to ensure proper documentation, to improve processing of the certification, and to promote statewide consistency.

8. Good Operating Practices

The proposed amendments strengthen the good operating practices outlined in the Dry Cleaning ATCM to further reduce fugitive emissions. All facilities are required to follow the good operating practices outlined in the proposed amendments. These include trained operators, operation and maintenance requirements, leak check requirements, and Perc concentration testing in the machine drum for secondary control machines.

a. Trained Operators

In the current Dry Cleaning ATCM, each facility is required to have one or more operators who have completed the environmental training requirements. Under the proposed amendments, the length of time to notify the local air district when a trained operator leaves the employ of the facility has been reduced from 30 days to 15 days of the departure. To ensure proper equipment operation, the allowance for a trained operator, who owns multiple facilities, to serve as the interim trained operator at two of those facilities has been deleted. Trained operators must be on-site whenever the dry cleaning machine is operating.

b. Operation and Maintenance Requirements

Since transfer and vented machines are no longer permitted, all language pertaining to these machines has been deleted. To shorten repair time, the facility owner/operator is required to keep on-site a spare set of gaskets for the loading door, still, lint trap, button trap, and water separator. They are also required to keep a spare lint filter on-site. Carbon adsorbers in integral secondary control systems must be designed for non-contact steam or hot air stripping operation, and must be stripped or desorbed in accordance with manufacturer's instructions or at least weekly, whichever is more frequent.

c. Leak Check Requirements

The proposal reduces the timeframe to repair a leak. Since the facility is required to keep spare gaskets and filters on hand, repairs should take less time. Liquid leaks or vapor leaks shall be repaired immediately upon detection. If a facility with a leak does not have parts available, the parts need to be ordered within the next business day of detecting the leak and the part installed within two business days after receipt. A facility with a leak that has not been repaired by the end of the seventh business day, after detection, shall not operate the dry cleaning machine until the leak is repaired. A new requirement is that the dry cleaning system shall be inspected at least once a year for liquid and vapor leaks using a Perc detector which gives quantitative results with less than ten percent uncertainty at 50 ppmv of Perc. See Chapter III for a discussion of Perc detectors.

d. Machine Testing of the Perc Concentration in the Drum

The proposed amended ATCM requires facility operators to test the Perc concentration in the drum annually for secondary control machines to ensure proper performance of the secondary control machines. Facility operators are required to perform annual drum concentration testing by installing two sampling ports as specified by the proposed amendments. The sampling needs to be done using a detector that gives quantitative results with less than ten percent uncertainty at 50 ppmv of Perc. The concentration of Perc in the drum, as represented by the reading from the sample port upstream of the carbon bed, needs to be less than 500 ppmv at the end of the drying cycle (after the adsorption cycle) for a new machine during the initial start-up period and less than 1000 ppmv at the end of the drying cycle during normal operation after the initial start-up period. Also, the Perc concentration at the downstream of the carbon bed needs to be less than 100 ppmv while the secondary control system is operating.

9. Recordkeeping Requirements

Recordkeeping requirements have been amended to include the new items listed below. This additional information should help the facility meet the requirements of the proposed amended ATCM.

- The wastewater disposal method being used. If a wastewater treatment unit is being used, then report the make and model of unit;
- For secondary control machines:
    i. The start and end time of each regeneration, and temperature of the chilled air;
    ii. The Perc concentration measured at the upstream and downstream locations at the end of the drying cycle; and
- The type of enhanced ventilation system installed.

10. Reporting Requirements

The reporting requirements are the same as in the Dry Cleaning ATCM with the addition that the annual report submitted by the facility must cover the period of January 1st through December 31st of each year. In addition to the existing reporting requirements, the facility must include the estimated distances of the facility to the nearest sensitive receptor and nearest business; the make, model, serial number, estimated age of the dry cleaning machine; the method of wastewater disposal; and, if applicable, the facility's enhanced ventilation type in their report. The owner/operator shall furnish this annual report to the local air district by February 2nd of each year. The local air districts shall report to ARB the annual Perc purchases of permitted facilities by April 2nd of each year or an alternate date agreed upon by the local air district and ARB. This information will be used by ARB staff to facilitate implementation of AB 998.

11. Wastewater Treatment

Based on site visit results, ARB staff are aware that some facilities are using homemade wastewater treatment devices that have no emission controls (CARB, 2006). This can lead to fugitive emissions to the air and to accidental discharge to the sewer or surface water. In order to protect the public from the accidental discharges to the sewer and to the water and the workers and nearby residents from fugitive emissions, we are strengthening the requirements. If a facility does not have their wastewater hauled away by a waste hauler they must use a wastewater treatment unit. All wastewater shall be placed in a wastewater treatment unit that has adequate processing capacity for the facility as approved by the local air district and the unit shall be equipped with a separator that has a settling chamber and carbon or another type of adsorbent filtration system that the wastewater cycles through.

12. Water-repelling Operations

All materials to be treated with Perc water-repelling solutions can only be treated in a closed-loop machine.

D. Regulatory Alternatives

The Board may choose to adopt these amendments or alternative requirements or any combination thereof. The alternative approaches to the proposed amendments to the dry cleaning regulation span a wide range of requirements. The Board is not limited to, but could consider, the following approaches.

ARB staff has identified several alternatives to the proposed regulatory action based on comments and suggestions received during the rulemaking process. In considering these alternatives, ARB staff evaluated the current state of non-Perc alternative technologies, the impacts on public health, and the impact on the economic vitality of the dry cleaning industry. A summary of the more likely alternatives follows.

1. Take No Action

One alternative to the proposed amendments would be to take no action to amend the Dry Cleaning ATCM, that is, to maintain the *status quo*. This alternative would continue the current situation where the public is likely to continue to be exposed to current levels of Perc emissions.

Although the current Dry Cleaning ATCM has furthered the reduction of Perc emissions from dry cleaning operations, air monitoring and modeling studies show that there continues to be potential public health risks under with the current ATCM. Furthermore, technology to future reduce the potential risk from exposures is proven and readily available.

2. Total Phase Out of Perc

A total phase out of Perc would prohibit the installation of new Perc machines and require existing Perc machines to be phased out over a specific time period. This option would virtually eliminate the potential cancer risk from Perc dry cleaning but would have far greater economic impacts on the dry cleaning industry. This option would also most likely result in a large-scale conversion to hydrocarbon solvents which would likely make attainment of state and national Ambient Air Quality Standards for ozone more difficult. Migration to other alternatives such as GreenEarth, water-based cleaning, and CO_2 would be expected to occur to a much lesser extent.

South Coast AQMD's 2002 grant program issued grants to dry cleaners in the Los Angeles area who replaced their existing Perc systems with either hydrocarbon, GreenEarth, wet cleaning, or CO_2 (GreenEarth was later removed from the program due to unresolved issues regarding its toxicity). To date, SCAQMD has awarded grants to 37 dedicated professional wet cleaning facilities, 41 mixed professional wet cleaning facilities, 5 CO_2 cleaning systems, 130 hydrocarbon cleaning systems, and 11 GreenEarth cleaning systems. Under ARB's 2005 grant program, which offers grants to dry cleaners statewide for switching from Perc to either CO_2 or wet cleaning, 12 grants were issued for wet cleaning and 2 grants were issued for CO_2. Many prospective applicants to ARB's grants program expressed concern about ARB grants not being made available for hydrocarbon systems. Currently, very few cleaners are moving toward wet cleaning in the absence of grant funds or other non-loan subsidies.

The behavior seen in the grant programs, which is supported by ARB's survey results, indicates that hydrocarbon is the alternative solvent of choice. GreenEarth is likely to be the second most popular. There are issues with each of the alternatives. Hydrocarbon solvents are volatile organic compounds (VOCs). VOCs are linked to ozone formation, which has been linked to smog, asthma, and premature death. GreenEarth is a silicone-based dry cleaning solvent which, although not a VOC, is being reviewed by OEHHA to determine if there is evidence of other possible toxic effects.

Wet cleaning and CO_2 are the two most environmentally-friendly alternatives. Currently, wet cleaning is not popular in the industry because many dry cleaners believe that it is not suitable for cleaning a wide range of garments and that it is a fundamentally different process. Many dry cleaners have also expressed liability concerns given that garments are labeled as "dry clean only" and do not indicate if the use of wet cleaning systems is appropriate. Additionally, if cleaners are not properly trained to use wet cleaning systems, they may experience an increase in customer complaints as well as a loss of business. ARB staff expects that few cleaners will migrate at this time toward CO_2 due to its high cost compared to the other alternatives. For this option, ARB staff estimates that the cost of a garment for a typical facility would have to increase by about 90 cents to recover the compliance costs.

More information regarding the non-Perc alternatives can be found in Chapters III, V, and VII.

3. <u>Total Phase Out of Perc and New VOC-Containing Systems</u>

This option is the same as discussed in Part 2 of this section (total phase out of Perc) except that it would include a provision to prohibit the use of hydrocarbon solvents. This option would also provide the maximum the protection from emissions of Perc while preventing an increase in VOC emissions from hydrocarbon solvents. This option would have greater economic impacts than the previous alternatives and result in a conversion to non-smog-forming technologies such as GreenEarth, wet cleaning, and CO_2. For this option, the ARB staff estimates that the cost of a garment for a typical facility would have to increase by an average of $1.40 to recover the costs.

Although ARB staff expects that, under this option, most facilities would migrate toward GreenEarth, there could be a considerable number of facilities that choose wet cleaning. The motivation for such a move may come from the unresolved toxicity of GreenEarth and the availability of grant programs, such as AB 998, which provide monetary resources to switch from Perc.

4. <u>Phase Out of Existing Perc Units in Residential Zones</u>

Under the staff proposal, any new facility wanting to use Perc would be required to use an integral secondary control machine and install an enhanced ventilation system. Siting criteria would also apply requiring a new facility to be located at least at a specified distance from a sensitive receptor and outside of and a specified distance from the boundary of any area zoned for residential land use. This alternative would apply the same siting criteria to existing Perc facilities. Any existing facility which did not meet the siting criteria would be phased out over a specified time period and would have the option of either switching to a non-Perc alternative or relocating to an area where the siting criteria for could be met. This option would eventually result in both new and existing facilities being held to the same standard. New Perc co-residential facilities would be prohibited and existing Perc co-residential facilities would be phased out over a specified time period.

This alternative would have a significant adverse economic impact on existing operations but would, in most cases, reduce the potential cancer risk to less than five chances per million. Additionally, this option would most likely result in a large-scale conversion to hydrocarbon solvents thereby significantly increasing statewide VOC emissions. Migration to other non-Perc alternatives such as GreenEarth, water-based cleaning, and CO_2 would be expected to occur to a much lesser extent.

5. <u>Only Address New and Co-residential Facilities</u>

Another alternative is to amend the ATCM to focus only on new facilities and co-residential facilities. No action would be proposed for existing facilities. Under this option, BACT for new Perc facilities would be updated (integral secondary control machines) prohibiting the installation of older, more-emissive technologies (converted, primary, an add-on secondary control machines). This option would also address new co-residential facilities by prohibiting co-residential facilities from installing Perc systems. Existing co-residential facilities would be required to phase out their Perc systems within a specified time period. Although this option would most likely represent a relatively low economic burden to California dry cleaners, it would also provide a lower level of public health protection than the other alternatives primarily because action on existing facilities is not included.

A potential benefit to not including existing facilities is that additional time is provided for ARB staff to further evaluate alternative technologies and collect additional information regarding which alternative technologies the industry is most likely to support (and to what extent). Such information is expected to come from the implementation of South Coast AQMD's Rule 1421, which will require many Perc dry cleaning facilities in the Los Angeles area to start considering non-Perc alternatives as soon as the November 2007 time frame. This benefit would have to be balanced with the reduction in public health protection.

6. Increase the Phase Out Period for Converted, Primary Control, and Add-On Secondary Control Machines

The proposed amendments phase out the more emissive converted, primary control, and add-on secondary control machines based on machine age. Under the proposed amendments, an existing facility will be required at the earliest date to install, operate and maintain an integral secondary control machine by July 1, 2009 or when the primary, converted, or add-on secondary control machine is 15 years of age, whichever comes later. The proposed amendments also limit the time given to replace machines that are 10 years of age in facilities that are located close to sensitive receptors. Extending the phase out period would lessen the economic burden on the dry cleaning facility owners by allowing more time for the facility to replace their existing machines with integral secondary control machines.

7. Decrease the Phase Out Period for Converted, Primary Control, and Add-On Secondary Control Machines

This alternative would shorten the time frames in the regulation which require certain emission control requirements to be in place by specified dates. By decreasing the phase out periods, the emission and risk reduction benefits of the proposed amendments would be realized more expeditiously. However, shortening the time frames in the regulation would increase the cost of compliance. The amount of the increase would depend on what requirement is adjusted and how significant the change in the compliance date. The main cost impacts beyond the proposed ATCM would be associated with the loss of residual value in existing machines due to accelerated replacement of integral secondary control machines.

8. Performance Inspections of Primary Control Machines Before Phase Out

Some dry cleaners have suggested that the efficiency of a dry cleaning machine is dependent on operation and maintenance practices, amount and frequency of usage, and machine design. Therefore, a machine phase out based on age may potentially phase out machines that are operating efficiently.

Based on staff's evaluation and discussions with industry representatives, it is well established that the performance of a primary control machine is less than that of a secondary control machine. For example, the concentration of Perc in the machine drum for a primary control machine after the drying cycle, operating at its highest efficiency, can be as high as 8600 ppmv. In contrast, the drum concentration for a secondary control machine after the drying cycle, operating with the same high efficiency, is 300 ppmv or lower.

9. Use a Risk-based Threshold Requirement to Achieve Emission Reductions

Finally, the Board could consider specifying risk thresholds above which Perc dry cleaning facilities could not operate, similar to the South Coast AQMD requirements. Currently, the South Coast AQMD requires all existing Perc dry cleaners to use secondary control and comply with its Control of Toxic Air Contaminants from Existing Sources (Rule 1402) which limits the lifetime cancer risk from an existing facility to no more than 25 in a million. In addition, if an existing facility chooses to replace its existing machine with a new Perc machine, the facility would need to purchase a secondary control machine and comply with South Coast AQMD's New Source Review of Toxic Air Contaminants (Rule 1401) which limits the lifetime cancer risk from a facility to less than 10 in a million. This approach is administratively more challenging than the proposed ATCM. It would also require additional costs for the air pollution control districts to implement this regulation.

III. SUMMARY OF THE DRY CLEANING INDUSTRY

Typically, dry cleaners are considered small businesses and most employ less than 5 employees. More than 50 percent employ two or less as full time employees. Dry cleaners are typically located in shopping centers. Perc solvent is the most widely used by the dry cleaning industry in the State of California. ARB survey (2003) indicates that there are about 5,040 dry cleaning facilities in the State and that 4,290 of them use Perc as the solvent and about 2 percent are co-residential facilities. More than 95 percent of the cleaning facilities have only one dry cleaning machine. There are approximately 190 facilities that use Perc and one of the other alternatives such as hydrocarbon, GreenEarth, Rynex 3, water-based cleaning including wet cleaning, and CO_2 cleaning technology. Of the 550 non-Perc facilities, 400 use one of the alternative hydrocarbons called DF-2000, 90 used the GreenEarth technology, and the remaining 60 use one of the other hydrocarbons or one of the other alternatives.

A. Dry Cleaning Technologies

1. Types of Cleaning Technologies

Perc is the most widely used dry cleaning solvent in California. Perc is also used in other industry sectors including degreasing operations, paints and coatings, and industrial and consumer products. The Dry Cleaning ATCM currently permits the use of closed-loop, dry-to-dry machines when Perc is the solvent of choice. The vast majority of California dry cleaners are familiar with the operation of this technology. Vented and transfer machines have been phased out and no Perc dry cleaners should be using these systems at this time.

All hydrocarbon solvents used in dry cleaning consist of aliphatic hydrocarbons, meaning they are straight-chained, branched or cyclic as opposed to aromatics, which contain stable carbon-ring structures called benzene rings. Hydrocarbon solvents are combustible. Inherent properties of these petroleum-based solvents include high flammability volatility, odor, and toxicity. Toxicity varies by compound; however, none of the petroleum-based solvents have been evaluated by ARB and OEHHA for their potential to be toxic air contaminants. All of the solvents are VOCs. The machines predominately used for petroleum solvents are closed-loop machines equipped with primary control. Solvent technologies used for these types of equipments are DF-2000™ Fluid, PureDry®, EcoSolv®, Shell Sol 140 HT, and Stoddard Solvent. These technologies are described below.

a. DF-2000™ Fluid

DF-2000™ Fluid (DF-2000) was introduced in 1994 by ExxonMobil as an alternative solvent to Stoddard and Perc. Currently, it is the most popular alternative to Perc. Consisting of C_{11} to C_{13} aliphatic hydrocarbons, it is a synthetic mix of isoparaffins and cycloparaffins (naphthenes) that boils between 185 and 211 degrees Centigrade (OEHHA, 2003). Machines designed for DF-2000 and other hydrocarbon solvents offer closed-loop, dry-to-dry operation. Most include a primary control device (refrigerated condenser) and offer computerized control.

b. PureDry®

PureDry® (PureDry) was developed as a replacement for Perc. It is a blend of isoparaffinic hydrocarbon and a chemical additive produced by 3M. The mixture contains about 95 percent odorless mineral spirits. The odorless mineral spirits are a mixture of aliphatic hydrocarbons (C_9 to C_{12}). Mineral spirits can cause neurotoxicity, and eye and respiratory irritation at high concentrations. It also contains HFE-7200 (a mixture of ethyl perfluoroisobutyl ether and ethyl perfluorobutyl ether), FC-43 (perfluoro compounds of primarily 12 carbons), PF-5070 (perfluoro compounds of primary seven carbons), and PF-5060 (perfluoro compounds of primarily six carbons) (OEHHA, 2003). The flash point of PureDry is 350°F with a boiling point temperature of 298°F. The flash point of a solvent is the temperature at which vapor given off will ignite when an external flame is applied under specified test conditions. A flash point is defined to minimize fire risk during normal storage and handling. Flash points for all dry cleaning solvents range from 110°F to 350°F.

c. EcoSolv®

Chevron Phillips Chemical Company LP manufactures EcoSolv® (EcoSolv). This dry cleaning fluid is 100 percent isoparaffin with carbon numbers ranging from C_9 through C_{13}. The manufacturer formulated this product by adding butylated hydroxytoluene at 10 parts per million (ppm) to act as an oxygen stabilizer. This solvent is a high purity aliphatic mixture with minimum in aromatics. The isoparaffin is a branched hydrocarbon that is also used for food processing, cosmetic and personal care formulations, and as a solvent for a number of industrial products. EcoSolv has a flash point between140°F and 200°F, and is classified as Class IIIA solvent (ARB, 2004e).

d. Shell Sol 140 HT

Shell Sol 140 HT (Shell 140) is a high flash point hydrocarbon solvent. Shell 140's flash point is 145°F. This solvent works well in closed-loop machines.

e. Stoddard Solvent

Stoddard Solvent (Stoddard), a class of petroleum solvents, consists of a blend of C_8 to C_{12} hydrocarbons and is similar to kerosene. Its flash point is 110°F. Stoddard contains small amounts of chemicals known to be carcinogenic but are not classified as toxic. Stoddard also contains benzene, which has been identified as a toxic air contaminant. It also gives off an irritating odor.

The technologies described above are used as alternative to Perc dry cleaning. ARB staff estimates that about 400 dry cleaners in California are currently using hydrocarbon technology. In the South Coast AQMD grant program, about 80 percent of the dry cleaners received grants to switch from Perc to hydrocarbon technologies. In addition to hydrocarbon technologies, dry cleaners are also using other technologies such as decamethylcyclopentasiloxane (D_5), Rynex™, CO_2, Professional Wet Cleaning (wet cleaning), and Green Jet®. These technologies are described below.

f. Volatile Methyl Siloxane Cleaning

Decamethylcyclopentasiloxane (D_5) or volatile methyl siloxane is an odorless, colorless liquid that has many consumer and industrial applications. D_5 is used as an ingredient in a number of personal health and beauty products, including deodorants, antiperspirants, cosmetics, shampoos, and body lotions. It is also used as a dry cleaning solvent.

D_5 is present in the GreenEarth® (GreenEarth) dry cleaning solvent. GreenEarth solvent is mostly being used in hydrocarbon machines and has a flash point of 170°F. Although, GreenEarth is used in some converted Perc machines, the manufacturer does not recommend this option. In order for Perc machines to be converted, the following assemblies must be installed by manufacturer: filtration system; temperature control sensors; pre-water separator filter; water separator; and electrical control panel. GreenEarth solvent is distributed by Dow Corning, General Electric, and Shin-Etsu.

g. Rynex™ (Propylene Glycol Ether) Cleaning

Rynex™(Rynex 3) is an organic and biodegradable solvent with low volatility and a high flash point (>200°F) and is classified as a Class IIIB solvent. Rynex 3 is lighter than water and, therefore, floats on water after separation. It is a mixture of substituted aliphatic glycol ethers. It is also considered a VOC.

Rynex 3 can be used in most hydrocarbon machines with some temperature and timing adjustment. Converting Perc machines to use Rynex 3 is not recommended by the solvent manufacturer. It is not an economically prudent exercise due to the differences in physical properties of Perc and Rynex 3.

h. Carbon Dioxide (CO_2) Cleaning

CO_2 is a process that has been developed for use by commercial and retail dry cleaners. CO_2 is a non-flammable, non-toxic, colorless, tasteless, odorless naturally-occurring gas that, when subjected to pressure, becomes a liquid solvent. The CO_2 used in this process is an industrial by-product from existing operations, primarily anhydrous ammonia (fertilizer) production. There is no net increase in the amount of CO_2 emitted; therefore, this process does not contribute to global warming. CO_2 is naturally occurring and is also used in other applications such as carbonating soft drinks. To date, there are 5 CO_2 cleaning systems installed in California.

i. Professional Wet Cleaning

Professional Wet Cleaning (wet cleaning), an alternative to dry cleaning that was first introduced in 1991, is different than commercial laundering in several aspects. Wet cleaning uses computer-controlled washers and dryers with detergents that have been specially formulated for the process. Specialized equipment is used because ordinary washers and dryers lack the control needed to ensure that garments are processed properly. Finishing equipment includes pressing and tensioning units. The tensioning units are used to touch-up, stretch, reform, and finish the garments. Wet cleaning systems use non-toxic, biodegradable detergents, which are approved for disposal into the sewer system.

j. Green Jet®

The Green Jet® (Green Jet) machine cleans and dries garments in a single computer-controlled unit. The process involves using a mist of water and detergent to clean the garments. They are not immersed in liquid. The machine is designed to receive a full 45 pound load of garments. It then dehydrates the garments to remove humidity and reduce surface tension, which allows mechanical action and pulsating air jets to dislodge and remove non-soluble soil from the garments. This soil is then collected in a lint chamber. Next, a pre-determined amount of water-based cleaning solution is injected through air jet nozzles to re-hydrate the fabric. After about a pint of solution has been injected, heavy felt pads attached to the ribs and the cylinder absorb the soluble soil. After the cleaning process, the unit goes into a conventional dry cycle and then a cool-down cycle.

2. Efficacy of Various Technologies

Efficacy, or the ability to effectively clean clothes, is an important factor to consider when considering dry cleaning alternatives. Properties to be considered include: cleaning ability, evaporation rate, and ease of purification of the cleaning solution through distillation. The solvent should not cause fabric to unnecessarily fade, shrink, weaken, or bleed color, and should be compatible with detergents. The overall cleaning ability of a process depends on soil chemistry, textile fabric type, transport medium (aqueous vs. non-aqueous), chemistry of the additives (detergents, surfactants), the use of spotting agents, and process considerations (e.g., time, temperature, and mechanical actions) (U.S. EPA, 1998). Over 95 percent of all soils are water soluble (Cleaners Family 2004).

The Kauri Butanol (KB) number is used to estimate the degreasing efficiency or cleaning ability of a solvent. High KB values generally indicate a strong cleaning ability, whereas a low KB value indicates a weaker cleaning ability. Table III-1 summarizes the cleaning performance for Perc and the alternatives. Evaluation of KB values and alternative technologies are discussed in Chapter VIII of the Technical Assessment Report (CARB, 2006).

3. Emerging Cleaning Technologies

There are four emerging technologies which are expected to be available to the dry cleaning industry within the next few years. These technologies are: 1) cold water cleaning systems; 2) the Resolve™ Dry Cleaning System; 3) the Impress™ Solvent, and 4) Hydroclene Fluids. Most of these technologies are still under research and development phase. However, a few cold water cleaning systems are currently in use.

More detail about these emerging technologies are described in Chapter II of the Technical Assessment Report (CARB, 2006).

Table. III-1. Summary of Cleaning Performance of Dry Cleaning Solvents

Solvent	Cleaning Performance
Perc	Aggressive, oil-based stains, most water-based stains, silks, wools, rayons. Not good for delicates.
Stoddard	Less aggressive than Perc for oil-based stains. Can handle delicate garments.
PureDry	Less aggressive than Perc for oil-based stains. Can handle delicate garments.
Shell 140	Less aggressive than Perc for oil-based stains. Can handle delicate garments.
EcoSolv	Less aggressive than Perc for oil-based stains. Can handle delicate garments.
DF-2000	Less aggressive than Perc for oil-based stains. Can handle delicate garments
Green Jet (DWX-44 detergent)	Less aggressive than Perc. More effective in cleaning sugar, salt, perspiration stains. Good for delicates. Not good for heavily soiled garments.
Rynex 3	Aggressive, cleans water-soluble and oil-based stains.
GreenEarth	Less aggressive than Perc for oil-based stains. Good for water-based stains, delicates.
CO_2	Good for all stains and most fabrics. Very effective in removing oils, greases, sweats.
Wet cleaning	Aggressive, good for both oil and water-based stains. Can handle delicate garments. Requires tensioning equipment and training for successful operation.

B. Emission Control and Ventilation Technologies

1. Emission Control Technologies

In dry cleaning operations, the majority of solvent is lost either through emissions to the atmosphere or via waste products. Furthermore, with Perc, a very small amount is also retained in clothes (relative to the total Perc emitted from dry cleaning operations). Some of the fugitive emissions can be controlled by using proper emission control and ventilation technologies to further reduce or capture emissions.

Over the past several years, the use of Perc recovery devices has become common in the dry cleaning industry because of economic considerations, environmental concerns, worker exposure concerns, and regulatory actions. Emission reductions from the dry cleaning industry can be attained through the use of proper operating practices and control equipment. These greatly increase the amount of solvent being recycled while at the same time minimizing the solvent loss to the atmosphere. Housekeeping measures include promptly repairing any worn or cracked gaskets, covering all solvent and waste containers, identifying and repairing any leaking equipment, and removing any lint build-up from the steam or water coils. Control devices such as carbon adsorbers, refrigerated or chilled water condensers, and distillation units have proven to be very effective for reducing emissions and recovering the solvent for reuse.

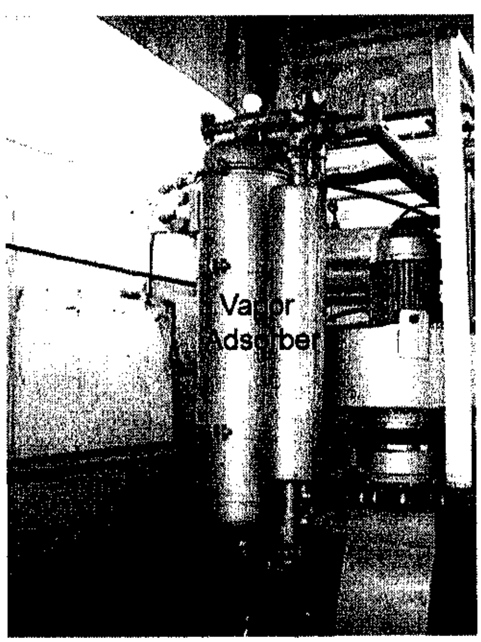
a. Primary Controls

Primary control systems operate during the heating and cool-down phases of the drying cycle. They are designed such that they neither exhaust to the atmosphere nor generate additional solvent-contaminated waste water (where applicable). Today, the most commonly used primary control device is the refrigerated condenser. In the past, carbon adsorbers and polymeric vapor adsorbers (a largely unproven technology) were also considered but could not compete with the overall efficiency of the refrigerated condenser.

Refrigerated condensers operate throughout the drying cycle, in which solvent-laden air is continually recirculated through the condenser. The condenser recovers both the solvent and water vapors from the air stream, sending a liquid solvent and water mixture to a water separator. The solvent is recovered by the water separator then goes to the solvent storage tank. During the drying cycle, the air stream circulates past the refrigerated condenser, is reheated by the heating coils, circulates through the drum evaporating more solvent from the materials, and then flows through the condenser again where the solvent is recovered. The refrigerated condenser keeps the temperature low during the drying cycle (ARB, 1996). A detailed discussion on primary controls is presented in Chapter III of the Technical Assessment Report (CARB, 2006).

b. Secondary Controls

Figure III-1. Secondary Control



A significant source of solvent emissions from closed-loop machines is from opening the drum at the end of the drying cycle to remove materials. For example, the concentration of Perc in the drum at the end of the drying cycle can be as high as 8,600 ppmv (ARB, 1993). The operation of a secondary control device (typically a carbon adsorber - an activated carbon bed contained in a housing), which operates in series with a refrigerated condenser, can further reduce solvent vapor concentrations in the drum and, therefore, reduce fugitive emissions and solvent consumption. Secondary control devices are activated at the end of the cool down step before the machine door is opened. These devices route solvent vapors from the drum and button and lint traps through the refrigerated condenser, then through a vapor adsorber (see Figure III-1), which strips solvent vapors from the air. In order to keep operating efficiently, the carbon must be periodically regenerated. The regeneration process typically uses heat to strip and recover the adsorbed solvent. This desorption process usually occurs after a specific number of loads or according to the manufacturer's recommended schedule (ARB, 1996).

The Dry Cleaning ATCM requires that closed-loop machines with secondary control systems reduce the concentration of Perc in the drum to less than 300 ppmv at the end of the drying cycle. Based on source test results submitted to ARB for the approval of the secondary control systems, some systems can reduce the Perc concentration to below 100 ppmv. There are no similar statewide requirements for other solvents.

2. Ventilation Technologies

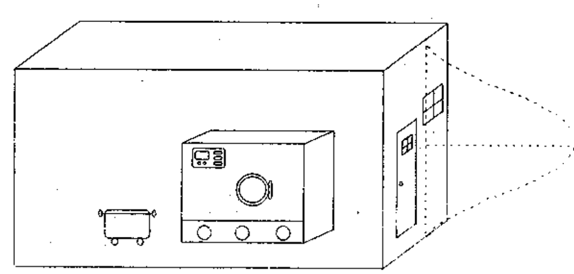
There are different types of ventilation systems at dry cleaning facilities. Ventilation affects the dispersion of solvent vapors and other airborne compounds in the facility and impacts the potential health risk to nearby residences and businesses. In many cases, the type of ventilation system found at a facility is a function of its construction. The facility owner most likely had little or no input into the design and construction of the ventilation system. Newer facilities tend to have more aggressive (or "active") systems compared to the relatively passive system used in older facilities. Many facilities do not have active ventilation systems. This means that solvent vapors, such as Perc, are emitted from the doors, windows, roof vents, and other openings throughout the facility. Natural ventilation, window fans, and general ventilation are examples of passive system. Aggressive or enhanced ventilation systems include: local ventilation, partial vapor barrier rooms, and full vapor barrier rooms.

An enhanced ventilation system is required by the proposed amendments for all new and existing facilities. Enhanced ventilation system should have adequate airflow (minimum 1,000 cubic feet per minute (CFM) but likely much higher: 2,500-10,000 CFM) to maintain a capture velocity greater than 100 feet per minute at any fugitive capture structure (such as a shroud at the loading door and the fume hood). An air change rate of at least once every 10 minutes is generally adequate in a stand-alone building, but greater air change is recommended for mixed-use buildings. The exhaust fan(s) may be installed inside the full vapor barrier rooms, partial vapor barrier rooms or local ventilation systems or outside the facility on a wall or on the roof; should be a high pressure (1-3" H_2O) design with a minimum capacity of 1,000 CFM and should be run whenever the dry cleaning machine is operating or being maintained (BAAQMD, 2001).

a. Natural Ventilation

Natural ventilation depends upon wind and convective forces to move air and is typically considered the least effective. Figure III-2 shows a typical natural ventilation.

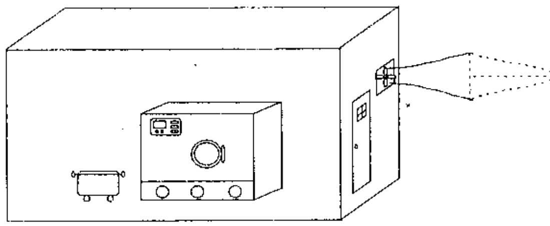
Figure III-2. Natural Ventilation



b. Window Fans

Window fans or wall fans are high flow rate propeller type fans that are installed vertically in a wall (window-type-opening). The air is exhausted horizontally, typically near ground level. These also provide an improvement to a facility with only natural ventilation. Figure III-3 shows a typical window fan configuration.

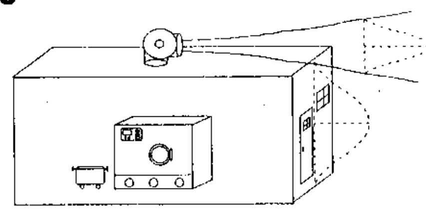
Figure III-3. Window Fan



c. General Ventilation

General ventilation systems typically have one or more large capacity fans on the roof of the facility. Capture efficiency depends on the air exchange rate inside the facility and is a function of the fan air flow rate and the size of the facility. General ventilation is considered an upgrade from natural ventilation. Figure III-4 shows a typical general ventilation configuration.

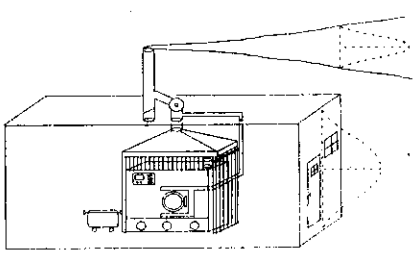
Figure III-4. General Ventilation



d. Local Ventilation System

Local ventilation system is a ventilation system with a high capacity fan, exhaust stack (5 feet from the roof top), and physical apparatus/structure (fume hoods, shrouds, flexible walls, vertical plastic strips) near the dry cleaning machine. This system is designed to capture fugitive emissions. Emissions are then exhausted through a stack on the roof of the facility. Fume hoods should have plastic curtains on the sides (or a combination of walls and curtains) to minimize cross-flow drafts and provide better capture of fugitive emissions.

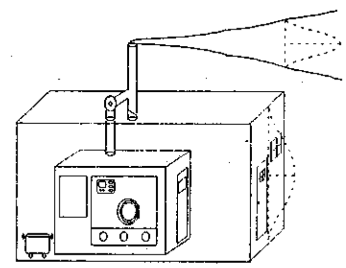
Figure III-5. Local Ventilation



The ventilation duct or fan intake should be placed near the ceiling directly above the back of the machine or at the rear of the local ventilation system. Walls or plastic strip curtains should extend at least 3 feet in front and back of the machine. The exhaust fan should be mounted above or behind the machine near the ceiling. The exhaust point should be at least 5 feet above the building or adjacent building and 30 feet from any window or air intake. According to ventilation specifications, a minimum of 1,000 cubic feet per minute airflow with a capture velocity greater than 100 feet per minute is required for ventilation. In addition, for stand-alone building, an air change rate of at least once every 5 minutes is required. Figure III-5 shows a typical local ventilation system (BAAQMD, 2001).

e. Partial Vapor Barrier Rooms

Figure III-6. Partial Vapor Barrier Room

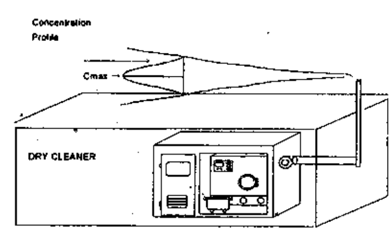


A partial vapor barrier room encloses the back of a dry cleaning machine in a small room with the front panel and loading door exposed for convenient loading and unloading. As a result, partial vapor barrier rooms are able to more effectively capture fugitive emissions from leaks and maintenance activities when compared to local or general ventilation systems. Maintenance doors are normally closed and can be equipped with a self-closing device or alarm. Additionally, any windows are typically constructed of Plexiglas or tempered glass (for safety reasons). Figure III-6 shows a typical vapor barrier room configuration.

The ventilation duct or fan intake should be placed near the ceiling directly above the back of the machine or at the rear of the partial vapor barrier rooms. The stack should extend at least 5 feet above the building's roofline or any adjacent roof and at least 30 feet from any air intake or window. Emissions must be exhausted vertically (no rain caps). Proper stack design eliminates rain intrusion with offset legs, drains, and internal deflectors. External fans may also have drain holes. In addition, there should be one air exchange rate every 5 minutes. The diameter of the stack should generally be 8 to 14 inches with an air flow rate of 1,000 to 2,500 CFM to provide good dispersion (BAAQMD, 2001).

f. Full Vapor Barrier Rooms

Figure III-7. Full Vapor Barrier Room



Improving on partial vapor rooms, full vapor barrier rooms are the most efficient vapor capture systems. A full vapor barrier room is able to restrict the diffusion and transport of solvent vapors that escape from a dry cleaning machine because a ventilation fan collects virtually all the vapors and exhausts them through a stack above the building. The door(s) to vapor barrier rooms are normally equipped with a self-closing device. Design features may vary, but normally include a "swinging" design that opens both ways or a sliding door. Additionally, any windows are typically constructed of Plexiglas or tempered glass (for safety reasons). Full vapor barrier rooms are currently required for co-residential dry cleaning facilities in the San Francisco Bay Area and for all dry cleaners in mixed-use buildings in the State of New York. Figure III-7 shows a typical full vapor barrier room configuration.

Full vapor barrier rooms are constructed of material resistant to diffusion of solvent vapors such as sheet metal (recommended), metal foil faced insulation sheets, or heavy plastic sheeting sandwiched between dry wall (gypsum) sheets. Seams should be offset for multiple layers of material. Seams and gaps should be sealed with aluminized tape (not standard duct tape) at each layer. The ventilation duct or fan intake should be placed near the ceiling directly above the back of the machine or at the rear of the full vapor barrier rooms. Warm air rises transporting solvent vapors towards the ceiling, placing the fan near the ceiling will effectively remove warm air and solvent vapors. The fan should produce an adequate air flow (minimum 1,000 CFM) to maintain a capture velocity greater than 100 feet per minute at any intentional gap or opening or about 50 feet per minute at the entry door when temporarily open (plastic strips covering doorway will enhance capture). An air change rate of once a minute is recommended (for a small 10' X 10' room a 1,000 CFM fan has an air change rate of once a minute, for larger rooms a proportionally larger fan should be considered).

The exhaust fan may be installed inside the full vapor barrier rooms or near the ceiling at the back of the machine or outside the facility on a wall or on the roof; should be of a high pressure (1-3" H_2O) design with a minimum capacity of 1,000 CFM; and should be run continuously (24 hours a day, 365 days a year) in a co-residential facility and whenever the dry cleaning machine is operating or being maintained in a non-residential facility (interlock fan motor to dry cleaning machine). The stack should extend at least 5 feet (a 10 foot stack is recommended) above the roofline or any adjacent roof and at least 30 feet from any air intake or window. Emissions must be exhausted vertically (no rain caps). Proper stack design eliminates rain intrusion with offset legs, drains, and internal deflectors. External fans may also have drain holes. In addition, there should be one air exchange every 5 minutes. The diameter of the stack should generally be 8 to 14 inches with an air flow rate of 1,000 to 2,500 CFM to provide good dispersion. Spotting using Perc containing solvents should be done within the full vapor barrier rooms for co-residential facilities. In addition, solvent and waste drums may be stored in a full vapor barrier room (BAAQMD, 2001).

C. Dry Cleaning Evaluation

The state of the current dry cleaning industry was assessed based on several surveys, site visits of dry cleaning facilities, and emission testing. More detail information is presented in the Technical Assessment Report (CARB, 2006).

1. Dry Cleaning Facility Survey Results

The Facility Survey was conducted in 2003 and designed to collect information from dry cleaning facilities. The Facility Survey was used to gather information concerning: operating information, facility information, potential future machine purchase/replacement, machine(s) type, solvent usage, waste produced, and maintenance information. Because of the large percentage of Korean dry cleaners, the Facility Survey and the cover letter were also translated into Korean.

Approximately 5,800 Facility Surveys were mailed out and the response rate was 32 percent. A total of 1,634 Facility Surveys were returned from dry cleaning facilities with dry cleaning machine(s) on-site. There were 265 responses from drop off or agency shops (no dry cleaning on-site). Assuming the 14 percent proportion of drop off shops to dry cleaning plants is the same for those that did not return the Facility Survey, ARB staff estimated that there are about 5,040 dry cleaning plants and 816 drop off shops in the State.

Dry cleaners in California are mostly small businesses employing less than five employees. After equating 40 part-time hours worked by part-time employees to one equivalent full time employee, it is estimated that over half of the dry cleaners employ two or less equivalent full time employees. Dry cleaners are usually independently owned and often are operated by the owner and/or their spouse.

The majority of the dry cleaning facilities operate a single dry cleaning machine. Based on the Facility Survey results, the average number of machines per facility was approximately 1.1. Using this value, we estimate that there are about 5,500 dry cleaning machines in California. Most of these dry cleaning machines use Perc as the solvent. In addition to Perc, the second and the third solvent of choice are DF-2000 and GreenEarth. Table III-2 summarizes the current technologies used by California dry cleaners. Table III-3 shows the number of dry cleaning facilities that are using non-toxic and non-smog forming technologies.

Table III-2. Statewide Estimates - California Dry Cleaning Industry[1]

Statewide Facility Estimates	Number of Facilities[2]	Percent (%)[3]
Dry cleaning facilities	5,040	n/a
Perc dry cleaning facilities	4,290	85
Mixed facilities (Perc + Alternative)	190	4
Non-Perc facilities	550	11
DF-2000 (hydrocarbon)	400	8
GreenEarth	90	2
Others (PureDry, Rynex 3, Stoddard, and other high flash point hydrocarbon solvent)	60	1

1. Source: 2003 Facility Survey.
2. Values are generally rounded to the nearest 10.
3. Values are generally rounded to the nearest integer.

Table III-3. Number of Dry Cleaning Facilities Statewide Using Non-Toxic and Non-Smog Forming Technologies

Non-Toxic and Non-Smog Forming Facilities[1]	Number of Facilities[1]	Percent (%)[2]
Water-based Cleaning including Professional Wet Cleaning	49	~1
Professional Wet Cleaning Demonstration Facilities	20	<1
CO_2 Cleaning	5	<1

1. Based on 2006 information. Professional wet cleaning demonstration facilities may also be included in water-based cleaning.

Of the 5,500 dry cleaning machines, there are four types of machines in use: transfer machines, machines converted from vented to closed-loop (converted), closed-loop machines with primary control (primary), and closed-loop machines with both primary and secondary controls (secondary). Transfer machines in use today are for wet cleaning or for cleaning with hydrocarbon solvent, mainly Stoddard. Wet cleaning machines may either be transfer or closed-loop. The percentage of converted machines is about 2 percent (or 110 machines), about 62 percent (or 3,410 machines) of the machines in operation are primary machines and about 28 percent (or 1,540 machines) of the machines are secondary and 2 percent (or 110 machines) are wet cleaning. The remaining 5 percent did not provide answers to the machine type.

Based on the current dry cleaning technology information, alternative technologies are being introduced gradually in the dry cleaning industry. Therefore, the percentages of Perc usages may no longer be as high as shown in Table III-2. In 2002, the South Coast AQMD administered the *Financial Incentive Grant Program* to assist dry cleaners in purchasing non-Perc alternative technologies. The program covered dry cleaners located in South Coast air basin and initially provided funding to dry cleaners that have purchased and installed one of the following qualifying non-perc technologies: 1) Professional Wet Cleaning System, 2) CO_2 Cleaning System, 3) Hydrocarbon Cleaning System and 4) GreenEarth Cleaning System. To date, they have awarded grants to 37 dedicated professional wet cleaning, 41 mixed facilities (combination of Perc machines and alternative technologies), 5 CO_2 cleaning systems, 130 hydrocarbon cleaning systems, and 11 GreenEarth cleaning systems. However, with the uncertainty in the health effects of the silicone-based dry cleaning solvent used in GreenEarth cleaning systems, the South Coast AQMD has discontinued awarding grants for GreenEarth cleaning systems. OEHHA is currently reviewing the toxicity data for the silicone-based solvent used in this system. In addition to SCAQMD grants, AB 998 grants provided 12 professional wet cleaning and 2 CO_2 cleaning systems in 2005.

When comparing machine age of the three types of Perc machines, the average age of Perc converted machines is 16 years, primary machines is 10 years, and the secondary machines is 4 years. In regards to machine capacity, there is a slight increase in capacity when comparing Perc secondary machines to Perc primary machines; the median capacity for Perc secondary machines is 45 pounds while that for the Perc primary machines is 40 pounds. DF-2000 machines are generally slightly larger than the Perc secondary machines with a median capacity of 50 pounds.

One of the tools used to estimate potential health impacts at dry cleaning facilities is air dispersion modeling. Information needed for dispersion modeling includes physical dimensions of the facilities, as well as emission estimates and emission release parameters. Based on the Facility Survey, the average area of the facilities is 1,900 square feet, and the average height is 14 feet. The median facility area is 1,600 square feet, and the median facility height is 12 feet.

Information on whether there are people living above or next to a dry cleaning facility (co-location information) and receptor distances to facilities were obtained from the Facility Survey. The type of receptors included businesses, residences, schools, day care facilities, hospitals, and senior communities. About 2 percent of the facilities are co-located, with about one percent having people living next to and one percent having people living above the dry cleaning facilities. Also, about 56 percent (2,822) of the facilities are within 20 feet of the nearest business indicating that many facilities are most likely located in strip malls. In contrast, about 4 percent (202) of the facilities are within 20 feet of the nearest resident, and about 85 percent (4,284) of the facilities are over 50 feet from the nearest resident. The number of facilities that are less than 100 feet away from schools, day care facilities, hospitals, and senior communities is 2 percent or less. Additional details on the facility survey, dry cleaning business information, operating information, machine information, facility size, receptor distance, maintenance information, and future machine purchase are discussed in Chapter IV of the Technical Assessment Report (CARB, 2006).

2. <u>Other Surveys Results</u>

ARB staff visited over 100 facilities around the State to get more detailed data. The facilities were located in 66 cities and covered 9 districts. During the site visits, staff measured receptor distances, gathered information regarding ventilation types, and gathered general information from the machine operator, owner, and/or worker. The Machine Manufacturers Survey provided staff with current information on machine and maintenance costs, recommended maintenance schedule/practices, and latest technologies available on the machines.

To ensure that our health and environmental impact assessment is based on the correct chemical(s), a Dry Cleaning Solvent Manufacturers Survey (2003) was sent to some of the alternative dry cleaning solvent manufacturers. Staff obtained formulation information associated with petroleum solvent cleaning (DF-2000, PureDry, EcoSolv, Shell 140, Stoddard), volatile methyl siloxane cleaning (GreenEarth), glycol ether cleaning (Rynex 3), CO_2 cleaning, and water-based cleaning systems. Several manufacturers also provided health and environmental impact data. Information gathered was used in our health/environmental impact evaluation.

Additionally, a Perc Solvent Distributors Survey (Distributors Survey) was developed to assess the amount of Perc that is sold to the California dry cleaning industry. Information for years 2001, 2002, and 2003 were gathered from the distributors. In general, there is a continuing decrease in usage of Perc in dry cleaning industry. This is most likely due to regulations that are in place and improved processes. The detailed information about the site visits, machine manufacturers survey, solvent manufacturers survey, and the solvent distributors survey are discussed in Chapter IV of the Technical Assessment Report (CARB, 2006).

3. <u>Leak Detector Evaluation</u>

Based on observations during site visits and conversations with ARB training staff and districts, some Perc facility operators do not use their halogenated hydrocarbon detector (HHD) as often as they are required. The reason is that most of the HHDs do not give quantitative results. A majority of the Perc facilities use HHDs made by TIF™ Instruments, Inc. (TIF detectors) that would beep when Perc or other VOCs were detected. The threshold level for beeping to begin is around eight ppm

(ARB, 2004c). The TIF detectors cannot be easily used to accurately determine whether a facility is in violation because the Dry Cleaning ATCM requirement for the facility to fix the leak is at 50 ppmv.

ARB staff looked at what is available in the industry for Perc detection and conducted a limited evaluation. The staff evaluated 12 portable detectors, including a TIF detector; a photoionization detector (PID) was available and served as a reference analyzer, were evaluated. The range of technologies tested included: PID, gas sensitive semiconductor, colorimetric tube, infrared, and heated diode sensor technology. Cost information for the detectors is discussed in Chapter VII of the Technical Assessment Report (CARB, 2006).

In all cases, the PID detectors with an internal pump performed well and provided quantitative results. The Aeroqual 200 Leak Detector technology (different from the Aeroqual 200 used for monitoring purposes) was also deemed suitable for leak checks and provided quantitative results within 10 percent uncertainty at a 50 ppmv Perc level. With the exception of the TIF-5100, the detectors that used diffusion for sample delivery had response times of five seconds or more in the field and were deemed not suitable for leak detection. The Tek-Mate and the TIF-5100 were sensitive to Perc and will indicate leaks at levels below 50 ppm. The facility background concentrations were mostly non-detectable with the limit of detection of the PID detectors at around one or two ppmv; the largest background concentration reading was between 5 to 10 ppmv. A summary of the results is shown on Table III-4.

Table III-4. Summary of Leak Detector Evaluation

Model and (Manufacturer)	Detection Principle	Sample Delivery	Display	ResponseTime[1] (sec)	Leak Check Suitability[2]
Gas Alert Micro 5 (BW Technologies)	Photoionization	Diffusion	LCD with audio and visual alarms	5 – 10	No
PhoCheck 1000 (Ion Science)	Photoionization	Internal pump	LCD	<5	Yes
MiniRAE 2000 (Rae Systems)	Photoionization	Internal pump	LCD with visual alarms	<5	Yes
Aeroqual 200 Leak Detector (Aeroqual)	Gas Sensitive Semiconductor	Internal fan	LCD with audible alarms	<5	Yes
Aeroqual 500 (Aeroqual)	Gas Sensitive Semiconductor	Diffusion	LCD with audio alarm	20 – 30	No
Aeroqual 500 with build-in fan[3] (Aeroqual)	Gas Sensitive Semiconductor	Internal fan	LCD with audio alarm	5 – 10	No
C-21 (Eco Sensors,Inc.)	Gas Sensitive Semiconductor	Diffusion	LED bar with audible alarm	No Response[4]	No
D-Tek (Inficon)	Infrared	Internal pump	Audible with LED bar	No Response	No
Tek-Mate (Inficon)	Heated Diode Sensor Technology	Internal pump	Audible with low and high sensitivity options	<5	Yes
TIF-5100 (TIF Instruments)	Heated Diode Sensor Technology	Diffusion	Audible	<5	Yes
Draeger CMS (Draeger)	Colorimetric	Internal pump	LCD	110	No
HW 101 reference analyzer (h-nu Systems)	Photoionization	Internal pump	Analog Potentiometer	<5	No

1. Response time is the approximate time needed for the detector to display a stable concentration.
2. Leak check suitability based on response time of less than five seconds in the field.
3. Laboratory testing done after the memorandum in Appendix H was written.
4. No response to calibrated standards, may require humidified gas sample.

4. Emissions from Dry Cleaning Operations

Emissions from dry cleaning operations are calculated based on a material balance approach. The amount of solvent that is consumed by a dry cleaning operation is either emitted into the air or is embedded in the waste or in clothes that are removed from the facility. Equation 1 shows the material balance relationship.

(1) $$\mathbf{Solv_e = Solv_c - Solv_w - Solv_{clothes}}$$

where:

$Solv_e$ = volume in gallons of solvent emitted to the atmosphere from a dry cleaning facility,

$Solv_c$ = volume in gallons of solvent consumed in a dry cleaning facility,

$Solv_w$ = volume in gallons of solvent that exit a dry cleaning facility in the waste products, such as still bottoms, separator water, and used cartridge filters, and

$Solv_{clothes}$ = volume in gallons of solvent that exit a dry cleaning facility in clothes.

Table III-5 shows the amount of solvent consumed, three-year average of clothes dry cleaned, solvent consumed, still bottoms generated, and the number of filters used for facilities that used Perc primary machines, Perc secondary machines, and DF-2000 machines. As shown in Table III-5, there are three types of cartridge filters that are used in the machines. These are standard, split, and jumbo cartridge filters. A majority of the machines that use cartridge filters only use standard cartridges. Some of the machines have a combination of the three types of cartridge filters and they are designated as such on the table. In addition to cartridge filters, a portion of the machines have spin-disk filters. There are two types of spin-disk filters, powdered and non-powdered. As shown on Table III-5, less than half of a percent of the Perc machines have both a powdered and a non-powered spin-disk. The machines that have cartridge filters may also have spin-disk filters; therefore, the sum of all the values on Table III-5 under proportion of filters used is greater than 100 (CARB, 2006).

Table III-5. Facility Survey Summary for Emission Analysis

Emission Analysis Information	Perc Facilities Primary Machines	Perc Facilities Secondary Machines	DF-2000 Facilities
Amount of clothes cleaned	**Pounds[1]**	**Pounds[1]**	**Pounds[1]**
Average	44,000	52,000	53,000
Yearly solvent usage and waste produced	**Gallons[2,3]**	**Gallons[2,3]**	**Gallons[2,4]**
Solvent consumed	80	68	89
Average Still Bottom Removed	75	88	90
Average Separator Water Produced	141	191	210
Amount of Filters Used Per Year	**Count[2,3]**	**Count[2,3]**	**Count[2,4]**
Average number of Standard cartridge used	15	10	7
Average number of Split cartridges used	13	7	11
Average number of Jumbo cartridges used	7	5	9
Proportion of Filters Used	**Percent[3,5]**	**Percent[3,5]**	**Percent[4,5]**
Machine using Standard cartridge only	58	46	39
Machine using Split cartridge only	7	11	4
Machine using Jumbo cartridge only	5	10	6
Machine using a combination of Standard, Split, and Jumbo cartridges	4	8	9
Machine using non-powdered spin-disk	31	55	42
Machine using powdered spin-disk	13	11	27
Combo (non-powdered and powdered)	<0.5	<0.5	None

1. Values are rounded off to the nearest thousand. Based on annual average data over three years period (2000, 2001 and 2002)
2. Values are rounded off to the nearest integer, unless it is less than one.
3. Values are averaged from three years of data, excluding newly purchased Perc machines.
4. Value is obtained from 2002 data excluding data for machines purchased in 2002.
5. Values are rounded off to the nearest integer unless they are less than one and may not add up to 100 because of combined usage of spin-disk and cartridge filters.

As shown in Table III-6, Perc emissions calculated for the converted machines are the highest, with primary machines having lower emissions, and the secondary machines emitting the least amount of Perc for the same amount of clothes cleaned. When comparing primary machines, there is a distinct difference in emissions between machines that use spin disk filters and a combination of spin disk and cartridge filters versus those that use cartridge filters only. Primary machines that operate with only cartridge filters emit about 41 percent more Perc when compared with those that have a spin disk filter. The difference in emissions between filter types for secondary machines is relatively small. Comparing average Perc secondary machines to DF-2000 machines shows that the weight percent of solvent emitted is very close, with 50 percent and 49 percent, respectively. However, the actual amount in pounds per year emitted is higher for the Perc secondary machines when compared to DF-2000 machines (410 pounds per year versus 230 pounds per year) because Perc has a greater density.

Table III-6. Emissions Comparison[1]

Machine Type	Percent of Machine in Category	Solvent Usage (gal/yr)	Sludge Amt (gal/yr)	Amt Solvent in Sludge (Wt %)	No. of Filter	Solvent Emitted (gal/yr)	Solvent Emitted (Wt %)	Solvent Ems (lb/yr)
Converted	100	106	46	45	22	79	75	1073
Primary (Spin Disk Only)	28	73	86	45	0	44	60	589
Primary (Cartridge Only)	55	97	65	45	18	66	68	889
Primary (Combo)	17	79	78	45	14	45	57	613
Primary (Average)	100	86	74	45	10	56	65	759
Secondary (Spin Disk Only)	32	65	90	46	0	28	48	383
Secondary (Cartridge Only)	29	60	67	46	10	35	55	469
Secondary (Combo)	39	59	85	46	6	17	34	227
Secondary (Average)	100	61	81	46	5	30	50	410
DF-2000	100	78	79	42	4	36	46	230

1. Values are normalized to 46,600 pounds of material cleaned per year and rounded off to the nearest integer.

5. Statewide Estimates of Emissions from Dry Cleaning Operations

Statewide estimates are made based on usage and emission information obtained. The 4,670 Perc machines currently in operation statewide are estimated to use 378,000 gallons of Perc and emit 220,000 gallons of Perc annually. These numbers are calculated based on current estimates of machine types and amount of material dry cleaned.

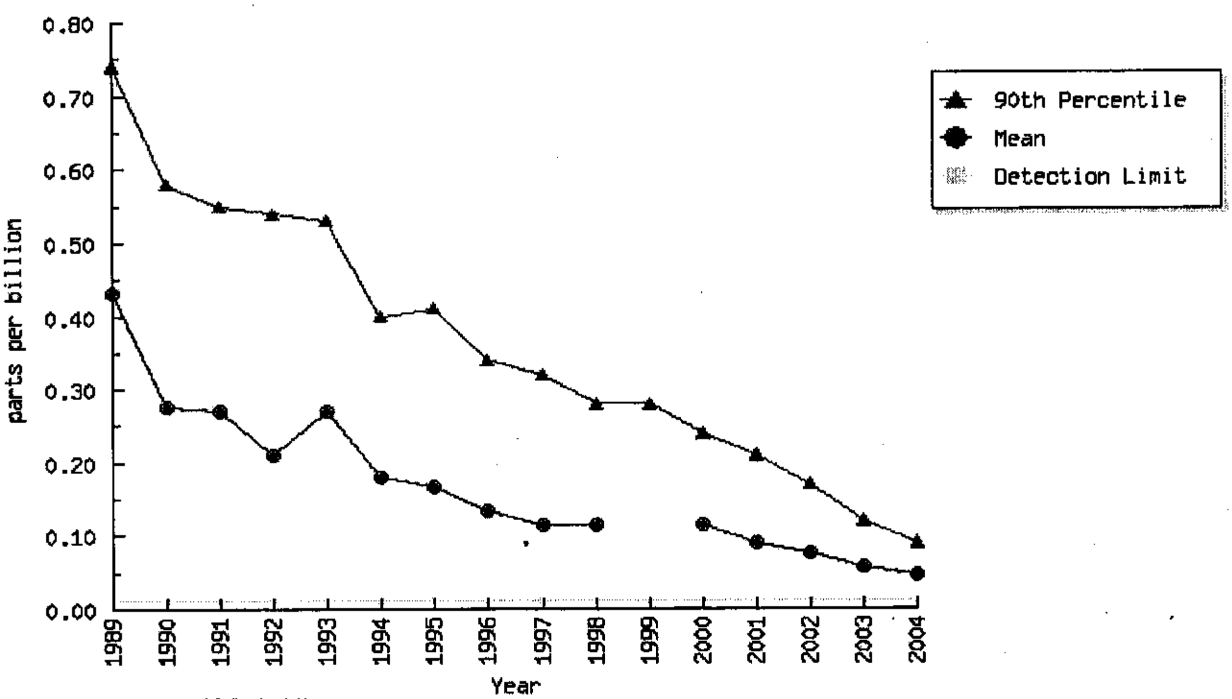
Upon full implementation of the proposed amendments and assuming for the phase out of Perc due to the effects of the South Coast AQMD's Rule 1421, it is estimated that the total reduction in Perc emissions can be up to 4.3 tons per day statewide. This corresponds to about a 90 percent reduction in Perc emissions from dry cleaning facilities.

D. Ambient Air Monitoring of Perchloroethylene

In 1985, the ARB established a 20 station toxic monitoring network to provide data to determine annual average concentrations of toxic air contaminants. This monitoring data is used to prioritize substances for the identification process, and to help assess the effectiveness of controls. The ARB routinely monitors Perc in the ambient air throughout the State.

Prior to development of the Dry Cleaning ATCM, the statewide annual average concentration from July 1988 to December 1991 was 0.28 ppb (ARB, 1993a). The statewide annual Perc average for the years 2002 to 2004 is 0.06 ppb (ARB, 2006c). This data shows that the ambient levels of Perc have decreased approximately 80 percent. Figure III-8 shows that, overall, there has been a downward trend in the statewide annual averages for Perc.

Figure III-8. Statewide Annual Average Monitored Values for Perchloroethylene[1,2]



1. ARB, 2006b
2. There is no data point for the mean value in 1999 because there was insufficient data or no data to determine the value.

As mentioned in the previous section, ARB staff expects that upon full implementation of the proposed amendments to the Dry Cleaning ATCM and the effects of the South Coast AQMD Rule, Perc emissions would be reduced by up to 4.3 tons per day from the dry cleaning industry. Therefore, we expect that ambient levels will continue to decrease since dry cleaning operations account for the majority of Perc emissions. According to Perc solvent manufacturers, about 80 percent of the Perc is used in the dry cleaning industry and the remaining 20 percent is used in other industries.

On a regional basis, the proposed ATCM would reduce dry cleaning Perc emissions by about 40 percent. Based on recent monitoring data (2004), the average population weighted cancer risk from exposure to Perc is estimated between 1 and 2 chances per million[1]. When the dry cleaning reduction is added to the other Perc control actions adopted by the Board, an overall reduction of Perc emissions from the 2004 levels of approximately 66 percent is expected. After full implementation of the proposed Perc ATCM and with other Perc measures in place, the average potential cancer risk from exposure to ambient Perc is expected to drop below 1 chance per million..

[1] Excludes the SCAQMD which is applying it's own measure.

IV. POTENTIAL HEALTH IMPACTS OF DRY CLEANING WITH PERCHLOROETHYLENE

A. Overview of Health Risk Assessment

A health risk assessment (HRA) is an evaluation that a risk assessor (e.g., ARB, district, consultant, or facility operator) develops to describe the potential a person or population may have of developing adverse health effects from exposure to a facility's emissions. Some health effects that are evaluated could include cancer, developmental effects, or respiratory illness. The pathways of exposure can include breathing; dermal exposure; and the ingestion of soil, water, crops, fish, meat, milk, eggs, and mother's (breast) milk.

For this HRA, we are evaluating the health impacts from Perc for the inhalation pathway only. We are not evaluating other pathways of exposure for Perc because OEHHA does not currently recommend using a multipathway methodology when assessing the exposure to volatile compounds such as Perc. Such multiple exposure pathway (multipathway) assessments are traditionally used for lipophilic (fat-loving), semivolatile, or low volatility compounds such as polychlorinated dibenzodioxins (PCDDs or dioxins) and dibenzofurans (PCDFs or furans), polycyclic aromatic hydrocarbons (PAHs), and polychlorinated biphenyls (PCBs).

Generally, to develop an HRA, the risk assessor would perform or consider information developed under the following four steps: hazard identification, dose-response assessment, exposure assessment, and risk characterization.

1. Hazard Identification

In the first step, the risk assessor would determine if a hazard exists, and if so, would identify the pollutant(s) of concern and the type of effect, such as cancer or respiratory effects.

Perc has been formally identified as a TAC under the California Toxic Air Contaminant Program (Assembly Bill 1807: HSC sections 39660-39662). In addition, Perc is listed as a HAP by U.S. EPA under the Federal Clean Air Act (42 U.S.C. 7412). The ARB identified HAPs as TACs pursuant to HSC section 39657(b).

2. Dose-Response Assessment

In this step of risk assessment, the assessor would characterize the relationship between a person's exposure to a pollutant and the incidence or occurrence of an adverse health effect.

This step of the HRA is performed by OEHHA. OEHHA supplies these dose-response relationships in the form of cancer potency factors (CPF) for carcinogenic effects and reference exposure levels (RELs) for non-carcinogenic effects.

The CPFs and RELs that are used in California and those that are used for Perc in this HRA are presented in Section B, part 2 of this chapter.

3. Exposure Assessment

In this step of the risk assessment, the risk assessor estimates the extent of public exposure by looking at who is likely to be exposed, how exposure will occur (e.g., inhalation and ingestion), and the magnitude of exposure.

For dry cleaning activities, the receptors (people) that are likely to be exposed include residents and off-site workers located near the facility. On-site workers are not included in this HRA because Cal/OSHA has jurisdiction over on-site workers. To protect worker safety, Cal/OSHA has established a PEL for Perc. The PEL is the maximum, eight-hour, time-weighted average concentration for occupational exposure and it is 25 ppmv for Perc (Cal/OSHA, 2004). Since the proposed ATCM will phase-out the use of Perc in co-residential facilities, phase out the more emissive Perc technologies, and require the installation of enhanced ventilation for all Perc facilities, on-site worker exposure to Perc at those facilities will be reduced.

Exposure to Perc at residential and off-site work locations was evaluated via the inhalation exposure pathway. Emission estimates and release parameters for the generic release scenarios were designed from previous work on dry cleaners, data taken from over 100 site visits, evaluation of over 1,600 survey responses, and input from industry representatives and the districts. Computer air dispersion modeling was used to provide downwind ground-level concentrations of the Perc at near-source locations.

4. Risk Characterization

This is the final step of risk assessment. In this step, the risk assessor combines information derived from the previous steps. Modeled concentrations, which are determined through exposure assessment, are combined with the CPFs (for cancer risk) and RELs (for noncancer effects) determined under the dose-response assessment. This step integrates this information to quantify the potential cancer risk and noncancer health impacts.

B. Tools and Information Used for this Risk Assessment

The tools and information that are used to estimate the potential health impacts from a source include an air dispersion model and pollutant-specific health values. Information required for the air dispersion model includes emission estimates, meteorological data, physical descriptions of the source, and emission release parameters. Combining the output from the air dispersion model and the pollutant-specific health values provides an estimate of the off-site potential cancer and noncancer health impacts from the emissions of a TAC.

For this assessment, ARB staff is estimating the potential health impacts from Perc emitted during dry cleaning activities. A brief description of the emission estimates, air dispersion modeling, and pollutant-specific health values is provided in this chapter. Additional information on the generic release scenarios used in the air dispersion modeling can be found in Appendix B. This risk assessment is based on the methodology outlined in *The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments, August 2003* (OEHHA Guidelines) (OEHHA, 2003a). In conjunction with the OEHHA Guidelines, staff also followed the ARB's *Recommended Interim Risk Management Policy for Inhalation-Based Residential Cancer Risk* (ARB Interim Risk Management Policy) (ARB, 2003a).

1. Air Dispersion Modeling

Air dispersion models are used to estimate the downwind, ground-level concentrations of a pollutant after it is emitted from a facility. The downwind concentration is a function of the quantity of emissions, release parameters at the source, and appropriate meteorological conditions. The model that was used during this HRA was Hot Spots Analysis and Reporting Program (HARP) (ARB, 2005h). HARP includes the Industrial Source Complex Short Term (ISCST3) air dispersion model, which is recommended by U.S. EPA for refined air dispersion modeling (U.S. EPA, 1995). HARP is a recommended tool for risk analysis in California that can be used for most source types (e.g., point, area, and volume sources) and is currently used by ARB, districts, and other states.

a. Emission Estimates

Risk assessment results are based on unit emission rates and can be easily adjusted to reflect any emission rate scenario. Therefore, emissions of Perc from dry cleaning activities for the risk assessment were based on unit emission rates of 100 gallons per year (1,350 pounds per year) for annual emissions and 0.1 gallons per hour (1.35 pounds per hour) for hourly emissions.

Emissions for this assessment were based on data taken from site visits and the evaluation of responses to an ARB facility survey. Table IV-1 shows the high-end (90^{th} percentile) and average annual emission rates and the hourly emission rates that were used in this report for dry cleaners with converted machines, primary control, and secondary control. According to the dry cleaner survey results and our site visits, approximately 90 percent of dry cleaners emit below the high-end annual emission rate.

Table IV-1. Emissions Rates

Scenario	Annual (gallons/year)		Hourly (gallons/hour)[2]
	High-End Emissions[1]	Average Emissions	
Converted Machine	113	76	0.45
Primary Control	94	52	0.13
Secondary Control	61	34	0.06

1. High–end emissions is defined by the 90th percentile of emissions.
2. The hourly emissions are based on the 10th percentile of mileage and 90th percentile for machine capacity from our survey results.

b. Meteorological Data

This assessment uses meteorological data sets from four locations in California. Those locations are Anaheim (81), Fresno (85-89), Oakland (port) (98-00), and San Diego (Miramar) (67-71). The year(s) of meteorological data used at each location are listed in the parenthesis.

c. Physical Descriptions of the Source and Emission Release Parameters

Eight generic dry cleaner scenarios were used for the air dispersion modeling. These generic facilities were created from survey information, information obtained during site visits, and input from draft industry-specific reports, industry representatives, and from districts regarding dry cleaning operations. The generic release scenarios address the physical dimensions and emission release parameters used in the HRA. The generic release scenarios are presented in Appendix B.

2. Pollutant-Specific Health Effects Values

Dose-response or pollutant-specific health values are developed to characterize the relationship between a person's exposure to a pollutant and the incidence or occurrence of an adverse health effect. A CPF is used when estimating potential cancer risks and a REL is used to assess potential noncancer health impacts.

As presented in Section C, exposure to Perc may result in both cancer and noncancer health effects. The inhalation CPF and noncancer acute and chronic RELs that are used for this HRA are listed in Table IV-2. Also included in Table IV-2 are the noncancer acute and chronic target organs for Perc. Table IV-2 reflects the most current OEHHA-adopted health effects values for Perc.

Table IV-2. Pollutant-Specific Health Effects Values used for Determining Potential Health Impacts[1]

Compound	Inhalation Cancer Potency Factor $(mg/kg\text{-}day)^{-1}$	Noncancer Reference Exposure Levels (ug/m3)		Target Organs	
		Acute	Chronic	Acute	Chronic
Perchloroethylene (Perc)	$2.1x10^{-2}$	20,000	35	Nervous System; Eye, & Respiratory	Kidney and Alimentary

1. Health effects values were obtained from: a)The OEHHA Air Toxics "Hot Spots" Program Risk Assessment Guidelines, Part I, The Determination of Acute RELs for Airborne Toxicants, March 1999, (OEHHA, 1999); b) The OEHHA Air Toxics "Hot Spots" Program Risk Assessment Guidelines, Part II, Technical Support Document for Describing Available Cancer Potency Factors (Revised), December 2002, (OEHHA, 2002); c) The Air Toxics Hot Spots Program Risk Assessment Guidelines; Part III; Technical Support Document for the Determination of Noncancer Chronic Reference Exposure Levels, April 2000, (OEHHA, 2000a); d) The Air Toxics Hot Spots Risk Assessment Guidelines; Part IV; Exposure Assessment and Stochastic Analysis Technical Support Document, September 2000, (OEHHA, 2000b); and e) The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments. August 2003, (OEHHA, 2003a).

The CPF, which is currently used for health risk assessment, describes the excess cancer risk associated with exposure to one milligram of a given chemical per kilogram of body weight. The inhalation unit risk factor (URF), which was used in the past for health risk assessment, is defined as the estimated upper-confidence limit (usually 95th percentile) probability of a person contracting cancer as a result of constant exposure to a concentration of 1.0 microgram per cubic meter ($\mu g/m^3$) over a 70-year lifetime. The URF of $5.9x10^{-6}$ $(\mu g/m^3)^{-1}$ is converted to the cancer potency factor of $2.1x10^{-2}$ $(mg/kg - day)^{-1}$ by multiplying the URF by 3500 and rounding to two significant figures. The factor of 3500 is derived from a 70 kilogram (kg) human body weight, 20 m^3 inhalation rate, and 1000 factor unit conversion.

Reference exposure levels are defined as a concentration level at or below which no adverse health effects are anticipated and is used as an indicator of potential noncancer adverse health effects. Reference exposure levels are designed to protect sensitive individuals in the population by including safety factors in their development and can be created for both acute and chronic exposures. An acute exposure is defined as one or a series of short-term exposures generally lasting less than 24 hours. Consistent with risk guidelines, a one-hour exposure is used to determine acute noncancer impacts. Chronic exposure is defined as long-term exposure usually lasting from one year to a lifetime.

C. Potential Health Effects of Perchloroethylene

This section summarizes the cancer and noncancer impacts that can result from exposure to Perc. Exposure to Perc may result in both cancer and noncancer health effects. The probable route of human exposure to Perc is inhalation (ARB, 1997).

1. Cancer

The OEHHA staff has performed an extensive assessment of the potential health effects of Perc, reviewing available carcinogenicity data. OEHHA concluded that Perc is a potential human carcinogen with no identifiable threshold below which no carcinogenic effects are likely to occur. The Board formally identified Perc as a TAC in October 1991 (ARB, 1991). The State of California, under Proposition 65, listed Perc as a carcinogen in April 1988 (OEHHA, 2006). Table IV-2 presents the current health effects values that are used in this HRA for determining the potential health impacts.

In 1990, the U.S. Congress listed Perc as a HAP in subsection (b) of section 112 of the Federal Clean Air Act (42 U.S.C. 7412). The U.S. EPA has classified Perc in Group B2/C, as a probable human carcinogen, on the basis of sufficient evidence for carcinogenicity in animals and inadequate evidence in humans. The International Agency for Research on Cancer (IARC) has classified Perc in Group 2A, as a probable human carcinogen, based on sufficient evidence in animals and limited evidence in humans (ARB, 1997). The ARB identified these HAPs as TACs pursuant to HSC section 39657(b).

Epidemiological studies have provided some indication that the use of dry cleaning solvents, primarily Perc, poses an increased risk of cancer for exposed workers. However, investigators were unable to differentiate among exposures to various solvents, and other possible confounding factors, like smoking, were not evaluated. Perc increased the incidence of hepatocellular tumors in laboratory mice after oral and inhalation exposure and mononuclear cell leukemia and kidney tumors in rats after inhalation (ARB, 1997).

2. Noncancer

Short-term (acute) and long-term (chronic) exposure to Perc may result in noncancer health effects. Acute toxic health effects resulting from short-term exposure to high levels of Perc may include headaches, dizziness, rapid heartbeat, and irritation or burns on the skin, eyes, or respiratory tract. Massive acute doses can induce central nervous system depression resulting in respiratory failure. Chronic exposure to lower Perc concentration levels may result in dizziness, impaired judgement and perception, and damage to the liver and kidneys (ARB, 1996). Workers have shown signs of liver toxicity following chronic exposure to Perc, as well as kidney dysfunction and neurological effects. Effects on the liver, kidney, and central nervous systems from chronic inhalation exposure to Perc have been reported in animal studies (ARB, 1997).

In addition to OEHHA listing Perc as having acute and chronic noncancer RELs (OEHHA, 1999, OEHHA 2000a), the U.S. EPA established an oral Reference Dose (RfD) for Perc of 0.01 milligrams per kilogram per day based on hepatotoxicity in mice and weight gain in rats. The U.S. EPA has not established a Reference Concentration (RfC) for Perc (ARB, 1997). Table IV-2 presents the current health effects values that are used in this HRA for determining the potential health impacts.

Epidemiological studies of women working in the dry cleaning industry showed some adverse reproductive effects, such as menstrual disorders and spontaneous abortions, but study design prevented significant conclusions. Women exposed to drinking water contaminated with solvents including Perc, showed some evidence of birth defects. Inhalation exposure of pregnant rodents to 300 ppmv Perc produced maternal toxicity and fetotoxicity manifested as developmental delays and altered performance in behavioral tests in the offspring of exposed mice and rats. However, Perc is not considered to be a teratogen (ARB, 1997).

D. Factors that Affect the Health Risk Assessment Results

Risk assessment is a complex process that requires the analysis of many variables to simulate real-world situations. There are a few factors that can affect the results of a health risk assessment at a dry cleaner, including: 1) the amount of (Perc) emissions released from the operation; 2) the source release characteristics (e.g., height of stack, stack configuration, flow rate, and building dimensions); 3) local meteorological conditions; 4) the distance to the receptor; 5) the duration of exposure; and 6) the inhalation rate of the receptor. A combination of these factors will determine the potential health impacts.

In this report, potential health impacts are presented for generic facilities. Therefore, the potential health impacts at an actual facility may vary due to that facility's individual characteristics. The generic release scenarios used in the HRA are presented in Appendix B.

E. Summary of the Risk Assessment Results from Generic Dry Cleaner Scenarios Using Secondary Control

This section presents a summary of the risk assessment results from eight generic dry cleaning facility configurations. This assessment uses meteorological data sets from four locations in California. Those locations are Anaheim, Fresno, Oakland (port), and San Diego (Miramar). The risk assessment used the Tier 1 methodology outlined in the OEHHA Guidelines (OEHHA, 2003a). In conjunction with the OEHHA Guidelines, staff also followed the ARB Interim Risk Management Policy (ARB, 2003a).

In general, the potential cancer risk at any receptor ((i.e., resident or off-site (adjacent) worker)) ranges between approximately 139 chances per million at 20 meters and 1 chance per million at 100 meters for a majority of existing dry cleaners using converted machines, primary control, and secondary control.

Table IV-3 provides estimates of the potential cancer risk for a resident living at 20, 30, or 100 meters from a sample of Perc dry cleaning facilities. Risk estimates are presented for converted machines and primary control machines with general ventilation and for secondary control machines with enhanced ventilation. Staff used emission rates that will likely include 90 percent of the Perc facilities. The potential cancer risk levels for converted and primary machines are what we would expect for source complying with the current ATCM. The potential cancer risk level for secondary machines with enhanced ventilation are what we would expect for source complying with the proposed ATCM.

For any receptor located closer than 20 meters from a dry cleaner, it is possible that their potential health impacts may be either higher or lower than the results presented in this report. Factors that may contribute to this variation include meteorology (wind and weather) and the individual release characteristics at each facility. Currently, 20 meters is the minimum air dispersion modeling distance used by the ARB in their Air Toxics Program. Since 1997, the districts have used 20 meters as the minimum modeled distance in the industrywide risk assessment guidelines for sources in the Air Toxics Hot Spots Program. The impacts at the 100 meter distance is identified to provide perspective for the potential health impacts at 300 feet, which is distance listed in the regulation for siting criteria. Noncancer health effects are not considered to be an issue as all chronic and acute hazard indices are less than 1.0 and are not considered to be a concern to public health.

Table IV-3. Potential Cancer Risk for the Generic Dry Cleaning Scenarios [1]

Distance [meters (feet)][2]	Range of Potential Cancer Risk (chances per million)		
	Converted Machine with General Ventilation	Primary Control Machine with General Ventilation	Secondary Control Machine with Enhanced Ventilation
20 (66)	75	60	23
30 (100)	45	40	15
100 (330)	8	6	3

1. Assuming Perc emissions rates of 113 gallons per year for converted, 94 gallons per year for primary, and 61 gallons per year for secondary machines. The table includes results from three meteorological data sets (Fresno, Oakland (port), and San Diego (Miramar)). Results are for the inhalation pathway. Calculations assume a70-year exposure duration and use the 80th percentile daily breathing rate. An enhanced ventilation system includes local ventilation, a partial vapor barrier room, or a full vapor barrier room. All results are rounded.
2. Distances are presented from the building edge.

Table IV-4 provides an estimate of the percentage of facilities that have residents located within 20, 30, or 100 meters from the facility. As can be seen in the table, about 22 percent of the machines are at facilities that have a residence within 20 meters of the facility, 36 percent of machines are at facilities that have a residence within 30 meters, and 66 percent of all machines are at facilities that are within 100 meters of a residence.

Table IV-4. Percent of Perc Machines at Various Distances from Residences

Distance [meters (feet)]	Percent of Machines
< 20m (66ft)	22%
< 30m (100ft)	36%
<100m (330ft)	66%

Combining the information provided in Table IV-3 and IV-4, shows that after implementation of the proposed amended ATCM, about 22 percent of the facilities would have potential cancer risks in the 20 to 25 in a million range, 14 percent of the facilities would have potential cancer risks in the 15 in a million range, and 64 percent of the facilities would have potential cancer risks of 5 in million or less.

Table IV-5 presents a summary of the potential health impacts from the generic scenarios across the four meteorological data sets. This table provides a summary of the potential cancer risk for both residential and off-site (adjacent) worker receptors exposed to high-end (90th percentile) and average emissions of Perc at existing dry cleaners with secondary control. The purpose for showing the potential health impacts at these two emission levels is to provide a perspective for Perc emissions at dry cleaning facilities in California. According to the dry cleaner survey results and our site visits, approximately 90 percent of dry cleaners emit below the high-end annual emission rate. Appendix B contains more detailed risk assessment results for dry cleaners with secondary control technology using generic unit emission rates that are broken down by meteorological data set, generic source configuration, and receptor breathing rates.

The upper section of Table IV-5 provides a summary of the potential cancer risk for a residential receptor exposed to high-end (90th percentile) and average emissions of Perc at dry cleaners using secondary control. Residential receptor results use the 80th percentile daily breathing rate and a 70-year exposure duration.

Depending on the meteorological data set and the dry cleaner configuration, the potential cancer risk for a residential receptor exposed to the high-end (90th percentile) Perc emissions scenario is estimated to range between approximately 75 chances per million at 20 meters and 3 chances per million at 100 meters. Under the average emissions scenario, the residential receptor potential cancer risk is estimated to range between approximately 42 chances per million at 20 meters and 2 chances per million at 100 meters.

The lower section of Table IV-5 provides a summary of the potential cancer risk for an off-site worker receptor exposed to high-end (90th percentile) and average emissions of Perc at dry cleaners using secondary control. The exposure duration for a worker is assumed to be 40 years.

Depending on the meteorological data set and the dry cleaner configuration, the potential cancer risk for an off-site worker receptor exposed to the high-end (90th percentile) Perc emissions scenario is estimated to range between approximately 62 chances per million at 20 meters and 2 chances per million at 100 meters. Under the average emissions scenario, the off-site worker potential cancer risk is estimated to range between approximately 35 chances per million at 20 meters and 1 chance per million at 100 meters.

The chronic hazard indices are less than 0.4 at all receptor locations under the high-end (90th percentile) emissions scenario and less than 0.2 at all receptor locations under the average emissions scenario. The acute hazard indices are less than 0.2 at all receptor locations for dry cleaners with secondary control. Generally, hazard indices less than 1.0 are not considered to be a concern to public health.

Table IV-5. Potential Cancer Risk at Residential and Off-site Worker Receptors from a Generic Dry Cleaner Emitting at the High-End (90th Percentile) and Average Emission Rates Using Secondary Control [1, 2]

Source Types	RESIDENTIAL Potential Cancer Risk (chances per million)											
	(Based on High-end Emissions)						(Based on Average Emissions)					
	Distance (meters)[3]						Distance (meters)[3]					
	20	40	60	80	100	120	20	40	60	80	100	120
Window Fan	48-96	19-34	10-18	6-11	4-8	3-6	27-54	10-19	5-10	3-6	2-4	2-3
Natural Ventilation	40-75	17-31	9-17	6-11	4-8	3-6	22-42	9-18	5-10	3-5	2-4	1-3
Natural Ventilation (B)[4]	29-53	13-24	8-14	5-9	3-7	3-5	16-29	7-13	4-8	3-6	2-4	2-3
General Ventilation (60/40)[5]	39-77	16-30	9-17	6-11	4-8	3-6	22-43	9-17	5-9	3-6	2-4	2-3
General Ventilation (B)[4] (60/40)[5]	25-51	12-24	8-14	5-9	3-7	3-5	14-28	7-13	4-8	3-5	2-4	1-3
Local Ventilation (80/20)[5]	22-29	11-15	7-10	4-7	3-5	2-4	12-16	6-9	4-6	2-4	2-3	1-2
Partial Vapor Barrier Room (95/5)[5]	22-34	12-19	7-12	4-8	3-6	2-4	12-19	7-11	4-7	2-4	2-3	1-2
Full Vapor Barrier Room	21-32	11-19	7-12	4-8	3-6	2-4	12-18	6-10	4-7	2-4	2-3	1-2

Source Types	OFF-SITE WORKER Potential Cancer Risk (chances per million)											
	(Based on High-end Emissions))						(Based on Average Emissions)					
	Distance (meters)[3]						Distance (meters)[3]					
	20	40	60	80	100	120	20	40	60	80	100	120
Window Fan	40-80	16-28	8-15	5-9	3-7	2-5	22-44	9-16	5-8	3-5	2-4	1-3
Natural Ventilation	33-62	14-26	7-14	5-9	3-6	2-5	18-35	8-15	4-8	3-5	2-3	1-3
Natural Ventilation (B)[4]	24-44	10-20	6-12	4-8	3-5	2-4	13-24	6-11	3-6	2-4	2-3	1-2
General Ventilation (60/40)[5]	32-64	14-25	8-14	5-9	3-6	2-5	18-36	8-14	4-8	3-5	2-3	1-3
General Ventilation (B)[4] (60/40)[5]	21-42	10-20	6-11	4-7	3-5	2-4	11-23	5-11	3-6	2-4	2-3	1-2
Local Ventilation (80/20)[5]	18-24	9-13	5-9	3-6	2-4	2-3	10-13	5-7	3-5	2-3	2-2	1-2
Partial Vapor Barrier Room (95/5)[5]	18-28	10-16	5-10	4-7	3-5	2-3	10-16	5-9	3-6	2-4	1-3	1-2
Full Vapor Barrier Room	17-26	9-16	5-10	3-7	2-5	2-3	10-15	5-9	3-5	2-4	1-3	1-2

1. All results are rounded and represent generic dry cleaning scenarios using secondary control technology and four meteorological data sets (Anaheim, Fresno, Oakland (port), and San Diego (Miramar). The high-end (90th percentile) and average emissions of Perc equate to approximately 61 and 34 gallons per year, respectively.
2. Results are for the inhalation pathway. Residents assume a 70-year exposure duration and use the 80th percentile daily breathing rate. Workers assume a 40-year exposure duration.
3. Distances are presented from the building edge.
4. Building is approximately 2,500 square feet and 18 feet high. Other scenarios use a building approximately 1,100 square feet and 12 feet high.
5. Values identified within the parenthesis identify the ratio that emissions are modeled from a point and volume source.

F. Comparison of Potential Cancer Risk at Dry Cleaning Facilities Using Converted Machines, Primary Control, and Secondary Control

Table IV-6 provides a summary of the potential cancer risk for a residential receptor exposed to high-end (90th percentile) and average emissions of Perc at dry cleaners using various machines or controls. The purpose for showing the potential health impacts at these two emission levels is to provide a perspective for Perc emissions at dry cleaning facilities in California. Under the high-end (90th percentile) and the average emissions scenarios, when a converted machine is replaced by a machine with secondary control, the residential receptor potential cancer risk is anticipated to be reduced by approximately 45 and 55 percent, respectively. When a machine with primary control is replaced with a machine with secondary control, then the residential receptor potential cancer risk is anticipated to be reduced by approximately 35 percent under both the high-end (90th percentile) and average emission scenarios.

Table IV-6. Comparison of Potential Cancer Risk from Dry Cleaning Operations Using Converted Machines, Primary Control, or Secondary Control [1, 2]

Source Types	Potential Cancer Risk (chances per million)					
	(Based on High-end Emissions)[3]			(Based on Average Emissions)[4]		
	Converted	Primary	Secondary	Converted	Primary	Secondary
Window Fan	178	148	96	120	82	54
Natural Ventilation	139	116	75	93	64	42
Natural Ventilation (B)[5]	97	81	53	65	45	29
General Ventilation (60/40)[6]	142	118	77	96	66	43
General Ventilation (B)[5] (60/40)[6]	94	78	51	63	43	28
Local Ventilation (80/20)[6]	53	44	29	36	24	16
Partial Vapor Barrier Room (95/5)[6]	63	52	34	42	29	19
Full Vapor Barrier Room	59	49	32	40	27	18

1. All results are rounded and are presented for the point of maximum impact (e.g., 20 meters) using generic dry cleaner configurations and the Anaheim meteorological data set.
2. Results are for the inhalation pathway and calculated for a residential receptor with a 70-year exposure duration and 80th percentile daily breathing rate.
3. The high-end (90th percentile) emissions of Perc equate to approximately 113, 94, and 61 gallons per year for converted machines, primary control, and secondary control, respectively.
4. The average emissions of Perc equate to approximately 76, 52, and 34 gallons per year for converted machines, primary control, and secondary control, respectively.
5. Building is approximately 2,500 square feet and 18 feet high. Other scenarios use a building approximately 1,100 square feet and 12 feet high.
6. Values identified within the parenthesis identify the ratio that emissions are modeled from a point and volume source.

V. POTENTIAL HEALTH IMPACTS OF THE PROPOSED AMENDED ATCM

A. Emissions and Risk Reduction Benefits

The proposed amended ATCM, which excludes facilities in South Coast AQMD, will reduce the emissions of Perc from dry cleaning facilities by approximately one ton per day, from approximately 2.0 tons per day to 1.0 tons per day. This emission reduction will lead to reductions in exposure and decrease the potential health impacts from Perc exposure.

The proposed amendments will phase-out the more emissive Perc technologies, require the installation of enhanced ventilation for all Perc facilities, and phase-out the use of Perc in co-residential facilities. An overview of the potential cancer risk for any receptor ((i.e., resident or off-site (adjacent) worker)) located outside of South Coast AQMD ranges between approximately 80 chances per million at 20 meters and 1 chance per million at 100 meters for a majority of existing dry cleaners using converted machines, primary control, and secondary control. In general for a majority of dry cleaners, an individual's exposure to Perc under the proposed amended ATCM may be reduced by up to approximately 80 percent through the use of improved technology and enhanced ventilation. Table V-1 provides an overview of the estimated reductions in potential cancer risk that may result from implementation of the proposed amended ATCM.

Under the current ATCM, higher use Perc facilities could continue to emit Perc at rates that result in lifetime potential cancer risks of approximately 80 chances per million at 20 meters[1], and approaching ten chances per million at 100 meters, approximately two-thirds of an average city block. With full implementation of the proposed controls, near source lifetime potential cancer risks would be reduced to no more than approximately 25 chances in a million for very close-by residents (those at 20 meters) living near a high use facility. Risks would be at or below ten chances per million for those living 50 meters or further from the facility. Potential risks to residents very near an average emitting facility would be lower, and are estimated to be below 15 chances in a million at 20 meters and below ten chances in a million at 30 meters.

On a regional basis, the proposed ATCM would reduce dry cleaning Perc emissions by about 40 percent. Based on recent monitoring data (2004), the average population weighted cancer risk from exposure to Perc is estimated between 1 and 2 chances per million[2]. When this reduction is added to the other Perc control actions adopted by the Board, an overall reduction of Perc emissions from the 2004 levels of approximately 66 percent is expected. After full implementation of the proposed Perc ATCM and with other Perc measures in place, the average potential cancer risk from exposure to ambient Perc is expected to drop below one chance per million.

[1] Risk levels using meteorological data sets from Fresno, Oakland, and San Diego, and excluding those from SCAQMD, which is implementing its own Perc control measure.
[2] Excludes the SCAQMD which is applying it's own measure.

Table V-1. Summary of Estimated Reductions in Potential Cancer Risk at an Individual Dry Cleaning Facility from Implementation of the Proposed Amendments [1]

Type of Action	Estimated Potential Reduction
Replacement of more emissive technologies [2]	Up to 55 percent
Using enhanced ventilation[3] rather than using other emission release scenarios	Up to 63 percent
Replacement of Perc machines in co-residential facilities	Up to 100 percent[4]
Total reduction from proposed amendments to the ATCM	Up to 80 percent[5]

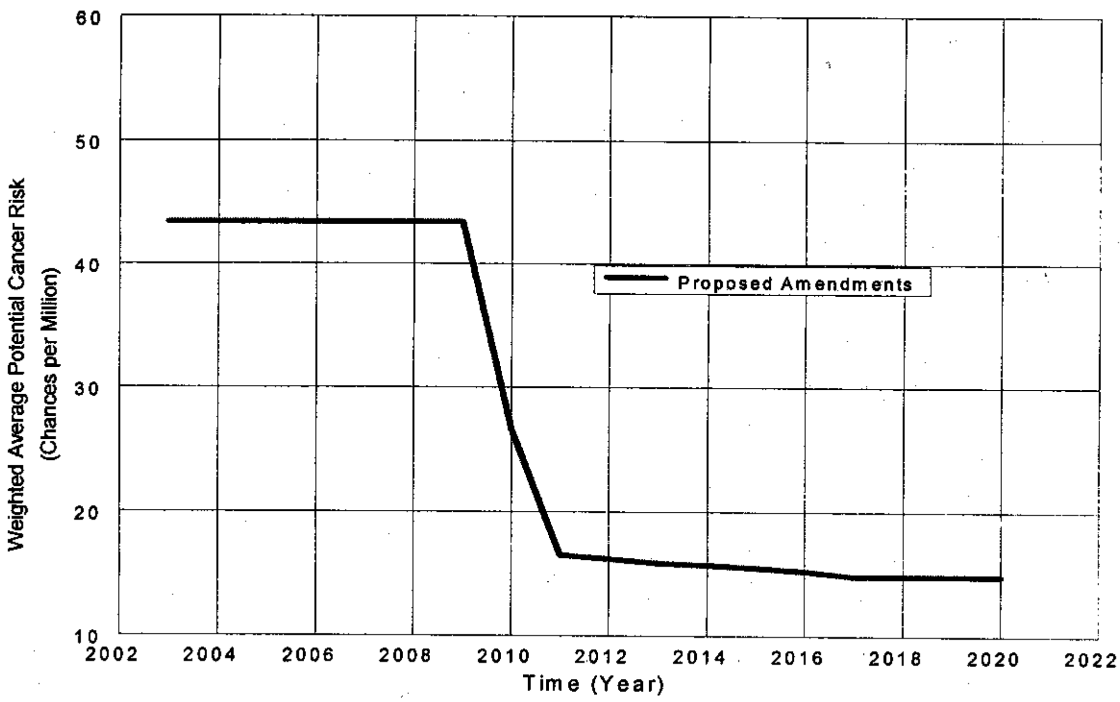
1. All figures are rounded and may be less at an actual dry cleaning facility.
2. Covers the change from converted machine and primary control machine to a secondary control machine.
3. Enhanced ventilation is local ventilation, partial vapor barrier room, or full vapor barrier room
4. Primarily applies to the removal of Perc machines; however, spotting agents that contain Perc may still be utilized.
5. Scenario includes the potential change in risk for a dry cleaner that installs a combination of new machine technology and enhanced ventilation. This scenario does not include co-residential facilities.

An individual's exposure to Perc under the proposed amended ATCM may be reduced by as much as 55 percent when the more emissive technologies (primary control and converted machines) in existing facilities are replaced by dry cleaning machines with secondary control. An additional 63 percent reduction in exposure may be achieved by using enhanced ventilation (i.e., local ventilation, partial vapor barrier rooms, and full vapor barrier rooms) in place of other emission release scenarios. Exposure will be almost entirely eliminated when Perc is phased-out for dry cleaning machines located in co-residential facilities. Appendix B contains more detailed risk assessment results for dry cleaners with secondary control technology using generic unit emission rates that are broken down by meteorological data set, generic source configuration, and receptor breathing rates.

Figure V-1 shows the current and projected weighted average potential cancer risk after implementation of the proposed amended Dry Cleaning ATCM for facilities in California. The figure uses potential risk results for a receptor at 20 meters. As shown in Figure V-1, the overall weighted risk reduction is expected to be about 65 percent.

In general for a majority of dry cleaners outside South Coast, public exposure to Perc under the proposed amended ATCM may be reduced by up to approximately 80 percent through the use of improved machine technology and enhanced ventilation. Potential risk estimates for impacted facilities from the proposed amendments were derived by weighting the potential risk based on survey results for machine type.

Figure V-1. Potential Cancer Risk at Perc Dry Cleaners Subject to the Proposed Amended ATCM[1]



1. Figure is based on potential risk estimates at 20 meters.

B. Potential Adverse Health Impacts from Perchloroethylene Alternatives

The proposed amendments are expected to result in increased usage of Perc alternatives. The most popular Perc alternative is a high flash point hydrocarbon solvent. A significant issue associated with increased usage of hydrocarbon solvents is increased VOC emissions. VOC emissions contribute to the formation of ozone. Ozone formation in the lower atmosphere results from a series of chemical reactions between VOCs and nitrogen oxides in the presence of sunlight. Ozone is linked to a myriad of health effects including respiratory irritation, asthma, and premature death. Section D contains more information on the health impacts of ozone. See Chapter 3 for more discussion on current emissions and trends of Perc alternatives.

While the impacts of ozone are well documented, there is relatively little health data available on the specific alternatives and no California health values have been adopted. As a result, ARB staff requested OEHHA to review the health effects of alternative dry cleaning solvents as they are used in the dry cleaning industry. The California Dry Cleaning Industry Technical Assessment Report (CARB, 2006), which is available under separate cover, contains a copy of OEHHA's December 2003 memorandum to ARB which provides both a summary of their literature review and toxicity data summaries for many of these compounds. Based on their literature review, OEHHA has estimated several interim chronic noncancer reference exposure levels (RELs) and is continuing to follow the peer-reviewed literature on toxicity studies for the alternative solvents. Currently, there are no cancer potency factors or acute RELs for Perc alternatives.

1. Hydrocarbon Solvent Cleaning (DF-2000, PureDry, EcoSolv, Shell 140, Stoddard)

Hydrocarbon solvents, sometimes referred to as mineral spirits and petroleum solvents, are mixtures of hydrocarbons with or without other materials. Hydrocarbons have been used in the dry cleaning industry for many years and are some of the more common alternatives to Perc dry cleaning. The hydrocarbon solvents are a unique mixture of carbon and hydrogen molecules that co-exist as linear and branched chains, as well as in cyclic forms (U.S. EPA, 1998).

A recent two-year inhalation study of Stoddard solvent conducted by the National Toxicology Program (NTP) concluded that there was some evidence of carcinogenic activity in male rats (NTP, 2004). In general, this study confirmed previous studies on toxicity for Stoddard. Most of the studies found in the literature for short and long-term toxicity identified the kidney and liver as the major target organs (NTP, 2004). Additionally, stoddard solvent can be irritating to the eyes, nose, throat, and can also have effects on the nervous system (U.S. EPA, 1998).

There is also very limited health information on other hydrocarbon mixtures. DF-2000 contains C_{11} to C_{13} synthetic isoparaffin aliphatic hydrocarbons. PureDry contains 95 percent mineral spirits, which can cause neurotoxicity, and eye and respiratory irritation at high concentrations (OEHHA, 2003). EcoSolv and Shell 140 have similar hydrocarbon properties. ARB staff has not received information indicating that TACs or HAPs are present in hydrocarbon mixtures.

Most information is lacking on the environmental persistence of these and other hydrocarbon mixtures; however the manufacturer of DF-2000 indicated that their solvent can exhibit moderate rates of biodegradation (ExxonMobil, 2003). The manufacturer of EcoSolv indicated their solvent can exhibit moderate to rapid rates of biodegradation (Chevron Phillips, 2005).

For hydrocarbon mixtures, OEHHA has developed an interim chronic REL of 1,200 $\mu g/m^3$. The development of this interim value, which has not been through scientific peer review, is based on a study by Phillips and Egan on male and female rats. Additional information on this study can be found in the Technical Assessment Document (CARB, 2006).

An occupational exposure limit (OEL) can be calculated for various hydrocarbon solvents. Guidance values for individual hydrocarbon constituents or groups of constituents were recently published in an article *A Proposed Methodology for Setting Occupational Exposure Limits for Hydrocarbon Solvents* in the Journal of Occupational and Environmental Hygiene, October 2005. (JOEH, 2005). Information on calculating OELs and guidance values for other substance groups can be found in the article.

Note however, these guidance values have not been approved for use in California's regulatory programs.

One detrimental environmental and secondary health effect of hydrocarbon solvents is their contribution to the formation of ozone. See Section D for more discussion on the health impacts of ozone.

2. Volatile Methyl Siloxane Cleaning

D_5, is a cyclosiloxane which is now being used as a dry cleaning solvent. Historically, it has been used as an ingredient in many personal health and beauty products. D_5 is present in GreenEarth solvent. Dow-Corning, who manufacturers the solvent, conducted a two-year study with rats in which preliminary data showed an increase in tumors of the uterine endometrium. Preliminary findings may indicate that there is a potential carcinogenic hazard associated with D_5 (U.S. EPA, 2003). The observance of adverse effects on the uterus by D_5 is of concern (OEHHA, 2003). Because D_5 is lipophilic there is also concern that D_5 may bioaccumulate in the food chain.

A study by Burns-Naas *et al.* (1998) evaluated the subchronic toxicity of D_5. This study showed there were several minor changes observed in clinical biochemistry parameters; the most notable was an increase in gamma glutamyl transferase (a liver enzyme) in both sexes at the high dose. This study also showed that there was an increase in liver weight in rats. McKim et al. (1999) investigated the effects of D_5 on the expression and activity of selected rat hepatic phase I and phase II enzymes. Additional information on the Burns-Naas *et al.* and McKim *et al.* studies can be found in the Technical Assessment Document (CARB, 2006).

In June 2005, D_5 manufacturers submitted final toxicity testing data to ARB, OEHHA, Department of Health Services (DHS), and U.S. EPA. After these agencies review the data, a better assessment of the public health impacts from GreenEarth emissions can be made.

3. Propylene Glycol Ether (Rynex 3)

Rynex 3 is a form of propylene glycol ether and water. This solvent had some changes in formulation since its inception. Rynex 3 represents the current formulation for Rynex™. Currently, there is limited toxicity data on Rynex 3.

Based on a recent study by NTP on a previous formulation for Rynex™, propylene glycol t-butyl ether, OEHHA expressed concerns over its toxicity and carcinogenic potential. Of particular concern was the presence of tumors in mice. OEHHA has developed an interim chronic REL for propylene glycol t-butyl ether of 200 $\mu g/m^3$ to prevent adverse effects in the respiratory system. In addition, an interim inhalation unit risk factor for cancer was estimated to be 5.2×10^{-7} $(\mu g/m^3)^{-1}$, about one-tenth that of Perc. There are no developmental or reproductive studies on the chemical. The Technical Assessment Document (CARB, 2006) has more detailed information on the toxicological studies for the previous formulation of Rynex^{TM}, propylene glycol t-butyl ether.

The manufacturer of Rynex 3 has indicated that Rynex 3 is not carcinogenic and has low toxicity. A Rynex 3 fact sheet states that, based on laboratory animal studies, propylene glycol ethers do not cause the type of toxicological effects that are associated with exposure to ethylene glycol ethers (Rynex, 2005a). It is unknown if the interim health number or previous studies are still appropriate for Rynex 3. ARB staff has requested the studies on Rynex 3. However, neither ARB nor OEHHA staff have received these toxicological studies and cannot verify the manufacturer's claim for Rynex 3.

4. Carbon Dioxide Cleaning

As discussed in Chapter III, CO_2 cleaning uses liquid CO_2. The CO_2 used in this process is an industrial by-product. There is no net increase in the amount of CO_2 emitted; therefore, this process does not contribute to global warming. CO_2 is naturally occurring and is routinely ingested in food products such as soft drinks. CO_2 is also used in packaging for many foods such as salads, potato chips, and cookies.

5. Professional Wet Cleaning (Wet Cleaning)

Most detergents used in wet cleaning are a complex mixture of water and a variety of chemicals. Most formulations are trade secrets. Because there are a wide variety of formulations, there is difficulty with determining toxicity of these substances. Chemicals used in wet cleaning process commonly include spotting agents, detergents, fabric conditioners and sizing products. Other products may be used for cleaning leather and suede including water repellants.

In general, detergents are approved for disposal into the sewer system by the sanitation districts. U.S. EPA examined the human health and environmental hazards of surfactants because they are the primary components of detergents. In general, they found that there was no expected health risk to the general public. (U.S. EPA, 1998). In addition, the report by the Institute for Research and Technical Assistance, *Evaluation of New and Emerging Technologies for Textile Cleaning,* indicates that detergents are low in toxicity (IRTA, 2005).

In U.S. EPA's *Cleaner Technologies Substitute Assessment: Professional Fabricare Processes* (CTSA), U.S. EPA provided health hazard summaries on surfactants and surfactant aids for some example detergents. The following surfactants were included in their example detergents: cellulose gum (CG), cocamidopropyl betaine (CAPB), ethoxylated sorbitan monodecanoate (P-20), lauric acid diethanolamide (Lauramide DEA), sodium laureth sulfate (SLS), sodium lauryl isethionate (SLI). Surfactant aids include: acetic acid, citric acid, sodium citrate, and sodium carbonate. It is unknown how representative these example detergents were for detergents currently being used. Below is some health information on some of the surfactant and surfactant aids presented in the CTSA.

a. Surfactants

Several studies have been conducted on CG, a water-soluble cellulose ether. This and other water-soluble cellulose ethers exhibit very low oral toxicity, and no neurologic, reproductive, or mutagenic effects (U.S. EPA, 1998).

CAPB is reported as a potentially irritating substance. CAPB has limited data on chronic studies of systemic effects. One study suggests that CAPB does not increase systemic tumors above background, but there are not enough studies to be conclusive. CAPB does not have any studies on neurotoxicity or reproductive and developmental toxicity (U.S. EPA, 1998).

In both animals and humans, P-20 has been found to be essentially nontoxic following acute and long-term oral ingestion and to exhibit little or no potential for skin irritation and sensitization (U.S. EPA, 1998).

No human studies were located regarding the potential toxicity of lauramide DEA following oral or inhalation exposure. Lauramide DEA was not found to be mutagenic. The carcinogenic potential of lauramide DEA is currently being investigated (U.S. EPA, 1998).

SLS, following oral exposures, was found to be "moderately to slightly toxic" in acutely exposed animals and virtually non-toxic in chronically exposed animals. SLS does not appear to exhibit any reproductive, developmental, or carcinogenic effects in animals (U.S. EPA, 1998).

Limited information on SLI suggests that this chemical may not be a skin irritant and is not mutagenic (U.S. EPA, 1998).

b. Surfactant Aids

At high concentrations, acetic acid can result in severe irritation in both humans and animals. Based on short-term mutagenicity tests, acetic acid does not interact with genetic material. Although no direct information on the carcinogenicity of acetic acid was located, one chronic study in rats found no evidence of tumors (U.S. EPA, 1998).

Citric acid is generally considered to be innocuous except in the case of ingestion of large quantities or chronic exposures. Citric acid has been shown to be a mild to moderate skin and eye irritant in humans following inhalation or dermal exposure. No information has been located discussing neurotoxic, mutagenic, or carcinogenic effects associated with citric acid exposures in animals or humans. Sodium citrate is expected to behave chemically like citric acid systemically, but may not have the irritant properties (U.S. EPA, 1998).

Sodium carbonate is a skin and eye irritant. Sodium carbonate is not developmentally toxic to mice, rats, or rabbits. No information was available discussing reproductive, neurotoxic, mutagenic, or carcinogenic toxicity from exposure to humans or animals (U.S. EPA, 1998).

6. Green Jet

The detergent used in the Green Jet system is called DWX-44. The material safety data sheet (MSDS) states that the product is 100 percent biodegradable. It also states that it contains no petroleum solvents, volatile organic compounds, or products from the federal hazardous air pollutant list. ARB staff is not aware of any health studies on this detergent.

7. 1-Propyl Bromide

Although currently not in use in California, 1-propyl bromide, also known as 1-bromopropane, is a solvent that is currently being considered as an alternative to dry cleaning. This compound is a neurotoxicant and reproductive toxicant (OEHHA, 2003) and was listed under Proposition 65 as a reproductive toxicant in December 2004. It causes sterility in both male and female test animals, and harms developing fetuses when tested in pregnant animals. It can damage nerves, causing weakness, pain, numbness, and paralysis (CDHS, 2003).

OEHHA developed an interim chronic REL of 1100 $\mu g/m^3$ (220 parts per billion) for 1-propyl bromide from the reproductive toxicity data in the Ichihara (et.al.) study (OEHHA, 2003). Based on current toxicity data, OEHHA staff is concerned about its use as a dry cleaning solvent (OEHHA, 2003).

C. Interim Health Values

As mentioned earlier in this chapter, OEHHA has developed interim values for some of the dry cleaning alternatives. Interim RELs are estimates based on approved OEHHA procedures; however, interim values have not gone through public comment and scientific peer review. OEHHA is continuing to follow the peer-reviewed literature on toxicity studies for the alternative solvents. Table V-2 summarizes these values. The Technical Assessment Document (CARB, 2006) has a more detailed discussion on the applicability of these values to specific compounds.

As previously stated, the interim health values are not approved for use in a quantitative health risk assessment. However, from a qualitative standpoint and assuming these chronic noncancer values remain unchanged, it would be unlikely that adverse chronic noncancer impacts will result from use of the alternatives. This observation is based on the premise that the interim chronic RELS for the Perc alternatives are at least 20 times higher than the REL for Perc. This increase in

Table. V-2. Summary of Interim Health Values

Compound	Acute REL[1]	Chronic REL	Cancer Potency Factor[1]
D5 (GreenEarth)	N/A	700 μg/m^3	N/A
1-Propyl bromide	N/A	1,100 μg/m^3	N/A
Hydrocarbon mixtures	N/A	1,200 μg/m^3	N/A
Hydrofluoroether (HFE 7200) (a compound in PureDry)	N/A	19,000 μg/m^3	N/A
Perc[2]	2.0×10^4 μg/m^3	35 μg/m^3	2.1×10^{-2} (mg/kg-d)$^{-1}$

1. N/A means not available - not enough health data is available to determine a health value for this compound.
2. The values for Perc are approved by OEHHA and are included for comparison.

the RELs will result in lower chronic hazard indices. As presented in Chapter IV and Appendix B, both the chronic and acute hazard indices are less than 0.4 at all receptor locations for dry cleaners with secondary control. Generally, hazard indices less than 1.0 are not considered to be a concern to public health. Because there are no interim acute RELs or CPF factors for Perc alternatives, no qualitative comparison regarding the acute noncancer or cancer impacts for Perc alternatives can be made.

D. Potential Health Impacts of Volatile Organic Compounds

As previously mentioned, increased usage of hydrocarbon solvents will lead to increased VOC emissions. VOC emissions contribute to the formation of ozone. Ozone formation in the lower atmosphere results from a series of chemical reactions between VOCs and nitrogen oxides in the presence of sunlight.

Ozone adversely affects the respiratory functions of humans and animals. Human health studies show that short-term exposure to ozone injures the lung. In some animal studies, permanent structural changes with long-term exposures to ozone concentrations considerably above ambient levels were noted; these changes remain even after periods of exposure to clean air. Ozone is a strong irritant that can cause constriction of the airways, forcing the respiratory system to work harder in order to provide oxygen to the body. Ozone is a powerful oxidant that can damage the respiratory tract, causing inflammation and irritation, and induces symptoms such as coughing, chest tightness, shortness of breath, and worsening of asthma symptoms. Ozone in sufficient doses increases the permeability of lung cells, rendering them more susceptible to toxins and microorganisms.

The greatest risk is to those who are more active outdoors during smoggy periods, such as children, athletes, and outdoor workers. Exposure to levels of ozone above the current ambient air standard leads to lung inflammation and lung tissue damage, and a reduction in the amount of air inhaled into the lungs. Recent evidence has, for the first time, linked the onset of asthma to exposure to elevated ozone levels in exercising children (ARB, 2004j). Ozone is also associated with premature death. In 2005, premature deaths from ozone exposure in California are estimated at 630 deaths per year (ARB, 2005i).

VI. PUBLIC OUTREACH AND REPORT PREPARATION

A. Outreach Efforts

A public process that involves all parties affected by the proposed ATCM is an important component of ARB's actions. As part of ARB's outreach program, staff made extensive personal contacts with industry representatives, state and local regulatory agencies, environmental/pollution prevention and public health advocates, and other interested parties through meetings, telephone calls, and electronic mail. Staff developed a workgroup consisting of industry, state and local regulatory agencies, environmental group representatives and other interested parties. Staff held many workgroup meetings, conducted four public workshops and participated in two meetings with the Korean Dry Cleaners Associations in the Bay Area. Staff made special efforts to have key materials translated into Korean and have translator service available at the workshops and the meetings with the Korean Dry cleaners Association.

B. Public Involvement

As described below, affected industries, other government agencies, and organizations interested in minimizing public health impacts from the use of Perc in dry cleaning industries have been involved in the development of the proposed amended Dry Cleaning ATCM. All members of the public were invited to join the workgroup. ARB staff conducted a total of six public workshops in the following areas: Sacramento, the San Francisco Bay Area, and Southern California. ARB staff also conducted over 100 site visits to various dry cleaners in the State to get a better understanding of existing Perc and available alternative dry cleaning technologies. These facilities were located in 66 cities and covered nine air districts. Additionally, to further increase the general public's participation in this assessment, staff made information available via ARB's website (*www.arb.ca.gov/toxics/dryclean/dryclean.htm*).

1. Industry Involvement

Industry involvement included but was not limited to, dry cleaning operators, cleaners associations, machine manufacturers, solvent manufacturers, Perc distributors, and environmental groups. They have actively participated in the development of the Dry Cleaning ATCM amendment process providing technical information. They have provided comments and suggestions during the development of our surveys and the Technical Assessment Report (CARB, 2006). ARB staff has also had discussions with dry cleaning operators during site visits.

2. Government Agency Involvement

Other local, state, and federal agencies with an interest in potential emissions of, or soil/groundwater contamination by, Perc have been involved in the assessment process to promote statewide consistency in addressing public health concerns and provide a multi-media perspective. These agencies include: air and sanitation districts, Cal/OSHA, OEHHA, DHS, DTSC, and U.S. EPA.

We have kept the air districts informed of our activities through the California Air Pollution Control Officers Association's (CAPCOA). This work has included telephone calls to the districts and presentations at the CAPCOA Toxics and Risk Managers Committee and the CAPCOA Enforcement Managers Committee.

We have reviewed information provided to us by the sanitation districts on increasing concentrations of Perc in the influent to POTWs. We have also requested information that other agencies may have on Perc and alternative technologies in the dry cleaning industry.

3. Private Organization Involvement

The Institute for Research and Technical Assistance (IRTA) recently partnered with ARB and the U.S. EPA (the study's sponsor) to conduct a study of the alternative dry cleaning technologies. IRTA is a non-profit organization that assists industries, primarily small businesses, in reducing or eliminating their use of ozone depleting substances and chlorinated solvents through demonstration and evaluation of new technologies, solvent substitutes, and process modifications. IRTA invited ARB staff to visit facilities in the Los Angeles area and demonstrated how alternative technologies work to clean various types of garments. These facilities were participants in a study of alternative dry cleaning technologies. Some of the data was used in the ARB's evaluation of the dry cleaning industry. IRTA's study, the *Evaluation of New and Emerging Technologies for Textile Cleaning*, is available via IRTA's website (www.irta.us).

C. Data Collection Tools Used to Assist in Report Preparation

1. Dry Cleaning Surveys

ARB staff conducted several surveys such as: the Facility Survey, Machine Manufacturer Survey, Solvent Manufacturers Survey, and Solvent Distributors Survey to gather information for the evaluation of the current Dry Cleaning ATCM. The Facility Survey was designed to collect information from the dry cleaning facilities. Many questions were asked on the Facility Survey to gather information concerning: operating information, facility information, potential future machine purchase/replacement, machine(s) type, solvent usage, waste produced, and maintenance information. The Facility Survey and the cover letter were also translated into Korean. The Machine Manufacturers Survey was developed to obtain the list price of the dry cleaning machines. The list prices were used to assess the cost of purchasing a new dry cleaning machine. The survey also, provided information on recommended maintenance schedules, maintenance costs, latest technologies available on the machines, and machine brochures. In addition, a Dry Cleaning Solvent Manufacturers Survey was sent to some of the alternative dry cleaning solvent manufacturers to obtain information on solvent formulation associated with hydrocarbon solvent cleaning (DF-2000, PureDry, EcoSolv, Shell 140, Stoddard), GreenEarth, Rynex 3, CO_2 cleaning, and water-based cleaning systems. A Perc Solvent Distributors Survey (Distributors Survey) was also developed to assess the amount of Perc that is sold to the California dry cleaning industry. Information for years 2001, 2002, and 2003 were gathered from the distributors. More detailed discussion on the results of the surveys is available in Chapter IV of the Technical Assessment Report (CARB, 2006).

2. Sludge and Leak Detector Test

To support emission analysis of the dry cleaning processes, liquid sludge from Perc and DF-2000 machines was tested for solvent content. Based on observations during site visits and conversations with ARB training staff and local air districts, Perc facility operators do not use their HHD as often as they are required. The reason is that most of the HHDs do not give quantitative results. Detailed discussion on sludge test and leak detector evaluation is presented in Chapter IV of the Technical Assessment Report (CARB, 2006).

3. Dry Cleaning Site Visits

ARB staff conducted numerous site visits to dry cleaning facilities in addition to obtaining some feedback on the Facility Survey. After the Facility Survey was mailed in September 2003, staff visited over 100 facilities around the State to get more detailed data. The facilities were located in 66 cities and covered the area over nine air districts. The local air districts visited include: Bay Area AQMD, Butte County AQMD, San Diego County APCD, Sacramento Metro AQMD, San Joaquin Valley Unified APCD, Shasta County AQMD, South Coast AQMD, Ventura County APCD, and Yolo/Solano AQMD. In addition, staff requested facility data from Monterey Bay Unified APCD and Santa Barbara County APCD. In all, 11 local air districts, encompassing about 97 percent of the facilities statewide, are represented in the site visit analysis. Detailed information on the site visits are presented in Chapter IV of the Technical Assessment Report (CARB, 2006).

VII. ECONOMIC IMPACTS OF THE PROPOSED AMENDED ATCM

In this chapter, ARB staff presents the estimated costs and economic impacts associated with implementation of the proposed amendments to the Dry Cleaning ATCM. The expected initial capital costs and annual recurring costs for potential compliance options are discussed. The costs and associated economic impacts are given for private businesses, individuals, and governmental agencies.

A. Summary of the Economic Impacts

Staff estimates that the affected businesses the total statewide cost of the proposed amended Dry Cleaning ATCM to affected businesses will be approximately $16 million dollars over 15 years. This corresponds to an average annual statewide cost of approximately $680 for the 2,290 affected facilities that operate 2,490 machines. The cost of the proposed amended Dry Cleaning ATCM was estimated in 2005 dollars after accounting for when various costs would be incurred and the number of businesses that are required to phase out Perc machines, phase out the more emissive Perc machine, install enhanced ventilation, and purchase a spare lint filter, a spare set of gaskets, a wastewater treatment unit, and cost due to early equipment replacement for some of the facilities. The proposed amendments are not expected to impact dry cleaning facilities located in the South Coast AQMD, because South Coast AQMD has a dry cleaning rule (Rule 1421) that will phase out the use of Perc in dry cleaning by December 2020.

The initial investments and expenditures required by the proposed amendments include the incremental capital cost of purchasing a hydrocarbon machine or a secondary control Perc machine, capital cost to purchase enhanced ventilation, and cost associated with loss of useful life. Depending on the extent to which that a facility is already in compliance with the proposed amendments, staff estimates the proposed amendments to the Dry Cleaning ATCM will require an initial investment ranging between $3,740 and $35,400 for most facilities. Recurring costs due to the proposed amendments include annual leak testing and drum concentration checks, and changes in recurring costs due to machine requirements. Depending on the extent a facility is already in compliance with the machine requirements, its annual recurring expenditures due to the proposed amendments are anticipated to range from a $20 expenditure to an annual savings of $1,060. The major contributor to an annual cost savings is the difference in solvent cost. Hydrocarbon solvent is lower in cost compared to Perc and a secondary control machine uses less Perc compared to a primary control machine.

The economic impact analysis separates the dry cleaning facilities into three categories: 1) co-residential facilities; 2) facilities that operate with a converted, primary control, or add-on secondary control machine; and 3) facilities that operate with an integral secondary control machine. The analysis separates the facility types because the requirements for the dry cleaning equipment at these facilities are different. Of the approximately 2,290 facilities affected by the proposed amended Dry Cleaning ATCM, it is estimated that about 48 are co-residential facilities that will need to phase out of Perc operation (replacing a Perc dry cleaning machine with a non-Perc machine) by July 1, 2010, independent of age. The number of facilities and machines in each of the three categories are shown in Table VII-1 on page VII-5.

Approximately 1,490 dry cleaning facilities are operating with either converted, primary control, or add-on secondary control machines. These facilities are required to replace their machines with either an integral secondary control machine or an alternative non-Perc machine. The third group includes approximately 800 facilities that operate with integral secondary control machines. Integral secondary control machines are allowed under the proposed amendments. In addition, all facilities that continue to use Perc will be required to install enhanced ventilation and address all other operation and maintenance requirements specified in the proposed amendments.

As presented in Table VII-2, the ARB estimates that approximately 2,090 facilities will need to install enhanced ventilation. In order to minimize the economic impact to these facilities, there is either a two or three year compliance period established for enhanced ventilation installation based on their distance from a sensitive receptor. For many of the facilities that will need to replace their machines (including converted machines, primary control machines, and add-on secondary control machines), a replacement period was established which allows dry cleaners to maximize the remaining useful life of their existing dry cleaning machines and reduce potential economic burden. Replacement is to occur by July 1, 2009 or when the machines are at the end of their useful life of 15 years if the facility is over 100 feet from a sensitive receptor. Otherwise, replacement is to occur by July 1, 2010 or when the machines are at 10 years of age. All non-BACT machines will need to be replaced by July 1, 2016.

Some of the fundamental assumptions used when calculating the impacts of the proposed amendments are summarized here. Costs for co-residential facilities are calculated assuming the owners of those facilities will choose the most popular alternative dry cleaning process (a hydrocarbon machine) when they are required to replace their machine. Costs for existing facilities are based on the assumption that these facilities will replace their converted machine, primary control machine, or add-on secondary control machines with integral secondary control machines. For estimating the cost associated with early replacement of a machine, we used straight line depreciation and a useful life of 15 years. The cost for installing enhanced ventilation was calculated assuming the facilities will choose to install a local ventilation system, the least costly enhanced ventilation system.

One State agency, the Department of Corrections, will be impacted by the proposed amendments. The Department of Corrections operates nine Perc dry cleaning machines at nine correctional facilities throughout California. The nine facilities will need to install enhanced ventilation within the first three years. Two of the nine Perc machines are secondary control machines and sampling ports will need to be installed on these machines. Seven of the Perc machines are primary control machines and will need to be replaced. The Department of Corrections can choose to comply with the requirements of the proposed amendments by replacing the primary control machines with Perc secondary control machines or to install alternative dry cleaning machines. If the Department of Corrections chooses to continue using the Perc dry cleaning process, the cost impact during the first three years of implementation of the amendments is estimated to range from $58,000 to $209,600 and the eventual cost impact range from $76,300 to $341,600 to comply with the proposed amendments over the next 15 years.

Profitability impacts were estimated by calculating the decline in the return on owner's equity (ROE). A decline in ROE of 10 percent or more is considered to indicate a significant adverse impact. Assuming that all costs are absorbed by the affected businesses, the change in ROE was estimated for a typical business. Depending on the extent that a facility might already be in compliance with the proposed amendments and the facility type, the proposed amended Dry Cleaning ATCM is expected to result in an decline in ROE ranging from 7 to 10 percent for facilities with a secondary control machine, ranging from 10 to 35 percent for facilities with a converted, primary control, or add-on secondary control machine, and from 22 to 35 percent for co-residential Perc facilities. Therefore, the proposed amended Dry Cleaning ATCM may have a significant adverse impact on the profitability of the operators of the dry cleaning businesses in California (e.g., co-residential facilities or facilities with marginal profitability).

The proposed amended Dry Cleaning ATCM may significantly alter the profitability of some of the businesses. Some of the marginal operators may have difficulty securing the required capital to finance the purchase of the dry cleaning equipment and enhanced ventilation required by the proposed amendments. These businesses may choose to operate with a less costly alternative dry cleaning process such as a newly developed hydrocarbon cleaning with tonsil or the Green Jet process or cease their dry cleaning operations altogether. If this occurs, a small number of employees could be adversely affected. Therefore, staff expects the proposed amendments to have a small impact on employment, business creation, and expansion. We do not expect the proposed amendments to have any significant impact on California interstate business competitiveness, because these businesses operate locally and are not subject to competition with businesses in other states.

The primary customers of dry cleaning facilities are individual consumers. Most dry cleaning businesses are likely to pass their compliance costs onto their customers in the form of higher prices for their services. To the extent that dry cleaning businesses are able to pass on all of the cost increase onto their customers, ARB estimated the potential cost increase to consumers based on the facility owners' recovery of their short term (five years) net cash outflow. For those facilities that replace their existing machine with a secondary machine when the existing machine is 15 years old, we estimate that the typical owner would have to charge an additional $0.65 per garment. For the same situation, except assuming the existing machine needs to be replaced when it is 10 years old, the additional charge per garment would be around $0.75. The owners of co-residential facilities would have to increase their cost per garment by about $0.90. Lastly, the owners of those facilities that already have a secondary machine will have to charge an additional $0.05 under the proposed amendments because they are already in compliance with the equipment requirements of the proposed amendments.

B. Economic Impacts Analysis on California Businesses as Required by the California Administrative Procedure Act (APA)

1. Legal Requirements

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 amended Dry Cleaning ATCM on California's jobs, business expansion, elimination or creation, and the ability of California businesses to compete with businesses in other states.

In addition, 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. The estimate shall include any non-discretionary cost or savings to local agencies and the cost or savings in federal funding to the State.

Section 57005 of the Health and Safety Code requires the ARB to perform an economic impact analysis of submitted alternatives to a proposed amended regulation before adopting any major regulation. The proposed amended Dry Cleaning ATCM is not considered to be a "major regulation", because the estimated cost to California business enterprises does not exceed $10 million in any single year.

2. Affected Businesses

Any dry cleaning business operating a Perc dry cleaning machine outside of the South Coast AQMD is affected by the proposed amended Dry Cleaning ATCM. Other potentially affected businesses include those that remove and install dry cleaning machines, and businesses that supply dry cleaning machines, enhanced ventilation systems, Perc detectors, or sampling ports to the dry cleaning facilities. The focus of this analysis, however, will be on dry cleaning facilities because these businesses would be directly affected by the proposed amendments.

Table VII-1 provides a summary of the number of dry cleaning facilities statewide and those subject to the proposed amended Dry Cleaning ATCM. Based on ARB's 2003 Facility Survey, there are about 4,670 dry cleaning machines that use Perc as the cleaning solvent (Perc machines) at 4,290 dry cleaning facilities statewide. None of the facilities use a solvent that contains an identified TAC other than Perc. During the time of the Facility Survey, about 47 percent (approximately 2,180) of the dry cleaning machines were located in the South Coast AQMD. The proposed amendments are not anticipated to impact Perc dry cleaning facilities located in the South Coast AQMD because South Coast AQMD's Rule 1421 will phase out the use of Perc in dry cleaning operations by year 2020. The number of Perc dry cleaning facilities that are outside of the South Coast AQMD is approximately 2,290.

The economic impact analysis separates the dry cleaning facilities into three categories: 1) co-residential facilities; 2) facilities that operate with a converted, a primary control or an add-on secondary control machine; and 3) facilities that operate with an integral secondary control machine. The reason for this separation is because the requirements for the dry cleaning equipment at these facilities are different. Of the approximately 2,290 facilities affected by the proposed amended Dry Cleaning ATCM, it is estimated that about 48 are co-residential facilities and they will need to phase out of Perc operation by July 1, 2010.

Approximately 1,490 dry cleaning facilities are operating with converted, primary control, or add-on secondary control machines. Many of these facilities are required to replace their machines with either an integral secondary control machine or an alternative dry cleaning machine by July 1, 2009, or when their machines are 15 years old, whichever is later. However, if the facility is located within 100 feet or less of a sensitive receptor, they will have to replace their machines at 10 years of age or by July 1, 2010; whichever is later. In addition, all converted, primary control, and add-on secondary control machines will need to be replaced by July 1, 2016, regardless of age. Approximately 800 facilities currently operate integral secondary control machines. These facilities could continue to operate this equipment. All facilities that continue to use Perc dry cleaning equipment will be required to install enhanced ventilation and address all other operation and maintenance requirements specified in the proposed amendments. The number of Perc dry cleaning machines and facilities in each of the categories are shown in Table VII-1.

Table VII-1. Breakdown of Perc Dry Cleaning Facilities Subject to the Proposed Amended ATCM[1]

Facility Description	Number of Facilities	Number of Machines
Facilities with Converted, Primary Control, and add-on Secondary Control	1,490	1,630
Facilities with Integral Secondary Control	800	860
Co-residential Facilities	48	48[2]
Total Facilities Subject to the ATCM[3]	2,290	2,490
Total Facilities in South Coast	N/A	2,180[4]
Total Statewide Perc Dry Cleaning Facilities	4,290	4,670

1. Values are rounded to the nearest ten.
2. Machine to facility ratio is assumed to be one.
3. Total number of facilities is not the sum of the first three rows because co-residential facilities are included in the count for facilities with various machine types in the first two rows.
4. Based on 2003 facility survey.

Table VII-2 provides a summary of the anticipated actions that dry cleaners will take to address the proposed amended Dry Cleaning ATCM. Of the approximately 2,290 facilities affected by the proposed amended Dry Cleaning ATCM, ARB estimates that approximately 2,090 facilities will need to install enhanced ventilation. In order to minimize the economic impact to these facilities, there is either a two-or three-year compliance period established for enhanced ventilation installation based on their distance from a sensitive receptor. About 395 facilities (430 machines) will be impacted by loss of useful life. This early replacement of machines will occur due to receptor distance, if not replaced earlier, the final date for all replacement of July 1, 2016.

Table VII-2. Overview of Anticipated Dry Cleaner Actions from the Proposed Amended ATCM[1]

Action	Number of Facilities
Facilities Acquiring a New Integral Secondary Control Machine	1,480
Facilities Adding Enhanced Ventilation	2,090
Facilities Assumed to be Purchasing a Wastewater Treatment Unit	350
Facilities Losing One to Five Years of Useful Life for Their Converted, Primary, or Add-on Secondary Machine(s)	395

1. Values rounded to the nearest ten.

3. Methodology for Determining the Potential Impacts on Profitability for Affected Businesses

The potential economic impact of the proposed amended Dry Cleaning ATCM on California businesses is based on the following assumptions:

- Facilities that responded to the Facility Survey are representative of all affected dry cleaning facilities.
- The Facility Survey results show that about 40 percent of the facilities have gross sales that are less than $100,000, about 55 percent of the facilities have gross sales in the range of $100,000 to $500,000, and about 5 percent of the facilities gross over $500,000.
- Based on the above Facility Survey information, we estimated a typical dry cleaner has an average gross sale of about $250,000 per year.
- Using three-year (2002-2004) Dunn and Bradstreet financial ratios, we estimated financial data at a typical dry cleaner (DB, 2006).
- The annual cost of compliance is estimated for the dry cleaning facilities that are affected by the proposed amended Dry Cleaning ATCM.
- The annual cost of compliance for a typical facility is adjusted for both federal and State taxes.
- These adjusted business costs are subtracted from net profit data and the results are used to recalculate the ROE.

The resulting ROE is then compared with the ROE before the subtraction of the adjusted fees to determine the impact on the profitability of the businesses. A reduction of more than 10 percent in profitability is considered to indicate a potential for significant adverse economic impacts. This threshold is consistent with the thresholds used by U.S. EPA and ARB in previous regulations.

4. Assumptions for Business Profitability Analysis

The business profitability ROE calculations were based on the following assumptions.

- All affected businesses are subject to federal and State tax rates of 35 percent and 9.3 percent, respectively.
- Affected businesses absorb the costs of the proposed amended Dry Cleaning ATCM instead of increasing the prices of their products or lowering their costs of doing business through cost-cutting measures.

5. Potential Economic Impacts for Individual Dry Cleaning Facilities

The requirements of the proposed amended Dry Cleaning ATCM are dependant on many variables. Therefore, the actual economic impacts will depend on facility type, location, and the extent that the facility is already in compliance with the proposed amendments. As mentioned previously, three facility types have been identified. They are: 1) co-residential facilities; 2) facilities that operate with a converted machine, a primary control machine, or an add-on secondary control machine; and 3) facilities that operate with an integral secondary control machine.

a. Co-residential Facilities

Co-residential facilities are defined as facilities that share a wall, floor, or ceiling with a residence or are located in the same building with a residence. The proposed amendments will require approximately 48 co-residential facilities to replace their Perc operation by July 1, 2010. It is assumed that owners of co-residential facilities will choose to operate using the most popular alternative solvent, a high flash point hydrocarbon solvent (i.e., DF-2000, or EcoSolv). Additionally, it is assumed that there is one dry cleaning machine in each co-residential facility. Since a majority of the co-residential facilities are in the Bay Area, it is also assumed in the statewide cost impacts that these facilities already have installed enhanced ventilation and will be changing from secondary control Perc machines to a machine that uses hydrocarbon solvent. Bay Area facilities had to compile with Bay Area's dry cleaning rule in 1998; therefore, it is assumed that all the co-residential facilities will lose three years of useful life when their Perc machines are replaced in 2010. The actual cost impact to the facility will depend on the actual machine type (primary control or secondary control) at the facility. Table VII-3 shows the potential initial costs for a co-residential facility.

Table VII-3. Potential Initial Costs for Co-residential Dry Cleaning Facilities[1]

Facility Action	Cost (Dollars)
Differential Cost for a New Hydrocarbon Machine[2]	$17,100 or $23,100
Enhanced Ventilation	$3,700 to $8,500
Wastewater Treatment Unit	$1,335[3]
Spare Set of Gaskets and a Lint Filter	$334
Lost of Useful Life of Machine[4]	$0 to $8,780
Range of Total Initial Cost[5]	$22,469 to $37,249

1. Totals are rounded.
2. High end of range is cost to switch from primary controlled machine to hydrocarbon machine.
3. Average cost of available units.
4. Assumed to be 3 years of an integral secondary machine for majority of co-residential facilities.
5. Assumes a local ventilation system is installed. Local ventilation system cost about $3,700.

Table VII-4 shows the total annual recurring costs or the cost of operation and maintenance for operating a Perc primary control machine, a Perc secondary control machine, and a hydrocarbon machine. As shown on Table VII-4 the key recurring costs for operating a Perc primary control machine, a Perc secondary control machine, and a hydrocarbon machine are solvent use, maintenance, filters, and waste disposal. Additional recurring costs for secondary controlled Perc machines include the cost of complying with the annual leak testing and the annual drum concentration check. The annual leak test and the annual drum concentration check require a leak check device that can provide quantitative (i.e., numeric) results.

Table VII-4. Comparison of Recurring Costs for a Primary Control, Secondary Control, and Hydrocarbon Machine[1]

Technology	Solvent Costs	Cost of Detergent/ Spotting Agents	Electricity Cost	Gas Cost[2]	Average Maintenance	Filters	Cost to Replace Gaskets	Waste Disposal Cost	Total Annual Recurring Cost
Perc (Primary)	$1,673[3]	$1,500	$850	$3,580	$375	$320	$500	$2,500	$11,298
Perc (Secondary)	$1,203[3]	$1,500	$850	$3,580	$375	$320	$500	$2,500	$10,828
Hydrocarbon	$546	$1,500	$850	$3,580	$250	$371	$500	$2,640	$10,237

1. Values (except for Gas and Solvent cost) are from the Technical Assessment Report.
2. Gas costs are based on IRTA report and PPERC report.
3. Solvent cost for a Perc primary control machine is based on average usage as found in the Technical Assessment Report and normalized to overall average 46,600 pounds.

Table VII-5 illustrates the potential cost impacts of the proposed amendments to co-residential facilities at two hypothetical facilities. The biggest cost impact due to the proposed amendments is the cost of purchasing a hydrocarbon machine compared to a Perc machine. The incremental machine cost or the cost difference between a hydrocarbon machine and a primary control machine is $23,100; whereas, the cost between a hydrocarbon machine and a secondary control machine is $17,100 (CARB, 2006).

The total annual net cost for switching from a secondary control machine to a hydrocarbon machine ranges from $1,900 to $2,420. This value is obtained by adding the annualized incremental equipment cost which ranges from $2,490 to $3,010 (depending on how much a co-residential facility is already in compliance with the amendments during the remaining life of the Perc machine) to the annual cost savings of $590 from operation and maintenance. In the same way, the calculated total annual net cost for switching from a primary control machine to a hydrocarbon machine is ranges from $1,170 to $1,680. The cost of the proposed amendments for the co-residential facilities over its lifetime can be calculated assuming a 15-year useful life. For the statewide cost analysis, ARB is assuming that all 48 co-residential facilities are currently using secondary control Perc machines and most would already have enhanced ventilation. The decline in ROE for a co-residential facility is shown in Table VII-5.

Table VII-5. Decline in Return on Owner's Equity (ROEs) for Co-residential Facilities[1]

Machine Type	Equipment Cost Due to Early Replacement of machine	Incremental Machine Cost[2]	Other Potential Equipment Cost	Annualized Incremental Machine and Equipment Cost	Total Annual Recurring Savings	Total Annual Net Cost[3]	Percent Decline in ROE
Primary Control to Hydrocarbon	0	$23,100	$0	$2,230	-$1,060	$1,170	22
Secondary Control to Hydrocarbon[4]	$8,780	$17,100	$0	$2,490	-$590	$1,900	35

1. Cost values rounded off to the nearest $10.
2. Cost differential between purchasing a new hydrocarbon machine and a new primary control or a new secondary control machine.
3. Total Annual Net Cost is the sum of Annualized Initial Cost and Total Annual Recurring Cost.
4. Most likely machine type for a co-residential facility.

b. <u>Facilities that Operate a Converted, Primary Control, or an Add-on Secondary Control Machine</u>

Based on 2003 survey data, there are an estimated 3,000 primary control machines and about 80 converted machines in California. There are approximately 1,610 primary control machines and converted machines and about 19 add-on secondary control machines at 1,490 facilities outside of the South Coast AQMD (see Table VII-1). These facilities are required to replace their machines with either an integral secondary control machine or an alternative (non-Perc) cleaning system. It is estimated that about 700 machines will need to be replaced by July 1, 2009. In each subsequent year about 100 machines will need to be replaced as they reach 15 years old. Owners of about 430 machines will incur an additional cost due to losing part of the useful life of the machines because of the facility's distance to sensitive receptors or the 2016 requirement to replace all non-BACT machine replacements independent of machine age.

The potential initial costs for a facility that will replace a converted, a primary control, or a secondary control machine are listed in Table VII-6. The proposed amendments require all facilities with Perc converted machines, primary control machines and secondary control machines to replace their machines with either a secondary control machine or an alternative dry cleaning technology at specified times. If the facilities owners choose to replace their machines with a secondary control machine, these facilities will incur on average an additional $6,000. This $6,000 figure is the cost difference between purchasing a new primary control machine that would be replaced at the end of the average useful life of the machine and a new integral secondary control machine.

Table VII-6. Possible Initial Costs Options for a Facility Replacing a Converted Machine or a Primary Control Machine[1]

Facility Action	Cost of Option Going to Integral Secondary Control Machine (Dollars)	Cost of Option Going to Hydrocarbon Machine (Dollars)
Switch to a Hydrocarbon Machine	N/A	$23,100
Cost Differential to Switch to Integral Secondary Control Machine From Primary Control Machine	$6,000	N/A
Enhanced Ventilation	$3,700 to $8,500	$0 to $8,500
Wastewater Treatment Unit	$0 to $1,340[2]	$0 to $1,340[2]
Spare Set of Gaskets and a Lint Filter	$0 to $330	$0 to $330
Install Two Sampling Ports in Secondary Control machine	$115 (w/labor) $40 (w/o labor)	N/A
Lost of Useful Life of Machine[3]	$0 to $12,630	$0 to $12,630
Range of Total Initial Cost[4]	$9,740 to 24,120	$23,100 to $41,100

1. Totals may be rounded. N/A means not applicable to analysis
2. Average cost of available units.
3. Lost of useful life for the machine being replaced ranges from 1 year to 5 years for some facilities.
4. Assumes a local ventilation system is installed. Local ventilation system cost about $3,700.

Table VII-7 illustrates the potential cost impacts of the proposed amendments to dry cleaning facilities with a converted machine, primary control machine, or an add-on secondary control machine. The total cost figure is calculated assuming that all of these facilities will choose to replace their machine with an integral secondary control machine. These facilities will incur on average an additional $6,000 of initial cost to purchase a secondary control machine. Some of these facilities will incur a cost due to early replacement of their machines. The number of years of useful life lost due to early replacement ranges from one year to five years and the cost associated with this loss is estimated using straight line depreciation method (equal loss of value over time). This corresponds to a loss ranging from $2,530 to $12,630. Other possible initial costs for complying with the proposed amendments include installation of enhanced ventilation, a spare set of gaskets, a spare lint filter, installation of two sampling ports, and possibly a wastewater treatment unit.

The total initial cost for a facility, in addition to machine cost and cost due to early replacement of existing non-BACT machines, will depend on the equipment needs at each particular facility. Based on Facility Survey results, about 350 facilities may be using a wastewater treatment unit that does not meet the criteria of the proposed amendments. For the cost analysis, it is assumed that the impacted facilities will choose to purchase a new wastewater treatment unit, and a typical facility will choose to install the least expensive type of enhanced ventilation, a local ventilation system. The range of initial cost, excluding machine or other equipment costs, is from $3,740 to $5,480.

The recurring costs of complying with the proposed amendments include the costs of the annual leak testing and the annual drum Perc concentration check for secondary control machines. ARB staff estimates that the majority of dry cleaning facilities will choose to arrange for their local air districts to perform this check during the district's annual inspection. Therefore, the facility operator will incur the cost of two man-hours, or $20, to assist district staff with this process. Most operation and maintenance costs are assumed to be the same between a primary control and a secondary control machine (see Table VII-4). The additional annual ongoing cost for the facilities that do not already have an integral secondary control machine is determined from cost savings due to reduced Perc usage and the cost of replacing the carbon for the secondary control. The ROE range for facilities that operate a primary or converted machine is shown in Table VII-7.

Table VII-7. Decline in Return on Owner's Equity (ROEs) for Facilities with an Add-On Secondary, Primary, or Converted Machine[1]

Machine Type	Equipment Cost Due to Early Replacement of machine	Incremental Machine Cost[2]	Other Equipment Cost[3]	Annualized Incremental Machine and Equipment Cost[4]	Total Annual Recurring Savings[5]	Total Annual Net Cost[6]	Percent Decline in ROE
Converted, Primary Control, or Add-on Secondary Control to Secondary Control	$0 to $12,630	$6,000	$3,740 to $5,480	$940 to $2,320	-$390	$550 to $1,930	10 to 35

1. Cost values rounded off to the nearest $10. Costs occur at time of purchase or use and reflect 2005 purchase.
2. Cost differential between purchasing a new secondary control machine and a new primary control machine assuming that a primary control machine has a useful life of 15 years.
3. Other Equipment Cost is the sum of all of the most likely initial costs besides machine (including local ventilation systems, wastewater treatment units, spare gaskets, spare lint filters, and installation of sample ports).
4. Lower end of the annualized incremental machine and equipment cost do not include cost due to early replacement of machine because not all facilities will incur this cost.
5. Annual Recurring Savings include cost savings due to reduced Perc usage, annual leak and drum concentration check cost, and annualized cost for carbon replacement.
6. Total Annual Cost is the sum of Annualized Initial Cost and Total Annual Recurring Cost.

c. Facilities that Operate a Secondary Control Machine

There are about 860 secondary control Perc machines in California, outside of the South Coast AQMD, that are subject to the proposed amendments. These 860 secondary control Perc machines are used in approximately 800 facilities. The potential initial costs for a facility with secondary control are listed in Table VII-8.

Table VII-8. Possible Initial Costs Options for a Facility with a Secondary Control Machine[1]

Facility Action	Cost of Option Going to Integral Secondary Control Machine (Dollars)	Cost of Option Going to Hydrocarbon Machine (Dollars)
Switch to a Hydrocarbon Machine	N/A	$17,100
Enhanced Ventilation	$0 to $8,500	$0 to $8,500
Wastewater Treatment Unit	$1,340[2]	$0 to $1,340[2]
Spare Set of Gaskets and a Lint Filter	$330	$0 to $330
Install Two Sampling Ports in Secondary Control machine[3]	$0 to $115	N/A
Range of Total Initial Cost[4]	$0 to $5,480	$17,100 to $22,469

1. Totals may be rounded. N/A means not applicable to analysis
2. Average cost of available units.
3. Where applicable, cost for installing two sampling ports is $40 without labor, and $155 with labor
4. Assumes a local ventilation system is installed. Local ventilation system cost about $3,700.

Other possible initial costs from complying with the proposed amendments are the same as those for facilities which operate a converted, primary control, or add-on secondary control machine and include installation of enhanced ventilation, a spare set of gaskets, a spare lint filter and possibly a wastewater treatment unit. The cost for enhanced ventilation ranges from $3,700 to $8,500. A summary of the initial costs for the impacted facilities are shown in Table VII-8.

The total initial costs for a facility, in addition to machine cost, will depend on the equipment needs at each of the particular facility. Based on Facility Survey results, some facilities may be using a wastewater treatment unit that does not meet the criteria of the proposed amendments. For the cost analysis, it is assumed that these facilities will choose to purchase a new wastewater treatment unit. Also, for the cost analysis, it is assumed that a typical facility will choose to install the least expensive type of enhanced ventilation, a local ventilation system. The range of initial costs excluding machine, or other equipment costs, is from $0 to $5,480.

Annual recurring costs or the cost of operation and maintenance for operating a Perc secondary control machine are shown on Table VII-4. The only recurring cost resulting from the proposed amendments is the cost of complying with the annual leak testing. ARB staff estimates that the majority of dry cleaning facilities will choose to arrange for their local air districts to perform this check testing during their annual inspection. Therefore, the facility operator will incur the cost of a two man-hours, or $20, to assist district staff with this process. The additional annual ongoing cost for the facilities that do not already have an integral secondary control machine is determined from cost savings due to reduced Perc usage and the cost of replacing the carbon for the secondary control. The decline in ROE and the total annual cost for complying with the regulation are shown in Table VII-9..

Table VII-9. Decline in Return on Owner's Equity (ROEs) for Facilities with a Secondary Control Machine[1]

Machine Type	Number of Machines in Cost Calculation	Incremental Machine Cost	Other Equipment Cost[2]	Annualized Incremental Machine and Equipment Cost	Total Annual Recurring Costs[3]	Total Annual Net Cost[4]	Percent Decline in ROE
Secondary Control	860	N/A	$3,700 to $5,480	$360 to $530	$20	$380 to $550	7 to 10

1. Cost values rounded off to the nearest 10, costs occur at time of purchase or use and reflect 2005 purchases.
2. Other Equipment Cost is the sum of all of the most likely initial costs besides machine (including local ventilation system, wastewater treatment unit, spare gaskets, spare lint filter, and installation of sample ports).
3. Annual Recurring Cost is the cost associated with annual leak and drum concentration checks.
4. Total Annual Cost is the sum of Annualized Initial Cost and Total Annual Recurring Cost.

6. Assumptions for Facility Cost Estimates

Several assumptions were made for the facility cost estimates. For machine usage, we assumed that the owners of the co-residential facilities will choose to purchase and operate a hydrocarbon machine when they need to phase out of Perc operation. We assumed that owners of facilities with the more emissive Perc machines would choose to purchase a secondary control machine when they need to replace their machines. For the facilities that will lose some of the useful life of the non-BACT machines, the loss was estimated using straight line depreciation discussed in Part 5. For enhanced ventilation, we assumed that owners would install a local ventilation system, the least costly type of enhanced ventilation. Regarding wastewater units, it is assumed that these facilities will choose to purchase a new wastewater treatment unit. We also assumed that half of the facilities will choose to put in the sampling ports themselves, and all of the impacted facilities will need to purchase a spare set of gaskets and a spare lint filter. The statewide costs of the proposed amendments were calculated in 2005 dollars and used the same assumptions as the facility cost calculations. Additional factors taken into considerations included: when cost incurred, the number of facilities for each facility type, the number and age of the machines, and the number of wastewater treatment units that need to be replaced.

We annualized non-recurring fixed costs using the Capital Recovery Method. Using this method, we multiplied the non-recurring fixed costs by the Capital Recovery Factor (CRF) to convert these costs into equal annual payments over a project horizon at a discount rate of 5 percent. The Capital Recovery Method for annualizing fixed costs is recommended by Cal/EPA (Cal/EPA, 1996), and is consistent with the methodology used in previous cost analyses for ARB regulations.

The CRF is calculated as follows:

$$CRF = \frac{i(1+i)^n}{(1+i)^n - 1}$$

where,

CRF	=	Capital Recovery Factor
i	=	discount interest rate (assumed to be 5 percent)
n	=	project horizon or useful life of equipment

All costs of equipment were annualized over 15 years, based on the expected lifetime of a dry cleaning machine. The total annual cost was obtained by adding the annual recurring costs to the annualized fixed costs derived by the Capital Recovery Method.

7. <u>Potential Impact on Manufacturers of Dry Cleaning Machines and Related Equipment Required by the Proposed Amended ATCM</u>

We expect the proposed amendments may increase business for the manufacturers or distributors of dry cleaning machines. Although the useful life of a dry cleaning machine has been recognized as 15 years, many facilities still operate with machines that are older than 15 years. We expect the proposed amendments would lead to an increase in new machine purchases. The manufacturers of dry cleaning machines in turn may incur some minor expense in the machine certification process due to changes in the proposed amendments. Staff estimated the additional cost due to changes in the certification process based on the increased number of loads before certification testing and the associated increase in labor, electricity, and gas costs. The additional cost is estimated to range from $609 to $3,379. Staff estimates that there will be about 3 new certifications per year. Because dry cleaning machine manufacturers are not located in California and the total cost is comparably insignificant, this cost would not impact California business.

We expect a slight increase in the sales of Perc detectors and wastewater treatment units due to the proposed amendments. These cost benefits are not factored into the cost calculations.

8. <u>Potential Impact on Consumers</u>

The potential impact of the proposed amended Dry Cleaning ATCM on consumers depends upon the expected payback period for the cost incurred by the proposed amendments. Two types of calculations were made to estimate the potential cost recovery price increase. First, the price increase is estimated assuming that the dry cleaning facilities will need to obtain a loan for the purchase of new dry cleaning equipment, a payback period of five years is used. This is a reasonable assumption because most dry cleaning businesses are small businesses. In addition, the potential impact calculation assumes the cost of the regulation to the dry cleaners will be passed onto their customers.

To completely offset the net cash outflow over the five years, a dry cleaner would have to increase its annual revenues by the amount of the loan repayment, additional tax due to price increase, and, if applicable, cost (loss) of early replacement of machine. For the co-residential facilities that will lose three years of useful life of their existing Perc machine and will purchase, install, and maintain a hydrocarbon machine, the increase in price would be about $0.90 per garment. For the typical facility that is required to purchase, install, and maintain an integral secondary control machine, with a maximum of five years of loss in useful life, the average increase in price would be between $0.65 and $0.75 per garment. For the facility that already has an integral secondary control machine, the price increase would be about $0.05 per garment.

The calculation for price increase is based on the cost of the regulation for the three typical facilities divided by the median annual amount of material dry cleaned per facility. The dry cleaning industry estimates that each garment weighs approximately one pound, (CARB, 2006). Table VII-10 shows a summary of the estimated price increase for the three facility types over the five-year loan period.

Table VII-10. Summary of Cost Recovery Price Increase for the Three Facility Types Over Loan Period

Facility Type	Machine Cost[1]	Maximum Potential Equipment Cost[2]	Annual Machine and Equipment Loan Cost[3] (Over 5 years)	Total Annual Recurring Savings	Total Annual Net Cost	Total Annual Net Cost[4] (before tax)	Cost of Loss of Useful Life[5]	Cost Recovery Price Increase[6] ($/garment)
Co-residential	$68,000	$0	$17,940	-$590 to -$1,060	$16,870 to $17,350	$28,690 to $29,430	$1,800	$0.90
Facility with Converted, Primary Control, or Add-On Secondary Control	$48,400	$3,740 to $5,480	$ 13,750 to $14,210	-$390	$13,360 to $13,820	$2,670 to $2,350	$0 to $2,530	$0.65 to $0.75
Facility with Integral Secondary Control machine	N/A	$3,740 to $5,480	$1,450	$20	$1,010 to $1,470	$1,710 to $2,490	$0	$0.05

1. Machine cost includes installation and removal costs.
2. Maximum Equipment Cost is the sum of all of the most likely initial costs besides machine (including local ventilation system, wastewater treatment unit, spare gaskets, spare lint filter, and installation of sample ports).
3. Assuming a 5-year loan at an interest rate of 10 percent.
4. Total annual net cost before tax is the total annual net cost divided by 1/(1-0.093)*1/(1-0.35) to account for a 9.3 percent State tax rate and a 35 percent federal tax rate.
5. Cost due to loss of useful life is spread out evenly over the 5 year loan period. Facilities with converted, primary control, or add-on secondary control, a range is provided to reflect years of useful life lost.
6. Cost recovery price increase is calculated using a median amount of material dry cleaned per facility of 35,000 lbs and rounded.

The estimation of cost recovery price increase shown in Table VII-10 is valid for the immediate economic effect on the dry cleaner but does not represent a facility's long-term cost or the true cost of the proposed amendments to the economy. The second estimation of cost recovery price increase due to the proposed amendments is calculated based on a 15-year lifetime of the machines, accounting for cost of reduced useful life when applicable and when various expenses are to occur. The statewide regulation cost is shown in Section E to be 16 million and do not include additional interest that a dry cleaner may have to pay for getting a loan. The cost recovery price increase is then calculated assuming all the dry cleaning facilities will need to recover the average amount of expense based on the total amount of material dry cleaned outside of the South Coast AQMD statewide. In this case, the theoretical resulting cost to the dry cleaning customers is about 2 cents ($0.02) per garment.

9. Potential Impact on Employment

We expect the proposed amended Dry Cleaning ATCM to have a minor impact on employment of the dry cleaning facilities. It is possible that some marginal dry cleaning businesses may not have the capital necessary to comply with the proposed amendments and may elect to close resulting in some employee lay-offs. Also, the proposed amended Dry Cleaning ATCM will likely result in increased business for dry cleaning machine manufacturers, distributors, and installers, enhanced ventilation manufacturer, distributors, and installers, and waste water treatment unit manufacturers and distributors. In these cases, it may result in increased employment.

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

Assuming that the compliance costs of the proposed amended Dry Cleaning ATCM may be absorbed for most dry cleaning operators or passed on to their customers, the proposed amended Dry Cleaning ATCM will have no noticeable impact on the status of California businesses. Some marginal dry cleaning businesses may not have the capital necessary to comply with the proposed amendments. These businesses may choose to operate with a less costly alternative dry cleaning process or cease their dry cleaning operations altogether.

11. Potential Impact on Business Competitiveness

The proposed amended Dry Cleaning ATCM is not expected to have a significant impact on the ability of California businesses to compete with businesses from other states. Most dry cleaning businesses are independent operations that compete for local business within their region and rarely seek business from outside the State.

C. Costs to State Agencies

Section 39666, of the Health and Safety Code requires that, after the adoption of the proposed amended Dry Cleaning ATCM by the Board, the local air districts must implement and enforce the ATCM or adopt an equally effective or more stringent regulation. Because the local air districts will have primary responsibility for implementing and enforcing the proposed amended Dry Cleaning ATCM, we evaluated the potential costs to the local air districts. We also evaluated the potential costs to local and State agencies. This section provides the conclusions we reached and the basis for those conclusions.

The Department of Corrections operates nine Perc dry cleaning machines and one hydrocarbon dry cleaning machine at ten correctional facilities in California. The one facilities that is operating a hydrocarbon dry cleaning machine will not be impacted by the proposed amendments. The remaining nine Perc machines and will need enhanced ventilation and installation of sampling ports to the secondary control machines. Two of the nine Perc machines are secondary control machines and are not impacted by the proposed amendments for equipment. The remaining seven dry cleaning machines are primary control machines and need to be phased out when they are 15 years old. Table VII-11 shows the facilities at the Department of Corrections that have dry cleaning on-site, their machine type, age, and whether or not they have a wastewater treatment unit (WWTU).

The Department of Corrections may incur a capital cost for replacing their primary machines, installing enhanced ventilation and sampling ports. During the first three years of implementation, a total of four of the primary control machines will need to be replaced because they will be 15 years old or older and a total of nine enhanced ventilation systems will need to be installed. Secondary control machines cost about $6,000 more than a primary control machine. The capital cost of a secondary control machine is about $43,900. The additional fiscal impact is, thus, estimated to be between $6,000 and $43,900 per machine purchased.

Table VII-11. List of Facilities at the Department of Corrections With Dry Cleaning Machines and Wastewater Treatment Units[1]

Facility Name	Machine Type		Machine Age (years)	WWTU	
	Solvent Type	# of Machines		Yes	No
CA Correctional Center Susanville	Perc Primary	1	14	X	
CA Correctional Institution Tehachapi	Perc Primary	1	approx. 10	X[2]	
CA Mens Colony San Luis Obispo	Hydrocarbon	1	Installed June 2005	N/A	N/A
CA Rehabilitation Center Norco	Perc Secondary	1	Installed Dec. 2005		X[2]
CA State Prison San Quentin	Perc Primary	1	18		X[2]
Centinela State Prison	Perc Primary	1	9		X[2]
Chuckawalla Valley State Prison Blythe	Perc Secondary	1	6	X	
Correctional Training Facility Soledad	Perc Primary	1	12 to 15		X[2]
Mule Creek State Prison	Perc Primary	1	18		X[2]
Valley State Prison for Women	Perc Primary	1	10	X	

N/A means not applicable.
1. Information for the table was obtained in 2005.
2. Hazardous waste is hauled away.

For the cost of enhanced ventilation, it is assumed that the Department of Corrections will choose to install local ventilation systems, the least costly type of enhanced ventilation. The cost of a local ventilation system is approximately $3,700 and the total cost for the nine facilities is about $33,300. For the cost of installing sampling ports, it is assumed that the labor cost for installing the ports is $75. Parts for the two sampling ports cost approximately $40. Therefore, the total cost of installing sampling ports for a secondary control machine is $115.

Alternatively, the Department of Corrections can also comply with the proposed amendments by replacing the Perc machines with an alternative dry cleaning technology when their primary machines are 15 years old. Depending on the type of technology that is chosen, this can result in higher or lower costs to the State. In summary, the fiscal cost impact to the Department of Corrections during the first three years ranges from $58,000 to $209,600, and the total cost to comply with the proposed amendments over its lifetime ranges from $76,300 to $341,600. Table VII-12 lists the estimated cost impacts to the Department of Corrections.

Table VII-12. Cost Impacts to the Department of Corrections[1]

Time	Cost Impact Due to Change of Machines[2]	Cost for Installing Sampling Ports	Enhanced Ventilation Cost	Total Cost Impact[3]
First Year	$0	$200	$0	$200
First Three Years	$24,000 - $175,600	$700	$33,300	$58,000 - $209,600
Life Time of the Regulation	$42,000 - $307,300	$1000	$33,300	$76,300 - $341,600

1. Costs rounded off to nearest $100.
2. Cost impact for switching to secondary machine.
3. Total cost impact equals the sum of cost impact due to change of machines and enhanced ventilation cost.

D. Costs to Local Air Districts

The dry cleaning facilities affected by the proposed amended Dry Cleaning ATCM are located in all but five local air districts. Four of local air districts do not have dry cleaning facilities. The fifth, South Coast AQMD, has a rule that is more stringent compared to the proposed amended Dry Cleaning ATCM; therefore, the dry cleaning facilities that are located in the South Coast AQMD are not expected to be impacted by this proposed amended Dry Cleaning ATCM. Over 95 percent of the rest of the dry cleaning facilities are located in the following six districts: Bay Area AQMD, Monterey Bay Unified APCD, Sacramento Metropolitan AQMD, San Diego County APCD, and San Joaquin Valley Unified APCD.

There is an estimated increase in reporting and enforcement cost of $931,000 to $1,463,000 for the districts for the first three years. These costs were estimated based on input from local air districts on time and labor costs of enforcement of the proposed amendments and the Perc purchase reporting requirement. The local air districts estimate that approximately four hours per facility will be required to enforce the phase out of primary control, converted, and add-on secondary control machines. An additional four hours would be required to enforce the installation of enhanced ventilation systems. Also, 4.8 hours are required per year for reporting facility Perc purchases to ARB. Table VII-13 shows the estimated cost increase for the first three years for the local air districts.

Local air district responsibilities under the proposed amended Dry Cleaning ATCM can be fully financed from the fee provisions authorized by HSC sections 42311 and 40510. The proposed amended regulation does not have provisions for reimbursement from the state to the districts pursuant to section 6 of Article XIII B of the California Constitution because the local air districts have the authority to levy service charges, fees, or assessments sufficient to pay for the program or level of service within the meaning of section 17556 of the Government Code.

Table VII-13. Estimated Cost Increase for the Local Air Districts

	Total Hours for Equip. Enforcement[1] (hrs)	Number of facilities for Equipment Change	Total Hours for Vent. Enforcement[1] (4 hr/facility)	Number of Facilities for Vent.	Reporting Time (hrs/year)	Total Cost (Based on $70/hour)[2]	Total Cost (Based on $110/hour)[2]
First year	0	0	0	0	168	$ 12,000	$ 19,000
Second year	2,908	727	4,644	1,161	168	$ 540,000	$ 849,000
Third year	1,288	322	3,960	990	168	$ 379,000	$ 596,000
Total (first three years)	4,196	1049	8,604	2,151	504	$ 931,000	$ 1,463,000

1. Based on district input of 4 four hours per facility for equipment enforcement and the same amount of time for ventilation requirement enforcement.
2. Values for total cost are rounded off to the nearest thousand.

E. Total Cost of the Proposed Amendments

The statewide cost of the proposed amendments was calculated in 2005 dollars and used the same assumptions as the facility cost calculations. Additional considerations taken included: when cost incurred, the number of facilities for each facility type, the number and age of the machines, and the number of wastewater treatment units that need to be replaced. Additional assumptions were that half of the facilities will choose to put in the sampling ports themselves, and all of the impacted facilities will need to purchase a spare set of gaskets and a spare lint filter. Table VII-14 provides a summary of the assumptions used in the cost estimates for equipment as other than a machine.

Table VII-14. Assumptions Used in the Cost Estimates for Equipment "Other Than a Machine"

Required Equipment	Percent of Impacted Facilities
Local Ventilation System[1]	93%
Wastewater treatment units	16%
Spare set of gaskets and a lint filter	100%
Install two sampling ports in secondary control machine (with labor and w/o labor)	50% (w/ labor) 50% (w/o labor)

1. Assumes facilities will choose to install a local ventilation system for enhanced ventilation.

Table VII-15 contains an overview of the total and annual costs of proposed amended Dry Cleaning ATCM. The calculated statewide cost of the amendments is $16 million over 15 years to private dry cleaning businesses. The annualized statewide cost of the amendments is $1.6 million per year. To the extent that dry cleaning facilities are unable to pass on the compliance costs of the proposed amendments to their customers, they could experience a significant adverse economic impact. The

ARB staff estimates the total capital cost of the proposed amended Dry Cleaning ATCM to State government agencies that operate dry cleaning machines to be approximately $341,600.

Cost impact calculations may be resulting in higher or lower estimates than that are actually realized because it was not possible to account for the dry cleaning facilities that have used Perc primary control machines while the Facility Survey was being conducted or voluntarily changed to either an alternative technology or to a secondary control machine.

F. Cost Effectiveness of the Amended ATCM

The cost effectiveness of the proposed amended Dry Cleaning ATCM is evaluated by calculating the cost per pound of Perc reduced. Assuming no facility closures due to economic hardship and all the facilities that are allowed to operate with Perc will continue to do so, the amended ATCM will reduce Perc emission by 1 ton per day (from 2.6 tons per day to 1.6 tons per day) from all impacted facilities when all the dry cleaning facilities are in full compliance of the proposed amended Dry Cleaning ATCM. This was calculated by multiplying the number of secondary control machines by the normalized average emissions for a secondary machine (CARB, 2006). In terms of pounds (lbs) per year, the result was about 604,000 lbs per year in Perc reduction.

The cost effectiveness of the proposed amended Dry Cleaning ATCM can then be calculated by dividing the annualized cost of the regulation of $1.6 million by the 604,000 lbs of Perc reduced per year. The result is about $2.60 per pound of Perc reduced.

Table VII-15. Overview of the Total and Annual Costs of Proposed Amended ATCM by Machine and Facility Type[1]

Machine Type	Number of Machines	Incremental Machine Cost	Other Equipment Cost[2]	Cost of Early Machine Replacement	Annualized Incremental Machine and Equipment Cost	Total Annual Recurring Costs[3]	Total Annual Net Cost[4]	Percent Decline in ROE
Co-res. Primary Control to Hydrocarbon	0	$23,100	$0	0	$2,230	-$1,060	$1,170	22
Co-res. Secondary Control to Hydrocarbon	48	$17,100	$0	$8,780	$2,490	-$590	$1,900	35
Converted, Primary Control or Add-on Secondary to Integral Secondary Control	1,630	$6,000	$3,740 to $5,484	$0 to $12,630	$940 to $2,320	-$390	$550 to $1,930	10 to 35
Integral Secondary Control	860	N/A	$3,700 to $5,484	0	$356 to $528	$20	$376 to $548	7 to 10
Sub-Total from Private Facilities[5]	2538	N/A	N/A	N/A	N/A	N/A	16 million	N/A
Sub-Total from State Facilities	9	N/A	N/A	N/A	N/A	N/A	$341,600	N/A

1. Cost values rounded. Values reflect 2005.
2. Other Equipment Cost is the sum of the most likely initial costs besides machine (including a local ventilation system, a wastewater treatment unit, spare gaskets, a spare lint filter, and installation of sample ports).
3. Annual Recurring Cost is the cost due to reduced Perc usage, annual leak and drum concentration checks, and carbon replacement.
4. Total Annual Net Cost is the sum of Annualized Initial Cost and Total Annual Recurring Cost.
5. Sub-Total from State Facilities is estimated from the costs shown for the different machine types with consideration for when the costs occurred.

VIII. ENVIRONMENTAL IMPACTS OF THE PROPOSED AMENDED AIRBORNE TOXIC CONTROL MEASURE

The intent of the proposed amended ATCM is to protect the public health by reducing the public's exposure to potentially harmful emissions of Perc. An additional consideration is the impact that the proposed amended ATCM may have on other areas of the environment.

This chapter describes the potential impacts that the proposed amended ATCM may have on wastewater, groundwater contamination, hazardous waste disposal, soil, flammability, energy usage, and other air pollution impacts. The ARB staff expects that the only significant adverse environmental impact should occur in air pollution due to the expected increase in the use of solvents containing VOCs.

A. Legal Requirements Applicable to the Analysis

The California Environmental Quality Act (CEQA) and ARB policy require an analysis to determine the potential adverse environmental impacts of proposed regulations. Since the ARB's program involving the adoption of regulations has been certified by the Secretary of Resources (see Public Resources Code section 21080.5), the CEQA environmental analysis requirements are allowed to be included in the Initial Statement of Reasons for a rulemaking in lieu of preparing an environmental impact report or negative declaration. In addition, the ARB will respond in writing to significant environmental issues raised by the public during the public review period or at the Board hearing. These responses will be contained in the Final Statement of Reasons for the ATCM.

Public Resources Code section 21159 requires that the environmental impact analysis conducted by ARB include the following: (1) an analysis of the reasonably foreseeable environmental impacts of the methods of compliance; (2) an analysis of reasonably foreseeable feasible mitigation measures; and, (3) an analysis of reasonably foreseeable alternative means of compliance with the ATCM. Regarding reasonably foreseeable mitigation measures, CEQA requires an agency to identify and adopt feasible mitigation measures that would minimize any significant adverse environmental impacts described in the environmental analysis.

B. Potential Wastewater Impacts

Sanitation districts have been concerned about the amount of chlorinated compounds found in the waste effluent at treatment plants and the potential for illegal disposal of Perc dry cleaning wastes down the sewers. Many treatment plants do not have the equipment necessary to process industrial wastes such as chlorinated solvents that have been detected at elevated levels at some facilities. The impact of influent concentrations of Perc from the dry cleaning industry appears to be low due to the changes in dry cleaning operations and the implementation of environmental regulations (NC, 2001). It should be noted that spotting chemicals can also be a source of Perc in wastewater. Based on information gathered from the Dry Cleaning Facility Survey, dry cleaning facilities using Perc either use a wastewater treatment unit to recycle their Perc or they have their wastewater picked up by a registered hazardous waste transporter. (Note: In California, all hazardous waste must be managed offsite by a transporter that is registered with DTSC.) ARB staff has determined that there will be a slight reduction of Perc to wastewater due to the reduction of Perc use and more stringent controls in the proposed amended ATCM.

In general, it is prudent to check with the local publicly owned treatment works in the State before discharging any wastewater into the sewer. However, potential wastewater impacts of the alternative solvents were assessed based on available information. The CO_2 cleaning process does not generate wastewater and would not have an impact. Dry cleaners that use other alternative solvents, including GreenEarth, hydrocarbon, and glycol ethers, can release the solvents to water, mainly in the form of separator water. Separator water was analyzed in a project conducted by the IRTA and the Los Angeles County Sanitation District (LACSD). Separator water from three facilities, each using one of the alternative solvents mentioned, was analyzed for certain metals, toxic organics, and aquatic toxicity (IRTA, 2005). In all cases, the metal concentrations and the toxic organic concentrations were below health-protective detection limits. Additionally, in all three cases, the separator water did not exhibit aquatic toxicity (IRTA, 2005).

In addition, IRTA and LACSD analyzed the wash and rinse effluents from four wet cleaning facilities for certain metals, toxic organics, and aquatic toxicity. None of the samples contained metal concentrations that exceeded hazardous waste levels that are set by title 22 of the California HSC. Perc and/or trichloroethylene (TCE) were found in the effluent from three of the wet cleaning facilities. In some cases, the concentrations of these toxics exceeded hazardous waste levels. The origin of the TCE and at least some of the Perc is most likely spotting chemicals that are used to pre-spot garments. A few of the facilities had both wet cleaning and Perc machines and the Perc may have also been entrained in garments cleaned in the wet cleaning machine. The analysis indicated that effluent samples from all four facilities did not exhibit aquatic toxicity despite the presence of Perc and/or TCE (IRTA, 2005).

C. Potential Groundwater Contamination Impacts

One of the concerns with the use of Perc is groundwater contamination. Perc is known to pass through porous surfaces, such as building walls, sewer lines, and cement floors (ARB, 1993). Therefore, Perc usage poses a significant threat to the safety of groundwater. Perc has been detected in both wastewater and groundwater in the South Coast air basin, with some levels in excess of the current drinking water standard of five parts per billion (South Coast, 2002). Perc has also been detected in 968 wells or approximately ten percent of the 9,500 wells tested in California as of March 1996. Cleanup cost for these wells have been estimated at $3 billion dollars (CFCA, 2002). The implementation of this dry cleaning regulation and resulting changes in the dry cleaning industry will reduce the amount of Perc used and provide at least a proportional reduction in the potential impact on groundwater contamination from Perc.

Based on information available for the alternative solvents, groundwater contamination is not as large an issue compared to Perc. When DF-2000, the more commonly used hydrocarbon solvent, is released into the environment, volatilization from water to the air is calculated to occur at a relatively rapid rate, i.e., a few days. Non-volatized product in the natural environment will biodegrade at a moderate rate and not persist (ExxonMobil, 2003). Other high flash point hydrocarbon solvents are expected to behave similarly.

The GreenEarth solvent is unlikely to leach into groundwater because it is not very soluble in water and readily sticks to soil particles (GreenEarth, 2003). Based on test data with other silicone materials, if spilled on the ground, D_5 is expected to decompose to carbon dioxide, silicon dioxide (sand), and water. According to a study conducted by the International Fabricare Institute (IFI), GreenEarth solvent has low solubility in water (<100 parts per billion (ppb)) and is very close in density to water; therefore, if it is discharged to water, it will initially form a surface film and then will rapidly evaporate into the air. The half-life for GreenEarth in surface water is estimated at between one to five days. Acute studies with trout, daphnia, and algae show no significant effects at the highest doses prescribed by the test methodology. If larger amounts of GreenEarth solvent are kept in contact with soil, it will also be expected to decompose to carbon dioxide, silicon dioxide (sand), and water (IFI, 2002).

Groundwater contamination is not a concern using the CO_2 process. At room temperature, CO_2 can exist as a liquid if kept in a closed system at an elevated pressure. The cleaning systems used for CO_2 are able to efficiently convert CO_2 from a gas to a liquid. One of these systems permits 98 percent of the CO_2 to be recycled (U.S. EPA, 1999). In general, only a nominal amount of CO_2 is then vented to the atmosphere.

Environmental fate on the Rynex 3 solvent is not readily available, but the Rynex 3 formulation is a type of propylene glycol ether. Proplylene glycol ethers are known to be biodegradable. All propylene glycol ethers are liquid at room temperature and all are water-soluble. Propylene glycol ethers are unlikely to persist in the environment. Two specific types of glycol ethers, proplylene methyl ether and propylene glycol methyl ether acetate, have shown rapid biodegradation in soil (SIDS, 2003).

D. Potential Hazardous Waste Impacts

Hazardous waste is regulated in California by a federally authorized State program under the responsibility of DTSC. Under this program, Perc is classified as hazardous waste. In California, all hazardous waste at a facility must be transported off-site by a registered hazardous waste transporter. In general, it is the facility owner's responsibility to determine whether the waste from the facility is hazardous.

Waste generated by the use of Perc in dry cleaning includes the still bottoms from solvent distillation and the spent cartridge filters used to remove lint and insoluble soil from the extracted Perc. Cartridge filters are typically replaced every six months or less, depending on workload and manufacturer recommendation. Reusable spin disc filters are also used and the removed lint and dirt from the spin disc filters generate perc-contaminated waste (JE, 2004).

According to the Facility Survey, the change in the amount of waste generated from hydrocarbon and GreenEarth technologies is relatively small compared to Perc. In terms of waste volume, the CO_2 and Rynex 3 cleaning processes are expected to generate the least amount of waste compared to Perc and the other alternative technologies. In general, wastes from the mentioned alternative processes include spent filters and still bottoms. The still bottoms from four dry cleaning facilities that used hydrocarbon solvents, GreenEarth, Rynex 3 and CO_2, were analyzed in a study IRTA conducted with LACSD. The results of these tests showed excess levels of lead for one of the still bottom samples and three out of four of the still bottom samples exhibited aquatic toxicity (IRTA, 2005). Given that the solvents do not contain lead and are not expected to exhibit aquatic toxicity, the results indicate that the spotting chemicals and detergents used may alter the characteristics of the waste streams. Alternately, waste streams from alternative processes can be handled as hazardous waste. Currently, registered hazardous waste transporters remove the wastes from hydrocarbon dry cleaning facilities as hazardous waste (ARB, 2004i).

The water-based cleaning technologies also generate spent filters. Again, in the absence of contamination from hazardous compounds, handling as municipal solid waste is an option. Additionally, the detergents that are used are biodegradable and designed for discharge via the sanitary sewer. These detergents should be readily removed at the local treatment plant (JE, 2004).

E. Potential Soil Impacts

Soil contamination has been a problem with Perc use. According to one report, Perc is found in more than 50 percent of the Superfund sites in the United States (CFCA, 2002). The DTSC identified Perc as a solvent that has contaminated one out of every ten public drinking water wells in California, creating a need for a state cleanup effort. Concern forf soil contamination is ongoing in all dry cleaning processes. Soil contamination can occur through accidental releases, such as spills, or during the distillation process from a boil-over. Although federal, state, and local environmental regulations have been developed to help minimize soil contamination, dry cleaners should take all necessary steps to contain spills and clean them up quickly.

F. Potential Flammability of Alternative Solvents

The use of alternative solvents may cause a potential fire hazard to the environment. Flammable or combustible liquids are listed in different classes. The combustible liquids used in the dry cleaning industry are listed under classifications based on their flash point. Flash point is defined as the temperature at which a flame will ignite the solvent vapors. The vapor burns, not the liquid itself. The range at which a liquid produces flammable vapors depends upon its vapor pressure. The vaporization rate increases as the temperature increases. Therefore, flammable and combustible liquids are more hazardous at elevated temperatures than at room temperature (UCSD, 2005). The combustible liquids used in dry cleaning are classified as Class II, Class IIIA, or Class IIIB in accordance with the National Fire Protection Association (NFPA). The use of these combustible liquids may require the issuance of fire permits. Class II liquids, like the Stoddard solvent, have a flash point at or above 100 degrees Fahrenheit (°F) and below 140°F. Class IIIA liquids have a flash point at or above 140°F and below 200°F. The hydrocarbon solvents are an example of the Class IIIA liquids. Class IIIB liquids, like the Rynex 3 solvent, have a flash point at or above 200°F. Class IV liquids, such as Perc, are considered noncombustible and, therefore, are not potential fire hazards (JE, 2004).

In the past, Stoddard was a popular dry cleaning solvent that saw a significant decrease in usage due to fire hazard concerns. As mentioned above, this solvent is classified as a Class II liquid and has a flash point of 110°F. The flash point hazard encouraged the petroleum industry to develop a new group of solvents that have a higher flash point. The newer solvents are classified as Class IIIA and IIIB liquids and have a flash point above 140°F. It is important to know that these hydrocarbon solvents are still considered hazardous materials by CAL/OSHA standards because they are classified as combustible liquids. This group of solvents includes DF-2000, PureDry, Shell 140, and EcoSolv (South Coast, 2002). The solvent DF-2000, with a flash point of 147°F, is currently the most popular hydrocarbon solvent being used.

A few more alternative solvents are being used in the garment industry today. They are GreenEarth, Rynex 3, and CO_2. The GreenEarth solvent is classified as a Class IIIA liquid and has a flash point of 170°F. Like the hydrocarbon solvents, GreenEarth is considered a combustible liquid. Rynex 3, which has a flash point greater than 200°F, is classified as a Class IIIB liquid, which is also considered a combustible liquid (JE, 2004). Based on a study conducted by the North Carolina Department of Environment and Natural Resources, CO_2 is a weak solvent; therefore, a detergent mixture is used as a supplement to the base solvent. Some of the detergent mixtures contain hydrocarbon chemicals in order to dissolve certain soils. The hydrocarbon compounds used in these detergent mixtures have a flash point above 140°F and are classified as a Class IIIA liquid. While the CO_2/detergent mixture is not expected to be a fire safety hazard, the detergent mixture by itself could be a potential fire safety hazard (NC, 2001).

The water-based cleaning processes use detergents that are not considered a fire hazard. Therefore, there is no potential flammability risk associated with these processes. For comparison purposes, Table VIII-1 below gives you a summary of the flash points and classifications of the commonly used solvents in the dry cleaning industry.

Table VIII-1. Summary of Flash Points and Classification for Commonly Used Solvents[1]

Solvent	Flash Point	Classification[5]
Perc	N/A	IV
Stoddard (hydrocarbon)	110°F	II
DF-2000 (hydrocarbon)	147°F	IIIA
PureDry[2] (hydrocarbon)	350°F	IIIB/IIIA
Shell 140 (hydrocarbon)	>143°F	IIIA
EcoSolv (hydrocarbon)	>140°F	IIIA
Rynex 3	>200°F	IIIB
GreenEarth[3]	170°F	IIIA
CO_2[4]	N/A	N/A

1. Source: Material Safety Data Sheet, unless otherwise noted.
2. Dry cleaners and vendors have reported that the flash point can decline to the 140°F range during use because of the perfluorocarbon that is in the Pure Dry mixture. If this is the case, it is classified as a IIIA solvent.
3. Source: Cleaners Family, Volume 4.
4. The detergent mixture used as a supplement with the CO_2 solvent is a hydrocarbon and is classified as a IIIA solvent, but when used together with the CO_2 it is not considered a fire hazard.
5. Source: UCSD, 2005.

G. Potential Energy Usage Impacts

According to a report prepared by Jacobs Engineering for the City of Los Angeles, the overall amount of electricity used by a shop running either a new Perc system or a solvent-based technology (hydrocarbon, GreenEarth, Rynex 3) is about 1,100 Kilowatt-hour (kWh) per month. For water-based technologies, tests conducted by the Pollution Prevention Education and Research Center (PPERC) at a facility that switched from Perc to professional wet cleaning found a reduction in electricity use (to approximately 600 kWh per month). The CO_2 system requires a 70 to 150-amp service to operate the refrigeration system necessary to maintain the CO_2 in a liquid state. Peak load for the pumps and compressor could be up to 20 kWh. This is twice the peak load reported for the other alternative technologies and it could result in increased peak load demand charges. Therefore, the assumption is made that a CO_2 shop will utilize 30 percent more power than a shop using Perc. Based on available information, Table VIII-2 shows monthly energy usage for Perc dry cleaning and alternatives (JE, 2004).

Table VIII-2. Estimated Monthly Electricity Usage[1]

Process	Electricity Usage (kWh)
Perc	1,100
DF-2000	1,100
GreenEarth	1,100
Wet Cleaning	600
CO_2	1,430

1. Source: JE, 2004.

H. Potential Air Pollution Impacts

1. Impacts on VOC Emissions and Global Warming

Tropospheric ozone ("bad" ozone) formation requires the mixing of ozone-forming chemicals, also known as VOCs, with nitrogen oxides, oxygen, and sunlight. Any reduction in VOC emissions is expected to provide a beneficial environmental impact on air quality by reducing tropospheric ozone formation. Since the proposed amended ATCM will phase out Perc dry cleaning technologies in co-residential facilities as well as phase out the use of primary, converted and add-on secondary control machines there may be an increase in the use of solvents that contain VOCs. The hydrocarbon solvents, as well as the Rynex 3 solvent, used in the dry cleaning industry are classified as VOCs. An increase in the usage of these solvents may cause an adverse environmental impact. If we assume, as a result of the South Coast Rule and implementation of the proposed amendments to the Dry Cleaning ATCM, in a worse-case scenario where all of the converted and primary machines and all of the co-residential Perc machines convert to hydrocarbon solvents, there would be a total significant increase of about 1.4 tons per day of VOCs statewide. Although the State would see this significant increase in VOCs, the South Coast Rule and the proposed amendments would also lead to 4.3 tons per day reduction in Perc emissions statewide.

Greenhouse gases, which alter the amount of heat, or infrared radiation, that can escape the Earth's surface, have been linked to a gradual warming of the Earth's surface and lower atmosphere. While CO_2 has been the traditional focus of greenhouse gas concerns, the CO_2 used in the dry cleaning process is an industrial by-product from other industrial operations and contributes a nominal amount to global warming. In the United States, the largest source of greenhouse gas emissions is from fossil fuel combustion, which accounted for approximately 81 percent of greenhouse emissions in 1996 (JE, 2004).

2. Impacts on the State Implementation Plan for Ozone

The Federal Clean Air Act amendments of 1990 require an ozone attainment plan from every state unable to meet the national ambient air quality standard for ozone. California's State Implementation Plan (SIP) for ozone fulfills this requirement. State law provides ARB the legal authority to develop regulations affecting a variety of mobile sources, fuels, and consumer products. The regulations that have already been adopted and measures proposed for adoption constitute ARB's portion of the SIP. The SIP serves as a road map to guide California to attain and maintain the national ambient air quality standard for ozone.

On October 23, 2003, the ARB adopted the Proposed 2003 State and Federal Strategy for the California SIP, which reaffirms the ARB's commitment to achieve the health-based air quality standards through specific near-term actions and the development of additional longer-term strategies. It also sets into motion a concurrent initiative to identify longer-term solutions to achieve the full scope of emissions reductions needed to meet federal air quality standards in the South Coast and San Joaquin Valley.

On June 15, 2004, the new eight-hour ozone standards became effective, causing a transition from the one-hour ozone standard, 0.12 ppm, to the more health-protective eight-hour ozone standard, 0.08 ppm (averaged over 8 hours). Strategies to meet this new standard will be due in 2007. ARB expects that California will need to reduce emissions beyond the existing commitments.

In the updated California SIP, Perc is not considered a VOC; therefore, if a VOC-based dry cleaning technology is substituted for Perc dry cleaning under the proposed ATCM amendments, we expect an increase of approximately 0.6 tons per day of VOCs in all the SIP areas combined. This shortfall will need to be addressed in the next comprehensive revisions of the California SIP.

In December 2002, the South Coast AQMD adopted amendments to its Perc dry cleaning rule. Based on these amendments the South Coast AQMD staff estimated that the more likely scenario would result in an average increase in VOC emissions of 0.8 tons per day in the South Coast in 2018.

As a result of both the South Coast AQMD adopted Rule and the proposed ARB Dry Cleaning ATCM amendments the expected increase statewide of VOC's would be 1.4 tons per day.

3. Workplace Exposure

The CAL/OSHA regulates the concentration of many toxic air contaminants and VOCs in the workplace environment through the establishment of PELs. The PEL is the maximum, eight-hour, time-weighted average concentration for occupational exposure based on indoor workplace exposures which are typically higher than outside ambient exposures. CAL/OSHA has established a PEL for several of the dry cleaning compounds. Perc has a PEL of 25 ppm and Stoddard has a PEL of 100 ppm. Although the remaining solvents do not have PELs, Table VIII-3 gives a summary of any known acute and chronic health impacts. The ARB staff expects a reduction of Perc emissions in the workplace due to the proposed amended Dry Cleaning ATCM requirements for the use of best available control technology and enhanced ventilation. As a result, an increase in workplace exposure to Perc emissions is not expected.

Table VIII-3. Potential Health Impacts and Permissible Exposure Limit (PEL)

Solvent	Acute	Chronic	PEL
Perc	central nervous system; irritation to eyes, skin, and respiratory tract	kidney, liver, and gastrointestinal system	25 ppm
Stoddard	central nervous system; irritation to eyes, skin, nose, and throat[1]	Unknown	100 ppm
DF2000	central nervous system; irritation to eyes, skin, and respiratory tract[2]	unknown	N/A
PureDry	central nervous system; irritation to eyes, skin, nose, throat, and respiratory tract[2]	unknown	N/A
EcoSolv	central nervous system; irritation to eyes, skin, and respiratory tract[2]	unknown	N/A
Shell 140	central nervous system; irritation to skin, nose, throat, and respiratory tract[2]	unknown	N/A
GreenEarth (D_5)	mild eye irritation	increase in liver weight[3]	N/A
Rynex 3	headaches; irritation to eyes, nose, and throat[1]	unknown	N/A
CO_2	irritation to skin and eyes,[4] frostbite[5]	unknown	N/A

1. Source: U.S. EPA, 1998.
2. Information taken from Material Safety Data Sheets.
3. CARB, 2006.
4. Due to exposure to detergents used with the CO_2 process.
5. Due to exposure to liquid CO_2.

4. Other Air Pollution Impacts

There is also evidence of phosgene formation from the photooxidation of chloroethylenes in air such as Perc and TCE. Phosgene is a byproduct of the thermal decomposition of chlorinated hydrocarbons such as Perc. Phosgene is a toxic, colorless, gas or volatile liquid with a suffocating odor that is similar to decaying fruit or moldy hay. It is slightly soluble in water and freely soluble in benzene, toluene, glacial acetic acid, chloroform, and most liquid hydrocarbons. Phosgene is noncombustible but can decompose into hydrochloric acid (HCl) and CO_2 when wetted. As a result, wet phosgene is corrosive and poses an additional hazard from pressure buildup in closed containers. The density of phosgene is more than three times that of air, which means that its concentrated emission plumes tend to settle to the ground and collect in low areas. Phosgene is listed as a TAC and a federal HAP (ARB, 2000).

The acute non-cancer affects of phosgene are of the most concern. Phosgene is extremely irritating to the lungs, and can cause severe respiratory effects, including pulmonary edema. Symptoms of acute exposure include choking, chest constriction, coughing, painful breathing, and bloody sputum. Acute phosgene poisoning may affect the heart, brain, and blood. Symptoms may be delayed up to 24 hours after exposure. Chronic inhalation exposure has been shown to result in some tolerance to acute effects noted in humans, but irreversible emphysema and pulmonary fibrosis may occur.

The U.S. Occupational Safety and Health Administration (OSHA) also list a PEL of 0.1 ppm.

The implementation of the proposed amended ATCM will minimize the potential for phosgene formation in the presence of flame or heat sources thereby extending a greater level of worker and public health protection and safety.

I. Reasonably Foreseeable Feasible Mitigation Measures

As previously discussed, ARB is required to do an analysis of reasonably foreseeable feasible mitigation measures. The ARB has determined that the only significant adverse environmental impact should occur in air pollution due to the expected increase in the use of solvents containing VOCs. ARB's plan to account for such VOC increases is discussed in Section H of this chapter.

J. Reasonably Foreseeable Alternative Means of Compliance with the Amended ATCM

The ARB is required to do an analysis of reasonably foreseeable alternative means of compliance with the ATCM. Alternatives to the proposed amended ATCM are discussed in Chapter II. Based on the discussion in Chapter II, ARB staff has concluded that implementation of the proposed amendments to the ATCM will further reduce the public's exposure to Perc. The ATCM is enforceable with the least burdensome approach to reducing public health impacts from Perc dry cleaning facilities.

K. Environmental Justice

ARB is committed to evaluating community impacts of proposed regulations including environmental justice concerns. Because some communities experience higher exposure to toxic pollutants, it is a priority of ARB to ensure that full protection is afforded to all Californians. The proposed ATCM is not expected to result in significant negative impacts in any community. The proposed ATCM is designed to further reduce emissions of Perc to residents and off-site workers living or working in communities near the affected facilities.

IX. REFERENCES

ARB, 1991. Initial Statement of Reasons for Rulemaking, Staff Report/Executive Summary, and Part B, Proposed Identification of Perchloroethylene as a Toxic Air Contaminant, California Air Resources Board, August 1991.

ARB, 1993. Staff Report: Proposed Airborne Toxic Control Measure and Proposed Environmental Training Program for Perchloroethylene Dry Cleaning Operations. California Air Resources Board, August 27, 1993.

ARB, 1993a. Technical Support Document: Proposed Airborne Toxic Control Measure and Proposed Environmental Training Program for Perchloroethylene Dry Cleaning Operations, California Air Resources Board, August 27, 1993.

ARB, 1996. Curriculum for the Environmental Training Program for Perchloroethylene Dry Cleaning Operations, California Air Resources Board, April 1996.

ARB, 1997. Toxic Air Contaminant Identification List - Summaries, California Air Resources Board, September 1997.

ARB, 2000. Initial Statement of Reasons for the Proposed Air Toxic Control Measure for Emissions of Chlorinated Toxic Air Contaminants from Automotive Maintenance and Repair Activities, March 10, 2000.

ARB, 2003a. Recommended Interim Risk Management Policy For Inhalation-Based Residential Cancer Risk. California Air Resources Board. October 9, 2003.

ARB, 2004c. CAPCOA Enforcement Manager's Meeting, April 15, 2004.

ARB, 2004e. E-mail from Dr. Nancy W. Eilerts, Chevron Philips Chemical Company to Mei Fong, ARB, January 2004.

ARB, 2004i. Telephone conversation with Katy Wolf, January 4, 2004.

ARB, 2004j. Initial Statement of Reasons for the Proposed Amendments to the California Aerosol Coating Products, Antiperspirants and Deodorant, and Consumer Products Regulations, Test Method 310, and Airborne Toxic Control Measure for Para-Dichlorobenzene Solid Air Fresheners and Toilet/Urinal Care Products, California Air Resources Board, May 7, 2004.

ARB, 2005h. Hot Spots Analysis and Reporting Program, version 1.2A. California Air Resources Board. August 2005.

ARB, 2005i. October 2005 Revisions to Chapter 1-2 and Appendix B of the March 11, 2005 Staff Report, Review of the California Ambient Air Quality Standard for Ozone, California Air Resources Board. October 27, 2005.

ARB, 2006a. E-mail from Ann Heil, City of Los Angeles Sanitation District to Sonia Villalobos, ARB, January 13, 2006.

ARB, 2006b. Annual Statewide Perchloroethylene Summary, California Air Resources Board. www.arb.ca.gov/adam/toxics/statepages/percstate.html, March 21, 2006.

ARB, 2006c. E-mail from Mike Redgrave, ARB, March 13, 2006.

AVES, 2000. The Assessment of the Effectiveness of Room Enclosures with Ventilation Systems in Reducing Risk at Dry Cleaning Facilities Using Perchloroethylene. AVES, an Affiliate of ATC Associates Inc., July 14, 2000.

BAAQMD, 2001. Dry Cleaner Ventilation Guidelines. Bay Area Air Quality Management District, October 3, 2001.

Cal/EPA, 1996. California Environmental Protection Agency. Memorandum from Peter M. Rooney, Undersecretary, to Cal/EPA Executive Officers and Directors. "Economic Analysis Requirements for the Adoption of Administrative Regulations." Appendix C ("Cal/EPA Guidelines for Evaluation Alternatives to Proposed Major Regulations"). December 9, 1996.

Cal/OSHA, 2004. Title 8, Section 5155, Table AC-1: Permissible Exposure Limits for Chemical Contaminants, California Occupational Safety and Health. October 31, 2004. Printed from Cal/OSHA website link on February 14, 2006. http://www.dir.ca.gov/Title8/5155table_ac1.html.

CARB, 2006. California Air Resources Board, California Dry Cleaning Industry Technical Assessment Report, February 2006.

CDHS, 2003. California Department of Health Services (CDHS), 2003 Health Hazard Alert, Hazard Evaluation System and Information System, 1-Bromopropane, July 2003.

CFCA, 2002. Coalition for Clean Air, Hung Out to Dry: How the Use of Perchloroethylene in Dry Cleaning Endangers You and Your Family's Health, October 2002.

Chevron Phillips, 2005. Letter to Ms. Mei Fong regarding California Dry Cleaning Industry Technical Assessment Report. November 22, 2005.

Cleaners Family, 2004. Cleaners Family, Miracle Solvents? Evaluation of Hydrocarbon, GreenEarth, PureDry vs Perc; The Secrete of the Amazing Cleaning Results by Alternative Solvents, Volume 4, No. 1, February 2004.

DB, 2006. Dunn and Bradstreet, Table on Industry Quartiles and Median Variance, 2002-2004, February 27, 2006.

ExxonMobil, 2003. Product Environmental Profile, DF-2000™ Fluid, ExxonMobile Chemical, January 9, 2003.

GreenEarth, 2003. Memo from Jim Barry, Chairman of GreenEarth Cleaning to Affiliates, Friends and Associates regarding GreenEarth Cleaning Safety Update. March 19, 2003.

IFI, 2002. Research Fellowship, GreenEarth® Fellowship, Copyright International Fabricare Institute, No. F-47, September 2002.

IRTA, 2005. Evaluation of New and Emerging Technologies for Textile Cleaning, Institute for Research and Technical Assistance, August 2005.

JE, 2004. Viable Alternatives to Perchloroethylene in Dry Cleaning, Jacobs Engineering, Prepared for City of Los Angeles, December 30, 2004.

JOEH, 2005. A Proposed Methodology for Setting Occupational Exposure Limits for Hydrocarbon Solvents, Journal of Occupational and Environmental Hygiene, Richard H. McKee, et al., October 2005.

Material Safety Data Sheets for Rynex (2004), Stoddard (1997), PureDry (2002), Shell 140 (1992), DF-2000 (2000), and EcoSolv (2003).

NC, 2001. Alternatives to the Predominant Dry Cleaning Processes, North Carolina Department of Environment and Natural Resources, October 2001.

NTP, 2004. NTP Technical Report on the Toxicology and Carcinogenesis Studies of Stoddard Solvent IIC In F344/N Rats and $B6C3F_1$ Mice, National Toxicology Program. September 2004.

OEHHA, 1999. The Air Toxics Hot Spots Program Risk Assessment Guidelines; Part I; The Determination of Acute Reference Exposure Levels for Airborne Toxicants, Office of Environmental Health Hazard Assessment. March 1999.

OEHHA, 2000a. The Air Toxics Hot Spots Program Risk Assessment Guidelines; Part III; Technical Support Document for the Determination of Noncancer Chronic Reference Exposure Levels, Office of Environmental Health Hazard Assessment. Office of Environmental Health Hazard Assessment. April 2000.

OEHHA, 2000b. The Air Toxics Hot Spots Risk Assessment Guidelines; Part IV; Exposure Assessment and Stochastic Analysis Technical Support Document. Office of Environmental Health Hazard Assessment. September 2000.

OEHHA, 2002. Part II, Technical Support Document for Describing Available Cancer Potency Factors (Revised). Office of Environmental Health Hazard Assessment. December 2002.

OEHHA, 2003. Memo from George Alexeeff to Peter Venturini regarding health effects of exposure to alternative dry cleaning solvents, December 2, 2003.

OEHHA, 2003a. The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments. Office of Environmental Health Hazard Assessment. August 2003.

OEHHA, 2006. Chemicals Known To The State To Cause Cancer Or Reproductive Toxicity, February 3, 2006. Office of Environmental Health Hazard Assessment. Printed on March 14, 2006, from OEHHA website www.oehha.ca.gov/prop65/prop65_list/Newlist.html.

Rynex, 2005a. The Facts about Rynex the Proven Alternative Solvent, www.rynex.com, December 2005.

SIDS, 2003. SIDS Initial Assessment Report For SIAM 17, November 2003.

South Coast, 2002. Final Staff Report - Proposed Amendment Rule 1421 - Control of Perchloroethylene Emissions from Dry Cleaning Systems, South Coast Air Quality Management District, October 2002.

UCSD, 2005. University of California, San Diego, Flammable and Combustible Liquids Overview, January 11, 2005.

U.S. EPA, 1995. ISCST3 Model User's Guide, EPA-454/B-95-003a. United States Environmental Protection Agency (U.S. EPA). Research Triangle Park, North Carolina. September 1995.

U.S. EPA, 1998. Cleaner Technologies Substitutes Assessment: Professional Fabricare Processes. Design for the Environment, June 1998.

U.S. EPA, 1999. Case Study: Liquid Carbon Dioxide (CO_2) Surfactant System for Garment Care, Design for the Environment. www.epa.gov/opptintr/dfe/pubs/garment/lcds/micell.htm. May 1999.

U.S. EPA, 2003. Siloxane D5 in Drycleaning Applications, Fact Sheet, August 2003.

Appendix A

Proposed Amended Regulation Order

Airborne Toxic Control Measure for Emissions of Perchloroethylene From Dry Cleaning Operations

DRAFT REGULATION ORDER

PROPOSED AMENDMENTS TO THE AIRBORNE TOXIC CONTROL MEASURE FOR EMISSIONS OF PERCHLOROETHYLENE FROM DRY CLEANING OPERATIONS

[NOTE: Section 93109 is proposed for amendment. For ease of review, the amended text is shown in two parts: first as proposed new text, and second as proposed deleted text. Strikeout and underline have been omitted as authorized by title 2, California Code of Regulations, section 8.]

Amend section 93109, title 17, California Code of Regulations, to read as follows:

Section 93109. Airborne Toxic Control Measure for Emissions of Toxic Air Contaminants from Dry Cleaning Operations.

(a) Purpose.

The purpose of this control measure is to reduce emissions of toxic air contaminants (TACs), including perchloroethylene (Perc), from dry cleaning operations. Reducing these emissions will further protect the public health, especially for Californians who live or work near dry cleaning facilities.

(b) Applicability.

This section applies to any person who owns, operates, manufactures, or distributes dry cleaning equipment in California that uses any solvent that contains Perc or an identified TAC.

(c) Definitions. The definitions in Health and Safety Code division 26, part 1, chapter 1, commencing with section 39010, shall apply, with the following additions:

(1) *"Add-on secondary control machine"* means a closed-loop machine with a secondary control system that is designed or offered as a separate retrofit system for use on multiple machine makes and models.

(2) *"Adsorptive cartridge filter"* means a replaceable cartridge filter that contains diatomaceous earth, activated carbon, or activated clay as the filter medium.

(3) *"Carbon adsorber"* means an air cleaning device that consists of an inlet for exhaust gases from a dry cleaning machine; activated carbon in the form of a fixed bed, cartridge, or canister, as an adsorbent; an outlet for exhaust gases; and a system to regenerate or reclaim saturated adsorbent.

(4) *"Cartridge filter"* means a replaceable cartridge filter that contains one of the following as the filter medium, including but not limited to, paper, activated carbon, clay, paper and clay, or paper and activated carbon. Cartridge filters include, but are not limited to: standard filters, split filters, "jumbo" filters, and all carbon polishing filters.

(5) *"Closed-loop machine"* means dry cleaning equipment in which washing, extraction, and drying are all performed in the same single unit (also known as dry-to-dry) and which recirculates Perc-laden vapor through a primary control system with or without a secondary control system with no exhaust to the atmosphere during the drying cycle. A closed-loop machine may allow for venting to the ambient air through a fugitive control system after the drying cycle is complete and only while the machine door is open.

(6) *"Co-residential"* means sharing a common wall, floor, or ceiling with a residence or located within the same building.

(7) *"Converted machine"* means an existing vented machine that has been modified to be a closed-loop machine by eliminating the aeration step, installing a primary control system, and providing for recirculation of the Perc-laden vapor with no exhaust to the atmosphere or workroom during the drying cycle. A converted machine may allow for venting to the ambient air through a fugitive control system after the drying cycle is complete and only while the machine door is open.

(8) *"Cool-down"* means the portion of the drying cycle that begins when the heating mechanism deactivates and the refrigerated condenser continues to reduce the temperature of the air recirculating through the drum to reduce the concentration of Perc in the drum.

(9) *"Desorption"* means regeneration of an activated carbon bed, or any other type of vapor adsorber by removal of the adsorbed solvent using hot air, steam, or other means.

(10) *"Dip tank operations"* means the immersion of materials in a solution that contains Perc, for purposes other than dry cleaning, in a tank or container that is separate from the dry cleaning equipment.

(11) *"District"* means an air pollution control or air quality management district as defined in Health and Safety Code section 39025.

(12) *"Drum"* means the rotating cylinder or wheel of the dry cleaning machine that holds the materials being cleaned.

(13) *"Dry cleaning"* means the process used to remove soil, greases, paints, and other unwanted substances from materials with Perc or other solvents.

(14) *"Dry cleaning equipment"* means any machine, device, or apparatus that uses a solvent to dry clean materials or to remove residual solvent from previously cleaned materials. Dry cleaning equipment may include, but is not limited to, a converted machine, a closed-loop machine, a reclaimer, a drying cabinet; a primary control machine, primary control machine with a secondary control system; or an integral secondary control machine.

(15) *"Dry cleaning system"* means all of the following equipment, devices, or apparatus associated with any dry cleaning process: dry cleaning equipment; filter or purification systems; waste holding, treatment, or disposal systems; solvent supply systems; dip tanks; pumps; gaskets; piping, ducting, fittings, valves, or flanges that convey Perc or other TAC vapors; and control systems.

(16) *"Drying cabinet"* means a housing in which materials previously cleaned with Perc or another solvent containing a TAC are placed to dry and which is used only to dry materials that would otherwise be damaged by the heat and tumbling action of the drying cycle.

(17) *"Drying cycle"* means the process used to actively remove the Perc remaining in the materials after washing and extraction. For closed-loop machines, the heated portion of the cycle is followed by cool-down and may be extended beyond cool-down by the activation of a control system. The drying cycle begins when heating coils are activated and ends when the machine ceases rotation of the drum for a converted or primary control machine, or at the end of the adsorption cycle for a secondary control machine.

(18) *"Enhanced ventilation system"* means a ventilation system that is specifically designed to capture fugitive emissions from a dry cleaning machine. Types of enhanced ventilation systems include local ventilation systems, partial vapor barrier rooms, and full vapor barrier rooms.

(19) *"Environmental training program"* means an initial course or a refresher course of the environmental training program for dry cleaning operations that has been authorized by the Air Resources Board according to the requirements of title 17, California Code of Regulations, section 93110.

(20) *"Executive Officer of the Air Resources Board"* means the executive officer of the California Air Resources Board or his or her delegate.

(21) *"Existing facility"* means any facility that operated Perc dry cleaning equipment prior to July 1, 2007.

(22) *"Facility"* means any entity or entities which: own or operate dry cleaning equipment, are owned or operated by the same person or persons, and are located on the same parcel or contiguous parcels.

(23) *"Fugitive control system"* means a device or apparatus that collects fugitive Perc vapors from the machine door, button and lint traps, still, or other intentional openings of the dry cleaning equipment and routes those vapors to a device that reduces the mass of Perc prior to exhaust of the vapor to the atmosphere.

(24) *"Full-time employee"* means any person who is employed at the dry cleaning facility and averages at least 30 hours per week in any 90-day period.

(25) *"Full vapor barrier room"* means a room that completely surrounds a closed loop machine and is constructed of material resistant to diffusion of solvent vapors. Fugitive emissions are vented through a stack above the building. According to specifications, the exhaust fan may be installed inside the full vapor barrier room or near the ceiling at the back of the machine or outside the facility on a wall or on the roof. The fan should be of a high pressure (1-3 inches of water) design with a minimum capacity of 1,000 cubic feet per minute; and it should be in continuous operation (24 hours a day, 365 days a year) in a co-residential facility and whenever the dry cleaning machine is operating or being maintained in a non-residential facility. A control interlock must be installed to interrupt power to the dry cleaning machine if the ventilation fan is not operating. The stack should extend at least 5 feet (a 10-foot stack is recommended) above the roofline or any adjacent roof and at least 30 feet from any air intake or window. Emissions must be exhausted vertically (no rain caps). In addition, there should be one air exchange every 5 minutes. The diameter of the stack should generally be 8 to 14 inches with an air flow rate of 1,000 to 2,500 cubic feet per minute.

(26) *"Gallons of perchloroethylene purchased"* means the volume of Perc, in gallons, introduced into the dry cleaning equipment, and not recovered at the facility for reuse on-site in the dry cleaning equipment, over a specified time period.

(27) *"Halogenated-hydrocarbon detector"* means a portable device capable of detecting vapor concentrations of Perc of 25 ppmv or less and indicating an increasing concentration by emitting an audible signal or visual indicator that varies as the concentration changes.

(28) *"Integral secondary control machine"* means a closed-loop machine that is designed and offered with an integral secondary control system.

(29) *"Integral secondary control system"* means a carbon adsorber, or an equivalent device that is designed and offered as an integral part of a production package with a single make and model of dry cleaning machine and primary control system.

(30) *"Liquid leak"* means a leak of liquid containing Perc of more than 1 drop every 3 minutes.

(31) *"Local ventilation system"* means a ventilation system with a high capacity fan, exhaust stack, and physical apparatus/structures (such as fume hoods, shrouds, flexible walls – vertical plastic strips), near the closed-loop machine, that are designed and constructed of materials resistant to diffusion of solvent vapors. A minimum of 1,000 cubic feet per minute airflow with a capture velocity greater than 100 feet per minute is required for the ventilation fan. The fan should be in operation whenever the dry cleaning machine and related equipment are operated. A control interlock must be installed to interrupt power to the dry cleaning machine if the ventilation fan is not operating. In addition, for stand-alone buildings, there should be one air exchange rate every 5 minutes. Walls or plastic strip curtains should extend at least 3 feet in front and back of the machine. The exhaust point should be at least 5 feet above the building or adjacent building and 30 feet from any window or air intake.

(32) *"Materials"* means wearing apparel, draperies, linens, fabrics, textiles, rugs, leather, and other goods that are dry cleaned.

(33) *"Muck cooker"* means a device for heating Perc-laden waste material to volatilize and recover Perc.

(34) *"New facility"* means a facility that did not operate any dry cleaning equipment using Perc or any solvent that contains a TAC prior to July 1, 2007. Facility relocations shall be considered new facilities for the purposes of this control measure.

(35) *"Partial vapor barrier room"* means a room that encloses the back of a closed-loop machine using materials resistant to diffusion of solvent vapors, with the front panel and loading door exposed for convenient loading and unloading. A high capacity fan within the room draws fugitive vapor through a stack for release outside. The ventilation duct or fan intake should be placed near the ceiling directly above the back of the machine or at the rear of the partial vapor barrier room. The fan should be in operation whenever the dry cleaning machine and related equipment are operated. A control interlock must be installed to interrupt power to the dry cleaning machine if the ventilation fan is not operating. In addition, there should be one air exchange rate every 5 minutes. The stack should extend at least 5 feet above the building roofline or any adjacent roof and at least 30 feet from

any air intake or window. Emissions must be exhausted vertically (no rain caps). The diameter of the stack should generally be 8 to 14 inches with an air flow rate of 1,000 to 2,500 cubic feet per minute.

(36) *"Perchloroethylene (Perc)"* means the substance with the chemical formula 'C_2Cl_4', also known by the name 'tetrachloroethylene', which has been identified by the Air Resources Board and listed as a TAC in title 17, California Code of Regulations, section 93000.

(37) *"Pounds of materials cleaned per load"* means the total dry weight, in pounds, of the materials in each load dry cleaned at the facility, as determined by weighing each load on a scale prior to dry cleaning and recording the value.

(38) *"Primary control machine"* means a closed loop machine used for dry cleaning that is equipped with a primary control system.

(39) *"Primary control system"* means a refrigerated condenser, or an equivalent closed-loop vapor recovery system approved by the district.

(40) *"Reclaimer"* means a machine, device, or apparatus used only to remove residual Perc from materials that have been previously cleaned in a separate piece of dry cleaning equipment.

(41) *"Reasonably available"*, as it applies to an initial course for the environmental training program, means that the course is offered within 200 miles of the district boundaries and that all such courses have a capacity, in the aggregate, that is adequate to accommodate at least one person from each facility in the district required to certify a trained operator at that time.

(42) *"Refrigerated condenser"* means a closed-loop vapor recovery system into which Perc vapors are introduced and recovered by cooling below the dew point of the Perc.

(43) *"Residence"* means any dwelling or housing which is owned, rented, or occupied by the same person for a period of 180 days or more, excluding short-term housing such as a motel or hotel room rented and occupied by the same person for a period of less than 180 days.

(44) *"Secondary control system"* means a device or apparatus (typically a carbon adsorber), that reduces the concentration of Perc in the recirculating air at the end of the drying cycle beyond the level achievable with a refrigerated condenser alone.

(45) *"Self-service dry cleaning machine"* means a Perc dry cleaning machine that is loaded, activated, or unloaded by the customer.

(46) *"Sensitive receptor"* means any residence; any educational resource for minors including, but not limited to, schools or preschools for kindergarten through twelfth grade (K-12) or early childhood education; and any facility licensed under Health and Safety Code division 2, commencing with section 1200, for health care or community care including, but not limited to, hospitals, clinics, skilled nursing, long-term care, adult day care, foster and small family homes, child care centers, and family day care homes.

(47) *"Separator"* means any device used to recover Perc from a water-Perc mixture.

(48) *"Solvent"* means a liquid substance other than water used in dry cleaning equipment.

(49) *"Substantial use of an authority to construct"* means one or more of the following: (A) the equipment that constitutes the source has been purchased or acquired; (B) construction activities, other than grading or installation of utilities or foundations, have begun and are continuing; or (C) a contract to complete construction of the source within one year has been entered into.

(50) *"TAC" or "toxic air contaminant"* means an air contaminant that has been identified by the California Air Resources Board under sections 93000 and 93001 of title 13, California Code of Regulations, or under title 42, United States Code, section 7412(b) and its implementing federal regulations.

(51) *"Trained operator"* means the owner, the operator, or an employee of the facility, who holds a record of completion for the initial course of an environmental training program and maintains her/his status by successfully completing the refresher courses as required.

(52) *"Transfer machine"* means a combination of Perc dry cleaning equipment in which washing and extraction are performed in one unit and drying is performed in a separate unit.

(53) *"Vapor adsorber"* means a bed of activated carbon or other adsorbent into which Perc vapors are introduced and trapped for subsequent desorption.

(54) *"Vapor leak"* means an emission of Perc vapor from unintended openings in the dry cleaning system, as indicated by a rapid audible signal or visual signal from a halogenated-hydrocarbon detector or a concentration of Perc exceeding 50 ppmv as Perc as indicated by a portable analyzer.

(55) *"Vented machine"* means dry cleaning equipment in which washing, extraction, and drying are all performed in the same single unit and in which fresh air is introduced into the drum in the last step of the drying cycle and exhausted to the atmosphere, either directly or through a control device.

(56) *"Wastewater treatment unit"* means a device that treats Perc-contaminated wastewater through the addition of thermal or chemical energy, or through physical action, such as carbon or another type of adsorbent filtration system.

(57) *"Water-repelling operations"* means the treatment of materials with a Perc-containing solution for the purpose of making the material water resistant or water-repelling.

(58) *"Workday"* means any consecutive 24-hour period commencing at the same time each calendar day as defined in the California Code of Regulations, Labor Code section 500(a).

(59) *"Zoned for residential use"* means that a local land-use ordinance or other government requirement allows residences as a permitted use.

(d) Prohibitions. The owner/operator of a facility shall not operate any of the following types of equipment related to Perc dry cleaning:

(1) A transfer machine, including any reclaimer or other device in which materials that have been previously dry cleaned with Perc are placed to dry;

(2) A vented machine;

(3) A self-service dry cleaning machine;

(4) A primary control or converted machine installed after July 1, 2007;

(5) A drying cabinet;

(6) Dip tank operations; and

(7) A secondary control system that has not been certified pursuant to subsection (l).

(e) Requirements for Co-residential Facilities.

(1) No co-residential facility shall install any dry cleaning equipment which uses solvents that contain Perc.

(2) Existing co-residential facilities shall remove any currently installed Perc dry cleaning machine by July 1, 2010.

(f) Requirements for New Facilities.

(1) No person shall operate a new facility which uses Perc unless the following conditions are met:

(A) The facility is located at least 300 feet from a sensitive receptor;

(B) The facility is located outside of and at least 300 feet from the boundary of an area that is zoned for residential use;

(C) An enhanced ventilation system has been installed; and

(D) Facilities using Perc shall install, operate, and maintain an integral secondary control machine.

(2) No person shall operate a new facility which uses a TAC other than Perc unless the following conditions are met:

(A) The facility shall install, operate, and maintain best available control technology as required by applicable district rules or regulations; or

(B) In the absence of applicable district rules or regulations, the owner or operator of a new facility shall submit to and have approved by the district a control method or methods that achieve reductions in the risk associated with the TAC that equal or exceed the reductions for Perc under this section.

(3) A new facility shall be deemed to meet the requirement specified in subsection (f)(1)(A) and (B) if one of the following criteria is met, even if the new facility does not meet the requirement at the time of initial startup (e.g., because of a zoning change that occurs after the authority to construct is issued):

(A) If it meets the requirement at the time it is issued an authority to construct by the permitting agency, and substantial use of the authority to construct takes place within one year after it is issued; or

(B) If it meets the requirement at the time it is issued an authority to construct by the permitting agency, and substantial use of the authority to construct takes place before any zoning change occurs that affects the operation's ability to meet the standard at the time of initial startup.

(g) Requirements for Existing Facilities.

(1) All existing facilities that operate any dry cleaning equipment using Perc shall use an integral secondary control machine. For existing facilities that operated Perc dry cleaning equipment prior to July 1, 2007, and that do not have an integral secondary control machine, the compliance schedule is as follows:

(A) If the facility is 100 feet or more from a sensitive receptor, the facility shall install an integral secondary control machine (or non-Perc alternative) by July 1, 2010, or when the primary, converted, or "add-on" secondary control machine is 15 years of age, whichever comes later.

(B) If a facility is within 100 feet of a sensitive receptor, the facility shall install an integral secondary control machine (or non-Perc alternative) by July 1, 2009, or when the primary, converted, or "add-on" secondary control machine is 10 years of age, whichever is later.

(C) All existing facilities that have not already done so under (A) or (B) above, shall install an integral secondary control machine (or non-Perc alternative) by July 1, 2016.

(D) An existing primary control machine that is designed to accept a secondary control system will qualify as an integral secondary control machine if the following conditions are met:

1. The existing primary control machine is less than five years old on July 1, 2007;

2. The secondary control system has been designed for the make and model of the existing primary control machine;

3. The secondary control system has been demonstrated, pursuant to the requirements of subsection (l), to achieve a Perc concentration in the drum of 300 ppmv or less in each test; and

4. The secondary control system is installed by the machine manufacturer or distributor by July 1, 2008.

(2) All existing facilities shall install an enhanced ventilation system. Compliance shall be according to the following:

(A) By July 1, 2009, if a sensitive receptor is within 100 feet of the facility as of July 1, 2007; or

(B) By July 1, 2010, if a sensitive receptor is 100 feet or greater from the facility as of July 1, 2007.

(h) **Specifications for Integral Secondary Control Systems.** An integral secondary control system shall:

(1) Be designed to function with a primary control system or be designed to function as a combined primary control system and secondary control system that meets all of the applicable requirements of this section;

(2) Not exhaust to the atmosphere or workroom;

(3) Not require the addition of any form of water to the secondary control system that results in physical contact between the water and Perc;

(4) Have a holding capacity equal to or greater than 200 percent of the maximum quantity of Perc vapor expected in the drum prior to activation of the system; and

(5) Use a technology that has been demonstrated, pursuant to the requirements of subsection (l), to achieve a Perc concentration in the drum of 300 ppmv or less in each test.

(i) **Required Good Operating Practices.** No person shall operate Perc dry cleaning equipment unless all of the following requirements are met:

(1) *Environmental training requirements.* Each facility shall have one or more trained operators.

(A) A trained operator shall be the owner, the operator, or another employee of the facility, who successfully completes the initial course of an environmental training program to become a trained operator. Evidence of successful completion of the initial course shall be the original record of completion issued pursuant to title 17, California Code of Regulations, Section 93110.

(B) One person cannot serve as the trained operator for two or more facilities simultaneously.

(C) The trained operator shall be an owner or employee of the facility and be on site while the dry cleaning machine is in operation.

(D) Each trained operator shall successfully complete the refresher course of an environmental training program at least once every three years. Evidence of successful completion of each refresher course shall be the date of the course and the instructor's signature on the original record of completion.

(E) If the facility has only one trained operator and the trained operator leaves the employ of the facility, the facility shall:

1. Notify the district in writing within 15 days of the departure of the trained operator; and

2. Obtain certification for a replacement trained operator within 3 months.

i. If the district determines that the initial course of an environmental training program is not reasonably available, the district may extend the certification period for a replacement trained operator until 1 month after the course is reasonably available.

(2) *Operation and maintenance requirements.* The trained operator, shall operate and maintain all components of the dry cleaning system in accordance with the requirements of this section and the conditions specified in the facility's operating permit. For operations not specifically addressed, the components shall be operated and maintained in accordance with the manufacturer's recommendations.

(A) The district shall provide an operation and maintenance checklist to the facility. Each operation and maintenance function and the date performed shall be recorded on the checklist. The operation and maintenance checklist shall include, at a minimum, the following requirements:

1. Refrigerated condensers shall be operated to ensure that exhaust gases are recirculated until the air-vapor stream temperature on the outlet side of the refrigerated condenser, downstream of any bypass, is less than or equal to 45°F (7.2°C).

i. Refrigerated condensers shall have a graduated or digital thermometer with a minimum range from 0°F (-18°C) to 150°F (66°C), which measures the temperature of the outlet vapor stream, downstream of any bypass of the condenser, and is easily visible to the operator.

2. Primary control systems, other than refrigerated condensers, shall be operated to ensure that exhaust gases are recirculated until the Perc concentration in the drum is less than or equal to 8,600 ppmv at the end of the drying cycle, before the machine door is opened.

3. Vapor adsorbers used as a primary control system or a secondary control system shall be operated to ensure that exhaust gases are recirculated at the temperature specified by the district, based on the manufacturer's recommendations for optimum adsorption. These vapor adsorbers shall be desorbed according to the conditions specified by the district in the facility's operating permit, including a requirement that no Perc vapors shall be routed to the atmosphere during routine operation or desorption.

4. Cartridge filters and adsorptive cartridge filters shall be handled using one of the following methods:

    i. Drained in the filter housing, before disposal, for no less than: 24 hours for cartridge filters and 48 hours for adsorptive cartridge filters. If the filters are then transferred to a separate device to further reduce the volume of Perc, this treatment shall be done in a system that routes any vapor to a primary control system, with no exhaust to the atmosphere or workroom; or

    ii. Dried, stripped, sparged, or otherwise treated, within the sealed filter housing, to reduce the volume of Perc contained in the filter.

5. A still, and any muck cooker, shall not exceed 75 percent of its capacity, or an alternative level recommended by the manufacturer. A still, and any muck cooker, shall cool to 100°F (38°C) or less before emptying or cleaning.

6. Button and lint traps shall be cleaned and inspected for damage each workday and the lint placed in a tightly sealed container.

7. The facility owner/operator shall keep on site a spare set of gaskets for the loading door, still, lint trap, button trap, and water separator.

8. The facility owner/operator shall keep on site a spare lint filter.

9. All parts of the dry cleaning system where Perc may be exposed to the atmosphere or workroom shall be kept closed at all times except when access is required for proper operation and maintenance.

10. Wastewater treatment units shall be operated to ensure that no liquid Perc or visible emulsion is allowed to vaporize.

11. Carbon adsorbers in integral secondary control machines must be designed for non-contact steam or hot air stripping operation, and must be stripped or desorbed in accordance with manufacturer's instructions or at least weekly, whichever is more frequent.

(3) *Leak check and repair requirements.* The trained operator shall inspect the dry cleaning system for vapor leaks. The district shall provide a leak inspection checklist to the facility. The trained operator, shall record the status of each component on the checklist.

(A) *Weekly Leak Checks.* The dry cleaning system shall be inspected at least once per week for both liquid leaks and vapor leaks, using one of the following techniques:

1. A halogenated-hydrocarbon detector; or

2. A portable gas analyzer or an alternative method approved by the district.

(B) *Annual Leak Checks.* The dry cleaning system shall be inspected at least once per year for liquid and vapor leaks using a portable detector which gives quantitative results with less than ten percent uncertainty at 50 ppmv of Perc.

(C) Any liquid leak or vapor leak that has been detected by the operator shall be noted on the checklist and repaired according to the requirements of this subsection. If the leak is not repaired at the time of detection, the leaking component shall be physically marked or tagged in a manner that is readily observable by a district inspector.

(D) Any liquid leak or vapor leak detected by the district, which has not been so noted on the checklist and marked on the leaking component of the dry cleaning system, shall constitute a violation of this section. For enforcement purposes, the district shall identify the presence of a vapor leak by determining the concentration of Perc with a portable analyzer according to ARB Test Method 21 (title 17, California Code of Regulations, section 94124).

(E) Any liquid leak or vapor leak shall be repaired immediately upon detection. For the purposes of this section a business day shall mean Monday through Friday, except holidays, as provided in Government Code of Regulation section 6700 and following.

1. If repair parts are not available at the facility, the parts shall be ordered within the next business day of detecting such a leak. Such repair parts shall be installed within two business days after receipt. A facility with a leak that has not been repaired by the end of the 7th business day after detection shall not operate the dry cleaning machine, until the leak is repaired, without a leak-repair extension from the district.

2. A district may grant a leak-repair extension to a facility, for a single period of 30 days or less, if the district makes the following findings:

i. The delay in repairing the leak could not have been avoided by action on the part of the facility;

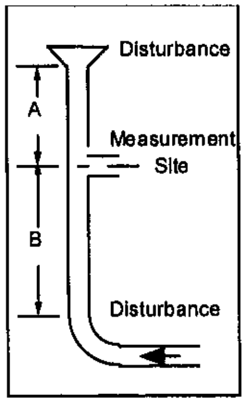
ii. The facility used reasonable preventive measures and acted promptly to initiate the repair;

iii. The leak would not significantly increase exposure to TACs near the facility; and

iv. The facility is in compliance with all other requirements of this section and has a history of compliance.

(4) *Annual Drum Concentration Checks.* Effective July 1, 2008, each facility shall perform annual drum concentration testing as specified below.

(A) Sampling ports shall be installed in the piping, upstream and downstream of the carbon bed. The sampling ports should be in a straight section of piping, and at least six pipe or duct diameters downstream (shown as distance B in figure below) and two pipe or duct diameters upstream (shown as distance A in figure below) from any flow disturbance such as a bend, expansion, contraction or process in that pipe, if possible.



(B) The sampling ports shall be at least ¼" (one-quarter inch) in diameter. Each port shall be equipped with a Swagelok® male connector, or equivalent, ⅛" (one-eighth inch) national pipe thread (NPT), ⅛" (one-eighth inch) tube fitting and ⅛" (one-eighth inch) tubing plug.

(C) At least once per year measure the Perc concentration at the end of a drying cycle from the sampling ports using a portable Perc detector that gives quantitative results with less than ten percent uncertainty at 50 ppmv of Perc.

(D) The concentration of Perc in the drum, as represented by the reading from the sample port upstream of the carbon bed, shall be:

1. Less than 500 ppmv at the end of the drying cycle for a new integral secondary control machine during the initial start-up period (under the Authority to Construct); and

2. Less than 1000 ppmv at the end of the drying cycle during normal operation after the initial start-up period.

(E) The concentration of Perc at the sampling port downstream of the carbon bed shall be less than 100 ppmv while the secondary control system is operating.

(j) Recordkeeping Requirements.

(1) The following records shall be retained by all facilities for at least 5 years:

(A) Method of wastewater disposal. If a wastewater treatment unit is being used, then the make and model of the treatment unit shall be recorded;

(B) Purchase and delivery receipts for the dry cleaning solvent indicating the volume in gallons;

(C) For add-on or integral secondary control machine operations: the start time and finish time of each regeneration; and the temperature of chilled air;

(D) Effective July 1, 2008, for add-on or integral secondary control machine: Perc concentrations measured annually at the sampling ports located upstream and downstream of the secondary control system at the end of the drying cycle;

(E) The operation and maintenance checklists required by subsection (i)(2)(A) and the completed leak inspection checklists required by subsection (i)(3);

(F) For liquid leaks or vapor leaks that were not repaired at the time of detection, a record of the leaking component(s) of the dry cleaning system awaiting repair and the action(s) taken to complete the repair. The record shall include copies of purchase orders or other written records showing when the repair parts were ordered and/or service was requested; and

(G) The type of enhanced ventilation system in the facility (e.g. local ventilation system, partial vapor barrier room, or full vapor barrier room).

(2) The manufacturer's operating manual for all components of the dry cleaning system shall be retained for the life of the equipment.

(3) The original record of completion of the environmental training program for each trained operator shall be retained during the employment of that person. A copy of the record of completion shall be retained for an additional period of two years beyond the separation of that person from employment at the facility.

(4) All records, or copies thereof, shall be maintained in English and shall be accessible at the facility at all times.

(k) Reporting Requirements.

(1) The owner or operator of each facility shall prepare an annual report which covers the period of January 1st through December 31st of each year. The annual report shall include the following information:

(A) The estimated distance of the facility to the nearest sensitive receptor and nearest business;

(B) A copy of the record of completion of the environmental training program for each trained operator;

(C) The total of the pounds of materials cleaned;

(D) The gallons of solvent purchased for all solvent additions in the reporting period;

(E) The make, model, serial number, and date of manufacture of the dry cleaning machine;

(F) The type of enhanced ventilation system in the facility (e.g. local ventilation system, partial vapor barrier room, or full vapor barrier room); and

(G) The method of wastewater disposal. If a wastewater treatment unit is used, the make and model of the treatment unit shall be reported.

(2) The owner or operator of each facility shall submit this annual report to the district by February 2nd of each year.

(3) A district may exempt a source from item (1) of this subsection if the district maintains current equivalent information on the facility.

(4) The districts shall report to ARB the annual Perc purchases of permitted facilities by April 2nd of each year or an alternative date agreed upon by the district and ARB.

(l) Testing and Certification of Secondary Control Systems.

(1) *Test Program and Scope.*

(A) For a given design, a single test program shall be conducted, in accordance with the following procedures, to meet the specifications in subsection (h).

(B) The person conducting the test program shall prepare a test plan that describes, in detail, the dry cleaning machine and control systems being tested, the test protocol, and the test method.

(C) A minimum of three tests shall be conducted for each test program on each control system design.

(D) All tests for a single test program shall be conducted on a single dry cleaning machine.

(E) When testing a particular dry cleaning machine model that is available in various drum capacities and carbon weights in the secondary control system, the testing shall, at a minimum, be conducted on the configuration with the largest ratio of drum capacity to weight of the carbon. The dry cleaning machine drum/carbon ratio shall be calculated as follows:

$$drum\,/\,carbon\ ratio = \frac{machine\ drum\ capacity\ (pounds)}{weight\ of\ carbon\ in\ adsorber\ (pounds)}$$

(F) Test results may not be applied to a different make/model or replacement dry cleaning machine that has been reconfigured.

(2) *Test Conditions.* Testing shall be conducted under normal operating conditions, unless otherwise specified.

(A) Each test shall be conducted during the cleaning of one load of materials, after running 80 percent of the manufacturer's recommended number of loads before carbon regeneration.

1. The machine shall be filled to no less than 85 percent of its drum capacity with materials for each test. At least 70 percent of the load to be cleaned must consist of woolen or absorbent padded material.

2. The weight of materials shall be recorded for each test.

(B) An integral secondary control machine shall be tested on a closed-loop machine with the primary control system operating normally.

(3) *Test Methods.*

(A) The temperature of the air in the dry cleaning machine drum shall be measured and recorded continuously during the entire drying cycle, including the operation of the secondary control system.

(B) Sampling shall be conducted as follows:

1. Sampling shall begin at the end of the drying cycle and be completed within 5 minutes.

2. Sampling shall be completed prior to the opening of the dry cleaning machine door and activation of any fugitive control system.

(C) The Perc concentration in the dry cleaning machine drum shall be determined by one of the following methods:

1. A sampling port and valve shall be appropriately placed to draw a sample from the interior of the drum or the lint filter housing. The sampling port shall be connected to a gas chromatograph by ¼" (one-quarter inch), outside diameter, Teflon tubing. Any sampling pump shall have Teflon diaphragms. The gas chromatograph shall measure the concentrations of Perc in accordance with ARB Method 422 (title 17, California Code of Regulations, section 94132) or NIOSH Method 1003 (NIOSH Manual of Analytical Methods, U.S. Department of Health and Human Services, August 15, 1987).

2. A sampling port and valve shall be appropriately placed to draw a sample from the interior of the drum or the lint filter housing. The sampling port shall be connected by ¼" (one-quarter inch) outside diameter Teflon tubing to a Tedlar bag. Any sampling pump shall have Teflon diaphragms. The concentration of Perc in the air sampled shall be measured in accordance with ARB Method 422 (title 17, California Code of Regulations, section 94132) or NIOSH Method 1003 (NIOSH Manual of Analytical Methods, U.S. Department of Health and Human Services, August 15, 1987) within 24 hours of sampling. If an independent laboratory is contracted to perform the analysis of the samples, the chain of custody procedures contained in ARB Method 422 or NIOSH Method 1003 shall be followed.

(D) An alternative test method deemed acceptable by the Executive Officer of the Air Resources Board.

(4) *Certification Procedures.*

(A) The manufacturer shall submit to the Air Resources Board the following information:

1. A detailed description of the dry cleaning system including control devices;

2. A copy of the operations manual, written in plain English;

3. Production photographs of the front and rear of the dry cleaning machine for which certification is being requested;

4. The test plan required by subsection (l)(1)(B), including a detailed summary of the test results; and

5. Any other information deemed necessary by the Air Resources Board to consider the request for certification.

(m) Wastewater Treatment.

(1) Effective July 1, 2008, wastewater shall be hauled away by a registered hazardous waste transporter or treated in a wastewater treatment unit.

(2) The wastewater treatment unit shall meet the following requirements:

(A) A self-contained unit designed to minimize solvent discharge to the environment, including but not limited to the air, water, and sewer system.

(B) The wastewater shall be placed in a wastewater treatment unit that has adequate processing capacity for the facility as determined by the district; and

(C) The wastewater treatment unit shall be equipped with a separator. The separator shall have all of the following:

1. A solvent/water separation settling chamber; and

2. Carbon or another type of adsorbent filtration system that the wastewater cycles through.

(n) Water-repelling Operations.

(1) No person shall perform water-repelling operations unless all materials to be treated with Perc water-repelling solutions are treated in a closed-loop machine.

(o) Severability.

Each part of this section is deemed severable, and in the event that part of this section is held to be invalid, the remainder of this section shall continue in full force and effect.

NOTE: Authority cited: sections 39600, 39601, 39650, 39655, 39656, 39658, 39659, 39665, and 39666, Health and Safety Code; sections 7412 and 7416, title 42, United States Code.

Reference: sections 39650, 39655, 39656, 39658, 39659, and 39666, Health and Safety Code; sections 7412 and 7414, title 42, United States Code; Sections 63.320, 63.321, 63.323, and 63.324, title 40, Code of Federal Regulation

FINAL REGULATION ORDER

AIRBORNE TOXIC CONTROL MEASURE FOR EMISSIONS OF PERCHLOROETHYLENE FROM DRY CLEANING OPERATIONS

APPROVED BY THE OFFICE OF ADMINISTRATIVE LAW ON MAY 4, 1994

CONTENTS

Deleted

FINAL REGULATION ORDER

AIRBORNE TOXIC CONTROL MEASURE FOR EMISSIONS OF PERCHLOROETHYLENE FROM DRY CLEANING OPERATIONS

Adopt new section 93109, Titles 17 and 26, California Code of Regulation, to read as follows:

17 CCR, Section 93109. Perchloroethylene Airborne Toxic Control Measure--Dry Cleaning Operations.

(a) Definitions. For the purposes of this section, the following definitions shall apply:

(1) "Adsorptive cartridge filter" means a replaceable cartridge filter that contains diatomaceous earth or activated clay as the filter medium.

(2) "Cartridge filter" means a replaceable cartridge filter that contains one of the following as the filter medium: paper, activated carbon, or paper and activated carbon. A cartridge filter contains no diatomaceous earth or activated clay. Cartridge filters include, but are not limited to: standard filters, split filters, "jumbo" filters, and all carbon polishing filters.

(3) "Closed-loop machine" means dry cleaning equipment in which washing, extraction, and drying are all performed in the same single unit (also known as dry-to-dry) and which recirculates perchloroethylene-laden vapor through a primary control system with no exhaust to the atmosphere during the drying cycle. A closed-loop machine may allow for venting to the ambient air through a fugitive control system after the drying cycle is complete and only while the machine door is open.

(4) "Co-located with a residence" means sharing a common wall, floor, or ceiling with a residence. For the purposes of this definition, "residence" means any dwelling or housing which is owned, rented, or occupied by the same person for a period of 180 days or more, excluding short-term housing such as a motel or hotel room rented and occupied by the same person for a period of less than 180 days.

(5) "Converted machine" means an existing vented machine that has been modified to be a closed-loop machine by eliminating the aeration step, installing a primary control system, and providing for recirculation of the perchloroethylene-laden vapor with no exhaust to the atmosphere or workroom during the drying cycle. A converted machine may allow for venting to the ambient air through a fugitive control system after the drying cycle is complete and only while the machine door is open.

(6) "Cool-down" means the portion of the drying cycle that begins when the heating mechanism deactivates and the refrigerated condenser continues to reduce the

temperature of the air recirculating through the drum to reduce the concentration of perchloroethylene in the drum.

(7) "Date of compliance" means the time from the effective date of this control measure in the district until a facility must be in compliance with the specific requirements of this control measure.

(8) "Desorption" means regeneration of an activated carbon bed, or any other type of vapor adsorber by removal of the adsorbed solvent using hot air, steam, or other means.

(9) "Dip tank operations" means the immersion of materials in a solution that contains perchloroethylene, for purposes other than dry cleaning, in a tank or container that is separate from the dry cleaning equipment.

(10) "District" means the local air pollution control district or air quality management district.

(11) "Drum" means the rotating cylinder or wheel of the dry cleaning machine that holds the materials being cleaned.

(12) "Dry cleaning equipment" means any machine, device, or apparatus used to dry clean materials with perchloroethylene or to remove residual perchloroethylene from previously cleaned materials. Dry cleaning equipment may include, but is not limited to, a transfer machine, a vented machine, a converted machine, a closed-loop machine, a reclaimer, or a drying cabinet.

(13) "Dry cleaning system" means all of the following equipment, devices, or apparatus associated with the perchloroethylene dry cleaning process: dry cleaning equipment; filter or purification systems; waste holding, treatment, or disposal systems; perchloroethylene supply systems; dip tanks; pumps; gaskets; piping, ducting, fittings, valves, or flanges that convey perchloroethylene-contaminated air; and control systems.

(14) "Drying cabinet" means a housing in which materials previously cleaned with perchloroethylene are placed to dry and which is used only to dry materials that would otherwise be damaged by the heat and tumbling action of the drying cycle.

(15) "Drying cycle" means the process used to actively remove the perchloroethylene remaining in the materials after washing and extraction. For closed-loop machines, the heated portion of the cycle is followed by cool-down and may be extended beyond cool-down by the activation of a control system. The drying cycle begins when heating coils are activated and ends when the machine ceases rotation of the drum.

(16) "Environmental training program" means an initial course or a refresher course of the environmental training program for perchloroethylene dry cleaning operations that has been authorized by the Air Resources Board according to the requirements of 17 CCR, Section 93110.

(17) "Equivalent closed-loop vapor recovery system" means a device or combination of devices that achieves, in practice, a perchloroethylene recovery performance equal to or exceeding that of refrigerated condensers.

(18) "Existing facility" means any facility that operated dry cleaning equipment prior to the effective date of this control measure in the district. Facility relocations, within the same district, shall be considered existing facilities for the purposes of this control measure.

(19) "Facility" means any entity or entities which: own or operate perchloroethylene dry cleaning equipment, are owned or operated by the same person or persons, and are located on the same parcel or contiguous parcels.

(20) "Facility mileage" means the efficiency of perchloroethylene use at a facility, expressed as the pounds of materials cleaned per gallon of perchloroethylene used, and calculated for all dry cleaning machines at the facility over a specified time period.

(21) "Fugitive control system" means a device or apparatus that collects fugitive perchloroethylene vapors from the machine door, button and lint traps, still, or other intentional openings of the dry cleaning system and routes those vapors to a device that reduces the mass of perchloroethylene prior to exhaust of the vapor to the atmosphere.

(22) "Full-time employee" means any person who is employed at the dry cleaning facility and averages at least 30 hours per week in any 90-day period.

(23) "Gallons of perchloroethylene used" means the volume of perchloroethylene, in gallons, introduced into the dry cleaning equipment, and not recovered at the facility for reuse on-site in the dry cleaning equipment, over a specified time period.

(24) "Halogenated-hydrocarbon detector" means a portable device capable of detecting vapor concentrations of perchloroethylene of 25 ppmv or less and indicating an increasing concentration by emitting an audible signal or visual indicator that varies as the concentration changes.

(25) "Liquid leak" means a leak of liquid containing perchloroethylene of more than 1 drop every 3 minutes.

(26) "Materials" means wearing apparel, draperies, linens, fabrics, textiles, rugs, leather, and other goods that are dry cleaned.

(27) "Muck cooker" means a device for heating perchloroethylene-laden waste material to volatilize and recover perchloroethylene.

(28) "New facility" means a facility that did not operate any dry cleaning equipment prior to the effective date of this control measure in the district. Facility relocations, within the same district, shall not be considered new facilities for the purposes of this control measure.

(29) "Perceptible vapor leak" means an emission of perchloroethylene vapor from unintended openings in the dry cleaning system, as indicated by the odor of perchloroethylene or the detection of gas flow by passing the fingers over the surface of the system. This definition applies for an interim period of 18 months only, beginning on the effective date of this control measure in the district.

(30) "Perchloroethylene (Perc)" means the substance with the chemical formula 'C2Cl4', also known by the name 'tetrachloroethylene', which has been identified by the Air Resources Board and listed as a toxic air contaminant in 17 CCR, Section 93000.

(31) "Perchloroethylene dry cleaning" or "dry cleaning" means the process used to remove soil, greases, paints, and other unwanted substances from materials with perchloroethylene.

(32) "Pounds of materials cleaned per load" means the total dry weight, in pounds, of the materials in each load dry cleaned at the facility, as determined by weighing each load on a scale prior to dry cleaning and recording the value.

(33) "Primary control system" means a refrigerated condenser, or an equivalent closed-loop vapor recovery system approved by the district.

(34) "Reclaimer" means a machine, device, or apparatus used only to remove residual perchloroethylene from materials that have been previously cleaned in a separate piece of dry cleaning equipment.

(35) "Reasonably available", as it applies to an initial course for the environmental training program, means that the course is offered within 200 miles of the district boundaries and that all such courses have a capacity, in the aggregate, that is adequate to accommodate at least one person from each facility in the district required to certify a trained operator at that time.

(36) "Refrigerated condenser" means a closed-loop vapor recovery system into which perchloroethylene vapors are introduced and trapped by cooling below the dew point of the perchloroethylene.

(37) "Secondary control system" means a device or apparatus that reduces the concentration of perchloroethylene in the recirculating air at the end of the drying

cycle beyond the level achievable with a refrigerated condenser alone. An "integral" secondary control system is designed and offered as an integral part of a production package with a single make and model of dry cleaning machine and primary control system. An "add-on" secondary control system is designed or offered as a separate retrofit system for use on multiple machine makes and models.

(38) "Self-service dry cleaning machine" means a perchloroethylene dry cleaning machine that is loaded, activated, or unloaded by the customer.

(39) "Separator" means any device used to recover perchloroethylene from a water-perchloroethylene mixture.

(40) "Still" means a device used to volatilize and recover perchloroethylene from contaminated solvent removed from the cleaned materials.

(41) "Trained operator" means the owner, the operator, or an employee of the facility, who holds a record of completion for the initial course of an environmental training program and maintains her/his status by successfully completing the refresher courses as required.

(42) "Transfer machine" means a combination of perchloroethylene dry cleaning equipment in which washing and extraction are performed in one unit and drying is performed in a separate unit.

(43) "Vapor adsorber" means a bed of activated carbon or other adsorbent into which perchloroethylene vapors are introduced and trapped for subsequent desorption.

(44) "Vapor leak" means an emission of perchloroethylene vapor from unintended openings in the dry cleaning system, as indicated by a rapid audible signal or visual signal from a halogenated-hydrocarbon detector or a concentration of perchloroethylene exceeding 50 ppmv as methane as indicated by a portable analyzer. This definition applies beginning 18 months after the effective date of this control measure in the district.

(45) "Vented machine" means dry cleaning equipment in which washing, extraction, and drying are all performed in the same single unit and in which fresh air is introduced into the drum in the last step of the drying cycle and exhausted to the atmosphere, either directly or through a control device.

(46) "Waste water evaporator" means a device that vaporizes perchloroethylene-contaminated waste water through the addition of thermal or chemical energy, or through physical action.

(47) "Water-repelling operations" means the treatment of materials with a water-repellent solution that contains perchloroethylene.

Deleted

(b) Applicability. Any person who owns or operates perchloroethylene dry cleaning equipment shall comply with Section 93109.

(c) Initial Notification. The owner/operator shall provide the district with all of the following information, in writing:

(1) By the applicable date shown in column 2 of Table 1.

(A) The name(s) of the owner and operator of the facility.

(B) The facility name and location.

(C) Whether or not the facility is co-located with a residence.

(D) The number, types, and capacities of all dry cleaning equipment.

(E) Any control systems for each dry cleaning machine.

(F) For existing facilities only, the gallons of perchloroethylene purchased by the facility dur

(2) A district may exempt a source from item (1) of this subsection if the district maintains current equivalent information of the facility.

(d) Recordkeeping. The owner/operator shall maintain records for the specified time period, beginning on the applicable date shown in column 3 of Table 1. These records, or copies thereof, shall be accessible at the facility at all times.

(1) All of the following records shall be retained for at least 2 years or until the next district inspection of the facility, whichever period is longer.

(A) For each dry cleaning machine, a log showing the date and the pounds of materials cleaned per load.

(B) Purchase and delivery receipts for perchloroethylene.

1. For only those facilities with solvent tanks that are not directly filled by the perchloroethylene supplier upon delivery, the date(s) and gallons of perchloroethylene added to the solvent tank of each dry cleaning machine.

(C) The completed leak inspection checklists required by subsection (f)(2) and the operation and maintenance checklists required by subsection (f)(1)(A).

(D) For liquid leaks, perceptible vapor leaks, or vapor leaks that were not repaired at the time of detection, a record of the leaking component(s) of the dry cleaning system awaiting repair and the action(s) taken to complete the repair.

The record shall include copies of purchase orders or other written records showing when the repair parts were ordered and/or service was requested.

(2) For dry cleaning equipment installed after the effective date of this control measure in the district, the manufacturer's operating manual for all components of the dry cleaning system shall be retained for the life of the equipment.

(3) The original record of completion for each trained operator shall be retained during the employment of that person. A copy of the record of completion shall be retained for an additional period of two years beyond the separation of that person from employment at the facility.

(e) Annual Reporting. The owner/operator shall maintain an annual report. At the district's discretion, the facility owner or operator shall furnish this annual report to the district by the date specified by the district. The annual report shall include all of the following:

(1) A copy of the record of completion for each trained operator.

(2) The total of the pounds of materials cleaned per load and the gallons of perchloroethylene used for all solvent additions in the reporting period.

(3) The average facility mileage, determined from all solvent additions in the reporting period, as follows:

$$\frac{\text{The Total of the Pounds of Materials Cleaned Per Load}}{\text{The Total of the Gallons of Perchloroethylene Used}}$$

(f) Good Operating Practices. The owner/operator shall not operate dry cleaning equipment after the applicable dates shown in column 5 and column 6 of Table 1, unless all of the following requirements are met:

(1) Operation and maintenance requirements. The trained operator, or his/her designee, shall operate and maintain all components of the dry cleaning system in accordance with the requirements of this section and the conditions specified in the facility's operating permit beginning on the applicable date specified in column 5 of Table 1. For operations not specifically addressed, the components shall be operated and maintained in accordance with the manufacturer's recommendations.

(A) The district shall provide an operation and maintenance checklist to the facility. Each operation and maintenance function and the date performed shall be recorded on the checklist. The operation and maintenance checklist provided by the district shall include, at a minimum, the following requirements:

Deleted

1. Refrigerated condensers shall be operated to ensure that exhaust gases are recirculated until the air-vapor stream temperature on the outlet side of the refrigerated condenser, downstream of any bypass, is less than or equal to 45° F (7.2° C).

2. Primary control systems, other than refrigerated condensers, shall be operated to ensure that exhaust gases are recirculated until the perchloroethylene concentration in the drum is less than or equal to 8,600 ppmv at the end of the drying cycle, before the machine door is opened and any fugitive control system activates.

3 Vapor adsorbers used as a primary control system or secondary control system shall be operated to ensure that exhaust gases are recirculated at the temperature specified by the district, based on the manufacturer's recommendations for optimum adsorption. These vapor adsorbers shall be desorbed according to the conditions specified by the district in the facility's operating permit, including a requirement that no perchloroethylene vapors shall be routed to the atmosphere during routine operation or desorption.

4. During the interim period between compliance with this subsection and compliance with the requirements of subsection (g), an existing facility with a transfer machine or a vented machine shall operate any existing carbon adsorber, which functions during the drying cycle, to meet the following requirements:

   i. Desorption shall be performed periodically, at the frequency specified by the district. The frequency, at a minimum, shall be each time all dry cleaning equipment exhausted to the device has cleaned a total of three pounds of materials for each pound of activated carbon. Desorption shall be performed with the minimum steam pressure and air flow capacity specified by the district.

   ii. Once desorption is complete, the carbon bed shall be fully dried according to the manufacturer's instructions.

   iii. No vented perchloroethylene vapors shall bypass the carbon adsorber to the atmosphere.

5. Cartridge filters and adsorptive cartridge filters shall be handled using one of the following methods.

i. Drained in the filter housing, before disposal, for no less than: 24 hours for cartridge filters and 48 hours for adsorptive cartridge filters. If the filters are then transferred to a separate device to further reduce the volume of perchloroethylene, this treatment shall be done in a system that routes any vapor to a primary control system, with no exhaust to the atmosphere or workroom.

ii. Dried, stripped, sparged, or otherwise treated, within the sealed filter housing, to reduce the volume of perchloroethylene contained in the filter.

6. A still, and any muck cooker, shall not exceed 75 percent of its capacity, or an alternative level recommended by the manufacturer. A still, and any muck cooker, shall cool to 100° F (38° C) or less before emptying or cleaning.

7. Button and lint traps shall be cleaned each working day and the lint placed in a tightly sealed container.

8. All parts of the dry cleaning system where perchloroethylene may be exposed to the atmosphere or workroom shall be kept closed at all times except when access is required for proper operation and maintenance.

9. Waste water evaporators shall be operated to ensure that no liquid perchloroethylene or visible emulsion is allowed to vaporize.

(2) Leak check and repair requirements. The trained operator, or her/his designee, shall inspect the dry cleaning system for liquid leaks and perceptible vapor leaks beginning on the applicable date shown in column 5 of Table 1. The trained operator, or her/his designee, shall inspect the dry cleaning system for vapor leaks instead of perceptible vapor leaks beginning 18 months after the effective date of this control measure in the district. The district shall provide a leak inspection checklist to the facility. The trained operator, or her/his designee, shall record the status of each component on the checklist.

(A) The dry cleaning system shall be inspected at least once per week for liquid leaks and:

1. For perceptible vapor leaks, beginning on the applicable date shown in column 5 of Table 1 until 18 months after the effective date of this control measure in the district.

2. For vapor leaks, beginning 18 months after the effective date of this control measure in the district, using one of the following techniques:

i. A halogenated-hydrocarbon detector.

ii. A portable gas analyzer or an alternative method approved by the district.

(B) Any liquid leak, perceptible vapor leak, or vapor leak that has been detected by the operator shall be noted on the checklist and repaired according to the requirements of this subsection. If the leak is not repaired at the time of detection, the leaking component shall be physically marked or tagged in a manner that is readily observable by a district inspector.

(C) Any liquid leak, perceptible vapor leak, or vapor leak detected by the district, which has not been so noted on the checklist and marked on the leaking component of the dry cleaning system, shall constitute a violation of this section. For enforcement purposes, the district shall:

1. Identify the presence of a perceptible vapor leak based on the odor of perchloroethylene or the detection of gas flow by passing the fingers over the surface of the system.

2. Identify the presence of a vapor leak by determining the concentration of perchloroethylene with a portable analyzer:

   i. According to ARB Test Method 21 (17 CCR, Section 94124, March 28, 1986).

   ii. Measured 1 cm away from the dry cleaning system.

(D) Any liquid leak or vapor leak shall be repaired within 24 hours of detection.

1. If repair parts are not available at the facility, the parts shall be ordered within two working days of detecting such a leak. Such repair parts shall be installed within five working days after receipt. A facility with a leak that has not been repaired by the end of the 15th working day after detection shall not operate the dry cleaning equipment, until the leak is repaired, without a leak-repair extension from the district.

2. A district may grant a leak-repair extension to a facility, for a single period of 30 days or less, if the district makes these findings:

   i. The delay in repairing the leak could not have been avoided by action on the part of the facility.

   ii. The facility used reasonable preventive measures and acted promptly to initiate the repair.

iii. The leak would not significantly increase Perc exposure near the facility.

iv. The facility is in compliance with all other requirements of this section and has a history of compliance.

(3) Environmental training requirements. The facility shall have one or more trained operators beginning on the applicable date shown in column 6 of Table 1.

(A) A trained operator shall be the owner, the operator, or another employee of the facility, who successfully completes the initial course of an environmental training program to become a trained operator. Evidence of successful completion of the initial course shall be the original record of completion issued pursuant to 17 CCR, Section 93110. The trained operator shall be a full-time employee of the facility. Except for the provisions of subsection (f)(3)(C)2., one person cannot serve as the trained operator for two or more facilities simultaneously.

(B) Each trained operator shall successfully complete the refresher course of an environmental training program at least once every three years. Evidence of successful completion of each refresher course shall be the date of the course and the instructor's signature on the original record of completion.

(C) If the facility has only one trained operator and the trained operator leaves the employ of the facility, the facility shall:

1. Notify the district in writing within 30 days of the departure of the trained operator.

2. Obtain certification for a replacement trained operator within 3 months, except that a trained operator who owns or manages multiple facilities may serve as the interim trained operator at two of those facilities simultaneously for a maximum period of 4 months, by which time each facility must have its own trained operator.

3. If the district determines that the initial course of an environmental training program is not reasonably available, the district may extend the certification period for a replacement trained operator until 1 month after the course is reasonably available.

(g) Equipment. The owner/operator shall not operate dry cleaning equipment after the applicable date shown in column 7 of Table 1, unless the following requirements are met:

(1) Prohibited Equipment. The owner/operator shall not operate any of the following types of dry cleaning equipment after the applicable date shown in column 7 of Table 1.

(A) A transfer machine, including any reclaimer or other device in which materials that have been previously dry cleaned with perchloroethylene are placed to dry, except a drying cabinet that meets the requirements of item (4)(A) of this subsection.

(B) A vented machine.

(C) A self-service dry cleaning machine.

(2) Required Equipment. The owner/operator of each new or existing facility shall meet the applicable requirements of Table 1 as follows:

(A) For an existing facility:

1. Within 12 months of the effective date of this control measure in the district, choose either Option 1 or Option 2 of Table 1 and notify the district of her/his choice.

2. Comply with the requirements of Option 2, notwithstanding her/his choice of Option 1, if the facility does not meet the applicable requirements for Option 1 within 18 months of the effective date of this control measure in the district.

3. Install, operate, and maintain the required equipment for the option chosen, as shown in column 1 of Table 1 for existing facilities.

(B) A new facility shall install, operate, and maintain the required equipment shown in column 1 of Table 1 for new facilities. The applicable requirements shall be determined based on the date the facility commences operation of the dry cleaning equipment.

(3) Specifications for Required Equipment. Required equipment shall meet the following specifications:

(A) A primary control system shall:

1. Operate during both the heated and cool-down phases of the drying cycle to reduce the mass of perchloroethylene in the recirculating air stream.

2. Not exhaust to the atmosphere or workroom.

Deleted

3. Not require the addition of any form of water to the primary control system that results in physical contact between the water and perchloroethylene.

4. For refrigerated condensers only:

   i. Be capable of achieving an outlet vapor temperature, downstream of any bypass, of less than or equal to 45° F (7.2° C) during cool-down; and

   ii. Have a graduated thermometer with a minimum range from 0° F (-18° C) to 150° F (66° C), which measures the temperature of the outlet vapor stream, downstream of any bypass of the condenser, and is easily visible to the operator.

5. For equivalent closed-loop vapor recovery systems:

   i. Use a technology that has been demonstrated pursuant to the requirements of subsection (h), to achieve a perchloroethylene concentration of 8,600 ppmv or less in each test.

   ii. Have a device that measures the perchloroethylene concentration, or a demonstrated surrogate parameter, in the drum at the end of each drying cycle, before the machine door is opened and any fugitive control system activates, and indicates if the concentration is above or below 8,600 ppmv. This device shall be installed such that the reading is easily visible to the operator.

(B) A converted machine shall meet all of the following requirements, as demonstrated on-site to the district, either upon conversion or prior to compliance with the requirements of subsection (g)(2)(A):

1. All process vents that exhaust to the atmosphere or workroom during washing, extraction, or drying shall be sealed.

2. The converted machine shall use an appropriately-sized primary control system to recover perchloroethylene vapor during the heated and cool-down phases of the drying cycle.

   i. A refrigerated condenser shall be considered appropriately sized, for a machine converted on or after the date that this section is filed with the Secretary of State, if all of the following conditions are met:

      a. The water-cooled condensing coils are replaced with refrigerant-cooled condensing coils.

b. The compressor of the refrigerated condenser shall have a capacity, in horsepower (hp) that is no less than the minimum capacity, determined as follows:

$$\text{Minimum Capacity (hp)} = \frac{\text{Capacity of the Machine (lbs)}}{12}$$

ii. A refrigerated condenser shall be considered appropriately sized, for a machine converted prior to the date that this section is filed with the Secretary of State, if the conditions a., or b. below are met:

a. The refrigerated condenser shall meet the specifications for new conversions in subsection (g)(3)(B)2.i.

b. The refrigerated condenser shall achieve and maintain for 3 minutes, an outlet vapor temperature, measured downstream of the condenser and any bypass of the condenser, of less than or equal to 45° F (7.2° C) within 10 minutes of the initiation of cool-down.

iii. An equivalent closed-loop vapor recovery system shall be appropriately sized for the conversion of a vented machine if the system does not extend the total drying time by more than five minutes to meet the specifications of subsection (g)(3)(A)5.

3. The converted machine shall operate with no liquid leaks and no vapor leaks. Any seal, gasket, or connection determined to have a liquid leak or vapor leak shall be replaced.

(C) A secondary control system shall:

1. Be designed to function with a primary control system or be designed to function as a combined primary control system and secondary control system that meets all of the applicable requirements of this section.

2. Not exhaust to the atmosphere or workroom.

3. Not require the addition of any form of water to the secondary control system that results in physical contact between the water and perchloroethylene.

4. Use a technology that has been demonstrated, pursuant to the requirements of subsection (h), to achieve a perchloroethylene concentration in the drum of 300 ppmv or less in each test.

5. Have a holding capacity equal to or greater than 200 percent of the maximum quantity of perchloroethylene vapor expected in the drum prior to activation of the system.

6. For add-on secondary control systems only, the system shall be sized and capable of reducing the perchloroethylene concentration in the drum from 8,600 ppmv or greater to 300 ppmv or less in the maximum volume of recirculating air in the dry cleaning machine and all contiguous piping.

(4) Specifications for Other Equipment.

(A) A drying cabinet shall:

1. Be fully enclosed.

2. Be exhausted via one of the following methods:

i. To a control system that has been demonstrated, pursuant to the requirements of subsection (h), to achieve a perchloroethylene concentration of 100 ppmv or less in each test measured at the outlet without dilution.

ii. To a control system that reduces the concentration of perchloroethylene in a closed system with no exhaust to the atmosphere or workroom.

(h) Equipment Testing. For a given design, a single test program shall be conducted, in accordance with the following procedures, to meet the specifications in subsections (g)(3) and (g)(4). The person or organization conducting the test program shall prepare a written test plan that describes, in detail, the dry cleaning machine and control systems being tested, the test protocol, and the test method.

(1) Test Program and Scope. A minimum of three tests shall be conducted for each test program on each control system design. All tests for a single test program shall be conducted on a single dry cleaning machine.

(A) Test results for a primary control system design, or an add-on secondary control system design, may be applied to a different make/model of dry cleaning machine if the equipment designer or facility demonstrates, to the satisfaction of the district, that:

1. The test results would be representative of the performance of the control system design on the different make/model of dry cleaning machine.

2. The control system design is properly sized for the maximum volume of recirculating air in the dry cleaning machine during the drying cycle.

(B) Test results for an integral secondary control system design may not be applied to a different make/model of dry cleaning machine.

(2) Test Conditions. Testing shall be conducted under normal operating conditions, unless otherwise specified.

(A) For primary control systems and secondary control systems, each test shall be conducted during the cleaning of one load of materials.

1. The machine shall be filled to no less than 75 percent of its capacity with materials for each test.

2. The weight of materials shall be recorded for each test.

(B) A primary control system shall be tested on a closed-loop machine, or a converted machine, without a secondary control system.

(C) A secondary control system shall be tested on a closed-loop machine.

1. An integral secondary control system shall be tested with the primary control system operating normally.

2. An add-on secondary control system shall be tested independent of a primary control system and the initial perchloroethylene concentration in the drum shall be 8,600 ppmv or greater.

(D) For a control system on the exhaust of a drying cabinet, each test shall be conducted following the placement of materials cleaned with perchloroethylene in the drying cabinet. The materials shall be transferred to the drying cabinet and testing shall begin no later than 15 minutes after the end of the washing and extraction process.

1. The drying cabinet shall be filled to no less than 50 percent of its capacity with materials for each test.

2. The weight of materials shall be recorded for each test.

(3) Test Method. Equipment shall be tested in accordance with the following methods.

(A) For primary control systems and secondary control systems:

1. The temperature of the air in the drum shall be measured and recorded continuously during the entire drying cycle, including the operation of the secondary control system.

2. Sampling shall be conducted as follows:

Deleted

i. For primary control systems and integral secondary control systems, sampling shall begin at the end of the drying cycle and be completed within 5 minutes.

ii. For add-on secondary control systems, sampling shall be done when the concentration of perchloroethylene is 8,600 ppmv or greater and again when the concentration reaches 300 ppmv or less.

iii. Sampling shall be completed prior to the opening of the machine door and activation of any fugitive control system.

3. The perchloroethylene concentration in the drum shall be determined by one of the following methods:

i. A sampling port and valve shall be appropriately placed to draw a sample from the interior of the drum or the lint filter housing. The sampling port shall be connected to a gas chromatograph by one-quarter (1/4-) inch, outside diameter, Teflon tubing. Any sampling pump shall have Teflon diaphragms. The gas chromatograph shall measure the concentrations of perchloroethylene in accordance with ARB Method 422 (17 CCR, Section 94132, December 31, 1991) or NIOSH Method 1003 (NIOSH Manual of Analytical Methods, U.S. Department of Health and Human Services, August 15, 1987).

ii. A sampling port and valve shall be appropriately placed to draw a sample from the interior of the drum or the lint filter housing. The sampling port shall be connected by one-quarter (1/4-) inch outside diameter Teflon tubing to a Tedlar bag. Any sampling pump shall have Teflon diaphragms. The concentration of perchloroethylene in the air sampled shall be measured in accordance with ARB Method 422 (17 CCR, Section 94132, December 31, 1991) or NIOSH Method 1003 (NIOSH Manual of Analytical Methods, U.S. Department of Health and Human Services, August 15, 1987) within 24 hours of sampling. If an independent laboratory is contracted to perform the analysis of the samples, the chain of custody procedures contained in ARB Method 422 or NIOSH Method 1003 shall be followed.

(B) For a control device on the exhaust of a drying cabinet, sampling and analysis shall be conducted using ARB Method 422 (17 CCR, Section 94132, December 31, 1991) or NIOSH Method 1003 (NIOSH Manual of Analytical Methods, U.S. Department of Health and Human Services, August 15, 1987).

(C) An alternative test method deemed acceptable by the Air Pollution Control Officer or Executive Officer of the district and the Executive Officer of the Air Resources Board.

(4) All test plans and test results shall be made available to the district and the Executive Officer of the California Air Resources Board upon request.

(i) Water-repelling and Dip Tank Operations. No person shall perform water-repelling or dip tank operations, after the applicable date shown in column 8 of Table 1, unless all of the following requirements are met:

(1) All materials to be treated with perchloroethylene water-repelling solutions shall be treated in a closed-loop machine, a converted machine, or a dip tank.

(2) For dip tank operations:

(A) The dip tank shall be fitted with a cover that prevents the escape of perchloroethylene vapors from the tank and shall remain covered at all times, except when materials are placed in and removed from the dip tank or while the basket is moved into position for draining.

(B) After immersion, the materials shall be drained within the covered dip tank until dripping ceases.

(C) All materials removed from a dip tank shall be immediately placed into a closed-loop machine or a converted machine for drying and not removed from the machine until the materials are dry.

(j) Compliance. A facility shall comply with all provisions of this section as follows:

(1) By the applicable dates of compliance specified in column 1 through column 8 of Table 1.

(2) For compliance with subsection (f)(3) "Environmental Training Requirements", an alternative date of compliance shall apply if the district determines that the initial course of an environmental training program for perchloroethylene dry cleaning operations is not reasonably available.

(A) For existing facilities in the district, if the initial course is not reasonably available within 12 months of the effective date of this control measure in the district, the alternative date of compliance for subsection (f)(3) only shall be 6 months from the date the district determines that the initial course is reasonably available.

(B) For each new facility in the district, if the initial course is not reasonably available within the period from 3 months prior to 2 months following commencement of operation, the alternative date of compliance for subsection (f)(3) only shall be 1 month from the date the district determines that the initial course is reasonably available.

Authority cited: Sections 39600, 39601, 39650, 39655, 39656, 39658, 39659, 39665, and 39666, Health and Safety Code; Sections 7412 and 7416, Title 42, United States Code.

Reference: Sections 39650, 39655, 39656, 39658, 39659, and 39666, Health and Safety Code; Sections 7412 and 7414, Title 42, United States Code; Sections 63.320, 63.321, 63.323, and 63.324, Title 40, Code of Federal Regulations.

Deleted

TABLE 1

Equipment Requirements and Summary of Compliance Times for Existing and New Facilities

Deleted

Facility Type	EQUIPMENT REQUIREMENTS		DATE OF COMPLIANCE (after the effective date of this control measure in the district)						
		Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8
	Compliance Option(s)	Required Dry Cleaning Equipment	Initial Notification	Recordkeeping	Annual Reporting	Leak Check and Repair Operation & Maintenance Requirements	Environmental Training Requirements	Equipment Requirements	Water-Repelling and Dip Tank Requirements
EXISTING FACILITIES	Option 1	Converted Closed-Loop Machine with Primary Control System	60 days	60 days	Specified by district	60 days	18 months	18 months	18 months
	or								
	Option 2	Closed-loop Machine with Primary Control System	60 days	60 days	Specified by district	60 days	18 months	48 months	18 months
NEW FACILITIES Commencing Operations prior to 18 months After the Effective Date of This Control Measure in the District									
		Closed-loop Machine with a Primary Control System	On application for permit	Upon commencement of operation	Specified by district	Upon commencement of operation	3 months following commencement of operation	Upon commencement of operation	Upon commencement of operation
NEW FACILITIES Commencing Operations 18 months or Later After the Effective Date of This Control Measure in the District									
		Closed-loop Machine with a Primary Control System and a Secondary Control System	On application for permit	Upon commencement of operation	Specified by district	Upon commencement of operation	3 months following commencement of operation	Upon commencement of operation	Upon commencement of operation

Appendix B

Health Risk Assessment Methodology for Dry Cleaning Operations

Appendix B

Health Risk Assessment Methodology for Dry Cleaning Operations

A. Introduction

This appendix presents the methodology used to estimate the potential cancer and noncancer health impacts from exposure to Perc emitted during dry cleaning activities. Also included are results from the four meteorological data sets.

As discussed in Chapter IV, the assumptions used to determine the potential health impacts are based on a selection of generic modeling scenarios for routine dry cleaning operations throughout the state. The generic facilities were created from the evaluation of over 1,600 responses to a facility survey, information obtained during over 100 site visits, and input from draft industry-specific reports, industry representatives, and from Air Pollution Control or Air Quality Management Districts staff regarding dry cleaning operations. The generic release scenarios used in the HRA are presented in Section B of this appendix. This assessment uses meteorological data sets from four locations in California. Those locations are Anaheim, Fresno, Oakland (port), and San Diego (Miramar). Emissions, source release parameters, and modeling inputs are discussed in the sections which follow.

B. Emission Estimates

Emissions for the risk assessment were based on generic unit emission rates of 100 gallons per year (1,350 pounds per year) for annual emissions and 0.1 gallons per hour (1.35 pounds per hour) for hourly emissions. Since risk assessment results are based on generic emission rates, they can be easily adjusted to reflect any emission rate scenario. Tables B-3 to B-6 use the generic emission rates.

Table B-1 shows the average and high-end (90th percentile) annual Perc emission rates that were used in Chapter IV of this report for dry cleaners with converted machines, primary controls, and secondary control. According to the facility survey results and our site visits, approximately 90 percent of dry cleaners emit below the high-end annual emission rate. The purpose for showing these two emission rates is to provide a perspective for Perc emissions at dry cleaning facilities in California. Hourly emissions are also shown for the three machines. The hourly emissions are based on the 10th percentile of mileage and 90th percentile for machine capacity from our survey results.

Table B-1. Emissions Rates

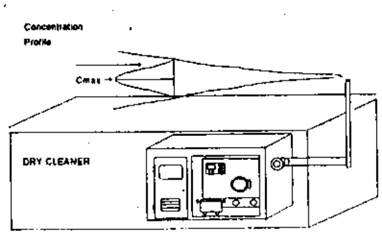
Scenario	Annual (gallons/year)		Hourly (gallons/hour)
	High-End Emissions[1]	Average Emissions	
Converted Machine	113	76	0.45
Primary Control	94	52	0.13
Secondary Control	61	34	0.06

1. High-end emissions are defined by the 90th percentile of emissions.

C. Generic Dry Cleaner Configurations

Eight generic dry cleaner scenarios were used for the air dispersion modeling. The generic release scenarios used in the HRA are presented below in Figures (a) – (f).

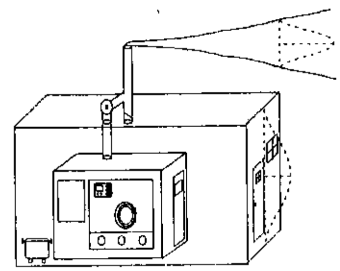
Figure (a) FULL VAPOR BARRIER ROOM (FVR)



For modeling purposes, assume: 100% capture by vapor barrier room (VBR), all emission modeled as point source.

POINT SOURCE:
Q = 1000 CFM; V = 15 m/s.
Stack Height = 5 feet + building ht. = 17 feet (5.18 m).
Diameter = 0.2 meters (8 inches).
Building Height = 12 feet.
Shop Size = Approximately 1100 ft^2.
Building Width = 10 meters (32.8 ft.).
Building Length = 10 meters (32.8 ft.).

Figure (b) PARTIAL VAPOR BARRIER ROOM (PVR)

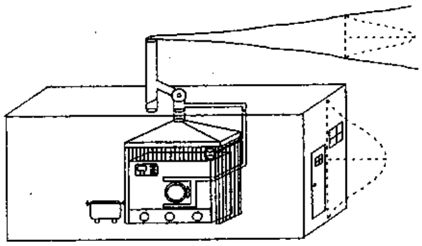


For modeling purposes, assume: 95% capture by PVR, 95% of emissions modeled as point source, 5% of emissions are treated as fugitive and modeled as volume source.

POINT SOURCE:
Q = 1000 CFM; V = 15 m/s.
Stack Height = 5 feet + building ht. = 17 feet (5.18 m).
Diameter = 0.2 meters (8 inches).
Building Height = 12 feet.
Shop Size = Approximately 1100 ft^2.
Building Width = 10 meters (32.8 ft.).
Building Length = 10 meters (32.8 ft.).

VOLUME SOURCE:
σ_{yo} = Length/4.3.
σ_{zo} = Height/ 2.15.
Building Height = 12 feet.
Release Ht = 0.5 Shop Ht = 6 feet.
Shop Size = Approximately 1100 ft^2.
Building Width = 10 meters (32.8 ft.).
Building Length = 10 meters (32.8 ft.).

Figure (c) LOCAL VENTILATION (L-VENT)

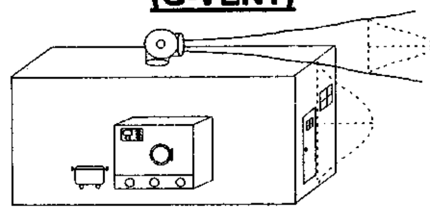


For modeling purposes, assume for typical system: 80% of emissions captured by fan and modeled as a point source, 20% of emissions are fugitive & modeled as volume source.

POINT SOURCE:
Q = 2500 CFM; V = 15 m/s.
Stack Height = 5 feet + building= 17 feet (5.18 m).
Diameter = 0.3 meters (12 inches).
Building Height = 12 feet.
Shop Size = Approximately 1100 ft^2.
Building Width = 10 meters (32.8 ft.).
Building Length = 10 meters (32.8 ft.).

VOLUME SOURCE:
σ_{yo} = Length/4.3.
σ_{zo} = Height/ 2.15.
Building Height = 12 feet.
Release Ht = 0.5 Shop Ht = 6 feet.
Shop Size = Approximately 1100 ft^2.
Building Width = 10 meters (32.8 ft.).
Building Length = 10 meters (32.8 ft.).

Figure (d) GENERAL VENTILATION (G-VENT)

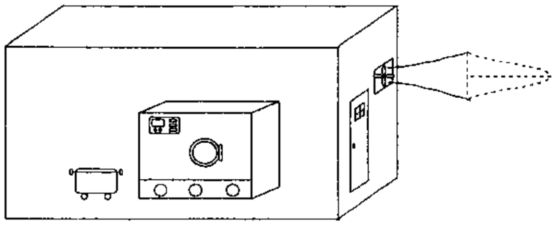


For modeling purposes, assume for typical system (< 1 change per 5 minutes): 60% capture of emissions by fan and modeled as horizontal point source, 40% of emissions are fugitive & modeled as volume source.

POINT SOURCE:
Q = 2500 CFM; V = 0.001 m/s (Exit velocity is 0.001 m/s and Q to 0.154 acfm to simulate horizontal flow, stack tip downwash off).
Stack Height = 1.5 feet + building= 13.5 feet (4.11 m).
Diameter = 0.3 meters (12 inches).
Building Height = 12 feet.
Shop Size = Approximately 1100 ft^2.
Building Width = 10 meters (32.8 ft.).
Building Length = 10 meters (32.8 ft.).
Scenario (B):
Stack Height = 1.5 feet + building= 19.5 feet (5.94 m).
Diameter = 0.3 meters (12 inches).
Building Height = 18 feet.
Shop Size = Approximately 2500 ft^2.
Building Width = 15 meters (49.2 ft.).
Building Length = 15 meters (49.2 ft.).

VOLUME SOURCE:
σ_{yo} = Length/4.3.
σ_{zo} = Height/ 2.15.
Building Height = 12 feet.
Release Ht = 0.5 Shop Ht = 6 feet.
Shop Size = Approximately 1100 ft^2.
Building Width = 10 meters (32.8 ft.).
Building Length = 10 meters (32.8 ft.).
Scenario (B):
Building Height = 18 feet.
Release Ht = 0.5 Shop Ht = 9 feet.
Shop Size = Approximately 2500 ft^2.
Building Width = 15 meters (49.2 ft.).
Building Length = 15 meters (49.2 ft.).

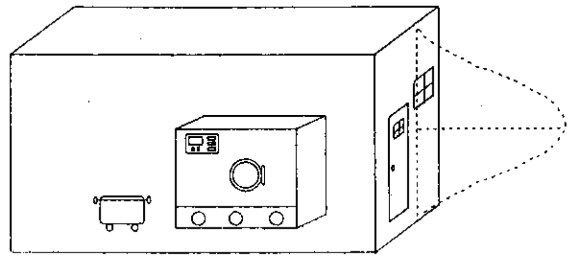
Figure (e) WINDOW FAN (WIN FAN)



For modeling purposes, assume: 100% of the emission are modeled as a horizontal point source.

POINT SOURCE:
Q = 5000 CFM, V = 0.001 m/s (Exit velocity is 0.001 m/s and Q to 0.154 acfm to simulate horizontal flow, stack tip downwash off).
Fan Height = 8 feet.
Diameter = 0.3 meters (12 inches).
Building Height = 12 feet.
Shop Size = Approximately 1100 ft^2.
Building Width = 10 meters (32.8 ft.).
Building Length = 10 meters (32.8 ft.).

Figure (f) NATURAL VENTILATION (N-VENT)



For modeling purposes, assume: 100% of emissions are fugitive & modeled as volume source.

VOLUME SOURCE:
σ_{yo} = Length/4.3.
σ_{zo} = Height/ 2.15.
Scenario A:
Building Height = 12 feet.
Release Ht = 0.5 Shop Ht = 6 feet.
Shop Size = Approximately 1100 ft^2.
Building Width = 10 meters (32.8 ft.).
Building Length = 10 meters (32.8 ft.).
Scenario (B):
Building Height = 18 feet.
Release Ht = 0.5 Shop Ht = 9 feet.
Shop Size = Approximately 2500 ft^2.
Building Width = 15 meters (49.2 ft.).
Building Length = 15 meters (49.2 ft.).

For all of the dry cleaner scenarios, stack releases are modeled as a point source and fugitive releases are modeled as a volume source. The dimensions of the volume source are assumed to be the size of the dry cleaning shop (not the size of the entire building). For those configurations with a stack that simulates the presence of a rain cap or which are vented horizontally, these facilities were modeled according to OEHHA and U.S. EPA guidance. In summary, that guidance states that stack gas exit velocity, gas temperature, and stack diameter are used to estimate plume rise based on the greater of thermal buoyancy or momentum. In the presence of a rain cap or horizontal vent, then the momentum plume rise is negated. Since a window fan and a general ventilation system do not have a vertical component to the exit velocity, the momentum component of plume rise equations should not be used. In addition, since the exhaust gas from the facility is near to ambient conditions, the thermal buoyancy portion of the plume rise equations should not be used either.

To simulate these conditions with a point source release with the ISCST3 air dispersion model, the exit velocity is set to 0.001 m/s (meters per second) and stack tip downwash is turned off, as recommended in *The Air Toxics Hot Spots Risk Assessment Guidelines; Part IV; Exposure Assessment and Stochastic Analysis Technical Support Document*, September 2000, (OEHHA, 2000b) and the U.S. EPA Model Clearinghouse Memo, July 9, 1993 (U.S. EPA, 1993). Also recommended in the guidelines is to reduce the stack height by three stack diameters (this is for the maximum stack-tip downwash effect). However, this would reduce the stack tip to a level below the roof-top, which is physically impossible. Therefore, the stack height is not adjusted.

C. Air Dispersion Modeling

The model that was used during this HRA was the Hot Spots Analysis and Reporting Program (HARP) (ARB, 2005h). HARP includes an air dispersion model, ISCST3. U.S. EPA recommends the ISCST3 model for refined air dispersion modeling (U.S. EPA, 1995). HARP is a recommended tool for risk analysis in California and can be used for most source types (e.g., point, area, and volume sources) and is currently used by the ARB, districts, and other states.

The eight generic dry cleaning scenarios and modeling inputs presented Section B were used for the risk assessment. This data was used in the air dispersion modeling analysis to estimate downwind concentrations. This assessment uses meteorological data sets from four locations in California. Those locations are Anaheim (81), Fresno (85-89), Oakland (port) (98-00), and San Diego (Miramar) (67-71). The year(s) of meteorological data used at each location are listed in the parenthesis. Eight-hour emission rate scalars were used when modeling the generic scenarios. All scenarios used urban dispersion, flat terrain, and building downwash.

D. Risk Assessment Results

Tables B-3 to B-6 provide an overview of the potential cancer risk between 20 and 400 meters for residential and (off-site) worker receptors exposed to the emissions of Perc from generic dry cleaners using secondary control. The potential health impacts are presented for generic facilities; therefore, the potential health impacts at an actual facility may vary due to that facility's individual characteristics. For any receptor located closer than 20 meters from a dry cleaner, it is possible that their potential health impacts may be either higher or lower than the results presented in this report. Factors that may contribute to this variation include meteorology (wind and weather) and the individual release characteristics at each facility. Currently, 20 meters is the minimum air dispersion modeling distance used by the ARB in their Air Toxics Program. Since 1997, the districts have used 20 meters as the minimum modeled distance in the industrywide risk assessment guidelines for sources in the Air Toxics Hot Spots Program. The impacts at the 100 meter distance is identified to provide perspective for the potential health impacts at 300 feet, which is distance listed in the regulation for siting criteria.

These tabulated results address each dry cleaner scenario presented in Section B and are broken down by meteorological data set. The risk estimates that are anticipated after implementation of the proposed amendments are footnoted with the number 6 in Tables B-3 to B-6 This footnote identifies the scenarios that use enhanced ventilation. Enhanced ventilation includes local ventilation, partial vapor barrier rooms, and full vapor barrier rooms. The results are presented assuming a unit emission rate of 1,350 pound per year (100 gallons per year). The results for residential receptors are presented using the high-end (393 L/kg-day), 80th percentile (302 L/kg-day), and average (271 L/kg-day) breathing rate point estimates under a 70-year exposure duration. The off-site worker scenario uses the worker breathing rate point estimate (149 L/kg-day) and a 40-year exposure duration. This risk assessment used the Tier 1 methodology outlined in the OEHHA Guidelines (OEHHA, 2003a). In conjunction with the OEHHA Guidelines, staff also followed the ARB's Interim Risk Management Policy (ARB, 2003a).

Each table shows the potential cancer risk to a distance of 400 meters. Potential cancer risks at distances beyond this point are no larger than one chance per million. Because the tables have spacing restraints, all scenario types are abbreviated. These abbreviations are defined in Table B-2.

Table B-2. Scenario Abbreviations for Tables B-3 to B-6

Full Name	Abbreviation
Window Fan	WinFan
Natural Ventilation	N-Vent
Natural Ventilation (B)	N-Vent B
General Ventilation (60/40)	G-Vent (60/40)
General Ventilation (B) (60/40)	G-Vent B (60/40)
Local Ventilation (80/20)	L-Vent (80/20)
Partial Vapor Barrier Room (95/5)	PVR (95/5)
Full Vapor Barrier Room	FVR

Table B-3. Potential Cancer Risk at Residential and Off-site Worker Receptors from Generic Dry Cleaners Using Secondary Control and Anaheim Meteorological Data[1, 2]

Scenario	CANCER RISK (chances per million)															
	Distance (meters)[3]															
	20	30	40	50	60	70	80	90	100	120	140	160	180	200	300	400
Resident – High-End Breathing Rate																
WinFan	205	117	73	51	39	30	24	20	17	12	10	8	6	5	2	2
N-Vent	160	98	67	46	37	29	24	20	16	12	9	7	6	5	2	2
N-Vent B[4]	112	70	51	38	30	24	20	17	14	11	8	7	6	5	2	1
G-Vent (60/40)[5]	164	100	65	47	36	29	23	19	16	12	9	7	6	5	2	2
G-Vent B[4] (60/40)[5]	108	73	51	38	29	23	19	16	14	10	8	7	6	5	2	1
L-Vent (80/20)[5,6]	61	44	33	27	22	18	15	13	11	8	7	5	4	4	2	1
PVR (95/5)[5,6]	72	54	41	32	26	21	17	14	12	9	7	6	5	4	2	1
FVR[6]	68	52	40	32	25	20	17	14	12	9	7	6	5	4	2	1
Resident – 80th Percentile Breathing Rate																
WinFan	158	90	56	39	30	23	18	15	13	9	7	6	5	4	2	1
N-Vent	123	75	51	35	28	22	18	15	12	9	7	6	5	4	2	1
N-Vent B[4]	86	54	39	29	23	18	15	13	11	8	6	5	4	4	2	1
G-Vent (60/40)[5]	126	77	50	36	28	22	18	15	12	9	7	6	5	4	2	1
G-Vent B[4] (60/40)[5]	83	56	39	29	22	18	15	12	11	8	6	5	4	4	2	1
L-Vent (80/20)[5,6]	47	34	25	21	17	14	12	10	8	6	5	4	3	3	2	1
PVR (95/5)[5,6]	55	41	32	25	20	16	13	11	9	7	5	4	4	3	2	1
FVR[6]	52	40	31	25	19	15	13	11	9	7	5	4	4	3	2	1
Resident – Average Breathing Rate																
WinFan	141	81	50	35	27	21	17	14	12	8	7	5	4	3	2	1
N-Vent	110	68	46	32	26	20	17	14	11	8	6	5	4	3	2	1
N-Vent B[4]	77	48	35	26	21	17	14	12	10	8	6	5	4	3	2	1
G-Vent (60/40)[5]	113	69	45	32	25	20	16	13	11	8	6	5	4	3	2	1
G-Vent B[4] (60/40)[5]	74	50	35	26	20	16	13	11	10	7	6	5	4	3	2	1
L-Vent (80/20)[5,6]	42	30	23	19	15	12	10	9	8	6	4	4	3	3	1	1
PVR (95/5)[5,6]	50	37	28	22	18	14	12	10	8	6	5	4	3	3	2	1
FVR[6]	47	36	28	22	17	14	12	10	8	6	5	4	3	3	2	1
Off-site Worker																
WinFan	131	75	46	32	25	19	15	13	11	8	6	5	4	3	2	1
N-Vent	102	62	43	29	24	18	15	13	10	8	6	5	4	3	2	1
N-Vent B[4]	71	45	32	24	19	15	13	11	9	7	5	4	4	3	1	1
G-Vent (60/40)[5]	104	64	41	30	23	18	15	12	10	8	6	5	4	3	2	1
G-Vent B[4] (60/40)[5]	69	46	32	24	18	15	12	10	9	6	5	4	4	3	1	1
L-Vent (80/20)[5,6]	39	28	21	17	14	11	10	8	7	5	4	3	3	2	1	1
PVR (95/5)[5,6]	46	34	26	20	17	13	11	9	8	6	4	4	3	3	1	1
FVR[6]	43	33	25	20	16	13	11	9	8	6	4	4	3	3	1	1

1. All results are rounded and represent generic dry cleaning scenarios using secondary control technology. Results are presented using a Perc unit emission rate of 1,350 pounds per year (100 gallons /yr).
2. Results are for the inhalation pathway. Residents assume a 70-year exposure duration and use the high-end, 80th percentile, and average point estimate breathing rates. The worker breathing rate and a 40-year exposure duration is used for the off-site worker receptor. This risk assessment is based on the methodology outlined in The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments, August 2003 (OEHHA Guidelines) (OEHHA, 2003a) and the ARB's Recommended Interim Risk Management Policy for Inhalation-Based Residential Cancer Risk (ARB, 2003a).
3. Distances are presented from the building edge.
4. Building is approximately 2,500 square feet. Other scenarios use a building approximately 1,100 square feet.
5. Values identified within the parenthesis identify the ratio that emissions are modeled from a point and volume source.
6. Denotes an enhanced ventilation scenario. Results corresponding to these scenarios are anticipated after implementation of the proposed ATCM.

Table B-4. Potential Cancer Risk at Residential and Off-site Worker Receptors from Generic Dry Cleaners Using Secondary Control and Fresno Meteorological Data[1, 2]

Scenario	CANCER RISK (chances per million)															
	Distance (meters)[3]															
	20	30	40	50	60	70	80	90	100	120	140	160	180	200	300	400
Resident – High-End Breathing Rate																
WinFan	103	63	41	29	21	16	13	10	9	6	5	4	3	2	1	<1
N-Vent	90	54	36	26	19	15	12	10	8	6	5	4	3	2	1	<1
N-Vent B[4]	62	40	28	21	16	13	10	9	7	5	4	3	3	2	1	<1
G-Vent (60/40)[5]	83	53	36	26	20	15	12	10	8	6	5	4	3	2	1	<1
G-Vent B[4] (60/40)[5]	53	37	28	21	16	13	11	9	7	6	4	3	3	2	1	<1
L-Vent (80/20)[5,6]	48	34	25	19	15	12	10	8	7	5	4	3	3	2	1	<1
PVR (95/5)[5,6]	50	37	27	21	16	13	11	9	8	6	4	3	3	2	1	<1
FVR[6]	48	36	27	20	16	13	10	9	7	6	4	3	3	2	1	<1
Resident – 80^{th} Percentile Breathing Rate																
WinFan	79	48	32	22	16	12	10	8	7	5	4	3	2	2	1	<1
N-Vent	69	41	28	20	15	12	9	8	6	5	4	3	2	2	1	<1
N-Vent B[4]	48	31	22	16	12	10	8	7	6	4	3	3	2	2	1	<1
G-Vent (60/40)[5]	64	41	28	20	15	12	9	8	6	5	4	3	2	2	1	<1
G-Vent B[4] (60/40)[5]	41	28	22	16	12	10	8	7	6	4	3	3	2	2	1	<1
L-Vent (80/20)[5,6]	37	26	19	15	12	9	8	6	5	4	3	3	2	2	1	<1
PVR (95/5)[5,6]	38	28	21	16	12	10	8	7	6	4	3	3	2	2	1	<1
FVR[6]	37	28	21	15	12	10	8	7	6	4	3	3	2	2	1	<1
Resident – Average Breathing Rate																
WinFan	71	43	28	20	14	11	9	7	6	4	3	3	2	2	1	<1
N-Vent	62	37	25	18	13	10	8	7	6	4	3	2	2	2	1	<1
N-Vent B[4]	43	28	19	14	11	9	7	6	5	4	3	2	2	2	1	<1
G-Vent (60/40)[5]	57	37	25	18	14	10	8	7	6	4	3	2	2	2	1	<1
G-Vent B[4] (60/40)[5]	37	26	19	14	11	9	8	6	5	4	3	2	2	2	1	<1
L-Vent (80/20)[5,6]	33	23	17	13	10	8	7	6	5	4	3	2	2	2	1	<1
PVR (95/5)[5,6]	34	26	19	14	11	9	8	6	5	4	3	2	2	2	1	<1
FVR[6]	33	25	19	14	11	9	7	6	5	4	3	2	2	2	1	<1
Off-site Worker																
WinFan	66	40	26	18	13	10	8	6	6	4	3	2	2	2	1	<1
N-Vent	57	34	23	17	12	10	8	6	5	4	3	2	2	2	1	<1
N-Vent B[4]	39	25	18	13	10	8	6	5	5	3	3	2	2	1	1	<1
G-Vent (60/40)[5]	53	34	23	17	13	10	8	6	5	4	3	2	2	2	1	<1
G-Vent B[4] (60/40)[5]	34	24	18	13	10	8	7	6	5	4	3	2	2	1	1	<1
L-Vent (80/20)[5,6]	31	22	16	12	10	8	6	5	5	3	3	2	2	1	1	<1
PVR (95/5)[5,6]	32	24	17	13	10	8	7	6	5	4	3	2	2	1	1	<1
FVR[6]	31	23	17	13	10	8	6	6	5	4	3	2	2	1	1	<1

1. All results are rounded and represent generic dry cleaning scenarios using secondary control technology. Results are presented using a Perc unit emission rate of 1,350 pounds per year (100 gallons /yr).
2. Results are for the inhalation pathway. Residents assume a 70-year exposure duration and use the high-end, 80^{th} percentile, and average point estimate breathing rates. The worker breathing rate and a 40-year exposure duration is used for the off-site worker receptor. Results are for the inhalation pathway. Residents assume a 70-year exposure duration and use the high-end, 80^{th} percentile, and average point estimate breathing rates. The worker breathing rate and a 40-year exposure duration is used for the off-site worker receptor. This risk assessment is based on the methodology outlined in The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments, August 2003 (OEHHA Guidelines) (OEHHA, 2003a) and the ARB's Recommended Interim Risk Management Policy for Inhalation-Based Residential Cancer Risk (ARB, 2003a).
3. Distances are presented from the building edge.
4. Building is approximately 2,500 square feet. Other scenarios use a building approximately 1,100 square feet.
5. Values identified within the parenthesis identify the ratio that emissions are modeled from a point and volume source.
6. Denotes an enhanced ventilation scenario. Results corresponding to these scenarios are anticipated after implementation of the proposed ATCM.

Table B-5. Potential Cancer Risk at Residential and Off-site Worker Receptors from Generic Dry Cleaners Using Secondary Control and Oakland (port) Meteorological Data[1, 2]

Scenario	CANCER RISK (chances per million)															
	Distance (meters)[3]															
	20	30	40	50	60	70	80	90	100	120	140	160	180	200	300	400
Resident – High-End Breathing Rate																
WinFan	109	67	43	30	22	17	14	11	9	7	5	4	3	3	1	<1
N-Vent	92	55	37	26	20	15	12	10	8	6	5	4	3	2	1	<1
N-Vent B[4]	64	41	29	21	16	13	11	9	7	6	4	3	3	2	1	<1
G-Vent (60/40)[5]	87	56	38	27	20	16	13	10	9	6	5	4	3	2	1	<1
G-Vent B[4] (60/40)[5]	55	39	29	22	17	14	11	9	8	6	4	4	3	2	1	<1
L-Vent (80/20)[5,6]	50	37	27	21	16	13	11	9	8	6	4	4	3	2	1	<1
PVR (95/5)[5,6]	53	40	29	22	17	14	11	10	8	6	5	4	3	3	1	<1
FVR[6]	51	39	29	22	17	14	11	9	8	6	5	4	3	3	1	<1
Resident – 80th Percentile Breathing Rate																
WinFan	84	51	33	23	17	13	11	8	7	5	4	3	2	2	1	<1
N-Vent	71	42	28	20	15	12	9	8	6	5	4	3	2	2	1	<1
N-Vent B[4]	49	32	22	16	12	10	8	7	6	4	3	3	2	2	1	<1
G-Vent (60/40)[5]	67	43	29	21	15	12	10	8	7	5	4	3	2	2	1	<1
G-Vent B[4] (60/40)[5]	42	30	22	17	13	11	8	7	6	4	3	3	2	2	1	<1
L-Vent (80/20)[5,6]	38	28	21	16	12	10	8	7	6	4	3	3	2	2	1	<1
PVR (95/5)[5,6]	41	31	22	17	13	11	8	7	6	5	4	3	2	2	1	<1
FVR[6]	39	30	22	17	13	11	8	7	6	5	4	3	2	2	1	<1
Resident – Average Breathing Rate																
WinFan	75	46	30	21	15	12	10	8	6	5	3	3	2	2	1	<1
N-Vent	63	38	26	18	14	10	8	7	6	4	3	3	2	2	1	<1
N-Vent B[4]	44	28	20	14	11	9	8	6	5	4	3	2	2	2	1	<1
G-Vent (60/40)[5]	60	39	26	19	14	11	9	7	6	4	3	3	2	2	1	<1
G-Vent B[4] (60/40)[5]	38	27	20	15	12	10	8	6	5	4	3	2	2	2	1	<1
L-Vent (80/20)[5,6]	34	26	19	14	11	9	8	6	5	4	3	2	2	2	1	<1
PVR (95/5)[5,6]	37	28	20	15	12	10	8	7	6	4	3	3	2	2	1	<1
FVR[6]	35	27	20	15	12	10	8	6	6	4	3	2	2	2	1	<1
Off-site Worker																
WinFan	69	43	27	19	14	11	9	7	6	4	3	2	2	2	1	<1
N-Vent	59	35	24	17	13	10	8	6	5	4	3	2	2	2	1	<1
N-Vent B[4]	41	26	18	13	10	8	7	6	5	4	3	2	2	1	1	<1
G-Vent (60/40)[5]	55	36	24	17	13	10	8	6	6	4	3	2	2	2	1	<1
G-Vent B[4] (60/40)[5]	35	25	18	14	11	9	7	6	5	4	3	2	2	2	1	<1
L-Vent (80/20)[5,6]	32	24	17	13	10	8	7	6	5	4	3	2	2	2	1	<1
PVR (95/5)[5,6]	34	25	18	14	11	9	7	6	5	4	3	2	2	2	1	<1
FVR[6]	32	25	18	14	11	9	7	6	5	4	3	2	2	2	1	<1

1. All results are rounded and represent generic dry cleaning scenarios using secondary control technology. Results are presented using a Perc unit emission rate of 1,350 pounds per year (100 gallons /yr).
2. Results are for the inhalation pathway. Residents assume a 70-year exposure duration and use the high-end, 80th percentile, and average point estimate breathing rates. The worker breathing rate and a 40-year exposure duration is used for the off-site worker receptor. Results are for the inhalation pathway. Residents assume a 70-year exposure duration and use the high-end, 80th percentile, and average point estimate breathing rates. The worker breathing rate and a 40-year exposure duration is used for the off-site worker receptor. This risk assessment is based on the methodology outlined in The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments, August 2003 (OEHHA Guidelines) (OEHHA, 2003a) and the ARB's Recommended Interim Risk Management Policy for Inhalation-Based Residential Cancer Risk (ARB, 2003a).
3. Distances are presented from the building edge.
4. Building is approximately 2,500 square feet. Other scenarios use a building approximately 1,100 square feet.
5. Values identified within the parenthesis identify the ratio that emissions are modeled from a point and volume source.
6. Denotes an enhanced ventilation scenario. Results corresponding to these scenarios are anticipated after implementation of the proposed ATCM.

Table B-6. Potential Cancer Risk at Residential and Off-site Worker Receptors from Generic Dry Cleaners Using Secondary Control and San Diego (Miramar) Meteorological Data[1, 2]

Scenario	CANCER RISK (chances per million) Distance (meters)[3]															
	20	30	40	50	60	70	80	90	100	120	140	160	180	200	300	400
Resident – High-End Breathing Rate																
WinFan	108	61	40	29	22	17	14	11	9	7	5	4	3	3	1	<1
N-Vent	85	52	36	26	20	16	13	11	9	7	5	4	3	3	1	<1
N-Vent B[4]	61	38	27	20	16	13	11	9	8	6	5	4	3	3	1	<1
G-Vent (60/40)[5]	85	51	35	26	20	16	13	11	9	7	5	4	3	3	1	<1
G-Vent B[4] (60/40)[5]	58	38	25	20	16	13	11	9	8	6	5	4	3	3	1	<1
L-Vent (80/20)[5,6]	47	32	23	17	14	11	9	7	6	5	4	3	3	2	1	<1
PVR (95/5)[5,6]	47	34	25	19	14	11	9	8	7	5	4	3	3	3	1	<1
FVR[6]	45	33	24	18	14	11	9	7	6	5	4	3	3	2	1	<1
Resident – 80th Percentile Breathing Rate																
WinFan	83	47	31	22	17	13	11	8	7	5	4	3	3	2	1	<1
N-Vent	65	40	28	20	15	12	10	8	7	5	4	3	3	2	1	<1
N-Vent B[4]	47	29	21	15	12	10	8	7	6	4	3	3	2	2	1	<1
G-Vent (60/40)[5]	65	39	27	20	15	12	10	8	7	5	4	3	3	2	1	<1
G-Vent B[4] (60/40)[5]	45	29	19	15	12	10	8	7	6	4	4	3	2	2	1	<1
L-Vent (80/20)[5,6]	36	25	18	13	11	8	7	6	5	4	3	2	2	2	1	<1
PVR (95/5)[5,6]	36	26	19	15	11	8	7	6	5	4	3	3	2	2	1	<1
FVR[6]	35	25	18	14	11	8	7	6	5	4	3	3	2	2	1	<1
Resident – Average Breathing Rate																
WinFan	74	42	28	20	15	12	10	8	6	5	4	3	2	2	1	<1
N-Vent	59	36	25	18	14	11	9	8	6	5	4	3	2	2	1	<1
N-Vent B[4]	42	26	19	14	11	9	8	6	5	4	3	3	2	2	1	<1
G-Vent (60/40)[5]	59	35	24	18	14	11	9	8	6	5	4	3	2	2	1	<1
G-Vent B[4] (60/40)[5]	40	26	17	14	11	9	8	6	5	4	3	3	2	2	1	<1
L-Vent (80/20)[5,6]	32	22	16	12	10	8	6	5	4	3	3	2	2	2	1	<1
PVR (95/5)[5,6]	32	23	17	13	10	8	6	5	4	4	3	2	2	2	1	<1
FVR[6]	31	23	17	12	10	8	6	5	4	3	3	2	2	2	1	<1
Off-site Worker																
WinFan	69	39	25	18	14	11	9	7	6	4	3	3	2	2	1	<1
N-Vent	54	33	23	17	13	10	8	7	6	4	3	3	2	2	1	<1
N-Vent B[4]	39	24	17	13	10	8	7	6	5	4	3	2	2	2	1	<1
G-Vent (60/40)[5]	54	32	22	17	13	10	8	7	6	4	3	3	2	2	1	<1
G-Vent B[4] (60/40)[5]	37	24	16	13	10	8	7	6	5	4	3	2	2	2	1	<1
L-Vent (80/20)[5,6]	30	20	15	11	9	7	6	5	4	3	2	2	2	1	1	<1
PVR (95/5)[5,6]	30	22	16	12	9	7	6	5	4	3	3	2	2	2	1	<1
FVR[6]	29	21	15	11	9	7	6	5	4	3	3	2	2	2	1	<1

1. All results are rounded and represent generic dry cleaning scenarios using secondary control technology. Results are presented using a Perc unit emission rate of 1,350 pounds per year (100 gallons /yr).
2. Results are for the inhalation pathway. Residents assume a 70-year exposure duration and use the high-end, 80th percentile, and average point estimate breathing rates. The worker breathing rate and a 40-year exposure duration is used for the off-site worker receptor. Results are for the inhalation pathway. Residents assume a 70-year exposure duration and use the high-end, 80th percentile, and average point estimate breathing rates. The worker breathing rate and a 40-year exposure duration is used for the off-site worker receptor. This risk assessment is based on the methodology outlined in The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments, August 2003 (OEHHA Guidelines) (OEHHA, 2003a) and the ARB's Recommended Interim Risk Management Policy for Inhalation-Based Residential Cancer Risk (ARB, 2003a).
3. Distances are presented from the building edge.
4. Building is approximately 2,500 square feet. Other scenarios use a building approximately 1,100 square feet.
5. Values identified within the parenthesis identify the ratio that emissions are modeled from a point and volume source.
6. Denotes an enhanced ventilation scenario. Results corresponding to these scenarios are anticipated after implementation of the proposed ATCM.

The chronic hazard indices are less than 0.4 at all receptor locations under the high-end (90th percentile) emissions scenario and less than 0.2 at all receptor locations under the average emissions scenario. The acute hazard indices are less than 0.2 at all receptor locations for dry cleaners with secondary control. Generally, hazard indices less than 1.0 are not considered to be a concern to public health.

REFERENCES FOR APPENDIX B

ARB, 2003a. Recommended Interim Risk Management Policy For Inhalation-Based Residential Cancer Risk. California Air Resources Board. October 9, 2003.

ARB, 2005h. Hot Spots Analysis and Reporting Program, version 1.2A. California Air Resources Board. August 2005.

OEHHA, 1999. The Air Toxics Hot Spots Program Risk Assessment Guidelines; Part I; The Determination of Acute Reference Exposure Levels for Airborne Toxicants, Office of Environmental Health Hazard Assessment. March 1999.

OEHHA, 2000a. The Air Toxics Hot Spots Program Risk Assessment Guidelines; Part III; Technical Support Document for the Determination of Noncancer Chronic Reference Exposure Levels, Office of Environmental Health Hazard Assessment. Office of Environmental Health Hazard Assessment. April 2000.

OEHHA, 2000b. The Air Toxics Hot Spots Risk Assessment Guidelines; Part IV; Exposure Assessment and Stochastic Analysis Technical Support Document. Office of Environmental Health Hazard Assessment. September 2000.

OEHHA, 2002. Part II, Technical Support Document for Describing Available Cancer Potency Factors (Revised). Office of Environmental Health Hazard Assessment. December 2002.

OEHHA, 2003a. The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments. Office of Environmental Health Hazard Assessment. August 2003.

U.S. EPA, 1993. US-EPA Model Clearinghouse Memo from Joseph A. Tikvart of the Source Receptor Analysis Branch to Ken Eng of the Air Compliance Branch regarding Proposal for Calculating Plume Rise for Stacks with Horizontal Release or Rain Caps for Cookson Pigment, Newark, New Jersey. July 9, 1993

U.S. EPA, 1995. ISCST3 Model User's Guide, EPA-454/B-95-003a. United States Environmental Protection Agency (U.S. EPA). Research Triangle Park, North Carolina. September 1995.

Appendix C

Summary of the Differences Between the Current and Proposed Amended Airborne Toxic Control Measure

Appendix C

Summary of the Differences Between the Current and Proposed Amended ATCM

	Current Dry Cleaning ATCM	Proposed Revised ATCM
Applicability	Owner/operator of Perc dry cleaning equipment	Owner/operator, manufacturer, or distributor of dry cleaning equipment that uses any solvent that contains Perc or an identified TAC.
Definitions		• 18 new definitions • 6 amended • 7 deleted
Prohibitions	Owner/operator shall not operate a transfer machine, vented machine, or a self-service dry cleaning machine	Expands prohibitions to include primary control machine, converted machine, drying cabinet, conduct dip tank operations, or secondary control system that has not been certified pursuant to subsection (l).
Initial Notification	Provide district in writing with name of owner and operator of facility; name and location of facility; whether facility is co-located with a residence; number, types, and capacities of dry cleaning machines; existing facilities only shall provide the annual gallons of Perc purchased.	No requirements.
Co-residential Facilities	No provisions	No co-residential facility shall install dry cleaning equipment which uses solvents that contain Perc. Existing co-residential facilities shall remove currently installed Perc dry cleaning machines by July 1, 2010.
New Facilities	Shall install, operate, and maintain a closed-loop machine with primary control and secondary control.	(1) No person shall operate a new facility which uses Perc unless the following is met: - Facility is located at least 300 ft. from a sensitive receptor; - Facility is located outside of and at least 300 feet from the boundary of an area zoned for residential use; - An enhanced ventilation system has been installed; - Facilities using Perc shall install, operate, and maintain an integral secondary control machine; and (2) No person shall operate a new facility that uses a TAC other than Perc unless the following conditions are met: - The facility shall install, operate,

New Facilities (con't)		and maintain best available control technology as required by applicable district rules or regulations; or - In the absence of applicable district rules or regulations, the owner or operator of a new facility shall submit to and have approved by the district a control method or methods that achieve reductions in the risk associated with the TAC that equal or exceed the reductions for Perc under this section. (3) A new facility shall be deemed to meet the above siting requirement if one of the following are met: - If the facility meets the requirement at the time it is issued an authority to construct by the permitting agency, and substantial use of the authority to construct takes place within one year after it is issued; or - If the facility meets the above requirement at the time it is issued an authority to construct by the permitting agency, and substantial use of the authority to construct takes place before any zoning change occurs that affects the operation's ability to meet the standard at the time of initial startup.
Existing Facilities	Shall install, operate, and maintain either a converted closed-loop machine with primary control; or a closed-loop machine with a primary control system.	All existing facilities that operate Perc dry cleaning equipment shall use an integral secondary control machine. Existing facilities that operated Perc dry cleaning equipment prior to July 1, 2007, and do not have an integral secondary control machine, the compliance schedule is as follows: - If the facility is 100 feet or more from a sensitive receptor the facility shall Install, operate and maintain an integral secondary control machine by July 1, 2010 or when the primary, converted, or "add-on" secondary control machine is 15 years of age, whichever comes later; or - If a facility is within 100 feet of a sensitive receptor, the facility

Existing Facilities (con't)		shall install, operate and maintain an integral secondary control machine (or non-Perc alternative) by July 1, 2009, or when the primary, converted, "add-on" secondary control machine is 10 years of age, whichever is later. - All existing facilities that have not already done so under (A) or (B) above, shall install an integral secondary control machine (or non-Perc alternative) by July 1, 2016. - An existing primary control machine that is designed to accept a secondary control system will qualify as an integral secondary control machine if it meets the requirements in subsection (g)(D) of the proposed Dry Cleaning ATCM. All facilities shall install enhanced ventilation by July 1, 2009, if a sensitive receptor is within 100 ft. of facility as of July 1, 2007; or by July 1, 2010, if a sensitive receptor is 100 ft. or more from the facility, as of July 1, 2007.
Specifications for Required Equipment	Outlined specific requirements for primary control systems, converted machines, add-on secondary control, integral secondary control machines, and drying cabinets.	Deleted specifications for primary control systems, converted machines, add-on secondary control systems, and drying cabinets. Requirements for integral secondary control systems remain the same.
Good Operating Practices	*Environmental Training Requirements*: The facility shall have one or more trained operators. The trained operator shall be a full time employee including the owner, operator, or another employee of the facility, who successfully completed the initial course pursuant to 17 CCR, section 93110. Each trained operator shall successfully complete a refresher course every three years. If the facility has only one trained operator and the trained operator leaves the facility shall notify the district within 30 days of departure; obtain a replacement trained operator within 3 months, except that a trained operator who owns or manages	Same requirement, however, the length of time to notify the district when a trained operator leaves the employ of the facility has been reduced from 30 days to 15 days of the departure. The exception of allowing a trained operator who owns multiple facilities serve as the interim trained operator at two of those facilities has been deleted. The trained operator shall be an owner/employee of the facility and shall be on site while the dry cleaning machine is in operation.

Good Operating Practices (con't)	multiple facilities may serve as the interim trained operator at two of those facilities simultaneously for a max period of 4 months. If an initial course is not reasonable available, the district may extend the certification period for a replacement trained operator until 1 month after the course is reasonably available.	
	Operation and Maintenance Requirements: The trained operator shall operate and maintain the dry cleaning system in accordance to this section and conditions on the facility's operating permit. Operations not specifically addressed shall be operated and maintained in accordance with the manufacturer's recommendations. The district shall provide an operation and maintenance checklist. Each operation and maintenance function and the date performed shall be recorded on the checklist. Refrigerated condensers shall be operated to ensure exhaust gases are recirculated until the air-vapor stream temp. on the outlet side of the condenser, downstream of any bypass, is less than or equal to 45°F. Desorption of carbon adsorbers shall be performed at the frequency specified by the district. At a minimum it shall be each time all dry cleaning equipment exhausted to the device has cleaned a total of three pounds of materials for each pound of activated carbon. Desorption shall be performed with the minimum steam pressure and air flow capacity specified by the district. After desorption the carbon bed shall be fully dried according to the manufacturers instructions.	Same requirement, however, since transfer and vented machines are no longer permitted, any thing pertaining to these machines has been deleted. In addition to the existing requirements, facility owner/operator shall keep on site a spare set of gaskets for the loading door, still, lint trap, button trap and water separator; and a spare lint filter. Also, carbon adsorbers in integral secondary control systems must be designed for non-contact steam or hot air stripping operation, and must be stripped or desorbed in accordance with manufacturer's instructions or at least weekly, whichever is more frequent.
	Leak Check and Repair Requirements: The dry cleaning system shall be inspected weekly for liquid and vapor leaks with either a halogenated-hydrocarbon detector; PID; or an alternative method approved by the district. Any detected leak shall be noted on the checklist provided by the district and repaired within 24 hours. If repair parts are not	Requirements remain the same however the timeframe to repair a leak has been reduced. Liquid leaks or vapor leaks shall be repaired immediately upon detection. If a facility with a leak does not have parts available, the parts need to be ordered within the next business day of detecting the leak and the part installed within 2

Good Operating Practices (con't)	available, then leaks shall be repaired within 15 working days. If the leak is not repaired at the time of detection, the leaking component shall be clearly marked or tagged. A 30 day extension can be granted by the district.	business days after receipt. A facility with a leak that has not been repaired by the end of the 7th business day after detection shall not operate the dry cleaning machine until the leak is repaired. An additional requirement would be that the dry cleaning system shall be inspected at least once a year for liquid and vapor leaks using a PID which gives quantitative results with less than ten percent uncertainty at 50 ppm of Perc.
	Annual Drum Concentration Checks: No requirements	Facilities shall perform annual drum concentration testing by installing a sampling port as specified in section (i)(4)(A)&(B) of the regulation. The sampling shall be done using detector that give quantitative results with less than ten percent uncertainty at 50 ppm of Perc. The concentration of Perc in the drum, as represented by the reading from the sample port upstream of the carbon bed shall be less than 500 ppm at the end of the drying cycle for a new machine during the initial start-up period and less than 1000 ppm at the end of the drying cycle during normal operation after the initial start-up period. The concentration of Perc at the downstream of the carbon bed shall be less than 100 ppm while the secondary control is operating.
Recordkeeping Requirements	Must retain the following records for at least 2 years of until district inspection of facility, whichever period is longer. • Log showing date and lbs. of material cleaned/load. • Purchase and delivery receipts for Perc. • For facilities with solvent tanks that are not directly filled by the Perc supplier upon deliver, the date and gallons of Perc added to solvent tank. • Completed leak inspection checklists and the operation and maintenance checklists • For liquid or vapor leaks not repaired at time of detection, a	All records must be retained for at least 5 years. Requirements are the same with the addition of the following: • Wastewater disposal method. If wastewater treatment unit is being used, then make and model of unit. • Purchase and delivery receipts for the dry cleaning solvent; • For add-on or integral secondary control machines: - the start and end time of each regeneration, and temperature of chilled air; - Effective July 1, 2008, Perc concentration measured at the

Recordkeeping Requirements (con't)	record of leaking component awaiting repair and action taken to complete repair. Record shall include copies of purchase orders or written records showing repair parts were ordered and/or service requested. • Manufacturer's operating manual • Original record of completion for each trained operator. • All records shall be accessible at the facility	sampling ports located upstream and downstream of the secondary control system at the end of the drying cycle. • All records shall be maintained in English and be accessible at the facility.
Reporting Requirements	Maintain annual report which includes: • Copy of certificate of completion for trained operator. • Total lbs. of material cleaned/load and gallons of Perc used for all solvent additions. • Average facility mileage.	Owner or operator shall prepare an annual report which covers the period of January 1st through December 31st of each year. The annual report shall cover the same requirements, however, in addition the facility must include the estimated distance of the facility to the nearest sensitive receptor and nearest business; the make, model, serial number, and age of the dry cleaning machine; the type of ventilation system in the facility; and the method of wastewater disposal. The owner/operator shall furnish this annual report to the district by February 2nd of each year. The districts shall report to ARB the annual Perc purchases of permitted facilities by April 2nd of each year or an alternate date agreed upon by the district and ARB.
Testing & Certification of Secondary Control	*Test Program and Scope*: For a given design a single test program shall be conducted. A test plan that describes, in detail, the dry cleaning machine and control system being tested, the test protocol and test method shall be prepared. A minimum of three tests shall be conducted for each test program on each control system design. All tests for a single test program shall be conducted on a single dry cleaning machine. Test results may not be applied to a different make/model machine. *Test Conditions*: Testing shall be conducted under normal operating conditions.	Same requirements, however the following additional requirements apply: • When testing a particular dry cleaning machine model that is available in various capacities and carbon weights, testing shall be conducted on the configuration with the largest ratio of drum capacity to weight of the carbon. The ratio calculation is included in the regulation language. • Test results may not be applied to a replacement dry cleaning machine that has been reconfigured. Test conditions for primary control, add-on secondary control and drying cabinets have been deleted.

Testing & Certification of Secondary Control	• Primary and Secondary - shall be filled to no less than 75 percent of its capacity. Weight of materials shall be recorded. • Primary - shall be tested on a closed-loop machine, or a converted machine, without secondary control. • Secondary - shall be tested on a closed-loop machine. • Integral secondary - shall be tested with primary control operating normally. • Add-on secondary - shall be tested independent of primary and initial Perc concentration in drum shall be 8600 ppmv or greater. • Drying Cabinet – Materials shall be transferred to the drying cabinet and testing shall begin no later than 15 minutes after the end of the washing and extraction process. The drying cabinet shall be filled 50 percent of its capacity. The weight of the material shall be recorded.	Test conditions for integral secondary control have been modified as follows: Integral secondary control systems shall be tested on closed-loop machines with the primary control system operating normally. The weight of materials shall be recorded for each test. • Each test shall be conducted during the cleaning of one load of materials, after running 80 percent of the manufacturer's recommended number of loads before carbon regeneration. • The machine shall be filled to no less than 85 percent of its capacity for each test. At least 70 percent of the load to be cleaned must consist of woolen or absorbent padded material.
	Test Method: Primary and secondary control • Temperature in the drum shall be measured and recorded continuously during the entire drying cycle. • Sampling: - For primary control and integral secondary control shall begin at the end of the drying cycle and completed within five minutes. - For add-on secondary control systems shall be done when the concentration of Perc is 8,600 ppmv or greater and again when the concentration reaches 300 ppmv or less. • Perc concentration in the drum shall be determined by the following methods: - A sampling port and valve shall be appropriately placed to draw samples from the interior of the drum or lint filter housing. Sampling port shall be connected to a gas chromatograph by ¼", outside diameter, Teflon tubing. Any	Test methods for primary control, add-on secondary and drying cabinets have been deleted. Existing test method requirements for integral secondary control remain the same, however, the following requirement has been modified: • An alternative test method deemed acceptable by the EO of the ARB.

Testing & Certification of Secondary Control (con't)	sampling pump shall have Teflon diaphragms. The gas chromatograph shall measure the concentrations of Perc in accordance to Method 422 or NIOSH Method 1003. - A sampling port and valve shall be appropriately placed to draw samples from the interior of the drum or lint filter housing. Sampling port shall be connected by ¼" outside diameter Teflon tubing to a Tedlar bag. Any sampling pump shall have Teflon diaphragms. The concentration of Perc in the air samples shall be measured in accordance with ARB Method 422 or NIOSH Method 1003 within 24 hours of sampling. If an independent lab is contracted to perform analysis of the samples, the chain of custody procedures in Method 422 or NIOSH 1003 shall be followed. • An alternative test method deemed acceptable by the APCO or EO of the district and the EO of the ARB. *Certification Procedures*: Detailed description of the dry cleaning system including control device; the test protocol; and the test method.	A detailed description of the dry cleaning system including control devices; A copy of the operations manual, written in plan English; Production photographs of the front and rear of the dry cleaning machine for which certification is being requested; and Any other information deemed necessary by the Air Resources Board to consider the request for certification.
Wastewater Treatment	Wastewater evaporators shall be operated to ensure that no liquid Perc or visible emulsion is allowed to vaporize.	Effective July 1, 2008, wastewater shall be hauled away by a registered hazardous waste transporter or treated in a wastewater treatment unit. The wastewater treatment unit shall meet the following requirements: - A self contained unit designed to minimize solvent discharge to

Wastewater Treatment (con't)		the environment, including but not limited to the air, water, and sewer system; - The wastewater shall be placed in a wastewater treatment unit that has adequate processing capacity for the facility as determined by the district; and - The wastewater treatment unit shall be equipped with a separator with the following requirements: a solvent/water separation settling chamber; and carbon or another type of adsorbent filtration system that the wastewater cycles through.
Water-repelling Operations	No person shall perform water-repelling or dip tank operations unless all materials to be treated with Perc water-repelling are treated in a closed-loop machine, a converted machine or a dip tank.	All materials to be treated with Perc water-repelling can only be treated in a closed-loop machine only, <u>not</u> a converted machine or a dip tank.
Severability	Not addressed	Each part of this section is deemed severable, and in the event that part of this is held to be invalid, the remainder of this section shall continue in full force and effect.

Appendix D

List of Toxic Air Contaminants in California

HISTORY

1. Amendment filed 1–2–76; effective thirtieth day thereafter (Register 76, No. 1).
2. Amendment filed 3–11–76; effective thirtieth day thereafter (Register 76, No. 11).
3. Amendment of NOTE filed 10–18–82; effective thirtieth day thereafter (Register 82, No. 43).
4. Amendment filed 8–30–84; effective thirtieth day thereafter (Register 84, No. 35).
5. Repealer and former section 92520 and renumbering and amendment of former section 92540 to section 92520 filed 5–1–91; operative 5–31–91 (Register 91, No. 24).

§ 92530. Certified Abrasives.

(a) The ARB shall certify abrasives which comply with the performance standards set forth in subdivision (b) below. Any person who desires certification of an abrasive shall furnish to the ARB an adequate test sample, together with fees to defray the cost of testing. Each certification of an abrasive shall include the ARB's determination of the original cut-point for fineness of the abrasive. The ARB shall maintain an up-to-date list of certified abrasives. Certification shall not be effective for more than two years. Abrasive materials which are certified on the effective date of this section shall remain certified until September 1, 1992.

(b) Performance Standards.

(1) (A) Before blasting the abrasive shall not contain more than one percent by weight material passing a #70 U.S. Standard sieve when tested in accordance with "Method of Test for Abrasive Media Evaluation," Test Method No. California 371–A, dated May 15, 1975.

(B) If the abrasive does not meet the requirements of subdivision (b)(1)(A), the person who desires certification of the abrasive may as an alternative demonstrate within the State of California to the satisfaction of the ARB that the abrasive meets a 20 percent opacity emission limit when tested in accordance with the "Visible Emission Evaluation Test Method for Selected Abrasives listed in Permissible Dry Outdoor Blasting," as adopted by the ARB on April 1, 1991, and incorporated herein by reference. The person who desires certification of the abrasive shall be solely responsible for conducting the demonstration.

(2) After blasting, the abrasive shall not contain morn than 1.8 percent by weight material 5 microns or smaller when tested in accordance with "Method of Test for Abrasive Media Evaluation," Test Method No. California 371–A, dated May 15, 1975.

(c) A used certified abrasive shall not be considered certified for reuse unless the abrasive conforms to its original cut-point for fineness.

(d) A blend of certified abrasives shall be considered certified for purposes of section 92530(a), unless found not to meet the requirements of section 92530(b) pursuant to testing initiated by the ARB.

(e) All manufacturers and suppliers of certified abrasives shall legibly and permanently label the invoice, bill of lading and abrasive packaging or container with each of the following:

(1) The manufacturer's name or identification trade name;

(2) The grade, weight proportion of components in abrasive blends, brand name of the abrasive or brand names and grades of components of abrasive blends; and

(3) The statement "ARB certified for permissible dry outdoor blasting."

(4) This subsection shall become effective six months after April 1, 1991.

NOTE: Authority cited: Sections 39600 and 39601, Health and Safety Code. Reference: Sections 41900, 41902, 41904 and 41905, Health and Safety Code.

HISTORY

1. New section filed 8–30–84; effective thirtieth day thereafter (Register 84, No. 35).
2. Repealer and new section filed 5–1–91; operative 5–31–91 (Register 91, No. 24).
3. Editorial correction of subsection (d) (Register 2003, No. 16).

§ 92540. Stucco and Concrete.

NOTE: Authority cited: Sections 39600 and 39601, Health and Safety Code. Reference: Sections 41900, 41902, 41904 and 41905, Health and Safety Code.

HISTORY

1. New section filed 8–30–84; effective thirtieth day thereafter (Register 84, No. 35).
2. Renumbering and amendment of former section 92540 to section 92520 filed 5–1–91; operative 5–31–91 (Register 91, No. 24).

Subchapter 7. Toxic Air Contaminants

§ 93000. Substances Identified As Toxic Air Contaminants.

Each substance identified in this section has been determined by the State Board to be a toxic air contaminant as defined in Health and Safety Code section 39655. If the State Board has found there to be a threshold exposure level below which no significant adverse health effects are anticipated from exposure to the identified substance, that level is specified as the threshold determination. If the Board has found there to be no threshold exposure level below which no significant adverse health effects are anticipated from exposure to the identified substance, a determination of "no threshold" is specified. If the Board has found that there is not sufficient available scientific evidence to support the identification of a threshold exposure level, the "Threshold" column specifies "None identified."

Substance	*Threshold Determination*
Benzene (C_6H_6)	None identified
Ethylene Dibromide ($BrCH_2CH_2Br$; 1,2–dibromoethane)	None identified
Ethylene Dichloride ($ClCH_2CH_2Cl$; 1,2–dichloroethane)	None identified
Hexavalent chromium (Cr (VI))	None identified
Asbestos [asbestiform varieties of serpentine (chrysotile), riebeckite (crocidolite), cummingtonite–grunerite (amosite), tremolite, actinolite, and anthophyllite]	None identified
Dibenzo–p–dioxins and Dibenzofurans chlorinated in the 2,3,7 and 8 positions and containing 4,5,6 or 7 chlorine atoms	None identified
Cadmium (metallic cadmium and cadmium compounds)	None identified
Carbon Tetrachloride (CCl_4; tetrachloromethane)	None identified
Ethylene Oxide (1,2–epoxyethane)	None identified
Methylene Chloride (CH_2Cl_2; Dichloromethane)	None identified
Trichloroethylene (CCl_2CHCl; Trichloroethene)	None identified
Chloroform ($CHCl_3$)	None identified
Vinyl chloride (C_2H_3Cl; Chloroethylene)	None identified
Inorganic Arsenic	None identified
Nickel (metallic nickel and inorganic nickel compounds)	None identified
Perchloroethylene (C_2Cl_4; Tetrachloroethylene)	None identified
Formaldehyde (HCHO)	None identified
1,3–Butadiene (C_4H_6)	None identified
Inorganic Lead	None identified
Particulate Emissions from Diesel–Fueled Engines	None identified

NOTE: Authority cited: Sections 39600, 39601 and 39662, Health and Safety Code. Reference: Sections 39650, 39660, 39661 and 39662, Health and Safety Code.

HISTORY

1. New section filed 9-23-85; effective thirtieth day thereafter (Register 85, No. 39). For history of former subchapter 7, see Registers 84, No. 10; 83, No. 2; 81, No. 48; 77, No. 12; and 74, No. 47.
2. Amendment filed 1-14-86; effective thirtieth day thereafter (Register 86, No. 3).
3. Amendment filed 2-10-86; effective thirtieth day thereafter (Register 86, No. 7).
4. Amendment filed 10-9-86; effective thirtieth day thereafter (Register 86, No. 43).
5. Amendment filed 11-25-86; effective thirtieth day thereafter (Register 86, No. 48).
6. Amendment filed 2-23-87; effective thirtieth day thereafter (Register 87, No. 9).
7. Amendment filed 10-8-87; operative 11-7-87 (Register 87, No. 43).
8. Amendment filed 3-15-88; operative 4-14-88 (Register 88, No. 13).
9. Amendment filed 7-22-88; operative 8-21-88 (Register 88, No. 31).
10. Amendment adding Methylene Chloride filed 6-7-90; operative 7-7-90 (Register 90, No. 30).
11. Amendment adding Trichloroethylene filed 2-27-91; operative 3-29-91 (Register 91, No. 13).
12. Amendment adding Vinyl chloride filed 5-10-91; operative 6-9-91 (Register 91, No. 25).
13. Editorial correction, including removal of Inorganic arsenic (Register 91, No. 25).
14. Amendment adding Chloroform filed 5-10-91; operative 6-9-91 (Register 91, No. 25).
15. Amendment adding Inorganic Arsenic filed 6-6-91; operative 7-6-91 (Register 91, No. 26).
16. Change without regulatory effect amending Trichloroethylene and adding Nickel filed 7-14-92 pursuant to section 100, title 1, California Code of Regulations (Register 92, No. 29).
17. Amendment adding Perchloroethylene filed 10-2-92; operative 11-1-92 (Register 92, No. 40).
18. Amendment adding Formaldehyde filed 3-2-93; operative 4-1-93 (Register 93, No. 10).
19. Amendment adding 1,3-Butadiene filed 4-14-93; operative 5-14-93 (Register 93, No. 16).
20. Editorial correction (Register 98, No. 16).
21. Amendment adding inorganic lead filed 4-14-98; operative 5-14-98 (Register 98, No. 16).
22. Amendment adding "Particulate Emissions from Diesel-Fueled Engines" filed 7-21-99; operative 8-20-99 (Register 99, No. 30).

§ 93001. Hazardous Air Pollutants Identified as Toxic Air Contaminants.

Each substance listed in this section has been identified as a hazardous air pollutant pursuant to subsection (b) of Section 112 of the federal Clean Air Act (42 U.S.C. Section 7412(b)) and has been designated by the State Board to be a toxic air contaminant pursuant to Health and Safety Code Section 39657.

Substance

Acetaldehyde
Acetamide
Acetonitrile
Acetophenone
2-Acetylaminofluorene
Acrolein
Acrylamide
Acrylic acid
Acrylonitrile
Allyl chloride
4-Aminobiphenyl
Aniline
o-Anisidine
Asbestos
Benzene (including benzene from gasoline)
Benzidine
Benzotrichloride
Benzyl chloride
Biphenyl
Bis (2-ethylhexyl) phthalate (DEHP)
Bis (chloromethyl) ether
Bromoform
1,3-Butadiene
Calcium cyanamide
Caprolactam
Captan
Carbaryl
Carbon disulfide
Carbon tetrachloride
Carbonyl sulfide
Catechol
Chloramben
Chlordane
Chlorine
Chloroacetic acid
2-Chloroacetophenone
Chlorobenzene
Chlorobenzilate
Chloroform
Chloromethyl methyl ether
Chloroprene
Cresols/Cresylic acid (isomers and mixture)
o-Cresol
m-Cresol
p-Cresol
Cumene
2,4-D, salts and esters
DDE
Diazomethane
Dibenzofurans
1,2-Dibromo-3-chloropropane
Dibutylphthalate
1,4-Dichlorobenzene (p)
3,3-Dichlorobenzidene
Dichloroethyl ether (Bis (2-chloroethyl) ether)
1,3-Dichloropropene
Dichlorvos
Diethanolamine
N,N-Diethyl aniline (N,N-Dimethylaniline)
Diethyl sulfate
3,3-Dimethoxybenzidine
Dimethyl aminoazobenzene
3,3-Dimethyl benzidine
Dimethyl carbamoyl chloride
Dimethyl formamide
1,1-Dimethyl hydrazine
Dimethyl phthalate
Dimethyl sulfate
4,6-Dinitro-o-cresol, and salts
2,4-Dinitrophenol
2,4-Dinitrotoluene
1,4-Dioxane (1,4-Diethyleneoxide)
1,2-Diphenylhydrazine
Epichlorohydrin (1-Chloro-2,3-epoxypropane)
1,2-Epoxybutane
Ethyl acrylate
Ethyl benzene
Ethyl carbamate (Urethane)
Ethyl chloride (Chloroethane)
Ethylene dibromide (Dibromoethane)
Ethylene dichloride (1,2-Dichloroethane)
Ethylene glycol
Ethylene imine (Aziridine)
Ethylene oxide
Ethylene thiourea
Ethylidene dichloride (1,1-Dichloroethane)
Formaldehyde
Heptachlor
Hexachlorobenzene
Hexachlorobutadiene
Hexachlorocyclopentadiene
Hexachloroethane
Hexamethylene-1,6-diisocyanate
Hexamethylphosphoramide
Hexane
Hydrazine
Hydrochloric acid
Hydrogen fluoride (Hydrofluoric acid)
Hydroquinone
Isophorone
Lindane (all isomers)
Maleic anhydride
Methanol
Methoxychlor
Methyl bromide (Bromomethane)
Methyl chloride (Chloromethane)
Methyl chloroform (1,1,1-Trichloroethane)

Methyl ethyl ketone (2–Butanone)
Methyl hydrazine
Methyl iodide (Iodomethane)
Methyl isobutyl ketone (Hexone)
Methyl isocyanate
Methyl methacrylate
Methyl tert butyl ether
4,4–Methylene bis(2–chloroaniline)
Methylene chloride (Dichloromethane)
Methylene diphenyl diisocyanate (MDI)
4,4–Methylenedianiline
Naphthalene
Nitrobenzene
4–Nitrobiphenyl
4–Nitrophenol
2–Nitropropane
N–Nitroso–N–methylurea
N–Nitrosodimethylamine
N–Nitrosomorpholine
Parathion
Pentachloronitrobenzene (Quintobenzene)
Pentachlorophenol
Phenol
p–Phenylenediamine
Phosgene
Phosphine
Phosphorus
Phthalic anhydride
Polychlorinated biphenyls (Aroclors)
1,3–Propane sultone
beta–Propiolactone
Propionaldehyde
Propoxur (Baygon)
Prophylene dichloride (1,2–Dichloropropane)
Propylene oxide
1,2–Propylenimine (2–Methylaziridine)
Quinoline
Quinone
Styrene
Styrene oxide
2,3,7,8–Tetrachlorodibenzo–p–dioxin
1,1,2,2–Tetrachloroethane
Tetrachloroethylene (Perchloroethylene)
Titanium tetrachloride
Toluene
2,4–Toluene diamine
2,4–Toluene diisocyanate
o–Toluidine
Toxaphene (chlorinated camphene)
1,2,4–Trichlorobenzene
1,1,2–Trichloroethane
Trichloroethylene
2,4,5–Trichlorophenol
2,4,6–Trichlorophenol
Triethylamine
Trifluralin
2,2,4–Trimethylpentane
Vinyl acetate
Vinyl bromide
Vinyl chloride
Vinylidene chloride (1,1–Dichloroethylene)
Xylenes (isomers and mixture)
o–Xylenes
m–Xylenes
p–Xylenes
Antimony Compounds
Arsenic Compounds (inorganic including arsine)
Beryllium Compounds
Cadmium Compounds
Chromium Compounds
Cobalt Compounds
Coke Oven Emissions
Cyanide Compounds[1]
Glycol ethers[2]
Lead Compounds
Manganese Compounds
Mercury Compounds
Fine mineral fibers[3]
Nickel Compounds
Polycyclic Organic Matter[4]
Radionuclides (including radon)[5]
Selenium Compounds

NOTE: For all listing above which contain the word "compounds" and for glycol ethers, the following applies: Unless otherwise specified, these listings are defined as including any unique chemical substance that contains the named chemical (i.e., antimony, arsenic, etc) as part of that chemical's infrastructure.

[1] X^1CN where $X=HN^1$ or any other group where a formal dissociation may occur. For example KCN or $Ca(CN)_2$

[2] includes mono– and di–ethers of ethylene glycol, diethylene glycol, and triethylene glycol $(R(OCH_2CH_2)_n–OR^1$ where
n = 1,2 or 3
R = alkyl or aryl groups
R^1 = R, H, or groups which, when removed, yield glycol ethers with the structure: $R(OCH_2CH)_n–OH$. Polymers are excluded from the glycol category.

[3] includes mineral fiber emissions from facilities manufacturing or processing glass, rock, or slag fibers (or other mineral derived fibers) of average diameter 1 micrometer or less.

[4] includes organic compounds with more than one benzene ring, and which have a boiling point greater than or equal to 100°C.

[5] a type of atom which spontaneously undergoes radioactive decay.

NOTE: Authority cited: Sections 39657, 39600, 39601 and 39662, Health and Safety Code. Reference: Sections 39650, 39655, 39656, 39657, 39658, 39659, 39660, 39661 and 39662, Health and Safety Code.

HISTORY

1. New section filed 3–9–94; operative 4–8–94. Submitted to OAL for printing only (Register 94, No. 10).

Subchapter 7.5. Airborne Toxic Control Measures

§ 93100. Nonvehicular Airborne Toxic Control Measures.

The nonvehicular airborne toxic control measures contained in this subchapter have been adopted by the state board and shall be implemented by adoption of regulations by local air pollution control and air quality management districts pursuant to Health and Safety Code Section 39666.

NOTE: Authority cited: Sections 39600, 39601, 39650 and 39666, Health and Safety Code. Reference: Sections 39650 and 39666, Health and Safety Code.

HISTORY

1. New section filed 6–16–88; operative 7–16–88 (Register 88, No. 26).

§ 93101. Benzene Airborne Toxic Control Measure—Retail Service Stations.

(a) Definitions. For the purposes of this section, the following definitions shall apply:

(1) "ARB–certified vapor recovery system" means a vapor recovery system which has been certified by the state board pursuant to Section 41954 of the Health and Safety Code.

(2) "Excavation" means exposure to view by digging.

(3) "Gasoline" means any organic liquid (including petroleum distillates and methanol) having a Reid vapor pressure of four pounds or greater and used as a motor vehicle fuel or any fuel which is commonly or commercially known or sold as gasoline.

(4) "Motor vehicle" has the same meaning as defined in Section 415 of the Vehicle Code.

(5) "Owner or operator" means an owner or operator of a retail service station.

(6) "Phase I vapor recovery system" means a gasoline vapor recovery system which recovers vapors during the transfer of gasoline from delivery tanks into stationary storage tanks.

(7) "Phase II vapor recovery system" means a gasoline vapor recovery system which recovers vapors during the fueling of motor vehicles from stationary storage tanks.

(8) "Retail service station" means any new or existing motor vehicle fueling service station subject to payment of California sales tax on gasoline sales.

(9) "Existing retail service station" means any retail service station operating, constructed, or under construction as of the date of district adoption of regulations implementing this control measure.

(10) "New retail service station" means any retail service station which is not constructed or under construction as of the date of district adoption of regulations implementing this control measure.

Appendix E

Glossary of Definitions, Selected Terms, and Acronyms

Appendix E

Glossary of Definitions, Selected Terms, and Acronyms

Definitions

Acute Exposure: One or a series of short-term exposures generally lasting less than 24 hours.

Acute Health Effects: A health effect that occurs over a relatively short period of time (e.g., minutes or hours). The term is used to describe brief exposures and effects which appear promptly after exposure.

Adverse Health Effect: A health effect from exposure to air contaminants that may range from relatively mild temporary conditions, such as eye or throat irritation, shortness of breath, or headaches, to permanent and serious conditions, such as birth defects, cancer or damage to lungs, nerves, liver, heart, or other organs.

Agency Shop: Same as drop off shop. A facility with no dry cleaning machine on-site.

Air District or District: The Air Pollution Control and Air Quality Management Districts, as defined in Health and Safety Code section 39025, are the political bodies responsible for managing air quality on a regional or county basis. California is currently divided into 35 air districts.

Air Dispersion Model: A mathematical model or computer simulation used to estimate the concentration of toxic air pollutants at specific locations as a result of mixing in the atmosphere.

Airborne Toxic Control Measure: Section 39655 of the Health and Safety Code, defines an "Airborne Toxic Control Measure" means either of the following:

1) Recommended methods, and, where appropriate, a range of methods, that reduce, avoid, or eliminate the emissions of a toxic air contaminant. Airborne toxic control measures include, but are not limited to, emission limitations, control technologies, the use of operational and maintenance conditions, closed system engineering, design equipment, or work practice standards, and the reduction, avoidance, or elimination of emissions through process changes, substitution of materials, or other modifications.
2) Emission standards adopted by the U.S. Environmental Protection Agency pursuant to section 112 of the federal act (42 U.S.C. Sec. 7412).

Asthma: A chronic inflammatory disorder of the lungs characterized by wheezing, breathlessness, chest tightness, and cough.

Bioaccumulation: The concentration of a substance in a body or part of a body or other living tissue in a concentration higher than that of the surrounding environment.

California Air Resources Board (ARB): The State's lead air quality management agency consisting of an eleven-member board appointed by the Governor. The ARB is responsible for attainment and maintenance of the state and federal air quality standards, and is fully responsible for motor vehicle pollution control. It oversees county and regional air pollution management programs.

Cancer Potency Factor (CPF): The theoretical upper bound probability of extra cancer cases occurring in an exposed population assuming a lifetime exposure to the chemical when the chemical dose is expressed in exposure units of milligrams/kilogram-day (mg/kg-d).

California Air Pollution Control Officers Association (CAPCOA): A non-profit association of the air pollution control officers from all 35 air quality districts throughout California. CAPCOA was formed in 1975 to promote clean air and to provide a forum for sharing knowledge, experience, and information among the air quality regulatory agencies around the state.

Chronic Exposure: Long-term exposure, usually lasting one year to a lifetime.

Chronic Health Effect: An adverse non-cancer health effect that develops and persists (e.g., months or years) over time after long-term exposure to a substance.

Developmental Toxicity: Adverse effects on the developing organism that may result from exposure prior to conception (either parent), during prenatal development, or postnatally to the time of sexual maturation. Adverse developmental effects may be detected at any point in the life span of the organism. Major manifestations of developmental toxicity include: death of the developing organism; induction of structural birth defects; altered growth; and functional deficiency.

Dose: A calculated amount of a substance estimated to be received by the subject, whether human or animal, as a result of exposure. Doses are generally expressed in terms of amount of chemical per unit body weight; typical units are mg/kg-day.

Dose-response Assessment: The process of characterizing the relationship between the exposure to an agent and the incidence of an adverse health effect in exposed populations.

Endpoint: An observable or measurable biological or biochemical event including cancer used as an index of the effect of a chemical on a cell, tissue, organ, organism, etc.

Epidemiology: The study of the occurrence and distribution of a disease or physiological condition in human populations and of the factors that influence this distribution.

Exposure: Contact of an organism with a chemical, physical, or biological agent. Exposure is quantified as the amount of the agent available at the exchange boundaries of the organism (e.g., skin, lungs, digestive tract) and available for absorption.

Exposure Pathway: A route of exposure by which xenobiotics enter the human body (e.g., inhalation, ingestion, dermal absorption).

Drop off Shop: Same as agency shop. A facility with no dry cleaning machine on-site.

Flash Point: The lowest temperature at which a liquid can form an ignitable mixture in air near the surface of the liquid. The lower the flash point, the easier it is to ignite the material.

Hot Spots Analysis and Reporting Program (HARP): A single integrated software package designed to promote statewide consistency, efficiency, and cost-effective implementation of health risk assessments and the Hot Spots Program. The HARP software package consists of modules that include: emissions inventory, air dispersion modeling, risk analysis, and mapping.

HSC: Health and Safety Code of the State of California.

Hazard Index (HI): The sum of individual acute or chronic hazard quotients (HQs) for each substance affecting a particular toxicological endpoint.

Hazardous Air Pollutant (HAP): A substance that the U.S. Environmental Protection Agency has listed in, or pursuant to, section 112 subsection (b) of the federal Clean Air Act Amendments of 1990 (42 U.S. Code, section 7412(b)).

Hazard Identification: The process of determining whether exposure to an agent can cause an increase in the incidence of an adverse health effect including cancer

Health Risk Assessment: A health risk assessment (HRA) is an evaluation or report that a risk assessor (e.g., Air Resources Board, district, consultant, or facility operator) develops to describe the potential a person or population may have of developing adverse health effects from exposure to a facility's emissions. Some health effects that are evaluated could include cancer, developmental effects, or respiratory illness. The pathways that can be included in an HRA depend on the toxic air pollutants that a person (receptor) may be exposed to, and can include inhalation (breathing), the ingestion of soil, water, crops, fish, meat, milk, and eggs, and dermal exposure.

Industrial Source Complex Dispersion Model (ISC3): Air modeling software that incorporates three previous programs into a single program. These are the short-term model (ISCST), the long term model (ISCLT), and the complex terrain model (COMPLEX).

Meteorology: The science that deals with the phenomena of the atmosphere especially weather and weather conditions. In the area of air dispersion modeling, *meteorology* is used to refer to climatological data needed to run an air dispersion model including: wind speed, wind direction, stability class and ambient temperature.

Mixed Shop: A dry cleaning facility that employs more than one type of dry cleaning process.

Multipathway Substance: A substance or chemical that once airborne from an emission source can, under environmental conditions, be taken into a human receptor by inhalation and by other exposure routes such as after deposition on skin or after ingestion of soil contaminated by the emission.

Noncarcinogenic Effects: Noncancer health effects which may include birth defects, organ damage, morbidity, and death.

Office of Environmental Health Hazard Assessment (OEHHA): An office within the California Environmental Protection Agency that is responsible for evaluating chemicals for adverse health impacts and establishing safe exposure levels. OEHHA also assists in performing health risk assessments and developing risk assessment procedures for air quality management purposes.

Permissible Exposure Limit (PEL): The maximum amount or concentration of a chemical that a worker may be exposed to under the Occupational Safety and Health Administration (OSHA) regulations.

Potency: The relative effectiveness, or risk, of a standard amount of a substance to cause a toxic response.

Potency Slope: A value used to calculate the probability or risk of cancer associated with an estimated exposure, based on the assumption in cancer risk assessments that risk is directly proportional to dose and that there is no threshold for carcinogenesis. It is the slope of the dose-response curve estimated at low exposures.

Proposition 65: The Safe Drinking Water and Toxic Enforcement Act of 1986, also known as Proposition 65. This Act is codified in California Health and Safety Code Section 25249.5, et seq. No person in the course of doing business shall knowingly discharge or release a chemical known to the state to cause cancer or reproductive toxicity into water or into land where such chemical passes or probably will pass into any source of drinking water, without first giving clear and reasonable warning to such individual.

Reference Exposure Level (REL): An exposure level at or below which no noncancer adverse health effect is anticipated to occur in a human population exposed for a specific duration. An REL is virtually the same as the terms Reference Concentration (RfC) for inhalation or Reference Dose (RFD) used by U.S. EPA, only it may be for varying amounts of time rather than lifetime only. It has been given a different name so that the values estimated by the State Office of Environmental Health Hazard Assessment can easily be distinguished from those developed by the U.S. EPA. RELs are used to evaluate toxicity endpoints other than cancer.

Reproductive Toxicity: Harmful effects on fertility, gestation, or offspring, caused by exposure of either parent to a substance.

Risk: The (characterization of the) probability of potentially adverse effects to human health, in this instance from the exposure to environmental hazards.

Risk Assessment: The characterization (in the present context) of the probability of potentially adverse health effects to people from exposure to environmental chemical hazards.

Scientific Review Panel on Toxic Air Contaminants (SRP): A nine-member panel appointed to advise the Air Resources Board and the Department of Pesticide Regulation in their evaluation of the adverse health effects toxicity of substances being evaluated as Toxic Air Contaminants.

Threshold, Nonthreshold: A threshold dose is the minimally effective dose of any chemical that is observed to produce a response (e.g., enzyme change, liver toxicity, death). For most toxic effects, except carcinogenesis, there appear to be threshold doses. Nonthreshold substances are those substances, including nearly all carcinogens, that are known or assumed to have some risk of response at any dose above zero.

TIF Detector: Halogen leak detector made by TIF™ Instruments, Inc.

Toxic Air Contaminant (TAC): An air pollutant which may cause or contribute to an increase in mortality or in serious illness, or which may pose a present or potential hazard to human health (HSC Section 39655(a)). Substances, which have been identified by the United States Environmental Protection Agency as hazardous air pollutants are also identified by the Board as toxic air contaminants.

United States Environmental Protection Agency (U.S. EPA): The Federal agency charged with setting policy and guidelines, carrying out legal mandates, for the protection, and national interests in environmental resources.

Variability: The ability to have different numerical values of a parameter, such as height or weight.

Volatile Organic Compound (VOC): Means any compound containing at least one atom of carbon, including carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates, and ammonium carbonate, and excluding the following:

(A) methane, methylene chloride (dichloromethane), 1,1,1-trichloroethane (methyl chloroform), trichlorofluoromethane (CFC-11), dichlorodifluoromethane (CFC-12), 1,1,2-trichloro-1,2,2-trifluoroethane (CFC-13), 1,2-dichloro-1,1,2,2-tetrafluoroethane (CFC-14), chloropentafluoroethane (CFC-115), chlorodifluoromethane (HCFC-22), 1,1,1-trifluoro-2,2-dichloroethane (HCFC-123), 1,1-dichloro-1-fluoroethane (HCFC-141b), 1-chloro-1,1-difluoroethane (HCFC-142b), 2-chloro-1,1,1,2-tetrafluoroethane (HCFC-124), trifluoromethane (HFC-23), 1,1,2,2-tetrafluoroethane (HFC-134), 1,1,1,2-tetrafluoroethane (HFC-134a), pentafluoroethane (HFC-125), 1,1,1-trifluoroethane (HFC-143a), 1,1-difluoroethane (HFC-152a), cyclic, branched, or linear completely methylated siloxanes, the following classes of perfluorocarbons:

1. cyclic, branched, or linear, completely fluorinated alkanes;
2. cyclic, branched, or linear, completely fluorinated ethers with no unsaturations;
3. cyclic, branched, or linear completely fluorinated tertiary amines with no unsaturations; and
4. sulfur-containing perfluorocarbons with no unsaturations and with the sulfur bonds to carbon and fluorine, and

(B) the following low-reactive organic compounds which have been exempted by the U.S. EPA: acetone, ethane, methyl acetate, parachlorobenzotrifluoride (1-chloro-4-trifluoromethyl benzene), perchloroethylene (tetrachloroethylene).

Acronyms

APA	California Administrative Procedure Act
APCD	Air Pollution Control District
APCO	Air Pollution Control Officer
AQMD	Air Quality Management District
ARB	California Air Resources Board
ATCM	Airborne Toxic Control Measure
BACT	Best Available Control Technology
Cal/EPA	California Environmental Protection Agency
Cal/OSHA	California Occupational Safety and Health Administration
CAPB	Cocamidopropyl Betaine
CAPCOA	California Air Pollution Control Officers Association
CAS	Chemical Abstract Service
CEQA	California Environmental Quality Act
CG	Cellulose Gum
CO_2	Carbon Dioxide
CPF	Cancer Potency Factor
CAS	Chemical Abstract Service
CRF	Capital Recovery Factor
CTSI	U.S. EPA's Cleaner Technologies Substitute Assessment: Professional Fabricare Processes
D_5	Decamethylcyclopentasiloxane
DfE	Design for the Environment
DHS	California Department of Health Services
Districts	Local Air Pollution Control and Air Quality Management Districts
DOF	California Department of Finance
DPNB	Dipropylene Glycol Normal Butyl Ether
DTSC	California Department of Toxics Substances Control
°F	Degrees Fahrenheit
FVR	Full Vapor Barrier Room
HAP	Hazardous Air Pollutant
HHD	Halogenated Hydrocarbon Detector
HSC	Health and Safety Code
HARP	Hot Spots Analysis and Reporting Program
HRA	Health Risk Assessment
HSIA	Halogenated Solvent Industry Alliance
IARC	International Agency for Research on Cancer
IFI	International Fabricare Institute
IRTA	Institute for Research and Technical Assistance
ISOR	Initial Statement of Reasons
KB	Kauri Butanol
Kg	Kilogram
kWh	Kilowatt-hour
Lauramide DEA	Luric Acid Diethanolamide
LOC	Local Ventilation System

m^3	Cubic Meter
MDL	Minimum Detection Limit
$\mu g/m^3$	Microgram per Cubic Meter
MSDS	Material Safety Data Sheets
NAICS	North American Industrial Classification System
NESHAP	National Emissions Standards for Hazardous Air Pollutants
NIOSH	National Institute for Occupational Safety and Health
NTP	National Toxicology Program
OEHHA	Office of Environmental Health Hazard Assessment
OEL	Occupational Exposure Level
OSHA	Occupational Safety and Health Administration
P-20	Ethoxylated Sorbitan Monodecanoate
PVR	Partial Vapor Barrier Room
PEL	Permissible Exposure Limit
Perc	Perchloroethylene
pH	A Logarithmic Measure of Hydrogen Ion Concentration
PID	Photoionization Detector
POTW	Publicly Owned Treatment Works
PPERC	Pollution Prevention Education and Research Center
ppm	Parts per Million
ppmv	Parts per Million by Volume
psi	Pound per Square Inch
PVR	Partial Vapor Barrier Room
REL	Reference Exposure level
ROE	Return on Owner's Equity
SEHSC	Silicones Environmental, Health & Safety Council of North America
SIC	Standard Industrial Classification Code
SLI	Sodium Lauryl Isethionate
SLS	Sodium Laureth Sulfate
SRP	Scientific Review Panel on Toxic Air Contaminants
TAC	Toxic Air Contaminant
TLV	Threshold Limit Value
TSCA	Toxic Substances Control Act of 1976
TWA	Time-weighted Average
UCLA	University of California, Los Angeles
URF	Unit Risk Factor
U.S.	United States
U.S. EPA	United States Environmental Protection Agency
VBR	Vapor Barrier Room
VOC	Volatile Organic Compound

TITLE 17. CALIFORNIA AIR RESOURCES BOARD

NOTICE OF PUBLIC HEARING TO CONSIDER THE PROPOSED ADOPTION OF A TEST PROCEDURE FOR PRESSURE/VACUUM VENT VALVES AND PROPOSED AMENDMENTS TO THE REGULATIONS FOR CERTIFICATION OF VAPOR RECOVERY SYSTEMS AT GASOLINE DISPENSING FACILITIES (SERVICE STATIONS)

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 regulations for certification of vapor recovery systems installed at gasoline dispensing facilities (service stations and similar facilities).

DATE: May 25, 2006

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 ARB, which will commence at 9:00 a.m., May 25, 2006, and may continue at 8:30 a.m., May 26, 2006. Please consult the agenda for the meeting, which will be available at least 10 days before May 25, 2006, to determine the time when this item will be considered.

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

INFORMATIVE DIGEST OF PROPOSED ACTION AND POLICY STATEMENT OVERVIEW

Sections Affected: Proposed amendments to section 94011, title 17, California Code of Regulations (CCR), and the incorporated certification and test procedures: Definitions for Vapor Recovery Procedures, D-200, last amended October 8, 2003; Certification Procedure for Vapor Recovery Systems at Gasoline Dispensing Facilities, CP-201, last amended February 9, 2005; Bend Radius Determination for Underground Storage Tank Vapor Return Piping, TP-201.2G, adopted October 8, 2003; Test Procedure for In-Station Diagnostic Systems, TP-201.2I, adopted October 8, 2003; and

the proposed adoption of incorporated test procedure: Leak Rate and Cracking Pressure of Pressure/Vacuum Vent Valves, TP-201.1E CERT.

Background: Throughout California, 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. Control of the emissions of air pollutants from GDFs is necessary to reduce hydrocarbon emissions that lead to the formation of ozone and to control emissions of benzene, a constituent of gasoline vapor that has been identified as a toxic air contaminant. In March 2000, ARB approved the Enhanced Vapor Recovery (EVR) certification regulations. The EVR regulations established new standards for vapor recovery systems to further reduce emissions during storage and transfer of gasoline at GDFs that use underground storage tanks for gasoline storage. The EVR standards apply to both new and existing facilities and are being phased in from 2001 to 2010. The EVR regulations have been previously updated in 2001, 2002, and 2004, in part, to improve test procedures for vapor recovery system certification.

Staff's Proposal: Assembly Bill 2955, enacted in September 2004, requires, among other provisions, that the State Water Resources Control Board determine whether equipment undergoing certification to meet the EVR regulations also meets the underground storage tank statutory requirements as specified in Health and Safety Code section 25290.1.2. The staff proposes that the Certification Procedure for Vapor Recovery at Gasoline Dispensing Facilities (Certification Procedure or CP-201) be amended to reflect this new requirement.

Vapor recovery equipment manufacturers have requested that the EVR regulations be amended to more clearly define and simplify the process for certification. Staff has proposed changes to CP-201 to expand and clarify the certification process, particularly to address the process when equipment manufacturers wish to modify or add alternative components to certified vapor recovery systems.

Concern that the pressure/vacuum (P/V) vent valve (a component of the vapor recovery system) specifications are more stringent than necessary has prompted some stakeholders to request that the certification specifications for P/V vent valves be amended. The concern stems from the delay or termination of system certification testing when P/V vent valves have exceeded the limits of the performance specifications. Staff is proposing modifications to the current performance specifications for cracking pressure and leak rate to better reflect appropriate P/V valve performance needs under actual field conditions. Staff is also proposing adoption of a new test procedure, "Vapor Recovery Test Procedure for Leak Rate and Cracking Pressure of Pressure/Vacuum Vent Valves" (TP-201.1E CERT). The test procedure is intended for use during certification testing and will result in a more accurate, precise, and representative test of P/V vent valves.

The Certification Procedure allows ARB's Executive Officer to delay implementation of the scheduled phased-in of EVR standards and specifications under specified

conditions. Executive Officer action in Executive Order G-70-206 delayed the implementation dates associated with some of the EVR requirements to April 1, 2005.

Also, the effective and operative dates for in-station diagnostics in GDFs with gasoline throughput greater than 1.8 million gallons per year were changed by Executive Order to August 1, 2005, and September 1, 2005, respectively (by Executive Officer action in Executive Order G-70-207 and Executive Officer action in Executive Order G-70-208, respectively). These delaying actions are not currently reflected in the regulations. The proposed action would update CP-201's schedule for the phase-in of EVR requirements.

Staff also proposes some reorganization of, and amendments to, CP-201 to improve clarity and readability. Likewise, staff proposes amendments to the definitions in D-200 to clarify and add terms used in the vapor recovery certification and test procedures.

COMPARABLE FEDERAL REGULATIONS

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

AVAILABILITY OF DOCUMENTS AND AGENCY CONTACT PERSONS

The ARB staff has prepared a Staff Report: Initial Statement of Reasons (ISOR) for the proposed regulatory action that includes a summary of the environmental and economic impacts of the proposal. The report is entitled: "Staff Report: Initial Statement of Reasons for Proposed Rulemaking, Public Hearing to Consider the Adoption of a Test Procedure for Pressure/Vacuum Vent Valves and Proposed Amendments to the Regulations for Certification of Vapor Recovery Systems at Gasoline Dispensing Facilities (Service Stations)."

Copies of the ISOR and full text of the proposed regulatory language, in underline and strike-out format to allow for comparison with the existing regulations, may be accessed on the ARB's web site listed below, or may be obtained from the Public Information Office, Air Resources Board, 1001 I Street, Visitors and Environmental Services Center, 1st Floor, Sacramento, CA 95814, (916) 322-2990, at least 45 days prior to the scheduled hearing on May 25, 2006.

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 web site listed below.

Requests for printed documents and inquiries concerning the substance of the proposed regulations may be directed to the designated agency contact persons: Mr.

Kevin Mongar, Mr. Pat Bennett, or Mr. George Lew, Engineering and Certification Branch, Monitoring and Laboratory Division, at (916) 327-0900.

Further, the agency representative and designated back-up contact person to whom non-substantive inquiries concerning the proposed administrative action may be directed are Artavia Edwards, Manager, Board Administration and Regulatory Coordination Unit, (916) 322-6070, or Alexa Malik, Regulations Coordinator, (916) 322-4011. The Board has compiled a record for this rulemaking action, which includes all the information upon which the proposal is based. This material is available for inspection upon request to the contact persons.

This notice, the ISOR, and all subsequent regulatory documents, including the FSOR, when completed, are available on the ARB Internet site for this rulemaking at http://www.arb.ca.gov/regact/pvvapor06/pvvapor06.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, the ARB staff evaluated the potential economic impacts on representative private persons and businesses. The Executive Officer is not aware of any costs that a representative private person or business would necessarily incur in reasonable compliance with the proposed action. Although not quantifiable, cost savings for vapor recovery equipment manufacturers may occur due to 1) proposed changes to the certification requirements (potentially fewer terminated certification tests), 2) proposed changes to the P/V valve performance specifications and test procedure (potentially fewer terminated certification tests), and 3) proposed improvements in the certification process (more clearly defined and simplified). Cost savings for GDF operators may occur when conducting P/V valve testing under the amended P/V valve performance specifications as there may be fewer test failures and P/V valve replacements. A complete assessment of the economic impacts of the proposed regulatory action can be found in the ISOR.

Pursuant to Government Code sections 11346.5(a)(5) and 11346.5(a)(6), the Executive Officer has determined that the proposed regulatory action will 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 part 7 (commencing with section 17500), division 4, title 2 of the Government Code, except as discussed above, or other nondiscretionary savings to state or local agencies.

The Executive Officer has made an initial determination that the proposed regulatory action will not have a significant statewide adverse economic impact directly affecting businesses, including the ability of California businesses to compete with businesses in other states, or on representative private persons.

In accordance with Government Code section 11346.3, the Executive Officer has initially determined that the proposed amendments will not affect the creation or elimination of jobs within the State of California, the creation of new businesses and the elimination of existing businesses within the State of California, and the expansion of businesses currently doing business within the State of California. An assessment of the economic impacts of the proposed regulatory action can be found in the ISOR.

The Executive Officer has also determined, pursuant to title 1, CCR, section 4, that the proposed regulatory action affects small businesses.

In accordance with Government Code sections 11346.3(c) and 11346.5(a)(11), the Executive Officer has found that the reporting requirements in the regulations and incorporated documents that apply to businesses are necessary for the health, safety, and welfare of the people of the State of California.

Before taking final action on the proposed regulatory action, the Board must determine that no reasonable alternative considered by the Board or that has otherwise been identified and brought to the attention of the Board would be more effective in carrying out the purpose for which the action is proposed or would be as effective and less burdensome to affected private persons or businesses than the proposed action.

SUBMITTAL OF COMMENTS

The public may present comments relating to this matter orally or in writing at the hearing, and in writing, or by e-mail before the hearing. To be considered by the Board, written submissions not physically submitted at the hearing must be received no later than
12:00 noon May 24, 2006, and addressed to the following:

Postal Mail is to be sent to:

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

Electronic submittal : http://www.arb.ca.gov/lispub/comm/bclist.php **no later than 12:00 noon, May 24, 2006.**

Facsimile submissions are to be transmitted to the Clerk of the Board at (916) 322-3928 and received at the ARB no later than **12:00 noon, May 24, 2006.**

The Board requests, but does not require, 30 copies of any written statement be submitted and that all written statements be filed at least 10 days prior to the hearing so that ARB staff and Board Members have time to fully consider each comment. The

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

STATUTORY AUTHORITY AND REFERENCES

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

HEARING PROCEDURES

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

Following the public hearing, the ARB may adopt the regulatory language as originally proposed or with nonsubstantial or grammatical modifications. The ARB may also adopt the proposed regulatory language with other modifications if the modifications are sufficiently related to the originally proposed text that the public was adequately placed on notice that the regulatory language as modified could result from the proposed regulatory action. In the event that such modifications are made, the full regulatory text, with the modifications clearly indicated, will be made available to the public for written comment at least 15 days before it is adopted.

The public may request a copy of the modified regulatory text from the ARB's Public Information Office, Visitors and Environmental Services Center, 1001 I Street, First Floor, Sacramento, California 95814, (916) 322-2990.

California Air Resources Board

Catherine Witherspoon
Executive Officer

Date: March 28, 2006

"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."

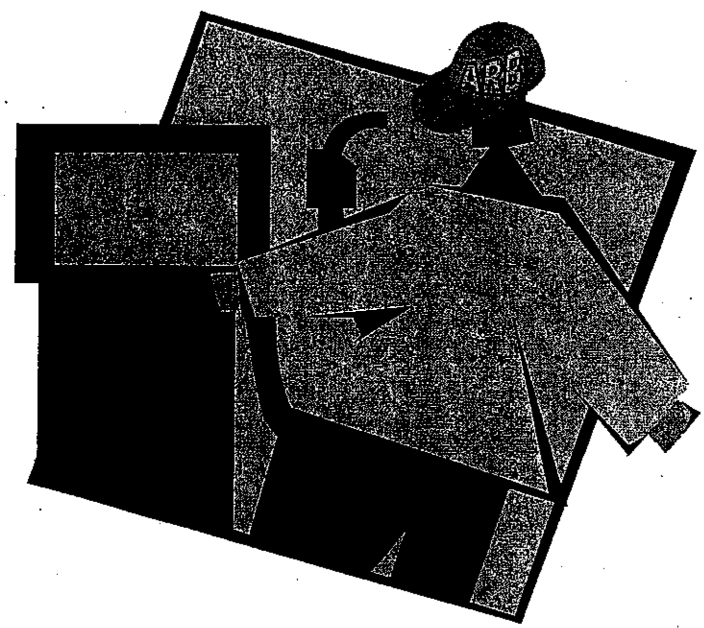
California Environmental Protection Agency

Air Resources Board

VAPOR RECOVERY

HEARING NOTICE AND STAFF REPORT

INITIAL STATEMENT OF REASONS FOR PROPOSED RULEMAKING, PUBLIC HEARING TO CONSIDER THE PROPOSED ADOPTION OF A TEST PROCEDURE FOR PRESSURE/VACUUM VENT VALVES AND PROPOSED AMENDMENTS TO THE REGULATION FOR CERTIFICATION OF VAPOR RECOVERY SYSTEMS AT GASOLINE DISPENSING FACILITIES (SERVICE STATIONS)



April 7, 2006

California Environmental Protection Agency

Air Resources Board

STAFF REPORT:
INITIAL STATEMENT OF REASONS FOR PROPOSED RULEMAKING,
PUBLIC HEARING TO CONSIDER THE PROPOSED ADOPTION OF A TEST PROCEDURE FOR PRESSURE/VACUUM VENT VALVES AND PROPOSED AMENDMENTS TO THE REGULATION FOR CERTIFICATION OF VAPOR RECOVERY SYSTEMS AT GASOLINE DISPENSING FACILITIES (SERVICE STATIONS)

Date of Release: April 7, 2006

Scheduled for Consideration: May 25, 2006

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

STAFF REPORT: INITIAL STATEMENT OF REASONS FOR PROPOSED RULEMAKING, PUBLIC HEARING TO CONSIDER THE PROPOSED ADOPTION OF A TEST PROCEDURE FOR PRESSURE/VACUUM VENT VALVES AND PROPOSED AMENDMENTS TO THE REGULATION FOR CERTIFICATION OF VAPOR RECOVERY SYSTEMS AT GASOLINE DISPENSING FACILITIES (SERVICE STATIONS)

Prepared by:

Kevin Mongar

Monitoring and Laboratory Division

Reviewed by:

William V. Loscutoff, Chief, Monitoring and Laboratory Division
George Lew, Chief, Engineering and Certification Branch
Pat Bennett, Manager, Vapor Recovery Certification Section
Cindy Castronovo, Staff Air Pollution Specialist
Diane Moritz Johnston, Senior Staff Counsel

ACKNOWLEDGEMENTS

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

American Petroleum Institute
California Air Pollution Control Districts
California Air Pollution Control Officers Association (CAPCOA) Vapor Recovery Committee
California Independent Oil Marketers Association
EBW
Fiberglass Tank and Pipe Institute
Franklin Fueling Systems
Hazlett Engineering
Husky
J.B. Dewar,Inc.
OPW
Remote Sensing Air, Inc.
R.S.S.E, Inc.
SKS, Inc.
Steel Tank Institute
Vapor Systems Technologies, Inc.
Veeder-Root
Western States Petroleum Association

Table of Contents

I. INTRODUCTION AND RECOMMENDATIONS

Introduction

In March 2000, the Air Resources Board (ARB or Board) approved the Enhanced Vapor Recovery (EVR) regulations. The EVR regulations established new standards for vapor recovery systems to reduce emissions during storage and transfer of gasoline at gasoline dispensing facilities (GDF) or service stations with underground storage tanks. Control of the emissions of air pollutants from GDFs is necessary to reduce hydrocarbon emissions that lead to the formation of ozone and to control emissions of benzene, a constituent of gasoline vapor that has been identified as a toxic air contaminant.

The EVR standards apply to both new and existing facilities and are being phased in from 2001 to 2010. Some of the EVR performance standards are technology forcing. The EVR regulations were updated in 2001, 2002, and 2004. Previous updates were necessary to improve test procedures for vapor recovery system certifications and to modify performance standards or implementation dates to reflect issues associated with evolving technology. Staff is now proposing additional amendments to the regulations to incorporate statutory changes, clarify certification procedures, amend some performance specifications and test procedures, update implementation dates, and provide a better organizational structure to the regulations.

Assembly Bill 2955, enacted in September 2004, requires, among other provisions, that the State Water Resources Control Board determine whether equipment undergoing certification to meet the EVR regulations also meets the underground storage tank statutory requirements as specified in Health and Safety Code section 25290.1.2. The staff proposes that the Certification Procedure for Vapor Recovery at Gasoline Dispensing Facilities (Certification Procedure or CP-201) be amended to reflect this new requirement.

Vapor recovery equipment manufacturers have requested that the EVR regulations be amended to more clearly define and simplify the process for certification. Staff has proposed changes to CP-201 to expand and clarify the certification process, particularly to address the process when equipment manufacturers wish to modify or add alternative components to certified vapor recovery systems.

Concern that the pressure/vacuum (P/V) vent valve (a component of the vapor recovery system) specifications are more stringent than necessary has prompted some stakeholders to request that the certification specifications for P/V vent valves be amended. The concern stems from the delay or termination of system certification testing when P/V vent valves have exceeded the limits of the performance specifications. Staff is proposing modifications to the current performance specifications for cracking pressure and leak rate to better reflect appropriate P/V valve performance needs under actual field conditions. Staff is also proposing to adopt a new test procedure, "Vapor Recovery Test Procedure for Leak Rate and Cracking

Pressure of Pressure/Vacuum Vent Valves" (TP-201.1E CERT). The test procedure is intended for use during certification testing and will result in a more accurate, precise, and representative test of P/V vent valves.

The Certification Procedure allows ARB's Executive Officer to delay implementation of the scheduled phased-in of EVR standards and specifications under specified conditions. Executive Officer action in Executive Order G-70-206 delayed the implementation dates associated with some of the EVR vapor recovery requirements to April 1, 2005. Also, the effective and operative dates for in-station diagnostics in GDFs with gasoline throughput greater than 1.8 million gallons per year were changed by Executive Order to August 1, 2005 and September 1, 2005, respectively (effective and operative dates changed to August 1, 2005 by Executive Officer action in Executive Order G-70-207, and the operative date changed to September 1, 2005 by Executive Officer action in Executive Order G-70-208). These delaying actions are not currently reflected in the regulations. The proposed action would update CP-201's schedule for the phase-in of EVR requirements.

Staff also proposes some reorganization of, and amendment to, CP-201 to improve clarity and readability. Likewise, staff proposes amendments to the definitions in D-200 to clarify and add terms used in the vapor recovery certification and test procedures.

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 incorporated vapor recovery system certification and test procedures and the adoption of a new test procedure (Appendix 2).

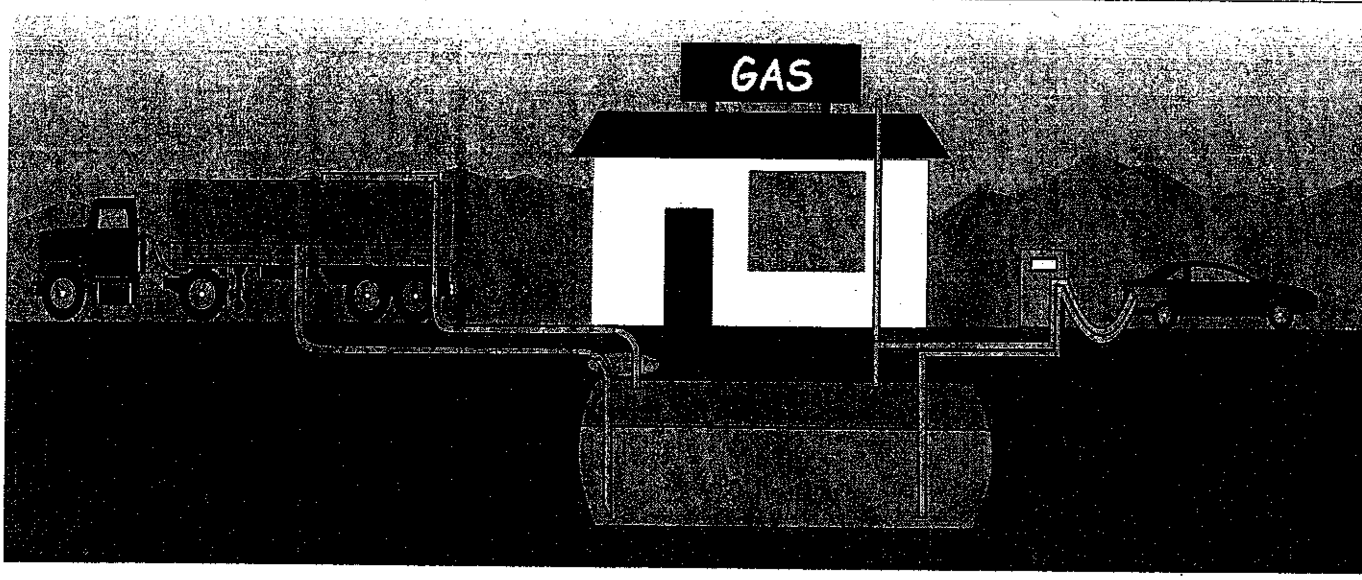
II. BACKGROUND

A. Vapor Recovery Program Overview

Gasoline vapor emissions are controlled during two types of gasoline transfer. 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. The vapor recovery collection efficiency during both of these transfers is determined through certification of vapor recovery systems. In-station diagnostics (ISD) provides real-time monitoring of critical vapor recovery system components and signals the station operator when failure modes are detected.

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

Phase I (distribution) Phase II (consumer)



The ARB and the air pollution control and management districts (districts) share implementation of the vapor recovery program. The ARB's staff certifies prototype Phase I and Phase II vapor recovery systems installed at operating station test sites. State law requires that throughout California only ARB-certified systems be offered for sale, sold, and installed. District staff inspects and tests the vapor recovery system upon installation during the permit process and conducts regular inspections to check that systems are operating as certified.

The vapor recovery requirements affect a multitude of stakeholders. These include the vapor recovery equipment manufacturers, gasoline marketers who purchase this equipment, contractors who install and maintain vapor recovery systems and air districts who enforce vapor recovery rules. In addition, California certified systems are required by most other states and many countries.

The vapor recovery program is expected to achieve over 372 tons per day of reductions in reactive organic gas (ROG) emissions statewide in 2010. Of the 372 tons per day emissions reduced, EVR's contribution is 25 tons per day of reductions. Gasoline vapor contains toxic air contaminants, such as benzene, that are also controlled by EVR. Statewide benzene emission reductions are 151 pounds per day.

As part of the adoption of EVR in 2000, a detailed cost analysis was included in the staff report. This analysis was updated as part of the technology review in an October 2002, staff report. Based on the 2002 technology review and on information available to staff as the EVR regulations have been implemented, the EVR program continues to remain cost-effective with an overall cost-effectiveness of $5.24 per pound. When EVR costs are assumed to be paid by the gasoline consumer, the increase in gasoline cost due to the EVR regulations is calculated to be less than one cent per gallon.

B. EVR Rulemaking History

In March 2000, with the Board's approval of the EVR regulations, new, more effective standards for vapor recovery systems were set to reduce emissions during the storage and transfer of gasoline at gasoline dispensing facilities (GDF or service stations).

On October 25, 2001, the Board considered and approved the amendment of five, and the addition of two new, certification and test procedures for gasoline vapor recovery equipment. The revised and new certification and test procedures were part of the Board's ongoing effort to provide the most updated and accurate procedures for certifying systems to control gasoline vapor emissions during gasoline marketing operation and measuring the emission of air pollutants. In addition to supporting certification of vapor recovery systems and equipment, the amended procedures support emissions measurement and verification of proper operation of installed systems.

On December 12, 2002, the Board considered and approved the amendment of ten certification and test procedures and the adoption of five new test procedures. This regulatory action was called Enhanced Vapor Recovery (EVR) Technology Review and was, again, part of the Board's ongoing effort to improve the EVR program.

At a public hearing held on July 22, 2004, the Board adopted an amendment to Section 4.11 of Certification Procedure 201 (CP-201) to allow modifying vapor piping in dispensers without triggering the unihose dispenser requirement. At a public hearing on November 18, 2004, the Board approved an amendment to the regulations to extend the ORVR compatibility deadline for existing gasoline dispensing facilities (GDF) and amend other EVR regulation compliance dates to be consistent with the extensions allowed under the regulations (as authorized in Executive Orders G-70-203 and G-70-205). The effective date for in-station diagnostics (ISD) for medium throughput stations was also revised to April 1, 2006, to maintain the ISD phase-in schedule.

C. EVR Implementation Schedule

The EVR standards are being phased in over several years and apply to both new and existing facilities. New facilities or major modifications of existing facilities must 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-1 shows the current EVR implementation timeline. The beginning of each solid bar shows the date when new stations must comply. The final compliance date for all facilities to meet a standard is the date at the end of the solid bar.

The EVR timeline reflects a change in the EVR implementation date provided by Executive Officer action in Executive Order G-70-206, which resulted in the delay of the EVR implementation date associated with Phase II vapor recovery to April 1, 2005. In addition, the EVR timeline also reflects a change which resulted in the delay of the EVR ISD effective and operative dates (for GDFs with gasoline throughput greater than 1.8 million gallons per year) to August 1, 2005, and September 1, 2005, respectively (effective and operative dates changed to August 1, 2005, by Executive Officer action in Executive Order G-70-207, and the operative date changed to September 1, 2005, by Executive Officer action in Executive Order G-70-208). These delays were approved due to the lack of certified Phase II vapor recovery systems (as no systems were certified as of the respective operative dates).

D. Certification and Test Procedures

Health and Safety Code (H&SC) section 41954 requires the Board to adopt procedures for certifying systems to control gasoline vapor emissions during gasoline marketing operations. Section 39607(d) of the Health and Safety Code requires ARB to adopt test methods to determine compliance with ARB's and district's non-vehicular emissions standards.

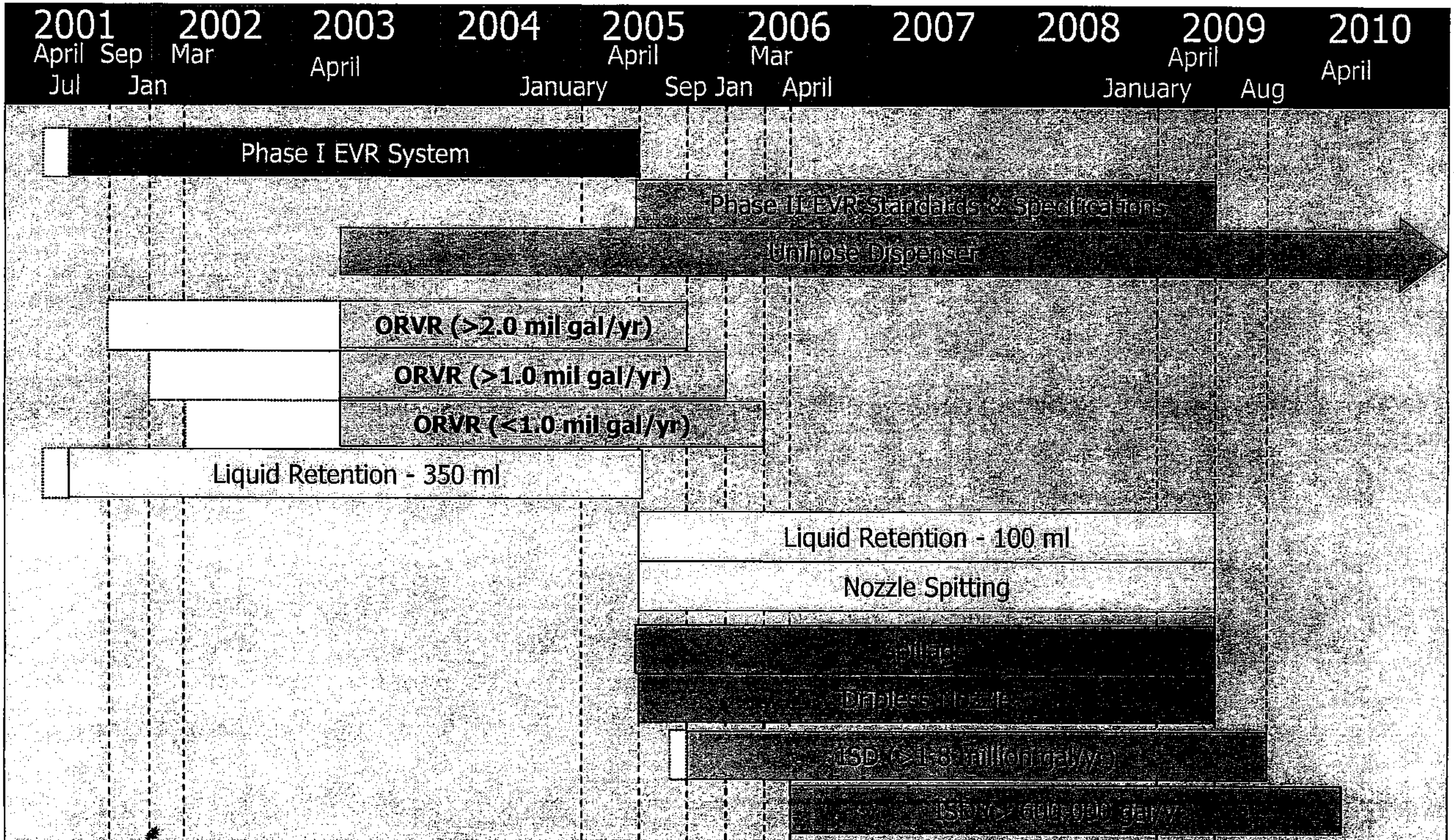
Since 1975, ARB has adopted over 63 test methods for determining emissions from non-vehicular or stationary sources. In addition, ARB adopted certification and test procedures for controlling gasoline vapor emissions from gasoline marketing operations, including transport and storage.

E. Legal Authorities

Section 41954 of the Health and Safety Code (set forth in Appendix 3) requires ARB to adopt procedures and performance standards for controlling gasoline 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

Figure II-1

EVR Timeline



Dotted box: time between start of 4-year clock and 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 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 has adopted the certification and test procedures found in title 17, Code of Regulations, Sections 94110 to 94015 and 94101 to 94165. These regulations reference procedures for certifying vapor recovery systems and test procedures for verifying compliance with performance standards and specifications.

F. 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 most other states that mandate the installation of vapor recovery systems in gasoline dispensing facilities.

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, vapor recovery list serve, and by postal mail.

A. Workshops

Staff conducted public workshops in Sacramento on October 18, 2005, and February 16, 2006. Attendees included representatives from petroleum marketers, vapor recovery equipment manufacturers and air pollution control agencies. The presentation was made available on the web in advance of the workshops and participation was made available via teleconference.

B. Meetings

Staff met with representatives from the Bay Area Air Quality Management District on September 13, 2005, in Richmond. Staff also conducted a conference call with the California Air Pollution Control Officers Association (CAPCOA) Vapor Recovery Committee Chairperson on January 3, 2006. Staff presented updates to the CAPCOA Vapor Recovery Committee at their quarterly meetings. Staff had numerous conversations with other industry stakeholders regarding the proposed amendments and comments.

C. Internet and Mail

Stakeholders have received electronic mail (e-mail) notifications via ARB's vapor recovery list serve when new materials are posted on the vapor recovery webpage (www.arb.ca.gov/vapor/vapor.htm). The workshop notices, agendas, and presentations, as well as the letters to the manufacturers are all available on the webpage. Stakeholders were encouraged to submit comments to staff by letter or via e-mail.

Two letters of request to vapor recovery stakeholders were issued through the vapor recovery webpage. The letters, posted on January 31, 2005, and April 20, 2005, requested comments for modification of pressure/vacuum vent valve performance specifications and test procedures. Stakeholders were notified of the letters through the vapor recovery list serve and through the vapor recovery mailing list. Numerous comments were received which formed the basis of many of the proposed changes.

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

A. 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. New terms and definitions were added to support the proposed language for the Executive Order amendment and renewal process. Terms used in the adopted certification procedure were also defined or revised. The amendments to D-200 are in Appendix 2.

B. Proposed Amendments to Certification Procedure for Vapor Recovery Systems at Gasoline Dispensing Facilities (Certification Procedure CP-201)

The Certification Procedure describes the procedure for evaluating and certifying Phase I and Phase II vapor recovery systems used at service stations. The Certification Procedure contains the system performance standards and specifications and references the test procedures (TP) used to determine compliance with the certification standards and specifications. Staff proposes revisions to both the certification specifications and the certification process. Staff proposes to reorganize CP-201 to more clearly describe the certification process, the process for renewal of certifications, and for making amendments to Executive Orders which authorize system certification. The following section summarizes the changes to CP-201.

Certification Standards and Specifications

1. Amend Sections 2.1, 2.2, and 2.4, Performance Standards and Specifications

The proposed language clarifies that an applicant may request certification to a performance standard or specification that is more stringent than the minimum performance standards or specifications required by CP-201. The proposed language regarding performance standards and specifications has been amended to clarify the difference in the consequences to presently certified systems when a certification standard is amended and when a certification specification is amended. The proposed amendments clarify that the adoption of new standards or the modification of existing standards will initiate a new "four-year clock" for continued use of previously certified systems, whereas the adoption or modification of specifications does not initiate a new four-year clock.

2. Amend Table 2-1, Effective and Operative Dates

Table 2-1 lists the operative and effective dates for the vapor recovery requirements. Table 2-1 has been updated to reflect Executive Order G-70-206, which changed the effective and operative dates for Phase II standards and specifications from January 1, 2005, to April 1, 2005. The **operative** date for ISD at stations with throughputs greater than 1.8 million gallons per year has been updated from August 1, 2005, to September 1, 2005 to reflect a change specified by Executive Order G-70-208. The **effective** date for ISD at stations with throughputs greater than 1.8 million gallons per year has been changed from August 1, 2005, to September 1, 2005, to be consistent with the operative date. The effective and operative dates for ISD at stations with throughputs greater than 600,000 gallons per year and less than 1.8 million gallons per year has been changed from April 1, 2006, to September 1, 2006, to allow a phase-in of ISD as provided in the original EVR regulations.

3. Amend Table 3-1 and Section 3.5, Pressure/Vacuum Vent Valve Performance Specifications

The underground storage tanks (UST) for gasoline at service stations are equipped with pressure/vacuum (P/V) vent valves on the vent pipe openings. The purpose of these valves is to limit hydrocarbon emissions from UST while also allowing the tank to "breathe" while protected from physical damage or permanent deformation caused by increases in internal pressure or vacuum. The UST's pressures vary due to temperature fluctuations, barometric pressure changes, or variations in the vapor/liquid ratio during refueling. When the UST pressure/vacuum exceeds the design setting, the valve opens or cracks to relieve the excess pressure/vacuum condition. Additionally, the P/V valve settings for pressure/vacuum cracking act to control flow allowing the displaced vapors to flow to the tanker truck tank compartment during a Phase I gasoline delivery, also known as a Phase I drop.

Stakeholders have commented that the P/V valve cracking specifications are more stringent than needed under actual field conditions and have requested that the specifications be modified. Under the current specifications, a number of Phase I and Phase II system certification tests have been delayed or terminated specifically because of P/V vent valves exceeding the limits of the performance specifications.

Section 3.5.1 of CP-201 defines the performance specifications for P/V vent valves as 3.0 plus or minus ($\pm$) 0.5 inches water (H_2O) (positive pressure) and -8.0 $\pm$ 2.0 inches H_2O (negative pressure).

The ARB staff has determined that increasing the P/V vent valve positive pressure cracking specification to 2.5 to 6.0 inches H_2O will not cause an increase in emissions from EVR systems. The ARB staff has also determined that this change to the positive pressure specification would not adversely affect the safeguarding functions of the P/V valve for USTs. The ARB staff initially proposed changing the negative pressure cracking specification to 6.0 to 19.0 inches H_2O. However, communications with stakeholders have indicated that there may be possible performance and safety issues associated with a vacuum greater than 10 inches H_2O. Thus, at this time, a change is proposed only for the positive pressure cracking specification.

The proposed change to the positive cracking pressure is not intended to allow systems to routinely operate at higher pressures. The CP-201 specifications for UST pressure require that the 30-day rolling average "Daily Average Pressure" and "Daily High Pressure" be less than or equal to positive ($\leq$ +) 0.25 and $\leq$+1.50 inches H_2O, respectively. However, certain events (e.g., Phase I drops under certain conditions) may cause temporary increases in UST pressure that do not affect the overall performance of the system. ARB staff does not believe the proposed increase to the positive cracking pressure will impact EVR system performance as long as the UST rolling average pressure requirements are met.

Staff is also proposing to change the leak rate specification when subject to a negative pressure of -4.0 inches H_2O from 0.21 cubic feet per hour (CFH) to 0.63 CFH. This change will make the specification consistent with the current certification practice of allowing GDF configurations with up to three P/V valves, each with an allowable leak rate of 0.21 CFH. Thus, the total leakrate of all P/V valves certified for use with any vapor recovery system shall not exceed 0.63 CFH at -4.0 inches H_2O. This may be accomplished by manifolding the tank vent pipes into a single P/V valve or, alternatively, by choosing P/V valves certified to more restrictive leak rate performance specifications. In the latter case, individual P/V valves shall be tested and certified to a maximum leak rate of 0.63 CFH at -4.0 inches H_2O divided by the maximum number of valves for which the system will be certified (normally this is three valves). The applicant shall state in the certification application the leak rates to which P/V valves are to be certified. All valves will be required to conform to the leak rate specifications as specified in the applicable certification Executive Order.

Section 3.5.3 has been expanded to more clearly discuss the use of multiple P/V valves at GDFs and Section 3.5.4 has been added to stipulate that Phase I certification sites shall be configured with three P/V valves.

The following table summarizes the proposed changes to the P/V valve specifications.

Specification	Existing	Proposed
Positive pressure cracking	2.5 to 3.5 inches H_2O	2.5 to 6.0 inches H_2O
Negative pressure cracking	6.0 to 10.0 inches H_2O	No Change
Positive pressure leakrate	$\leq$0.17 CFH at +2.0 inches H_2O	No Change
Negative pressure leakrate	$\leq$0.21 CFH at -4.0 inches H_2O	$\leq$0.63 CFH at -4.0 inches H_2O

4. Delete Section 3.4.4, Phase I Vapor Poppet Pressure Drop

Staff proposes to delete the specification requiring verification of the dynamic pressure drop of Phase I vapor adaptors. This specification was adopted in the 2000 EVR rulemaking without the procedure necessary to conduct the test. The specification is not necessary as Phase I efficiency determinations would identify any vapor adaptor pressure drop issues.

Certification Process

5. Amend Section 1.1, SWRCB Certification Approval

In 2004, State law was changed with the enactment of Assembly Bill (AB) 2955 which now requires the SWRCB determine that equipment meeting the vapor recovery regulations also meets the underground storage tank statutory requirements. Staff proposes to add the SWRCB to the Section 1.1 list of agencies from which a written determination must be received.

6. Amend Section 4.5, Compatibility of Phase II Systems with Phase I Systems

The performance specification for Phase II system compatibility with Phase I systems is currently linked to "excess emissions" from the Phase I system caused by the operation of the Phase II system. However, there is no specific procedure identified to make this determination and therefore compliance demonstration is uncertain. The ARB staff is proposing to determine compatibility of the proposed Phase II system with certified Phase I systems by performing the Phase I system tests specified in Section 3. Failure of any or all Phase I system tests conducted during the Phase II system certification would 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 would not trigger termination of the Phase II system certification unless sufficient information demonstrates that the Phase II system caused the failure(s).

During Phase II certification tests, if any Phase I component is identified as having possible performance deficiencies, then an investigation of the component performance will be initiated by ARB. Holders of all executive Orders using the component in question will be notified of the pending investigation.

7. Section 4.12.5, rigid piping specification, renumbered to 4.11.5

The specification for rigid piping has been clarified as piping material with a bend radius that exceeds six feet. The bend radius specification correlates to a TP-201.2G test result of a maximum deflection distance of 9 5/8 inches, as determined by TP-201.2G.

8. Section 9, Additional Requirements of Certification; Section 9 provisions moved to Sections 10 and 16

The text in Section 9.1 (Financial Responsibility) has been moved to the proposed Section 10 and Section 16.4. The text in Sections 9.2 (Warranty), 9.3 (Installation, Operation and Maintenance of the System) and 9.4 (Identification of System

Components) has been moved to the proposed Sections 16.5, 16.6, and 16.7 respectively.

9. Re-number Section 10, In-Station Diagnostic Systems, as Section 9

10. Add Section 10, Certification of Vapor Recovery Systems

The proposed Section 10 will provide an introduction and a "roadmap" for the certification process. This section will provide a transition between the sections addressing standards and specifications (Sections 1 through proposed 9) and the sections addressing the certification process (Sections 11 through 19).

11. Amend Section 11, Application Process

Section 11 provides directions for submitting certification applications. Staff proposes to add a requirement that the applicant provide proposed defects and test protocols, as described in proposed Section 12.6, to determine if the component or system failure meets the criteria for a vapor recovery equipment defect (VRED). Staff also proposes to require that the applicant provide proposed challenge modes and test protocols, as described in proposed Section 12.7, to determine if the component or system meets the standards and specifications under various GDF operating conditions. Staff also proposes to require that the applicant provide, if applicable, a bellows insertion force specification and test protocol to verify compliance with Section 5.1.3.

12. Replace Section 12.6, Failure Mode Procedures and Test Results

Staff proposes to replace the existing Section 12.6, Failure Mode Procedures and Test Results, with Section 12.6, Equipment Defect Identification.

13. Add Section 12.7, Challenge Mode Determination

This proposed Section 12.7 will address whether additional testing is needed to ensure the system will meet the applicable standards and specifications under various GDF operating conditions.

14. Amend Section 13; Vapor Recovery System Certification Testing

The purpose of conducting tests on the Phase I system during Phase II system certifications is clarified.

15. Clarify Section 13.1.1

The minimum throughput requirement (150,000 gallons per month) for the application for certification test facilities has been clarified to be the minimum throughput of the facility over a sequential six month period.

16. Add Sections 13.1.7 and 13.1.8

These Sections have been added to clarify the number of P/V vent valves required to be installed at Phase I and Phase II certification test sites, respectively.

17. Clarify Section 13.3

The minimum testing requirements have been clarified as a minimum operational test duration of 180 days and a minimum throughput of 900,000 gallons of gasoline.

18. Replace Section 13.4, Failure Mode Testing

Staff proposes to replace the existing Section 13.4, Failure Mode Testing, with Section 13.4, Equipment Defect and Challenge Mode Testing

19. Clarify Section 14.4, Testing of Alternate Test Procedures

Section 14.4 discusses the testing necessary to demonstrate the equivalence of proposed test procedures with adopted test procedures. The equivalence testing must follow the guidelines specified in US EPA Reference Method 301, "Field Validation of Pollutant Measurement Methods from Various Waste Media." However, Method 301 is not directly applicable for some test procedures. Staff has proposed that "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."

20. Move Section 15, Certification of Systems; Provisions moved to Section 16

The text in Sections 15.1 (One Vapor Recovery System per UST System), and 15.2 (Certification Not Transferable), has been moved to the proposed Section 16 (Duration and Conditions of Certification).

21. Replace Section 16, Certification of Vapor Recovery Systems and Components

Section 16, as currently adopted, is intended to address the transfer of vapor recovery components from one certified system to another certified system. This section allows for a case-by-case review of applications with ARB discretion to allow abbreviated tests, e.g., a minimum of a 30-day operational test rather than the full operational test of 180 days or more, under certain conditions. Section 16 contains a discussion of "system-specific" and "non-system-specific" components and provides language addressing the review and testing process for each category. The original intent was to require more stringent testing for "system-specific" component changes than for those defined as "non-system-specific." However, as written, Section 16 does not provide different review or testing requirements for the two categories, i.e., abbreviated testing is allowed, or additional testing required, in both cases at the discretion of the Executive Officer. Therefore, the separation of components into the two categories is unnecessary and staff proposes that the categories be eliminated in regard to the transfer of components from one certified system to another certified system. An expanded discussion of "Amendments to Executive Orders" has been added as proposed Section 18.

22. Re-number Section 17, Documentation of Certification, as Section 15

23. Re-number Section 18, Duration and Conditions of Certification, as Section 16

The text from Sections 9.1, 9.2, 9.3, 9.4,15.1 and 15.2 has been moved into this Section. The text in Section 18.3, Performance Monitoring, has been addressed in the proposed Section 17. Section 18.2, Duration of Component Certification, has been deleted because the ARB does not certify individual components.

24. Add Section 17, Certification Renewal

The adopted Section 18.1 specifies that "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 reissued." However, the currently adopted section did not discuss the renewal process. Staff proposes to add Section 17, Certification Renewal, to clarify the renewal request and review process.

25. Add Section 18, Amendments to Executive Orders

Staff proposes to add Section 18 to clarify the process for amending Executive Orders. Vapor recovery equipment manufacturers have requested that the regulations be modified to provide a more clearly defined and simplified process for making amendments to certified vapor recovery systems (authorized through Executive Orders). Vapor recovery system manufacturers may need to replace components as improvements in design or durability are incorporated or may choose to add an alternate component or a replacement component in a certified system (EO). Alternate or replacement components may be modifications to originally certified components, components originally certified on another certified system, or new components. In addition, manufacturers may want to reconfigure their vapor recovery equipment or make software updates to the ISD system.

26. Amend Section 19, Certifications that Have Been Terminated

Staff proposes that the caption for the section be made more specific. Section 19.2 has been deleted. Section 19.2.1 has been moved to Section 2.4. Sections 19.2.1(a), 19.2.1(b) and 19.2.2 are no longer applicable and will be deleted.

Section 19 has also been amended to include clarifications regarding replacement parts for certifications that have been revoked, superseded, or that have expired.

27. Clarifying Amendments

Other minor amendments have been made to CP-201 to correct test procedure references and improve the clarity and consistency of the procedure.

Commercial Availability

In response to stakeholder concerns regarding the commercial availability of equipment when only one system or one component has been certified to meet a standard, staff proposes several changes to CP201. These changes would accommodate the need for certified equipment to be commercially available by the operative date of a standard and for equipment to be obtained in a timely manner.

28. Add Section 2.4.4, Commercial Availability of Vapor Recovery Systems

Proposed Section 2.4.4 includes the criterion that a vapor recovery system is considered commercially available if that system can be shipped within eight weeks of the receipt of an order by the equipment manufacturer. Four to six weeks is a typical shipping schedule for gasoline dispensing components such as gasoline dispensers. However, an eight week delay in shipment would indicate that a manufacturer cannot ship the system within the normal timeframe. Eight weeks is also consistent with the amount of time typically needed to apply for and obtain air pollution and underground storage tank permits and schedule installation of gasoline dispensing equipment.

29. Amend and Re-number Section 9.1 to 16.4, Financial Responsibility

In order for ARB to make a determination of financial responsibility before the certification of a system, information is requested of an applicant. Staff proposes to add a provision that if no system has been certified to meet a new or amended standard, the applicant is requested to provide additional financial and manufacturing information to the Executive Officer. The Executive Officer will then determine whether the applicant can be projected to meet the market demand for a certified system by the operative date of the standard. If the Executive Officer determines that a compliant system will not be available by the operative date of a standard, Section 2.4.4 of the proposed CP-201 requires that the operative date shall be extended.

30. Amend Section 19.1

Staff proposes to amend Section 19.1 to include the criterion for commercial availability of a vapor recovery replacement component as commercially available if the component can be shipped within three weeks of the receipt of an order by the equipment manufacturer. From a survey of parts suppliers, staff determined that replacement components can generally be shipped within one to two weeks of a purchase order. However, a delay of three weeks would indicate that a component manufacturer cannot ship the replacement component within the normal timeframe.

Proposed New Test Procedure

31. Leak Rate and Cracking Pressure of Pressure-Vacuum Vent Valves (TP-201.1E CERT)

The currently adopted test procedure TP-201.1E, *Leak Rate and Cracking Pressure of Pressure/Vacuum Vent Valves*, verifies that P/V valves do not exceed the allowable cracking pressures and leak rates specified in CP-201. The adopted test procedure can be used both for certification of P/V valves and compliance testing. Staff is proposing to adopt a new test procedure, TP-201.1E CERT, which would be applicable to certification testing only.

Stakeholders have been critical of certain aspects of the adopted test procedure, TP-201.1E. The adopted procedure requires that a “sudden flow” of nitrogen be applied to the P/V vent valve to determine the cracking pressure. A gradual pressure build-up, rather than a sudden flow, may better reflect GDF operating conditions. Some commented that the 1) field versus bench test assembly volumes, and 2) manometer response time, combined with the sudden flow testing procedure may account for the variability in test results.

A more gradual increase in pressure or vacuum flow can be accomplished with the addition of a surge tank to the test assembly. The addition of a surge tank increases the volume of the test assembly. The equivalence of the proposed amendment has been demonstrated through comparison tests as outlined in US EPA Method 301. Although equivalent, proposed TP-201.1E CERT cannot be used as a compliance test because of the installation of ball valves in the vent pipe is required, making the test appropriate only for certification testing. The currently adopted TP-201.1E would continue to be used by Districts for compliance testing.

The proposed TP-201.1E CERT also includes:

- A requirement to average three test runs for cracking pressures, and
- A test-method error tolerance for data reporting.

The precision information included in Section 4 of TP-201.1E CERT may be reviewed or updated by the Executive Officer as additional information becomes available. Also, the method precision for leak flow rates has not been estimated and may be added by the Executive Officer as additional information becomes available.

Proposed Modifications to Test Procedures

32. Test Procedure for In-Station Diagnostic Systems (TP-201.2I)

Staff proposes to delete Section 9.12 of TP-201.2I, *Test Procedure for In-Station Diagnostic Systems,* since that section applies to a regulatory requirement that was removed as part of the December, 2002 EVR Technology Review Rulemaking.

33. Test Procedure for Bend Radius Determination for Underground Storage Tank Vapor Return Piping

Staff proposes to modify Section 7.2 of TP-201.2G, *Test Procedure for Bend Radius Determination for Underground Storage Tank Vapor Return Piping*, to correctly reference the specification in CP-201 Section 4.11.5 (as re-numbered).

Changes Without Regulatory Effect

Minor editorial corrections have been made to grammar and terminology throughout the certification and test procedures. The editorial corrections do not make any substantive changes to the certification and test procedures.

V. OUTSTANDING ISSUES

<u>Commercial Availability</u>

1. <u>First Certified System is Sole Source until Second System is Certified</u>

   Stakeholders commented that before a vapor recovery standard becomes operative there should be a minimum of two manufacturers with certified systems.

   The adopted regulations allow a standard to become operative as soon as one manufacturer certifies a system provided that the certified system is commercially available. Requiring two manufacturers to certify systems before the operative date of a standard would discourage the timely development and use of more effective emission control technologies and the implementation of regulations that are intended to be technology forcing. Since vapor recovery regulations were first adopted in the 1970s, there have been periods stretching from weeks to years when only one certified system or component was available. If ARB had to wait for the second certification of a compliant system before implementing a standard, the emission reductions resulting from that standard would be delayed for periods lasting from weeks to years. In addition, requiring that two systems be certified before a standard is operative is a disincentive for an applicant to invest in certifying the first system, since that company will not have a market for the certified system until another company certifies a second system.

Under EVR, ARB staff has recognized the potential disruption to the construction of gasoline dispensing facilities or major modifications of existing facilities that could occur if the only certified system is not commercially available. ARB staff has in place a number of procedures to monitor the commercial availability of systems and will continue monitoring availability of EVR systems throughout the four year phase-in period of the Phase II system standards. Staff obtains periodic reports from equipment manufacturers to determine that vapor recovery systems are shipped within eight weeks of the receipt of a purchase order by the manufacturer. If delivery of vapor recovery equipment is delayed, gasoline dispensing facilities can report directly to ARB, using a form available on the internet. Finally, ARB staff communicates frequently with district staff and equipment manufacturers in order to anticipate whether there may be a shortage of certified equipment available as regulatory deadlines approach.

The existing regulations already allow the Executive Officer to delay the operative date of the new performance standards or specifications, if a certified system is not commercially available. For these reasons, no changes to existing regulations are being proposed.

2. Criteria for System Commercial Availability

In order to be considered commercially available, stakeholders have argued that a vapor recovery system must be available to be shipped within six weeks of placing an order with the manufacturer.

The determination of commercial availability is made by the ARB Executive Officer. However, specific criteria are not presently established to facilitate such a determination. The proposed regulation would authorize the Executive Officer to make a finding that the system is not commercially available when there is only one certified system and it cannot be shipped within eight weeks of receiving an order.

ARB staff has determined typical shipping schedules by surveying distributors, equipment manufacturers, and gasoline marketers. Based on these surveys, ARB staff found that four to six weeks is a typical shipping schedule. If the manufacturer cannot ship the system within eight weeks, this means that the typical shipping timeframe cannot be met. Staff recommends that eight weeks, not six weeks, be the appropriate timeframe for determination of commercial availability of a vapor recovery system.

3. Criteria for Component Commercial Availability

   Stakeholders have argued that the test of commercial availability for a replacement component should be shipment of a component that meets newly operative standards within one week of the receipt of a purchase order.

   As mentioned in issue #2 above, specific criteria are not presently established to facilitate a commercial availability determination by the Executive Officer. The proposal would authorize the Executive Officer to make a finding that a component is not commercially available when the newly certified component cannot be shipped within three weeks of receiving an order. From a survey of parts suppliers, ARB staff determined that replacement components are routinely shipped between one and two weeks after a purchase order has been placed with the manufacturer. A delay of three weeks indicates that a component manufacturer cannot ship the replacement component within the normal timeframe. Staff recommends that three weeks, not one week, should be the appropriate timeframe for determination of commercial availability of a vapor recovery component.

4. Potential for Price Gouging

   Stakeholders believe that if only one manufacturer has a certified system to meet a standard, price gouging will occur.

   There are currently no requirements in the adopted regulations specifying the retail costs for a certified vapor recovery system. Price gouging has not been documented for either the first certified Phase I EVR system or the first certified Phase II EVR system. There has been no price gouging reported since the Healy Phase II EVR system was certified in April 2005. Similarly, between June 2001, and October 2002, when Phil-Tite was the only manufacturer of a Phase I EVR system, the cost of this system was comparable to that of non-EVR Phase I systems. ARB staff will continue to monitor the costs of the first certified vapor recovery system until a second certified system becomes available. No changes to existing regulations are being proposed.

VI. ECONOMIC AND ENVIRONMENTAL IMPACTS

A. Economic Impact of Proposed Amendments

As indicated in Table VI-1, all of the procedures proposed for amendment or adoption are used for vapor recovery system certification by ARB staff. Manufacturers also use the certification procedures in the development of vapor recovery systems and components and to generate data for certification applications.

Table VI-1
Summary of Economic Impacts for Proposed Vapor Recovery Procedures

Procedure	Certification, Compliance or Both	Proposed Changes	Economic Impacts
D-200	NA	Definitions	none
CP-201	Cert	Certification standards, certification process	Possible cost savings
TP-201.1E CERT	Cert	New procedure	Possible cost savings
TP-201.2G	Cert	minor correction	none
TP-201.2I	Cert	update	none

Cost savings for vapor recovery equipment manufacturers may occur due to: 1) proposed changes to the Phase I/Phase II compatibility requirements (potentially fewer terminated Phase II certification tests), 2) proposed changes to the P/V valve performance specifications and test procedure (potentially fewer terminated Phase I system certification tests), and 3) proposed changes to the Executive Order amendment process (more clearly defined, potentially simplified process).

Cost savings for GDF operators may occur, in regard to P/V valve compliance testing, due to proposed changes to the P/V valve performance specifications (i.e., fewer test failures and P/V valve replacements).

B. Environmental Impacts of Proposed Amendments

The proposed amendments are not expected to affect the emissions reductions attributed to the vapor recovery program.

VII. ALTERNATIVES CONSIDERED

Staff has considered, as an alternative, the option of not adopting the proposed vapor recovery proposals. Not approving the proposed amendments and adoption of the certification and test procedures would be detrimental for the following reasons:

A. May increase the timeframe of Phase I and Phase II vapor recovery certification tests without a commensurate air quality benefit.
B. May increase the cost of certification testing for Executive Order amendments without a commensurate air quality benefit.
C. May lead to higher compliance costs for GDFs without a commensurate air quality benefit.
D. May lead to less accurate, precise, and representative testing of P/V vent valves during the certification process without the proposed test procedure, TP-201.1E CERT.

E. Would not update the regulations to formalize the statutory requirements of AB 2955.

VIII. REFERENCES

1. January 31, 2005 Letter from George Lew, Air Resources Board to Vapor Recovery Stakeholders Regarding Proposed Changes to P/V Valve Cracking Specifications.

2. April 20, 2005 Letter from George Lew, Air Resources Board to Vapor Recovery Stakeholders Regarding Proposed Changes to P/V Valve Cracking Specifications.

Appendix 1

Proposed Amendments to California Code of Regulations

FINAL REGULATION ORDER

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

Amend Title 17, California Code of Regulations, Section 94011 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 ~~February 9, 2005~~ *[date of amendment to be inserted]*.

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

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

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

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

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

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

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

TP-201.1E CERT– "Leak Rate and Cracking Pressure of Pressure/Vacuum Vent Valves" (Adopted: *[date of adoption to be inserted]*)

TP-201.2 – "Efficiency and Emission Factor for Phase II Systems" (Adopted: April 12, 1996, as last amended October 8, 2003)

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

TP-201.2B – "Flow and Pressure Measurement of Vapor Recovery Equipment"

(Adopted: April 12, 1996, as last amended October 8, 2003)

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

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

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

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

TP-201.2G – "Bend Radius Determination for Underground Storage Tank Vapor Recovery Components" (Adopted: October 8, 2003, as last amended *[date of amendment to be inserted]*)

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 *[date of amendment to be inserted]*)

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

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

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

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

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

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

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

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

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

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

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

Appendix 2

Proposed Amendments of Vapor System Certification and Test Procedures

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:______________

[Note: The text is shown in ~~strikeout~~ to indicate that it is proposed for deletion and underline to indicate that it is proposed for addition. [Bracketed text] is not part of the proposed amendments.]

California Environmental Protection Agency
Air Resources Board
Proposed
Vapor Recovery Definitions

D-200

Definitions for
Vapor Recovery Procedures

1 APPLICABILITY

The terms and acronyms contained herein are applicable for the *Certification and Test Procedures for Vapor Recovery Systems at Gasoline Dispensing Facilities, Gasoline Bulk Plants, Gasoline Terminals, Cargo Tanks, and Novel Facilities*. 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 less than 180 days.

aboveground storage tank
a system that uses a gasoline storage tank that is intended for fixed installations, without backfill, is located above or below grade and requires emergency relief venting.

airport refueller
a cargo tank which: has a total capacity no greater than 5000 gallons; exclusively transports avgas and jet fuel; and is not licensed for public highway use.

assist
a vapor recovery system, which employs a pump, blower, or other vacuum inducing devices, to collect and/or process vapors at a subject facility.

balance
a vapor recovery system which uses direct displacement to collect and/or process vapors at a subject facility.

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.

~~tests which, as required by a certification procedure or an ARB Executive Order:~~

> ~~are performed before certification to determine compliance with a certified performance standard and~~
>
> ~~are performed after certification to determine compliance with a certified performance standard.~~

~~**Note:** Some ARB Executive Orders require periodic certification testing after certification. Also, compare with "compliance tests" below.~~

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 ~~a certification procedure or~~ an ARB Executive Order:

~~are performed before certification to evaluate and determine a certified performance specification and~~

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

<u>certification period and has not been renewed or extended by the Executive Officer.</u>

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.

<u>full operational tests</u>
<u>operational tests where the complete complement of test procedures are conducted to demonstrate compliance with all the applicable standards and specifications in CP-201.</u>

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, section 2250 et seq.

gasoline dispensing facility
~~a facility which dispenses gasoline to the end user.~~ <u>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.</u>

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 <u>re</u>fueling 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.

<u>i</u>~~I~~n-station diagnostics <u>(ISD)</u>
equipment that provides continuous real-time monitoring of critical emission-related vapor recovery system parameters and components, and alerts the station operator when a failure mode is detected so that corrective action is

taken.

leak detection solution
any solution containing soap, detergent or similar materials which promote formation of bubbles, and which is used to wet joints or surfaces from which gas may be leaking, and which causes bubbles to form at the site of any escaping gas.

leak free
liquid leak of no greater than three drops per minute.

limited operational tests
operational tests where only the test procedures appropriate for a specific component(s) are conducted to demonstrate compliance with specific standards and specifications.

liquid condensate trap (knock-out pot, thief port)
a device designed to collect liquid that condenses in the vapor return line in a manner that allows it to be evacuated and ensures that the vapor return line will not be blocked by the accumulation of liquid.

liquid leak
the dripping of liquid organic compounds at a rate in excess of three (3) drops per minute from any single leak source other than the liquid fill line and vapor line disconnect operations. For cargo tanks, a liquid leak from liquid product line and vapor line disconnect operations is defined to be:

more than two (2) milliliters liquid drainage per disconnect from a top loading operation; or

more than ten (10) milliliters liquid drainage from a bottom loading operation. Such liquid drainage for disconnect operations shall be determined by computing the average drainage from three consecutive disconnects at any one permit unit.

liquid removal device
a device designed specifically to remove liquid from the vapor return portion of a vapor hose.

liquid retain
any liquid gasoline retained in the vapor passage of the nozzle/hose assembly, on the atmospheric side of the vapor check valve.

lower explosive limit (LEL)
the minimum volumetric fraction of combustible gas, in air, which will support the propagation of flame; commonly expressed in units of percent (%) or parts per million (ppm).

Standard references for physical properties of combustible gases differ by a few percent in their listed values for lower explosive limit (LEL) and differ also in terms employed. For clarity:

"LEL" shall mean the same as "lower limit of flammability," "lower end of the explosive range", and other related terms in common technical discourse.

The authoritative reference for determination of LEL values shall be the chapter GASEOUS FUELS, by C. C. Ward, pages 7-21 to 7-24 of *Marks' Standard Handbook for Mechanical Engineers*, Eighth Edition, McGraw Hill, New York, 1978.

The LEL for propane is 2.1% (21,000 ppm).
<u>The LEL for methane is 5.0 % (50, 000 ppm)</u>

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 4.11.

<u>**mini-boot**</u>
<u>a device used on vapor recovery nozzles to enhance collection efficiency without requiring a tight seal at the vehicle fillpipe.</u>

multi-product dispenser (MPD)
a dispenser of multiple products with one or more hoses per dispenser side.

<u>**motor vehicle**</u>

<u>as defined in Section 39039 of the Health and Safety Code</u>

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 a gasoline dispensing facility constructed as of the operative date of the latest amendments to Certification Procedure CP-201 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.

<u>**operational test**</u>

<u>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.</u>

operative date

the date on which a regulated person is first required to act or is prohibited from acting. The operative date determines when new installations and facilities undergoing major modifications must use equipment that meets the applicable performance standard and/or performance specification.

over-fill prevention device

a device designed to stop the delivery of product to a storage tank to prevent the over-filling of the tank and potential spillage.

phase I

control of vapors during the transfer of gasoline from the cargo tank to the gasoline dispensing facility.

phase II

the control of vapors during the transfer of gasoline from the gasoline dispensing facility to the vehicle and storage of gasoline at the gasoline dispensing facility.

portable fuel container

any container or vessel that is designed or used primarily for receiving, transporting, storing, and dispensing fuel.

pressure-related fugitive emissions

those emissions of hydrocarbon vapors emitted from a GDF due to a positive gauge pressure in the headspace (ullage) of the gasoline storage tank. These emissions do not include transfer emissions at the nozzle/fillpipe interface nor the emissions from the vent pipe P/V valve, provided that the cracking pressure of the P/V valve has been exceeded.

processor

a vapor processor, either destructive or non-destructive, that operates to manage the pressure of the vapor in the gasoline storage tank within specified limits.

Reid Vapor Pressure

the absolute vapor pressure of volatile petroleum liquids, except liquefied petroleum gases, as determined in accordance with ASTM D323-89.

renewed certification

an Executive Order for vapor recovery equipment or system reviewed and approved for renewal by the Executive Officer on or before the expiration date as stated in the Executive Order.

revoked certification

an Executive Order for vapor recovery equipment or system which has been determined by the Executive Officer to not be in compliance with the applicable performance standards and specifications.

rigid piping
any piping material with a bend radius that exceeds six feet.

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.

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.

<u>superseded certification</u>
<u>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.</u>

summer fuel
fuel that is required to comply with the requirements of title 13, California Code of Regulations, section 2262.4.

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.

<u>terminated certification</u>
<u>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.</u>

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)

~~a device that is permanently installed at the base of a bootless vapor recovery nozzle spout to enhance the effectiveness of vapor collection.~~

vapor leak

a vapor leak measured as ~~less~~ 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 ~~absence~~ 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.

SFM
California State Fire Marshal.

Sec.
section.

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: ____________

[Note: The text is shown in ~~strikeout~~ to indicate that it is proposed for deletion and underline to indicate that it is proposed for addition. [Bracketed text] is not part of the proposed amendments.]

CP-201
TABLE OF CONTENTS

[Table does not reflect all proposed changes]

LIST OF TABLES

LIST OF FIGURES

California Environmental Protection Agency
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 "~~C~~ARB" refers to the California Air Resources Board, and the term "Executive Officer" refers to the ~~C~~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 ~~C~~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 25290.12, 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 CARB certification testing; however, the approval of the SFM, DMS, and 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. ~~GENERAL~~ 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 shall be demonstrated throughout certification testing. ~~Systems and components shall comply, throughout the warranty period, with the applicable performance standards.~~

2.2 Performance Specifications

A performance specification is an engineering requirement that relates to the proper operation of a specific system or component thereof. ~~Performance specifications shall be identified in the application for certification. Ongoing compliance with the minimum level of performance specifications identified herein shall be demonstrated throughout certification testing and specified in the certification Executive Orders.~~ In addition to the performance specifications mandated in CP-201, an applicant may specify additional performance specifications for a system or component. An~~y~~ applicant may request certification to a performance specification that is more stringent than the minimum performance ~~standard or~~ specification in CP-201. ~~The performance specification to which a system or component is certified shall be the minimum allowable level of performance the component is required to meet throughout the warranty period. Typical performance specifications include, but are not limited to, pressure drop and pressure integrity.~~ Ongoing compliance with all applicable performance specifications 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 ~~modify~~ amend existing) performance standards ~~or performance specifications~~, any system that is certified as of the effective date of additional or amended ~~more stringent~~ standards ~~or specifications~~ 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 amend existing 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~~, except as otherwise~~ are specified in Table 2-1~~, shall be April 1, 2001~~.

2.4.2 The operative dates of performance standards shall be the effective date of adoption of amended or additional ~~more stringent~~ performance standards ~~or specifications~~, except as otherwise specified ~~below~~ in Table 2-1. Certifications shall ~~expire~~ terminate on the operative date of amended or additional performance standards ~~or specifications~~ unless the Executive Officer determines that the system meets the amended or additional performance standards ~~or specifications~~. Upon the operative date of amended or additional performance standards ~~or specifications~~, only systems complying with the ~~more stringent~~ amended or additional performance standards ~~or specifications~~ may be installed. ~~Systems installed prior to this date shall be permitted to remain in use provided they comply with the conditions in Section 19 of this procedure.~~

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.~~3~~5 The Executive Officer may determine that a system certified prior to the operative date meets the amended or additional performance standards or specifications. In determining whether a previously certified system conforms 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.~~4~~6 Gasoline Dispensing Facilities in districts that ARB determines are in attainment with the state standard for Ozone are exempted from the Enhanced Vapor Recovery performance standards and specifications set forth in sections 3 through 9~~8~~, ~~and 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 subsection~~s 4.1,~~ 4.4~~, and 13.4.1~~. 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.~~5~~7 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.

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 2.4.5 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 2.4.5 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 2.4.5 and section 4.4	4.4	March 1, 2002	April 1, 2003
Nozzle Criteria	Post-Refueling Drips ≤ 3 drop/refueling	4.7	April~~January~~ 1, 2005	April~~January~~ 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~~January~~ 1, 2005	April~~January~~ 1, 2005
Spillage (including drips from spout)	≤ 0.24 pounds/1,000 gallons	4.3	April~~January~~ 1, 2005	April~~January~~ 1, 2005
For GDF > 1.8 mil. gal/yr.	ISD Requirements	9~~10~~	September~~April~~ 1, 2005	September~~April~~ 1, 2005
For GDF > 600,000 gal/yr.[2]	ISD Requirements	9~~10~~.1	September ~~April~~ 1, 2006	September ~~April~~ 1, 2006
Unihose	One Hose/Nozzle per Dispenser Side	4.11	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~~January~~ 1, 2005	April~~January~~ 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).
[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 ~~and Phase II~~ 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	≥ 98.0%	3.1	Std.	TP-201.1 TP-201.1A
Phase I Emission Factor	HC ≤ 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	≤ 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 Vapor Adaptor Dynamic Pressure Drop~~	~~Pressure Drop at 300, 400, & 500 gpm Specification to be Established During Certification Process~~	~~3.4~~	~~Spec.~~	~~Eng. Eval.~~
Phase I Product and Vapor Adaptors	≤ 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 ~~3.0 ± 0.5~~ inches H_2O Positive Pressure 6.0 to 10.0 ~~8.0 ± 2.0~~ inches H_2O Negative Pressure Leakrate at +2.0 inches H_2O ≤ 0.17 CFH Leakrate at -4.0 inches H_2O ≤ 0.63~~21~~ CFH ~~Total Additive Leakrate from All P/V Valves~~ ~~≤ 0.17 CFH at 2.0 inches H_2O~~	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 (2.0<u>0</u>) 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 Phase I vapor adaptor shall have performance specifications for the maximum pressure drop at 300, 400 and 500 gallons per minute (gpm) (± 50. gpm). The specifications shall be documented by the applicant and verified during the certification process.~~

3.4.~~5~~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). Compliance with 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 ~~settings~~ for P/V valves shall be:

Positive pressure setting of 2.5 to 6.0 ~~3.0 ±0.5~~ inches H_2O.
Negative pressure setting of 6.0 to 10.0 ~~8.0 ± 2.0~~ inches H_2O.

3.5.2 The total leak rates for P/V valves, ~~including connections,~~ shall be less than or equal to:

0.17 CFH at +2.0 inches H_2O.
~~0.21~~ 0.63 CFH at -4.0 inches H_2O.

3.5.3 The total ~~additive~~ leakrate of all P/V valves ~~installed on~~ certified for use with any vapor recovery system~~, including connections,~~ shall not exceed 0.17 CFH at 2.0 inches H_2O or 0.63 CFH at -4.0 inches H_2O. ~~This may be accomplished by manifolding the tank vent pipes into a single P/V valve or, alternatively,~~ 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.

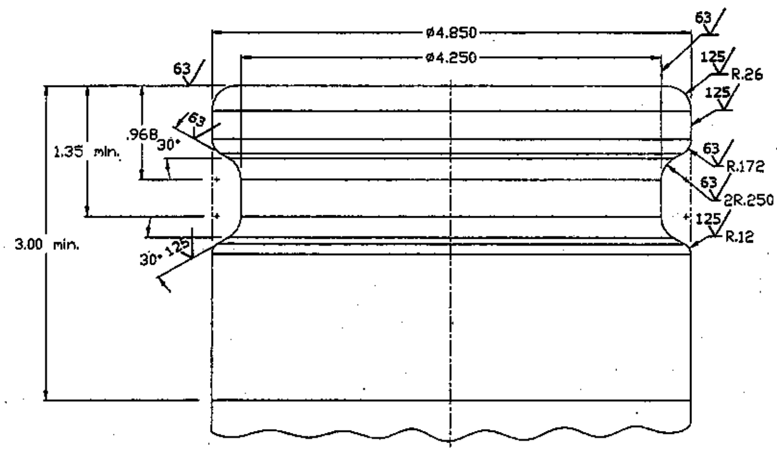
3.7 Vapor Connections and Fittings

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

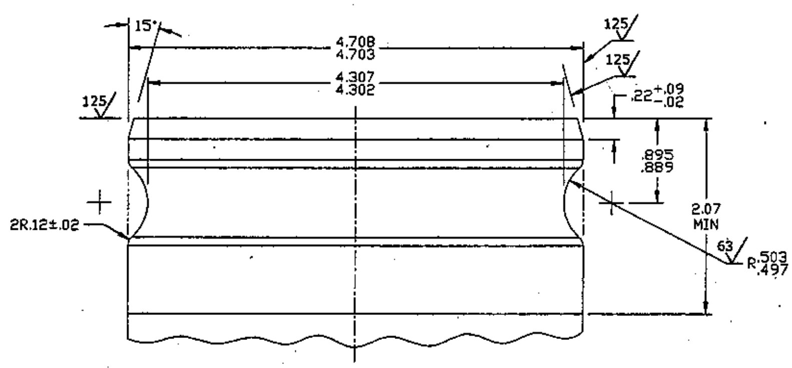
Vapor recovery systems and components shall be compatible with any and all fuel blends in common use in California, including seasonal changes, and approved for use as specified in title 13, CCR, section 2260 et seq. Applicants for certification may request limited certification for use with only specified 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 ~~used~~ certified only in facilities equipped with a certified Phase I system. ~~Phase II systems are subject to all of the standards and specifications in Section 3, as well as those in any other applicable section.~~

Table 4-1
Phase II Performance Standards and Specifications
APPLICABLE TO ALL PHASE II VAPOR RECOVERY SYSTEMS
[*table has been re-organized*]

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%	4.1 4.4	Std.	Approved 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
~~Liquid Removal Systems~~ [*moved to Table 5-1*]	~~Capable of Removing 5 ml/ gal. (average)~~	~~4.9~~	~~Std.~~	~~TP-201.6~~
ISD	See Section 9	9	Std.	TP-201.2I
Phase II Compatibility with Phase I Systems	~~Phase II System Shall Not Cause Excess Emissions From Phase I Operations~~ 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 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.~~10~~9	Spec.	Testing and Eng. Eval.
Unihose MPD Configuration	One Hose/Nozzle per Dispenser Side	4.1~~1~~0	Spec.	Testing and Eng. Eval.
Phase II Vapor Riser	Minimum 1" Nominal ID	4.1~~2~~1	Spec.	Testing and Eng. Eval.
Vapor Return Piping	No liquid or fixed blockage Minimum 3" Nominal ID after first manifold Recommended slope 1/4" per foot Minimum slope 1/8" per foot	4.1~~2~~1	Spec.	Testing and Eng. Eval.
Vapor Return Piping Rigidity	Rigid piping, or equivalent Bend radius exceeds 6 feet	4.1~~2~~1	Spec.	TP-201.2G
Vapor Return Pipe Runs	The Maximum Allowable Lengths of Pipe Runs Shall Be Established During the Certification Process	4.1~~2~~1	Spec.	Testing and Eng. Eval.
Liquid Condensate Traps	Shall have Automatic Evacuation System	4.1~~3~~2	Spec.	Testing and Eng. Eval.
Connectors and Fittings	No Indication of Vapor Leaks With Liquid Leak Detection Solution (LDS) or Bagging	4.1~~4~~3	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.

The emission factor shall demonstrate compliance with the standard when calculated for 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]

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

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

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

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

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

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 ~~failure~~ 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 system manufacturer shall be responsible for developing a procedure by which compatibility can be demonstrated. This procedure is subject to engineering evaluation by the Executive Officer; if it is deemed inadequate and/or unusable, the certification application shall be deemed unacceptable.

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 systems shall be evaluated.

~~Phase II vapor recovery systems shall not cause excess emissions from Phase I systems. Emissions resulting from Phase I operations which are attributable to the design or anticipated operation of the Phase II system shall not be discounted when determining the adequacy of the entire vapor recovery system.~~

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.

<u>4.7.5 A minimum of 10 nozzles must be tested for determination of post fueling drips.</u>

4.8 Liquid Retention

4.8.1 Liquid retention in the nozzle and vapor path on the atmospheric side of the vapor check valve shall not exceed 100 ml per 1,000 gallons. This shall be determined in accordance with TP-201.2E (Gasoline Liquid Retention in Nozzles and Hoses).

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 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.

~~4.9 Liquid Removal Systems~~ *[moved to Section 5.3]*

~~Liquid removal systems are designed to evacuate liquid from the vapor passage of the hose. Such systems are required in configurations that would otherwise be subject to liquid blockage that creates increased emissions.~~

~~4.9.1 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.~~

4.9~~10~~ 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~~11~~ Unihose MPD Configuration

There shall be only one hose and nozzle for dispensing gasoline on each side of a multi-product dispenser (MPD). This shall not apply to facilities installed prior to 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~~12~~Vapor Return ~~Path~~Piping

The requirements of Sections 4.1~~2~~1.1 through 4.1~~3~~2.2 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 ~~the effective date of this procedure~~ April 1, 2003.

4.11~~2~~.1The vapor return ~~path~~ piping from any fueling point to the underground storage tank shall be free of liquid or fixed blockage.

4.11~~2~~.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~~2~~.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~~2~~.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~~2~~.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), 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~~2~~.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~~13~~ 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~~13~~.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~~13~~.2 When condensate traps are installed, they shall be:
- (a) certified by ~~C~~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.~~14~~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. <u>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.</u>

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-201.2J
Nozzle Pressure Drop Specifications ΔP at Specified Vacuum Level	Specified by Applicant and Verified During the Certification Process	6.1	Spec.	TP-201.2B
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~~Failure~~ 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~~failure~~ 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 ~~7~~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 ~~the~~ 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. ADDITIONAL REQUIREMENTS OF CERTIFICATION~~ [*See provisions in Sections 10 and 16 as renumbered*]

~~9.1 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 by him or her 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.~~

~~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. This may take the form of posting a bond of not less than $20,000. An Executive Order certifying the system shall not be issued until the CARB certification fee has been paid in full.~~

~~9.2 Warranty~~

~~The requirements of this section shall apply with equal stringency both to the original applicant and to rebuilders 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.~~

~~9.2.1 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.~~

~~9.2.2 The minimum warranty shall be for one year from the date of installation of all systems and components. The applicant may request certification for a warranty period exceeding the minimum one-year requirement.~~

~~9.2.3 The manufacturer of any vapor recovery system or component shall affix a warranty tag to certified equipment that shall be removed only by the owner/operator of the vapor recovery 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.~~

~~9.2.4 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.~~

~~9.3 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.~~

~~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).~~

~~9.3.1 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.~~

~~9.3.2 No changes shall be made to CARB-approved manuals without the Executive Officer's prior written approval.~~

~~9.3.3 The equipment manufacturer shall be responsible for taking all reasonable and necessary steps to ensure that, at the time the system or component is installed, the owner/operator of the facility is provided with a copy of the appropriate manual(s) and any training specified in the applicable Executive Order.~~

9.4 ~~Identification of System Components~~

~~9.4.1 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 types of components may be exempted from this requirement if the Executive Officer determines, in writing, that this is not feasible.~~

~~9.4.2 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.~~

9~~10~~. IN-STATION DIAGNOSTIC SYSTEMS

9~~10~~.1 General Requirements

9~~10~~.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~~10~~.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~~10~~.2.

9~~10~~.1.3 All ISD systems shall be equipped with an RS232 port to remotely access

ISD status information using standardized software.

9~~10~~.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~~failure~~ mode testing during the certification process.

9~~10~~.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~~10~~.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~~10~~.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~~10~~.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~~10~~.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~~10~~.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~~10~~.1.11 Certification testing shall be performed in accordance with TP-201.2I (Test Procedure for In-Station Diagnostic Systems).

~~9~~10.2 Monitoring Requirements

~~9~~10.2.1 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~~10~~.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-201.2~~1~~I.

(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~~10~~.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~~10~~.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 points. 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~~10~~.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 points. The ISD system shall have the capability of re-enabling dispensing, and shall record that event.

9~~10~~.3 Records

9~~10~~.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~~10~~.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~~10~~.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~~10~~.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~~10~~.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~~10~~.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~~10~~.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~~10~~.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~~10~~.7 Challenge~~Failure~~ Mode Testing

The Executive Officer shall conduct, or shall contract for and observe; challenge~~failure~~ 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~~Failure~~ 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~~10~~.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 ~~8~~ 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 fills-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 ~~analysis~~. 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 ~~it shall be returned to the applicant with the deficiencies identified~~. 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.

~~Applications for non-system-specific components may include only the applicable subsections as determined by the Executive Officer.~~

~~Applications shall be evaluated and the applicant shall be notified of the determination within the time periods indicated below. The time periods may be extended by the Executive Officer for good cause.~~ Estimated timelines for evaluation of certification applications are provided below.

Table 11-1
Estimated Timeline ~~Requirements~~ for the Certification Application Process

Action	Time	Determination	CARB Response
Preliminary Application Filed	60 days	Acceptable	Preliminary Application Accepted Test Site Approval Granted
Preliminary Application Filed	60 days	Unacceptable	~~Preliminary Application Returned with Notation~~ Notification of Deficiencies
Application Resubmitted	30 days	Acceptable	Preliminary Re-Application Accepted Test site Approv~~ed~~al 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 copy of the warranty (§11.7)
(i) Request for and information about proposed test station (§11.8)
(j) Notification of System Certification Holder, if applicable (§11.9)
~~(k) Other Information such as the Executive Officer may reasonably require. (§11.10)~~
(k) Title 17 Defects and Test Protocols (§11.10)
(l) Challenge Modes and Test Protocols (§11.11)
(m) If applicable; Bellows Insertion Force Specification and Test Procedure (§11.12)
(n) Other Information such as the Executive Officer may reasonably require. (§11.13)

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 <u>challenge</u>~~failure~~ 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 ~~recordings~~ readings in the underground storage tank, as well as challenge ~~failure~~ 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~~9~~ 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~~9~~.

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 ~~petition~~ 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 System Certification Holder

If the applicant is not the manufacturer of all system components, the applicant shall include evidence that the applicant has notified the component manufacturer(s) of the applicant's intended use of the component manufacturers' equipment in the vapor recovery system for which the application is being made.

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 Other Information~~

~~The applicant shall provide any other information that the Executive Officer may reasonably deem necessary.~~

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. ~~ENGINEERING~~ EVALUATION OF ~~VAPOR RECOVERY SYSTEMS~~ THE APPLICATION

The application for certification of all systems and components shall be subjected to an evaluation by the Executive Officer. ~~Any system, or component not meeting the requirements of the engineering evaluation shall be denied certification and the preliminary application shall be returned to the system or component manufacturer with the reason for failure. Re-submittal of a system, or component, for certification shall not be granted until the system or component deficiencies identified during the initial engineering evaluation have been addressed and corrected. All testing conducted after the preliminary application has been deemed acceptable shall be evaluated, and adjustments shall be made to the certification process as necessary. The final application shall be reviewed and deemed complete prior to the issuance of certification.~~

The evaluation of the application shall include, but is not limited to, subsections 12.1 through 12.~~6~~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 ~~8~~ 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 ~~8~~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~~7. 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 ~~Failure Mode Procedures and Test Results~~

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 ~~failure~~ VRED mode test procedures, and the results of tests conducted by the applicant, shall be reviewed. Additionally, all ~~failure~~ 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 ~~8~~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 ~~complete~~. 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. ~~Further testing of the system shall not be permitted until the applicant identifies the cause of the failure and presents a solution to prevent a recurrence of the failure.~~ 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. ~~Except as otherwise provided in Section 16 of this procedure, only complete systems shall be certified.~~

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. ~~Except as otherwise provided in Section 16 of this procedure,~~ T~~t~~he 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.

~~The Executive Officer may, for good cause, grant approval of a test station with lower throughput, provided that the throughput is at least 100,000 gallons/month, and that all necessary testing can be conducted at that facility.~~

13.1.2 The station shall be located within 100 miles of the ~~C~~ARB Sacramento offices. When a suitable location for testing cannot be located within 100 miles of the ~~C~~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 ~~C~~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 ~~field~~ operational testing. This testing may be repeated during and/or after the ~~field~~ operational testing.

13.3 Operational Test of at Least 180 Days

~~All vapor recovery systems shall be subjected to a operational of at least 180 days. Failure to comply with any of the requirements shall result in termination of the operational test. A new operational test may be commenced only after the applicant reapplies, with specific information regarding the cause of the failure and the action taken to correct it. The requirements of the operational test are listed below.~~

13.3.1 All vapor recovery systems shall be subjected to an operational test. The duration of the test shall be ~~at least~~ for a minimum of 180 days, and for a minimum of 900,000 gallons of gasoline throughput, except as otherwise provided in Sections ~~16~~18 and 19.

13.3.2 No maintenance shall be performed other than that which is specified in the installation, operating 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. ~~The average of~~ N~~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~~s~~ ~~3 and~~ 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 ~~Phase I equipment or operations~~ 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 Failure Mode Testing~~

~~Additional failure mode test procedures may be required as needed.~~

~~13.4.1 ORVR Compatibility~~

~~The Phase II vapor recovery system shall demonstrate the ability to fuel vehicles equipped with ORVR systems without difficulty and to meet the performance standard specified in Section 4.1. Various penetrations of ORVR-equipped vehicles shall be used or simulated to represent typical and worst case conditions. The test procedures used shall be those developed by the applicant, submitted as part of the application for certification, and accepted after engineering evaluation.~~

~~13.4.2 ISD System~~

~~Failure mode testing for the ISD system is specified in Section 10.9.~~

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 ~~three~~ 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 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.

13.6.3 The Executive Officer may exclude any vehicle that fails to comply with the vehicle fillpipe specifications ("Specifications for Fill Pipes and Openings of Motor Vehicle Fuel Tanks" incorporated by reference in title 13, CCR, section 2235).

13.6.4 The Executive Officer may exclude a vehicle prior to its dispensing episode only if such exclusion and its reason is documented; e.g. unusual facility conditions beyond the applicant's control or unusual modifications to the vehicle. All data required by the test procedure shall be taken for such vehicles for subsequent review and possible reversal of the exclusion decision made during the test. The only other reasons for excluding a vehicle from the test fleet are incomplete data or the factors in TP-201.2.

13.6.5 Additional vehicles may be chosen for testing at the test site by the Executive Officer. The vehicles shall be chosen, according to the Executive Officer's judgment, so that any of the first 200 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 A matrix of fewer than 200 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, 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, 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 ~~C~~ARB staff or by a third party responsible to and under the direction of ~~C~~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. <u>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.</u> 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 ~~C~~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. CERTIFICATION OF 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, can be expected to comply with that system's certification over the specified warranty period. With the exception of those components listed in Section 16, this certification procedure is not intended to be used to certify individual system components.~~

~~15.1 One Vapor Recovery System per UST System~~ *[moved to Section 16.2]*

~~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.~~

~~15.2 Certification Not Transferable~~ *[moved to Section 16.3]*

~~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. CERTIFICATION OF VAPOR RECOVERY SYSTEMS AND COMPONENTS~~

~~Certification of vapor recovery systems shall include certification of all components present on the system during certification testing. Certification shall be issued only after each component of the system, and the system as a whole, successfully demonstrates compliance with all of the applicable performance standards and specifications. In order to expedite the certification process and to provide system owners and operators flexibility in the choice of components, some components may be certified as alternatives to the components certified on the system.~~

~~16.1 Identification of Components~~

~~Table 16-1 contains a listing of components that are system-specific. These components are required to pass all applicable tests as part of a system that is or becomes certified as specified in subsection 16.3. Table 16-2 contains a listing of components that are considered to be non-system-specific. The testing requirements listed in Table 16-2 are the minimum requirements; additional tests may be required as necessary. Any component not included in these tables shall be presumed to be system-specific unless the Executive Officer determines, in writing, that the component may be considered non-system-specific.~~

~~16.2 Properties of Non-System-Specific Components~~

~~Only those components that can be defined by performance specifications, that do not directly affect the performance of the system, and that are determined by the Executive Officer to be equivalent to the component with which the system was originally certified, shall be considered non-system-specific components.~~

~~16.3 Testing Requirements for System-Specific Components~~

~~System-specific components, such as those identified in Tables 16-1, shall be certified only after successfully completing all applicable tests as part of a system. These components may subsequently be considered for use with another certified system of similar design provided that the performance specifications of the components, as specified in the application for the system, are equivalent. The Executive Officer may, upon review of information submitted by the applicant, allow a field compatibility test of at least 30 days to be substituted for an operational test of at least 180 days. Other applicable testing requirements may be abbreviated only if the Executive Officer deems previous testing to be adequate to ensure that the component will perform adequately with the other system and that the component will meet all applicable performance standards and specifications.~~

~~16.4 Testing Requirements for Non-System-Specific Components~~

~~Non-system-specific components, such as those listed in Table 16-2, shall be subjected to sufficient operational testing to verify the reliability of the component as an alternative to the component with which the certified system was originally tested. Non-system-specific components shall be required to successfully complete at least one operational test of at least 180 days, either as a component of a system undergoing certification testing, or as an alternate component on a certified system. The Executive Officer may authorize abbreviated testing for specific components, such as the vapor piping in a dispenser, for components whose performance can be quantified and not expected to change or degrade over the longer test period. Testing on one system may be used in the evaluation of the component for use on other systems for which the performance is similar with regard to the component. For systems with dissimilar performance characteristics, additional testing may be required.~~

~~Table 16-1~~
~~System Specific Components~~

~~Component~~
~~Phase I Spill Container Drain Valve~~
~~Phase I Spill Container Drain Valve Configuration~~
~~Phase I Product and Vapor Adaptors~~
~~Phase I Drop Tube Overfill Prevention Device~~
~~Phase II Vacuum Source~~
~~Vapor Processor~~
~~Nozzle~~
~~Control Board~~

~~Table 16-2~~
~~Non-System Specific Components~~

~~Non-System Specific Components~~	~~Minimum Testing Requirements~~
~~Dispenser Vapor Piping~~	~~Engineering Evaluation, Pressure Drop, Integrity~~
~~Coaxial Hose~~	~~Eng. Eval., Operational Test, Pressure Drop, Integrity~~
~~Liquid Removal System~~	~~Eng. Eval., Operational Test, Pressure Drop, TP-201.6~~
~~Breakaway Coupling~~	~~Eng. Eval., Operational Test, Pressure Drop, Integrity~~
~~Flow Limiter~~	~~Eng. Eval., Operational Test, Function Test~~
~~Coaxial Swivel~~	~~Eng. Eval., Operational Test, Pressure Drop~~
~~Conversion Fitting~~	~~Eng. Eval., Operational Test, Pressure Drop~~
~~Pressure/Vacuum Vent Valve~~	~~Eng. Eval., Operational Test, Pressure Drop, TP-201.2B~~
~~Impact Valve (for vapor line)~~	~~Eng. Eval., Operational Test, Pressure Drop, Integrity~~
~~Phase I Delivery Elbow~~	~~Eng. Eval., Operational Test, Pressure Drop, TP-201.1~~
~~Phase I Drop Tube~~	~~Eng. Eval., Operational Test~~
~~Phase I Fill or Vapor Cap~~	~~Eng. Eval., Operational Test, Integrity~~
~~Phase I Spill Containers~~	~~Eng. Eval., Operational Test, Integrity~~
~~Phase I Tank Bottom Protector~~	~~Eng. Eval., Operational Test~~
~~Phase I Ball Float Valve~~	~~Eng. Eval., Operational Test~~
~~Phase I Extractor Fitting~~	~~Eng. Eval., Operational Test~~
~~Tank Gauge Port Adaptor & Cap~~	~~Eng. Eval., Operational Test~~

15~~7~~. 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~~7~~.1 Executive Order

The certification Executive Order shall include the following items.

15~~7~~.1.1 A list of components certified for use with the system.
15~~7~~.1.2 Applicable Performance Standards, Performance Specifications and Test Procedures.
15~~7~~.1.3 Applicable Operating Parameters and Limitations.
15~~7~~.1.4 Warranty period(s).
15~~7~~.1.5 Factory testing requirements, if applicable.

15~~7~~.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~~8~~. DURATION AND CONDITIONS OF CERTIFICATION

Vapor recovery system certifications shall specify the duration and conditions of certification.

16~~8~~.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 ~~reissued~~ 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.

~~18.2 Duration of Component Certification~~

~~Certification of a system shall include all components, and the expiration date of the certification shall apply to all system-specific components used on the system. For example, if the system is certified with nozzle A, the expiration date for nozzle A with that system will be the expiration date of the Executive Order that certifies the system.~~

~~18.3 Performance Monitoring~~

~~During the certification period, any significant deficiencies identified, through periodic equipment audits, complaint investigations, certification or compliance tests, etc., shall be noted in the performance file and brought to the attention of the equipment manufacturer.~~

~~18.4 Modification of Expiration Date~~

~~Modification of the certification for the purpose of adding system-specific components may establish a new expiration date for the system, providing the following conditions are met.~~

~~18.4.1 There are no significant outstanding problems that have not been resolved.~~

~~18.4.2 The system was subjected to, and passed, the operational and efficiency testing required for a new system.~~

~~18.4.3 The expiration date for system-specific components that were not tested is not changed.~~

~~18.4.4 For example, the system that was certified with nozzle A is tested with nozzle B. The system with nozzle A can be referred to as sub-system A, and the system with nozzle B can be referred to as sub-system B. Upon successful completion of all the required testing, sub-system B may be certified for a period of time not to exceed four years, and the expiration date will be established. This will not, however, change the expiration date for sub-system A. The Table below indicates the appropriate CARB actions with regard to certifications that are expiring.~~

~~Table 18-1~~

~~CARB Actions Regarding Expiring Certifications~~

~~Case~~	~~Recertification Requested?~~	~~Unresolved Problems?~~	~~Time Until Expiration~~	~~CARB Action~~
~~1~~	~~Yes~~	~~No~~	~~1 year~~	~~Letter of Intent to Recertify~~
	~~Yes~~	~~No~~	~~6 months~~	~~Draft EO for Review~~
	~~Yes~~	~~No~~	~~4 months~~	~~Revised Draft EO for Review~~

	~~Yes~~	~~No~~	~~1 month~~	~~Issue EO~~
~~2~~	~~No~~	~~Yes~~	~~1 year~~	~~Notification of Impending Expiration~~
	~~No~~	~~Yes~~	~~Expired~~	~~Notification of Expiration~~
~~3~~	~~Yes~~	~~Yes~~	~~Anytime~~	~~Notify Certification Holder~~
	~~Yes~~	~~Yes~~	~~1 year~~	~~Notification of Impending Expiration (except if Case 3a)~~
~~3a~~	~~Yes~~	~~Yes~~	~~1 year~~	~~Resolution Likely, Time Insufficient Extend Certification for 1 year max~~

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 ~~C~~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.

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.

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

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 11.2; 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 ~~CERTIFICATIONS THAT HAVE BEEN TERMINATED~~

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. ~~All components and parts of the system shall be subject to the requirements of paragraph 19.1.~~ ~~Systems whose certifications have terminated shall be permitted to be installed as provided in paragraph 19.2.~~

~~19.1 Replacement of Components or Parts of a System with a Terminated, Certification~~

19.~~1~~.1 Components and replacement parts meeting the currently and prospectively operative performance standards or specifications may be ~~certified~~ 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.~~1~~.2 A component or replacement part not meeting the currently operative performance standards or specifications, but which was certified for use with the system ~~prior to the termination of the certification~~, shall be used as a replacement only if no compatible component or part that meets the new standards or specifications has been ~~certified~~ approved as a replacement part ~~and are commercially available~~. ~~The certification of the component or part shall terminate at the end of the allowable in-use period for the system unless otherwise specified in the certification of the replacement component or part.~~

19.~~1~~.3 A component or part that was not certified for use with the system ~~prior to the termination of certification~~, and that does not meet all of the currently operative standards or specifications, may be ~~certified~~ 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.

~~19.1.4 When a certified, compatible component or replacement part that meets the operative standards or specifications becomes commercially available, only that component or part shall be installed. This shall not require the replacement of already-installed equipment prior to the end of the useful life of that part or component. Components or parts installed at the time the system reaches the end of the allowable in-use period for the system, may no longer be used even if the end of their useful life has not been reached.~~

~~19.1.5 Non-unihose configuration dispensers installed before April 1, 2003, may remain in use for the remainder of the useful life and may be replaced with non-unihose configuration dispensers as prescribed in section 4.11.~~

19.~~1~~.4 Approval of replacement parts shall be requested, evaluated, and granted as follows:

19.~~1~~.4.1 A request shall be submitted to the Executive Officer.

19.~~1~~.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.~~1~~.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.~~1~~.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.

~~19.2 Installation of Systems with Terminated Certifications~~

~~19.2.1 When the Executive Officer determines that a certified Phase I or II system that meets the applicable operative performance standards and specifications by operative dates specified in Table 2-1 of CP-201 is not commercially available, the Executive Officer may change the operative and effective dates of new performance standards and specifications. by renewing the certification for any system whose certification has been terminated provided that:~~

~~(a) Renewal preference shall be given to systems that are certified as being ORVR compatible, and~~

~~(b) The renewal shall be valid for a period to be determined by the Executive Officer with a maximum renewal period of six months.~~

~~19.2.2 Renewed certifications shall be posted on the ARB's Internet site. Systems whose certifications are posted as renewed certifications are permitted to be installed upon the Executive Officer's finding that a certified system is not commercially available.~~

California Environmental Protection Agency

Air Resources Board

PROPOSED

Vapor Recovery Test Procedure

TP-201.1E CERT

Leak Rate and Cracking Pressure of Pressure/Vacuum Vent Valves

Adopted:______________

[Note: All text is proposed for adoption. As permitted by title 2, California Code of Regulations, section 8, for ease of review underline to indicate adoption has been omitted.]

California Environmental Protection Agency
Air Resources Board

Vapor Recovery Test Procedure

TP-201.1E CERT

Leak Rate and Cracking Pressure of Pressure/Vacuum Vent Valves

Definitions common to all certification and test procedures are in:

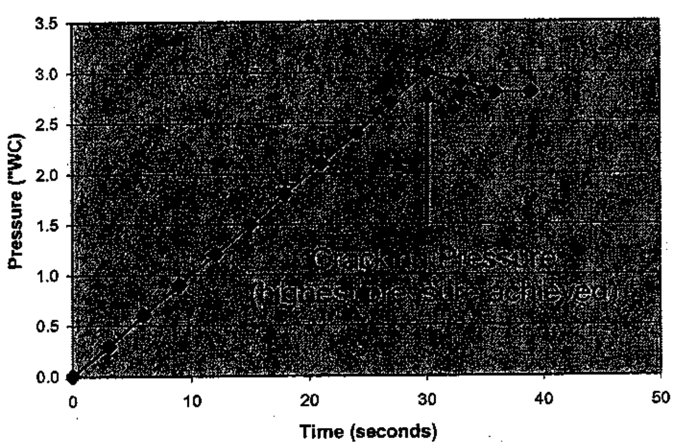
D-200 Definitions for Vapor Recovery Procedures

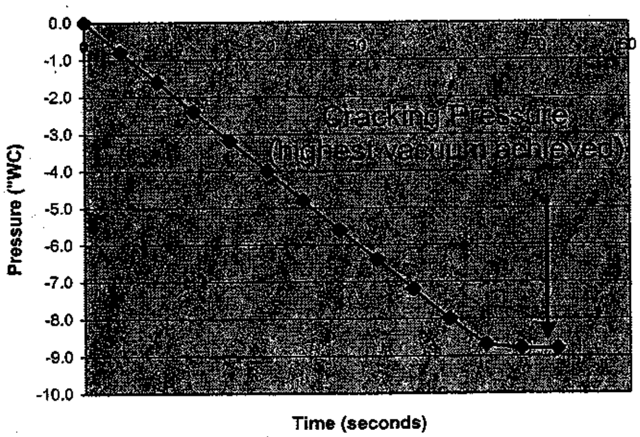
For the purpose of this procedure, the term "ARB" refers to the California Air Resources Board, and the term "Executive Officer" refers to the ARB Executive Officer or his or her authorized representative or designate.

1. PURPOSE AND APPLICABILITY

The purpose of this procedure is to determine whether a pressure/vacuum vent valve (P/V valve) meets the specifications in CP-201, *Certification Procedure for Vapor Recovery Systems at Gasoline Dispensing Facilities*. This procedure is applicable for certification testing of P/V vent valves and is not applicable for compliance testing of in-use P/V valves.

For the purpose of this test procedure, the cracking pressure of the P/V valve is defined as the maximum pressure achieved during the application of this test procedure. Typical positive (left) and negative (right) pressure/time curves are provided below.





2. PRINCIPLE AND SUMMARY OF TEST PROCEDURE

2.1 The positive and negative gauge cracking pressures are determined by measuring the pressure at which the P/V valve cracking pressures occur, as defined by this test procedure. A flow metering device is used to introduce flow while measuring pressure.

2.2 The volumetric leak rates through the P/V valve under positive and negative pressures are determined by measuring the leak flow rate for compliance with the requirements of Section 3 of CP-201.

2.3 For the positive and negative cracking pressure tests, three (3) replicate test runs shall be conducted sequentially, and the average of the three runs shall be reported for the test results.

2.4 The valves are tested while connected to the vent pipe(s) using a ball valve, or other valves, as shown in Figure 1. Note that the ball valve is installed for certification testing purposes only and must be removed after the certification testing is completed. However, "bench" testing of P/V valves may also be conducted for certification purposes.

2.5 The P/V valve shall not be cracked by anyone prior to the first pressure/vacuum cracking test each day of certification testing. The first valve crack per test day should be included in the average result reported. No maintenance or testing of the P/V valve shall have occurred for at least twenty-four hours prior to the pressure/vacuum cracking tests.

3. BIASES AND INTERFERENCES

3.1 P/V valve installation that does not follow the manufacturer's recommended installation instructions can produce erroneous results.

3.2 Leaks in test equipment can produce erroneous results.

3.3 For certification testing, ball valves used to isolate P/V valves on vent stacks may leak if not functioning correctly or if not closed completely. Such conditions may lead to erroneous results in the leak rate determinations. Leak rate test results not meeting the CP-201 specifications should not be considered as due solely to the P/V valve unless the ball valve is demonstrated to be leak free.

4. METHOD SENSITIVITY, RANGE, AND PRECISION

4.1 Positive and Negative Cracking Pressures: The sensitivity and range of the tests are dependent on the minimum readability and measurement range of the manometer (see Section 5.4). The method precision has been estimated to be plus/minus 9.3 percent ($\pm$ 9.3 %) and plus/minus 4.0 percent ($\pm$ 4.0 %) for the positive and negative cracking pressure tests, respectively.

4.2 Positive and Negative Leak Flow Rates: The sensitivity and range of the tests are dependent on the minimum readability and measurement range of the flow metering devices (see Section 5.5).

5. EQUIPMENT

5.1 Compressed Air or Nitrogen. Use air or nitrogen in a high-pressure cylinder equipped with a pressure regulator.

5.2 Surge Tank. If required, use a tank (10 liter minimum), capable of being pressurized or evacuated (placed under vacuum) to the minimum working pressure required by the control valve and/or flow-metering device(s).

5.3 Vacuum Pump or Vacuum Generating Device. Use a vacuum pump capable of evacuating the ballast tank or test stand to the minimum working pressure required by the control valve and/or flow-metering device.

5.4 Electronic Pressure Measuring Device (manometer). Minimum readability shall be 0.01 inches H_2O with measurement range(s) to include at least up to positive 10 (+10) and negative 20 (–20) inches H_2O with a minimum accuracy of plus or minus 0.05 inches H_2O. The electronic manometer shall have the capability to log the maximum/minimum pressures achieved during the test runs.

5.5 Flow Metering Device(s). Use a mass flow meter (MFM) as described below to measure introduced flow rates.

5.5.1 Mass Flow Meter. The minimum readability shall be 1.0 milliliters per minute (ml/min) with a minimum full-scale accuracy of plus/minus 1.0 percent (± 1.0 %). The meter may be used for both positive and negative flow rates by reconfiguring the pressure or vacuum lines. A MFM with a full scale reading of 20 ml/min will be used to measure flow rates of less than 20 ml/min and a MFM with a full scale reading of 200 ml/min will be used to measure flow rates from 20 ml/min to 200 ml/min.

5.5.2 Needle Valves. The test assembly shall be equipped with high precision needle valves of the appropriate control ranges to accurately adjust the flow settings for the leak rate and cracking tests.

5.6 Test Assembly. Use a test assembly as shown in Figure 1, or equivalent. The test assembly shall be equipped with at least two (2) ports used for introducing flow and measuring pressure. The P/V valve will be isolated on the vent stack with a ball valve and tested in place at the facility. Use a bypass valve to enable setting the required flow without pressurizing the P/V valve. Once the required flow rate is set, the bypass valve shall be closed to route the flow into the assembly and pressurize the P/V valve to check cracking pressure.

A six-liter surge tank (such as shown in Figure 1) will be placed in the test line between the bypass valve and the P/V valve for positive and negative cracking pressure tests. The surge tank is not used in the test assembly for the leak rate tests.

6. PRE-TEST PROCEDURES

6.1 All pressure measuring devices(s) shall be tested for accuracy using a reference gauge, incline manometer, or National Institute of Standards and Technology (NIST) traceable standard at least within six (6) months prior to the test. Accuracy checks shall be performed at a minimum of five points (e.g., 10, 25, 50, 75, and 90 percent of full scale) each for both positive and negative pressure readings. Accuracy shall meet the requirements of Section 5.4.

6.2 Electronic manometers shall be allowed to warm-up for the manufacturer's required warm-up time and shall be zeroed to atmosphere immediately prior to each test. The manometer must not be zeroed while connected to the test equipment.

6.3 The MFMs shall be tested for accuracy using a reference meter or NIST traceable standard. Accuracy checks shall be performed at a minimum of five points (e.g., at 10, 20, 50, 80, and 100 percent of full-scale range) and shall take place within six (6) months prior to testing. The accuracy checks should be conducted first at 10 pounds per square inch gauge (psig) inlet pressure and second at -25 inches mercury outlet vacuum (as used for the negative leak and cracking tests).

6.4 Perform an equipment leak check.

6.4.1 If testing a P/V valve on a test stand, install a two-inch cap onto the NPT threads in place of the P/V Valve using pipe sealant or Teflon tape. If the site is equipped with ball valves and test ports (i.e., for certification sites), connect the two test lines (that would normally be connected to the test ports on the vent stack) to each other using a quick connect coupler (see Figure 2).

6.4.2 Check all fittings for tightness and proper assembly.

6.4.3 Conduct the positive leak rate tests as specified in Section 7.2.

6.4.4 If the measured leak rate is less than or equal to two milliliters per minute ($\leq$ 2 ml/min) then proceed to Section 7.

6.4.5 If the measured leak rate is greater than two milliliters per minute (> 2 ml/min) then troubleshoot and resolve the leak problem before proceeding to Section 7.

7. TEST PROCEDURE

7.1 Configure the test assembly per Figure 1. If using a test stand, install the P/V valve in an upright position following the installation instructions provided by the manufacturer. Incorrectly installing the valve will invalidate any pressure versus flow rate measurement. If using a test stand, the ball valve, which would be used for isolating the P/V valve on a GDF vent stack, is not required.

7.2 Positive Leak Rate. Slowly open the needle valve on the test assembly until the pressure stabilizes at the positive leak rate pressure described in Section 3 of CP-201 or in the system application. Maintain steady state pressure for at least ten (10) seconds by using the control valve. Steady state is indicated by a pressure change of no more than 0.05 inches H_2O on the electronic manometer. Record the final leak flow rate on the data sheet and close the control valve.

If the leak rate is greater than seventy five percent (75%) of the required specification (e.g., greater than 60 milliliters per minute (> 60 ml/min)) for valves rated to 0.17 CFH or greater than 17 milliliters per minute (> 17 ml/min) for valves rated to 0.05 CFH) then run the leak rate test two more times. Record the results of all runs on the data sheet and use the average to report the result of the test.

If the leak rate test result is greater than the specification stated in CP-201 then proceed to Section 7.6.

7.3 Positive Cracking Pressure. Open the bypass valve to route the flow outside of the test assembly (to avoid prematurely pressurizing the P/V valve). Open the needle valve on the test assembly to establish a flow rate of 120 ml/min. Once the flow rate is established, close the bypass valve to route the flow into the test assembly. Observe the pressure on the electronic manometer. The P/V valve should crack at a pressure within the range of positive cracking pressures as described in Section 3 of CP-201. This is marked by a brief peak then a slight drop in pressure. Record the cracking pressure (highest pressure achieved) on the data sheet and open the bypass valve.

Run the cracking test two more times (i.e., total of three replicates). Re-adjust the flow rate to 120 ml/min, if necessary, prior to each test replicate. Record all values on the data sheet and report the average of the three runs. The value recorded by the digital manometer as the maximum pressure achieved (max hold) during the test run will be used for reporting purposes.

Note that the manometer max hold reading must be zeroed between each run. The maximum value logged must be checked and re-zeroed after any disconnecting/connecting of test assembly line quick connect fittings (as this may cause the maximum reading to change from zero). If it is known that the maximum reading was not zeroed (i.e., by mistake) between a previous test run and the current test run then make a note on the data sheet and re-run the replicate.

Note that care must be taken not to zero the manometer unless it is disconnected from the test assembly and is open to atmosphere. Zeroing the manometer while it is connected to the test assembly may cause an erroneous instrument zero which could impact (invalidate) the test results.

Open the bypass valve and close the valve on the compressed air cylinder.

7.4 Negative Leak Rate. Open the needle valve on the test assembly until the pressure stabilizes at the negative leak rate pressure described in Section 3 of CP-201 or in the system application. Maintain steady state pressure for at least ten (10) seconds by using the control valve. Steady state flow is indicated by a pressure change of no more than 0.05 inches H_2O on the electronic manometer. Record the final flow rate on the data sheet and close the control valve.

If the leak rate is greater than 75% of the required specification (e.g., > 75 ml/min for valves rated to 0.21 CFH) then run the leak rate test two more times. Record the results of all runs on the data sheet and use the average to report the result of the test.

If the leak rate test result is greater than the specification stated in CP-201 then proceed to Section 7.6.

7.5 Negative Cracking Pressure. Open the bypass valve to route the flow outside of the test assembly. Open the control valve on the test assembly to establish a negative flow rate of 200 ml/min. Once the correct flow rate is established, close the bypass valve to route the flow into the test assembly. Observe the pressure. The P/V valve should crack at a pressure within the range of negative cracking pressure as described in Section 3 of CP-201 or in the system application. This is marked by a brief leveling off then a slight drop in vacuum. Record the cracking pressure (highest vacuum achieved) on the data sheet and open the bypass valve.

Run the cracking test two more times (i.e., total of three replicates). Record all values on the data sheet and report the average of the three runs. The value recorded by the digital manometer as the maximum pressure achieved (max hold) during the test run shall be used for reporting purposes. Also see Section 7.3 for cautions on the use of the digital manometer.

7.6 Leak Rate Failure. If the P/V valve fails the positive or negative leak rate test, then disconnect the lines from the quick connect fittings on the P/V valve vent pipe (or test stand). Connect the two lines to each other using a quick connect coupler (see Figure 2). Run the leak rate procedure (as specified in Section 7.2) to verify that there is no leak in the test assembly (i.e., exactly as used during the test that failed). Use the MFM with a full scale reading of 0 to 200 ml/min. If the result of the check on this configuration of the test assembly shows a leak (i.e., > 10 ml/min; i.e., > 5% of full scale) then troubleshoot and resolve the leak point and re-run the P/V valve leak rate test.

If the result of the above leak rate test is $\leq$ 10 ml/min, then reconfigure the test assembly to use the MFM with a full scale reading of 0 to 20 ml/min and re-conduct the leak rate test. If the result of the check on the test assembly shows a leak problem (i.e., $\geq$ 2 ml/min) then troubleshoot and resolve the problem and re-run the P/V valve leak rate test.

If no leak rate greater than 2 ml/min is observed in the test assembly, then remove the P/V valve (refer to Figure 1), cap the two-inch vent pipe and conduct the leak rate procedure (as specified in Section 7.2) to verify that there is no leak (i.e., $\geq$ 2 ml/min) in the ball valve.

If the results of the checks on the test assembly and P/V vent ball valve show no leaks, then report the average of results of the three P/V valve test replicates.

As noted in Section 3.2 and 3.3, leak rate test results not meeting the CP-201 specifications should not be considered as due solely to the P/V valve unless the test equipment and ball valve are demonstrated to be leak free.

8. POST TEST PROCEDURES

After all tests are completed and before leaving the test site, switch the ball valve to the open position.

9. CALCULATING RESULTS

9.1 Commonly used flow rate conversions:

1 CFH = 472 ml/min

Examples:
0.21 CFH * 472 ml/min/CFH = 99 ml/min
0.17 CFH *472 ml/min/CFH = 80 ml/min
0.05 CFH * 472 ml/min/CFH = 24 ml/min

9.2 The individual replicate runs will be reported to three significant figures and the average of the three runs will be reported to two significant figures.

9.3 Reporting Results with Tolerance for Testing Error

The range of cracking pressures represented by the test result, including testing error, shall be calculated as follows:

$TR_{el} = TR - E\ (TR)$

$TR_{eu} = TR + E\ (TR)$

Where: TR_{el} = lower limit of the test result including allowable test error

TR_{eu} = upper limit of the test result including allowable test error

TR = the result from Section 8.2

E = the allowable testing error, percent, i.e. precision from Section 4.1

10. REPORTING RESULTS

10.1 Record the station or location name, address and tester information on Form 1.

10.2 Record the P/V valve manufacturer's name, model number, and manufacture date (date stamp) on Form 1.

10.3 Record the results of the test(s) on Form 1. Use additional copies of Form 1 if needed to record additional P/V Valve tests.

10.4 Alternate data sheets or Forms may be used provided they contain the same parameters as identified on Form 1.

10.5 Use the formulas and example equation provided in Section 8 to convert the flow measurements into units of ml/min.

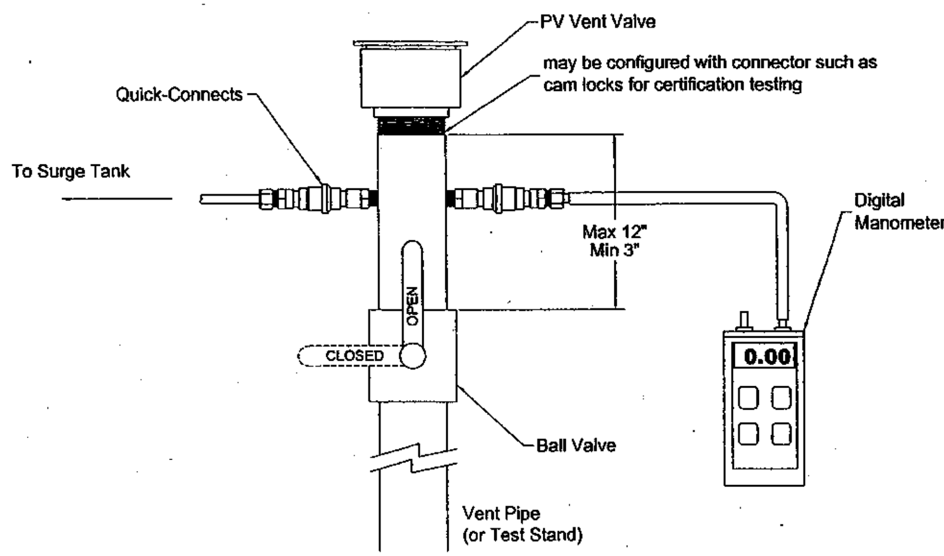
10.6 Compare the results to the performance specifications listed in Table 3-1 of CP-201 or as specified in Section 3 of CP-201, applying any allowable tolerance for testing error (as specified in Section 8.3). Circle "Pass" on the data sheet if the leak rate and cracking pressures meet the specifications. If either the volumetric leak rate or cracking pressure exceeds the specifications, circle "Fail" on the data sheet.

11. 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 Executive Officer pursuant to section 14 of CP-201.

Figure 1

Example of Test Assembly



*The mass flow meter must be oriented in the correct direction of flow.

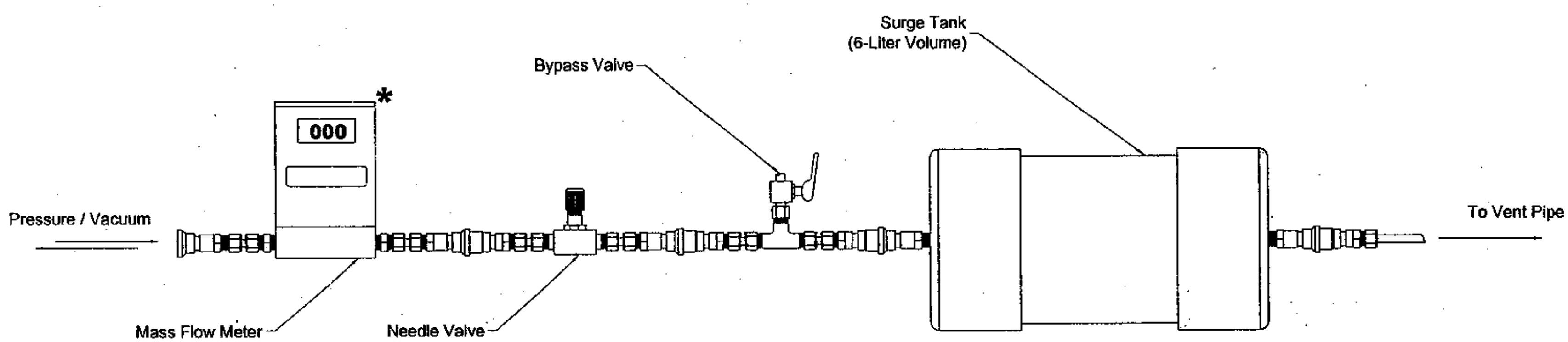
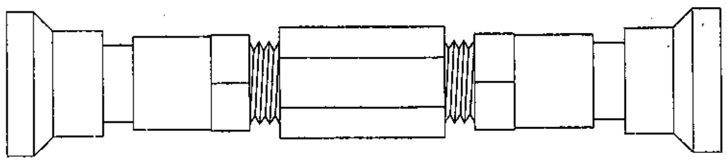


Figure 2
¼ Inch Quick Connect Union



Form 1
Pressure/Vacuum (P/V) Vent Valve Data Sheet

Facility Name:	Test Date:
Address:	Test Company:
City :	Tester(s) Name:

P/V Valve Manufacturer:	**Model Number:**	**Stamped Date:**

Required Positive Leak Rate Specification (CFH and ml/min):	**Required Negative Leak Rate Specification (CFH and ml/min):**
Measured Positive Leak Rate (ml/min), Run #1:	Measured Negative Leak Rate (ml/min): Run #1:
(if applicable) Run #2:	(if applicable) Run #2:
(if applicable) Run #3:	(if applicable) Run #3:
Average:	Average:
Pass/Fail	**Pass/Fail**
If Fail: 0-200 Assembly Leak Rate < 10 ml/min?:	**If Fail**: 0-200 Assembly Leak Rate < 10 ml/min?:
0-20 Assembly Leak Rate < 2 ml/min?:	0-20 Assembly Leak Rate < 2 ml/min?:
If Fail: Ball Valve Leak Rate < 2 ml/min?:	**If Fail**: Ball Valve Leak Rate < 2 ml/min?:
Positive Cracking Pressure (in. H_2O): Run #1:	Negative Cracking Pressure (in. H_2O): Run #1:
Run #2:	Run #2:
Run #3:	Run #3:
Average:	Average:
Comments:	Comments:
(If Applicable) Allowable Testing Tolerance (%):	(If Applicable) Allowable Testing Tolerance (%):
Test Result Range:	Test Result Range:
Pass/Fail	**Pass/Fail**

Was the "1st Crack" of the P/V valve for this test day included in the result? **Y / N**
If no, provide explanation:

Was there any maintenance or testing performed on the P/V valve within the last 24 hours? **Y / N**
If yes, provide explanation:

MFM accuracy check date: Manometer accuracy check date:

Comments:

California Environmental Protection Agency

Air Resources Board

PROPOSED

Vapor Recovery Test Procedure

TP-201.2G

Bend Radius Determination for Underground Storage Tank Vapor Return Piping

Adopted: October 8, 2003
Amended: ____________

[Note: The text is shown in ~~strikeout~~ to indicate that it is proposed for deletion and underline to indicate that it is proposed for addition. [Bracketed text] is not part of the proposed amendments.]

California Environmental Protection Agency
Air Resources Board

TP-201.2G

Bend Radius Determination for Underground Storage Tank Vapor Return Piping

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" 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. APPLICABILITY AND PURPOSE

This procedure applies to gasoline compatible piping used as vapor return piping to underground storage tanks of gasoline dispensing facilities (GDFs). The purpose is to determine whether vapor recovery piping complies with rigid piping as specified in CP-201 and D-200. This procedure can be used for certification and compliance testing.

2. PRINCIPLE AND SUMMARY OF TEST PROCEDURE

This test procedure measures the bend radius of a ten-foot length of pipe that is supported at two points and has a weight suspended from the center of the pipe for a given length of time. Piping with a bend radius less than or equal to the allowable limit is acceptable for use as vapor return piping in gasoline dispensing facilities utilizing buried vapor return piping.

3. BIASES AND INTERFERENCES

Testing should be performed within +/- 5 degrees of standard temperature (72 degrees Fahrenheit +/- 5 degrees) to avoid thermal effects.

4. SENSITIVITY, RANGE AND PRECISION

Section reserved.

5. EQUIPMENT

5.1 Roller Stands (2) (See Figure 1)

5.2 Three (3) foot minimum measuring tape or ruler. (1/8" minimum increments)

5.3 Forty (40) lb. Weight +/- 2 oz (See Figure 2)

5.4 One to two inch wide support strap. (See Figure 3)

5.5 Ten foot (10) +/- 1/4" length of vapor piping

5.6 Felt tipped marker

6. TEST PROCEDURE

Record test measurements on Form 1. Alternate forms may be used as long as they contain the same information

6.1 Place roller stands on flat level surface with the rollers aligned parallel with each other and adjust the height of the top of each roller to three feet (3') +/- 1/8" measured from the ground up.

6.2 Measure the distance between the centerlines of each roller and adjust the distance between the roller centers until they are six (6) feet +/- 1/4" apart.

6.3 Using the felt tipped marker, mark lengths two (2) ft from each end of the 10 foot pipe length and the center of the pipe, five (5) ft from either end.

6.4 Place the nylon support strap over the end of the pipe and slide it into position at the pipe center.

6.5 Place the pipe on the roller stands such that the two (2) ft marks are on top of the rollers.

6.6 Measure and record the distance from the bottom of the pipe to the ground at the center of the pipe.

6.7 Suspend the forty pounds (40) from the strap support at the center of the pipe.

6.8 Wait five (5) minutes and record the distance from the bottom of the pipe center to the ground.

7. CALCULATING RESULTS

7.1 Subtract the measured distance of the weighted pipe center from the ground from the measured distance of the straight pipe length from the ground.

7.2 Convert the deflection distance to a bend radius

7.3 Compare this distance to the allowable deflection limit as ~~defined~~ specified in Section 4 of CP-201 ~~D-200~~. If this ~~bend radius~~ deflection distance is less than or equal to the allowable deflection limit, then the piping meets the rigidity requirement for vapor piping.

8. REPORTING RESULTS

Report results on Form 1.

9. ALTERNATE PROCEDURE

This procedure shall be conducted as specified. Modifications to this procedure shall not be used to determine compliance unless prior written approval has been obtained from the Executive Officer, pursuant to Section 14 of Certification Procedure CP-201.

TP-201.2G Form 1

Pipe Specifications	
Pipe Manufacturer	
Piping Material (FRP, HDPE, etc)	
Outside Pipe Diameter (inches)	
Section 6 Test Measurements	
6.2 Distance from top of roller stands to ground (inches)	
6.3 Horizontal distance between centerline of each roller stand (inches)	
6.4 Distance from bottom of non-weighted pipe center to ground (inches)	
6.5 Distance from bottom of weighted pipe length center to ground after 5 minutes (inches)	
Section 7 Calculations	
7.1 Difference between measurements obtained from Step 6.4 and Step 6.5 (inches)	
7.2 Measurememnt difference converted to bend radius (feet)	
7.~~2~~3 Is the measurement less than or equal to the allowable ~~deflection limit~~ bend radius as called out in ~~CP-201~~D-200? (Yes or No)	
If the answer to 7.~~2~~3 is yes, then the piping meets the minimum bend radius requirements for vapor return piping.	

TP-201.2G Figures

Figure 1
Roller Stands

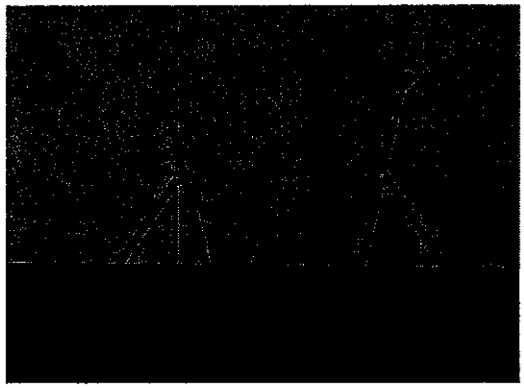
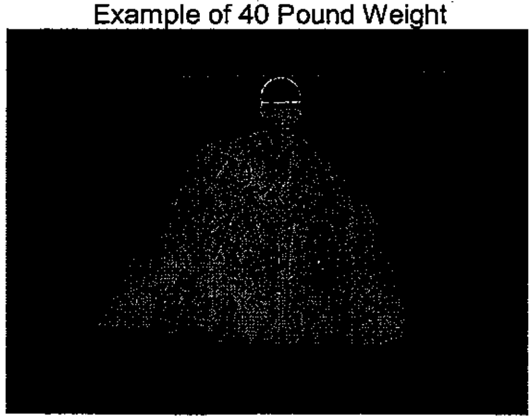


Figure 2
Strap Assembly

Figure 3
Example of 40 Pound Weight



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:

[Note: The text is shown in ~~strikeout~~ to indicate that it is proposed for deletion and underline to indicate that it is proposed for addition. [Bracketed text] is not part of the proposed amendments. Only the amended section is shown.]

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 UST Ullage Pressure - Phase I Overpressure Response~~

~~This test spans an actual or simulated period of 20 minutes for failures in which UST ullage pressure exceeds the criteria as specified and 20 minutes for borderline acceptable operation.~~

~~Induce or simulate unacceptable and borderline acceptable UST ullage pressure associated with Phase I deliveries as follows and verify appropriate system response. An alarm is scheduled immediately when assessment of any rolling 20-minute period shows failure. No interruption of fueling is scheduled.~~

~~If UST ullage pressure exceeds 2.5 inches of H_2O 25 percent (25%) of the time in any 20-minute period and a five-percent (5%) probable negative error in measurement of UST pressure is present the system should alarm as scheduled.~~

~~If UST pressure is at the maximum level allowed by an applicable executive order (or at the 75th percentile pressure observed in representative Phase I deliveries where no applicable executive order specification exists) for twenty minutes and a one-percent (1%) probable positive error in measurement of UST pressure is present the system should not alarm.~~

9.1~~3~~2 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.

Appendix 3

Vapor Recovery Health and Safety Code Statutes

H&S 25290.1.2

25290.1.2(a) The board and the State Air Resources Board, under the direction of the California Environmental Protection Agency, shall certify to the best of their knowledge, that the equipment that meets the requirements of Section 94011 of Title 17 of the California Code of Regulations for enhanced vapor recovery systems at gasoline dispensing facilities, as implemented by the State Air Resources Board, also meets the requirements of this chapter. The board and the State Air Resources Board shall make this certification collaboratively, using existing resources.

(b) The board and the State Air Resources Board, under the direction of the California Environmental Protection Agency, when making the certification specified in subdivision (a), shall consult with interested parties, including local implementing agencies, underground storage tank system owners and operators, equipment manufacturers, underground storage tank system installers, and environmental organizations.

(c) The board and the State Air Resources Board shall post the certification and any supporting documentation on their Web sites.

(d) This section shall be implemented by the executive directors of the board and of the State Air Resources Board, or by their designees.

SEC.4. Section 25299.51 of the Health and Safety Code is amended to read:

25299.51.The board may expend the money in the fund for all the following purposes:

(a) In addition to the purposes specified in subdivisions (c), (d), and (e), for the costs of implementing this chapter and for implementing Section 25296.10 for a tank that is subject to this chapter.

(b) To pay for the administrative costs of the State Board of Equalization in collecting the fee imposed by Article 5 (commencing with Section 25299.40).

(c) To pay for the reasonable and necessary costs of corrective action pursuant to Section 25299.36, up to one million five hundred thousand dollars ($1,500,000) per occurrence. The Legislature may appropriate the money in the fund for expenditure by the board, without regard to fiscal year, for prompt action in response to any unauthorized release.

(d) To pay for the costs of an agreement for the abatement of, and oversight of the abatement of, an unauthorized release of hazardous substances from underground storage tanks, by a local agency, as authorized by Section 25297.1 or by any other provision of law, except that, for the purpose of expenditure of these funds, only underground storage tanks, as defined in Section 25299.24, shall be the subject of the agreement.

(e) To pay for the costs of cleanup and oversight of unauthorized releases at abandoned tank sites. The board shall not expend more than 25 percent of the total amount of money collected and deposited in the fund annually for the purposes of this subdivision and subdivision (h).

(f) To pay claims pursuant to Section 25299.57.

(g) To pay, upon order of the Controller, for refunds pursuant to Part 26 (commencing with Section 50101) of Division 2 of the Revenue and Taxation Code.

(h) To pay for the reasonable and necessary costs of corrective action pursuant to subdivision (f) of Section 25296.10, in response to an unauthorized release from an underground storage tank subject to this chapter.

(i) To pay claims pursuant to Section 25299.58.

(j) To pay for expenditures by the board associated with discovering violations of, and enforcing, or assisting in the enforcement of, the requirements of Chapter 6.7 (commencing with Section 25280) with regard to petroleum underground storage tanks.

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 therefor. Payment of the fee shall be a condition of certification.

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

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

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

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

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

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

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

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

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

(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

State of California
AIR RESOURCES BOARD

NOTICE OF POSTPONEMENT

NOTICE OF PUBLIC HEARING TO CONSIDER ADOPTION OF NEW EMISSION STANDARDS, FLEET REQUIREMENTS, AND TEST PROCEDURES FOR FORKLIFTS AND OTHER INDUSTRIAL EQUIPMENT

BY NOTICE dated February 21, 2006, and published in the March 3, 2006, California Notice Register, Register 2006, No. 9-Z, the Air Resources Board (the Board or ARB) announced it would conduct a public hearing to consider the adoption of new emission standards and test procedures for forklifts and other industrial equipment with 2007 and later model-year off-road large spark-ignition (LSI) engines, requirements for fleet users of such equipment, and verification procedures for retrofit control systems. The hearing was scheduled for April 20, 2006, at 9:00 a.m., at the Long Beach Convention & Entertainment Center, 300 E. Ocean Boulevard, Long Beach, CA 90802.

PLEASE BE ADVISED that the hearing has been postponed to the following date, time and place:

DATE: **May 25, 2006**

TIME: 9:00 a.m.

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

This item will be considered at a two-day meeting of the Board, which will commence at 9:00 a.m., May 25, 2006, and may continue at 8:30 a.m., May 26, 2006. This item may not be considered until May 26, 2006. Please consult the agenda for the meeting, which will be available at least 10 days before May 25, 2006, to determine the day on which this item will be considered.

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

limited English and would like to request interpreter services, please contact ARB's Bilingual Manager at (916) 323-7053.

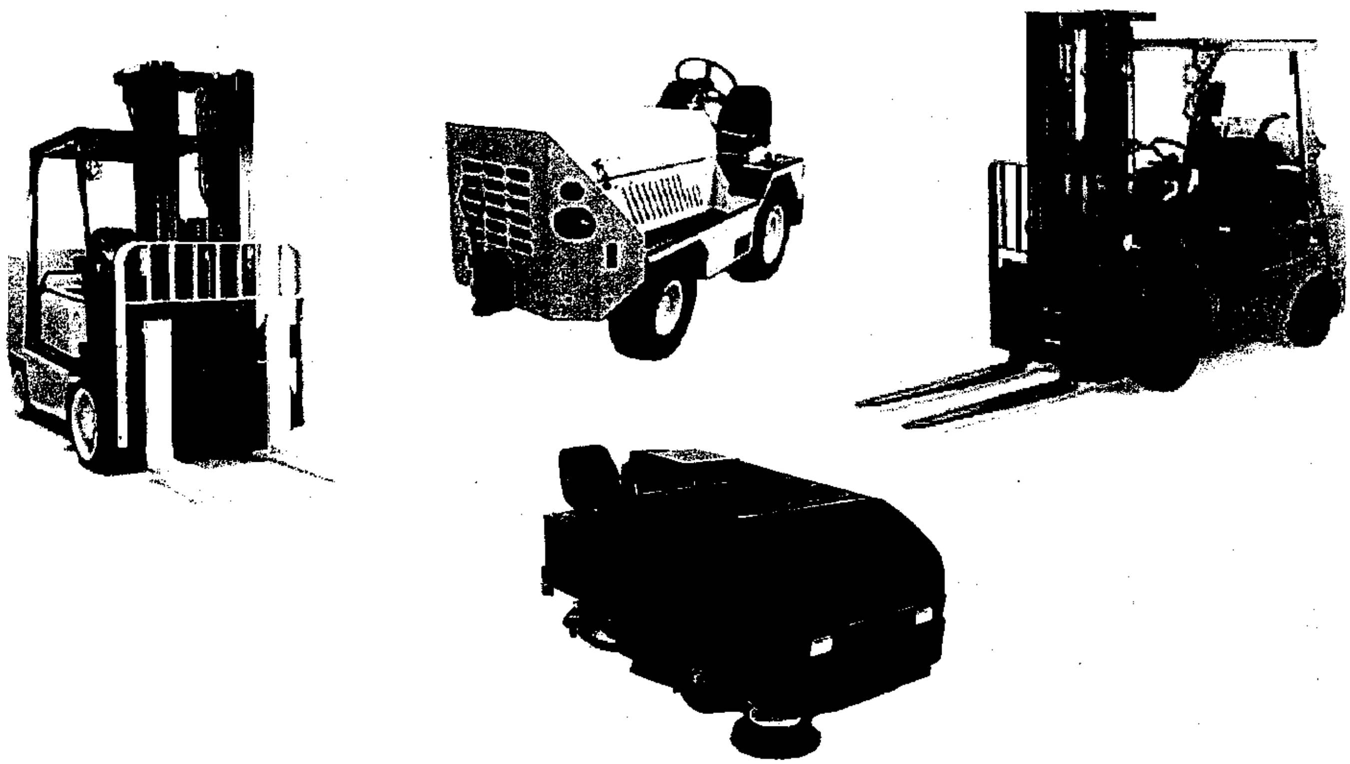
CALIFORNIA AIR RESOURCES BOARD

Catherine Witherspoon
Executive Officer

Date: April 10, 2006

California Environmental Protection Agency
AIR RESOURCES BOARD

STAFF REPORT: NEW EMISSION STANDARDS, FLEET REQUIREMENTS, AND TEST PROCEDURES FOR FORKLIFTS AND OTHER INDUSTRIAL EQUIPMENT



Date of Release:	March 3, 2006
Scheduled for Consideration:	April 20, 2006

CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY
AIR RESOURCES BOARD

STAFF REPORT: NEW EMISSION STANDARDS, FLEET REQUIREMENTS, AND TEST PROCEDURES FOR FORKLIFTS AND OTHER INDUSTRIAL EQUIPMENT

Date of Release: March 3, 2006
Scheduled for Consideration: April 20, 2006

EXECUTIVE SUMMARY

Air quality in California has improved dramatically over the past 30 years, due in large part to the continued progress in controlling pollution from mobile sources. Despite the achievements to date, the vast majority of Californians live in areas of the state that still do not meet State or federal health-based ambient air quality standards. Clearly, ozone – or smog – continues to be a serious health problem throughout much of our state. The California Air Resources Board (ARB or Board) pursues emissions reductions from all feasible sources in order to continue our progress toward clean air and to meet and sustain our air quality goals.

In 1998, the ARB first adopted emission standards for new spark-ignited engines used in propane forklifts and other similar industrial equipment. These engines are referred to as large spark-ignition (LSI) engines. In addition to forklifts, the LSI category includes airport ground support equipment (GSE), sweepers and scrubbers, generator sets, small irrigation pumps, and a variety of other similar equipment. The full implementation of these first emissions standards in 2004 required engine manufacturers to achieve approximately a 75 percent reduction in smog-forming pollutants. This was done with the incorporation of basic emissions control technology that had been successfully used in passenger cars for more than 20 years.

The 75 percent reduction was an important step, but still left the level of control for these new engines relatively basic. Building on this success, the United States Environmental Protection Agency (U.S. EPA) harmonized with California's standards and adopted more stringent requirements for new engines produced for the 2007 and later model years. The federal program demonstrated that additional reductions from new engines were technically feasible and cost-effective.

In developing the ARB's 2003 State Implementation Plan (SIP) for Ozone, it became clear that additional emissions reductions were possible from not only new LSI engines, but also in-use LSI equipment. The regulation of in-use LSI equipment represents an enormous opportunity since each uncontrolled forklift has the same emissions per day as over 700 clean passenger cars. Currently, there are over 30,000 uncontrolled forklifts in California. The Board-adopted SIP included a commitment to achieve additional reductions from the LSI category of between 6.1 and 13.0 tons per day of hydrocarbons (HC) and oxides of nitrogen (NOx) statewide by 2010. This proposal is designed to meet that 2003 obligation.

In June 2005, the ARB presented an initial LSI proposal to the Board. At that time, questions arose about the economic impact of the in-use portion of the proposal on forklift dealers and agricultural-related businesses that could not be fully answered. In addition, several stakeholders asked for more time to work with staff on its regulatory proposal. Accordingly, the Board listened to staff's presentation and to public testimony but deferred action to a later date. Subsequent to the June 2005 hearing, ARB staff has had numerous meetings and telephone conversations with dealer and agricultural business representatives in order to better understand their business practices and the economic impacts of the proposal.

The current proposal is similar to the June 2005 proposal, but revises several key modifications based on these meetings and ARB staff's subsequent analysis. The modifications are designed to reduce the economic impacts on agricultural businesses and address the unique business practices of forklift dealers. The main elements of this proposal are highlighted below, along with the key revisions to the previous proposal.

In late 2002, air carriers operating in the South Coast air basin signed a memorandum or understanding (MOU) with ARB committing to reduce HC and NOx emissions from new and in-use GSE used in airport operations. The MOU was intended to address the air carriers' contributions to the air basin's extreme ozone nonattainment classification. The airlines terminated the MOU on October 28, 2005. To retain those benefits, staff is proposing that GSE fleets in the South Coast air basin meet the same fleet average emission requirements as other fleets, and meet the zero-emission requirement of the MOU applied to the LSI fleet.

Proposed Requirements

Requirements for Engine Manufacturers

- Alignment with the engine certification standards adopted by the U.S. EPA beginning in 2007.
- Alignment with additional requirements of the federal rule including more rigorous test procedures and on-board diagnostics.
- More stringent emissions standards for 2010 and later model-year engines.
- Optional lower-emission standards to give manufacturers more flexibility.

Requirements for Fleet Users

- Fleet average emission limits for operators of specific LSI equipment (forklifts, sweeper/scrubbers, industrial tow tractors, and airport ground support equipment) beginning in 2009.
- An alternative compliance option for agricultural fleets to address issues specific to the agricultural industry.

Verification Procedure for Manufacturers of Retrofit Control Systems

- A new procedure for verifying LSI retrofit emission control systems.

Key Modifications to the June 2005 Proposal

For Equipment Dealers

Small fleets (one to three units) are no longer covered by the proposal. This modification reduces the in-use emissions benefit of staff's earlier proposal by less than 20 percent (roughly one ton per day of HC+NOx in 2010) while exempting an estimated 60 percent of fleets (the very smallest ones) from the fleet rules. This change not only eases the burden on small users, but also provides an ongoing purchaser pool for dealers that have uncontrolled equipment coming off existing leases. The primary concern with staff's 2005 proposal was that it was believed to impose unreasonably high control costs on relatively low-value equipment coming off lease. The proposed exemption for small fleets solves that problem while still controlling the majority of in-use engines.

For Agriculture

The alternative agricultural proposal would require control of only those owned forklifts for which a verified retrofit system is commercially available (40 percent of current agricultural forklifts). In addition, the timeframe for compliance provides an opportunity for 80 percent of this equipment to be eligible for Carl Moyer Program incentive funds if the owners act quickly to install retrofits. The proposal would allow those forklifts for which retrofit systems are not available to continue to operate, avoiding the cost of replacement. With full use of incentive funds, the modification reduces the cost by approximately 90 percent while retaining over one ton per day HC+NOx benefit during the summer ozone season.

For Air Carriers

Special requirements applicable to commercial airlines operating airport GSE in the South Coast air basin that implement provisions of a recently terminated MOU.

Economic and Environmental Impacts

The proposed 2007 new engine emission standards are not expected to create significant economic impacts because engine manufacturers are already developing engines to comply with the federal 2007 standards. The proposed California standards for 2010 and later can be met by optimizing emission controls used to meet U.S. EPA's 2007 standards, and thus provide extremely cost effective emission reductions estimated at $0.13 per pound.

In general, in-use fleet rules provide significant opportunities for emissions reductions but also require careful consideration due to their possible economic impacts on owners and users of the equipment. In many ways, the LSI category is well-positioned to achieve in-use emissions reductions. Available retrofit technology reduces emissions by 75 to 90 percent and is cost-effective. Because emission standards for new engines have been in effect only for the past few years, a significant number of high-emitting, uncontrolled equipment is still in operation and available for retrofit. Operators can meet the proposed in-use fleet-average emission standards by procuring low- and zero-emission equipment and by retrofitting uncontrolled equipment in their fleets. The use of new controlled engines and the retrofit of existing engines can reduce fuel use and improve engine life, creating cost savings that offset a portion of the additional equipment cost. As a result, the fleet requirements are cost-effective and range from $0.13 per pound for lower-emission equipment to $1.40 per pound for electric equipment.

The proposed in-use fleet-average emission standards will result in additional costs for some dealers of LSI engines. The costs depend on the number and age of the uncontrolled equipment in their possession, the rate at which they currently turn-over old equipment, the extent to which additional costs can be passed along, and the ability to sell equipment to small fleets that are exempt from the proposed regulations. This latter provision significantly reduces the economic impact of the proposal on dealers.

The ARB staff proposal will reduce statewide HC and NOx emissions by 5.7 tons per day in 2010 and 6.2 tons per day in 2020. These reductions are near or within the range of the commitment established within the 2003 SIP.

Staff Recommendation

The ARB staff recommends that the Board adopt the amendments as set forth in the proposed Regulation Order in Appendices A, B, and C and as described in this Initial Statement of Reasons.

TABLE OF CONTENTS

1 INTRODUCTION

The California Clean Air Act, adopted in 1988, grants the Air Resources Board (ARB) the authority to regulate a wide variety of off-road mobile engines and equipment. These sources include, but are not limited to marine vessels, locomotives, utility engines, off-road motorcycles, and off-highway vehicles. Forklifts, and other off-road large spark-ignition (LSI) equipment, are a subcategory of off-road mobile equipment subject to ARB regulation. Approximately 88,000 pieces of LSI equipment exist in California, with current hydrocarbon (HC) and oxides of nitrogen (NOx) emissions of approximately 15 and 54 tons per day, respectively.

In addition to forklifts, off-road LSI equipment includes portable generators, large turf care equipment, irrigation pumps, welders, air compressors, scrubber/sweepers, airport service vehicles, and a wide array of other agricultural, construction, and general industrial equipment. Forklifts comprise roughly half of the LSI inventory and contribute more than 85 percent of the category's emissions. The basic engines used in off-road equipment are similar to, and typically derived from, automobile engines, although they have significantly fewer emissions controls. They are most commonly fueled by gasoline or liquefied petroleum gas (LPG).

The ARB first adopted emission standards for off-road LSI equipment over 25 horsepower (19 kilowatts) in 1998, with implementation beginning in the 2001 model year, and fully implemented in 2004. The proposed amendments in this rulemaking continue ARB's efforts to achieve additional cost-effective reductions from the category. Requirements are proposed that would provide significant near- and mid-term reductions by addressing the remaining high-emitting uncontrolled equipment in-use. The proposal would also provide significant mid- and long-term reductions by establishing more stringent new engine HC and NOx emission standards in 2007 and 2010. Finally, the proposal would allow engine manufacturers to certify to optional lower-emission standards, and provide retrofit equipment manufacturers a test procedure for certifying retrofit systems.

In late 2002, the ARB signed a memorandum of understanding (MOU) with air carriers to reduce HC and NOx emissions from ground support equipment (GSE) in the South Coast air basin. The MOU included provisions for the early introduction of clean units, with a requirement for an average 2.65 grams per brake-horsepower hour HC+NOx fleet. The MOU also called for a specified percentage of zero-emission equipment and the use of diesel oxidation catalysts and diesel particulate filters to significantly reduce particulate matter emissions from the diesel portion of the fleet.

1.1 Regulatory Authority

As noted above, the ARB has been granted the authority to regulate emissions from off-road mobile sources. The authority, however, does not extend to new equipment under 175 horsepower used primarily in construction or farm equipment or vehicles. The United States Environmental Protection Agency (U.S. EPA) has sole authority to control emissions from this equipment, i.e., California is preempted from regulating this equipment. In the LSI category, the preempted equipment includes welders, air compressors, and irrigation pumps. Because of this preemption, some emissions from the subject engine category are beyond ARB's authority to regulate. However, the ARB staff works closely with the U.S. EPA in their development of federal rules to cover all engines in this category. It should be noted that the preemption does not prohibit the ARB from regulating a piece of equipment under 175 horsepower that is used in construction or farming; instead, it prohibits the ARB from regulating *categories* of equipment that are *primarily* used in construction and farming. The ARB has established a list of the types of equipment that are not primarily used in construction or farming. All equipment over 25 horsepower but less than 175 horsepower is considered to be construction or farm equipment except for the 11 categories listed below.

- Airport Ground Power
- Baggage Handling
- Forklifts that are neither rough terrain nor powered by diesel engines
- Generator Sets
- Mining Equipment not otherwise primarily used in the construction industry
- Off-highway Recreational Vehicles
- Other Industrial Equipment
- Refrigeration Units less than 50 hp
- Scrubbers/Sweepers
- Tow/Push Equipment
- Turf Care Equipment

1.2 Applicability

The new engine emission standards discussed in Section 3 apply to engines greater than 19 kilowatts (25 horsepower) used in the 11 categories of equipment listed above. The in-use requirements apply only to users of forklifts, sweeper/scrubbers, industrial tow tractors and GSE. Examples of GSE include forklifts, tugs, belt loaders, bobtails, cargo loaders, lifts, air conditioners, service trucks, de-icers, fuel delivery trucks, and ground power units.

Diesel equipment is not subject to the requirements of this proposal. Instead, separate requirements for in-use diesel forklifts are being developed and are expected to be proposed in late 2006.

1.3 Outreach

Outreach and public participation are important components of ARB's regulatory development process. In preparing the proposed regulations, ARB staff developed an outreach program to engage LSI engine and equipment manufacturers and distributors, emission control system manufacturers, propane fuel refiners and distributors, end-user facility operators, agricultural interests, federal regulatory agencies, environmental organizations, public health advocates, and other interested parties.

Through these efforts, ARB staff has been able to obtain detailed information on the use of, and emissions from, LSI equipment. Additionally, these entities participated in the development and review of the manufacturers advisory correspondence (MAC) for voluntary early certification of lower-emission engines and the interim retrofit verification procedure for retrofit emission control systems.

As part of the outreach efforts, ARB staff made extensive personal contacts with industry and facility representatives as well as other affected parties through meetings, telephone calls, and mail-outs. These activities included holding five public workshops, forming an LSI regulatory working group and holding 20 conference calls with the working group, more than 100 telephone conversations with the working group and facility operators, and visiting more than 15 facilities.

In June 2005, ARB presented a similar LSI proposal to the Board. At that time, questions arose about the impact of the proposal on forklift dealers and agriculture-related businesses that could not be fully answered and the Board took no action. In response, the ARB staff has conducted a series of meetings with both stakeholder groups, focusing on better understanding their business operations. This more detailed analysis has allowed staff to better understand the potential economic impacts to these two stakeholder groups. The current proposal is similar in structure to the previous proposal, but revises several key provisions in response to these discussions and analyses.

2 CURRENT REGULATIONS AND INVENTORY

2.1 California LSI Regulation

In 1998, ARB adopted LSI regulations in collaboration with U.S. EPA. The regulations phased-in an emission standard for new engines of 3.0 grams per brake-horsepower-hour (g/bhp-hr) of HC and NOx beginning in 2001.

2.2 Federal LSI Regulation

Federal law preempts California from regulating engines less than 175 horsepower used primarily in farm and construction equipment. To address these engines, the ARB staff worked closely with U.S. EPA in its development of a nationwide federal rule to cover all new engines in this category. The federal rule, adopted in 2002, established nationwide emission standards for new LSI engines, including those used in farm and construction equipment. The U.S. EPA regulation requires that LSI engines nationwide meet the same 3.0 g/bhp-hr standard beginning in 2004 as required in California. The federal regulation also includes a more stringent standard: beginning in 2007, new LSI engines must meet a 2.0 g/bhp-hr standard using a more rigorous transient testing procedure. It additionally contains evaporative emission and in-use requirements that were not included in the 1998 California regulation. As a result of the State and federal regulations, new LSI engines are now 75 percent cleaner than uncontrolled LSI engines and will become even cleaner beginning in 2007.

2.3 2003 State Implementation Plan for Ozone

LSI equipment accounted for approximately six percent of all off-road emissions in 2000 and this percentage is increasing (ARB, 2003). There are large numbers of uncontrolled LSI engines still in use. These engines can emit 12 g/bhp-hr or more of HC+NOx, contributing significantly to the smog problems in California. To put this in perspective, one uncontrolled LSI engine can emit as much pollution in three 8-hour shifts as a passenger car certified to California's cleanest standard emits during its entire life. Yet, LSI engines are generally based on automotive engine technology and can thus incorporate advanced automotive-inspired emission control technologies to dramatically reduce emissions while still meeting operational requirements. Finally, zero-emission forklifts are available to provide even greater emission benefits while in many cases reducing overall life-cycle costs.

In recognition of these opportunities, the 2003 SIP included two measures for LSI engines. The first measure proposed that California harmonize with the 2007 U.S. EPA 2.0 g/bhp-hr new engine emission standard. The second measure proposed that emissions from existing or in-use LSI engines be reduced by 80 percent or to a 3.0 g/bhp-hr verification level. The proposed verification protocol provides a range of percentage reductions from 75 percent to more than 90 percent based on the state of technology. The latter measure also proposed that new standards be developed that reflected the availability of zero- and near-zero-emission technologies.

2.4 Airport Ground Support Equipment Memorandum of Understanding

In late 2002, air carriers operating in the South Coast air basin signed a MOU with ARB committing to reduce HC and NOx emissions from new and in-use GSE used in airport operations. The GSE performs a variety of functions, including: starting aircraft, aircraft maintenance, aircraft fueling, transporting cargo and passengers to and from aircraft, loading cargo, baggage handling, lavatory service, and food service.

The GSE MOU was developed in cooperation with the Air Transport Association (ATA; representing the major South Coast air basin's air carriers), the Federal Aviation Administration, U.S. EPA, and the South Coast Air Quality Management District. It was intended to address the air carriers' contributions to the air basin's extreme ozone nonattainment classification. The MOU included provisions for the early introduction of clean units, with requirements for a 2.65 grams per brake-horsepower hour HC+NOx fleet average at the five major airports in the South Coast air basin by December 31, 2010, and the use of diesel oxidation catalysts and diesel particulate filters to significantly reduce particulate matter emissions from the diesel portion of the fleet. The MOU also included a requirement to have electric or zero-emission vehicles represent at least thirty percent of the 1997 existing fleet, in aggregate, by December 31, 2010. The signatory airlines terminated the MOU on October 28, 2005 stating that the adoption of the Portable Engine Air Toxic Control Measure and other pending rulemaking that affects GSE is generally statewide in approach and largely inconsistent with the MOU, which is applicable only in the South Coast.

The staff proposal presented in Section 3 is intended to retain the benefits of the original MOU through 2010 and achieve slightly greater benefits by 2013.

2.5 LSI Inventory

The ARB's OFFROAD emission inventory model (ARB, 1998b), adopted in 1998 and updated regularly, was used in the development of this rulemaking. The annual average statewide emissions from off-road LSI engines are shown in Table 2.0. Off-road LSI equipment emitted about 70 tons per day of HC and NOx in 2004. By 2010, the emissions of these pollutants will be reduced to about 35 tons per day. This decrease is due to the new engine emission standards implemented in 2001. The trend, while positive, does not produce the same degree of reduction achieved from some other off-road categories.

Table 2.0: Off-Road LSI Equipment Emissions Statewide Annual Average[1] (tons per day)

Year	Population	HC	NOx
2004	87,687	15.4	54.8
2010	92,104	7.5	28.3
2020	96,964	4.4	19.0

[1] The inventory shown in Table 2.0 includes engines preempted by federal regulations. The emissions estimates do not reflect the impact of U.S. EPA's 2007 new engine emission standard.

The three equipment categories in Table 2.1 contribute the majority of off-road LSI emissions and are the focus of the regulatory proposal to reduce emissions from in-use fleets. As calculated from Table 2.1, emissions from these three categories account for greater than 80 percent of the total statewide LSI emissions in 2004. In terms of population, in 2004, the categories account for 60 percent of all off-road LSI equipment.

Table 2.1: Off-Road LSI Equipment Emissions Top Three Equipment Categories (tons per day)

Equipment Category	2004		2010		2020	
	HC	NOx	HC	NOx	HC	NOx
Industrial Forklifts	11.8	40.4	5.3	19.9	3.4	15.6
Airport GSE	0.6	3.3	0.3	1.5	0.2	1.0
Sweeper/Scrubbers	0.2	0.8	0.1	0.3	0.1	0.2

3 REGULATORY PROPOSAL

Staff has worked with LSI engine and equipment manufacturers and distributors, emission control system manufacturers, propane fuel refiners and distributors, end-user facility operators, federal regulatory agencies, air carriers, environmental groups, and other interested parties since January 2004 to identify approaches that would reduce emissions from new and in-use LSI engines and equipment. The most promising options involved lower-emissions standards for new engines, and fleet emission limits applicable to in-use fleets. Staff conducted workshops in May and August 2004 on these approaches. A proposal combining both approaches was discussed at two workshops held in March 2005 and presented to the Board in June 2005. Pursuant to the Board's direction, additional information was sought and the proposal was further revised.

A central element of the proposed regulation is a fleet-average emission standard applicable to equipment operators. The requirement would reduce emissions from uncontrolled equipment through retrofit and/or replacement with newer, lower-emission or electric equipment. More stringent emission standards for new engines ensure that cleaner LSI equipment would be available for purchase. The elements of the proposal are discussed below.

3.1 More Stringent Emission Standards for New Engines

The proposed emission standards for new engines include the following components: adoption of U.S. EPA's 2007 model-year emission standard, a more stringent 2010 model-year emission standard, optional certification standards and more rigorous test procedures.

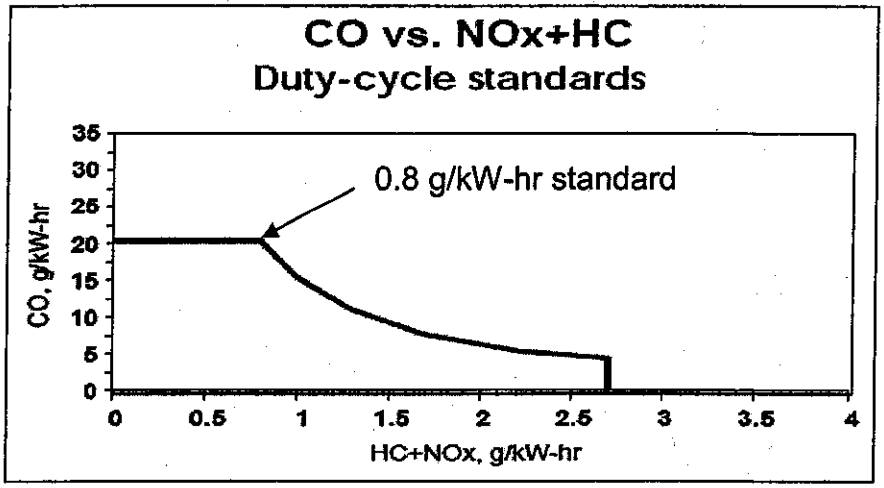
3.1.1 <u>2007 Standard</u>

Beginning with the 2007 model year, U.S. EPA's tailpipe emission standards for new LSI engines are more stringent than ARB's adopted standards. Staff proposes to adopt the U.S. EPA standards so that they can be enforced by California. Engine manufacturers would be required to meet a 2.0 g/bhp-hr (2.7 g/kW-hr) HC+NOx and 3.3 g/bhp-hr (4.4 g/kW-hr) carbon monoxide (CO) emission standards. Alternatively, a manufacturer could certify to the following formula:

$$(HC+NOx) \times (CO)^{0.784} \leq 8.57$$

This formula, established by U.S. EPA, is represented by the curve shown in Figure 3.0. The alternative certification standard provides manufacturers with the flexibility to certify engines with higher CO emissions if they achieve lower HC+NOx levels. Staff believes such a tradeoff is protective of public health.

Figure 3.0: Alternative Federal Certification



3.1.2 <u>2010 Standard</u>

Staff proposes a more stringent emission standard for new 2010 and subsequent model-year engines of 0.6 g/bhp-hr (0.8 g/kW-hr) HC+NOx and 15.4 g/bhp-hr (20.6 g/kW-hr) CO. The proposed standards lie on the alternative compliance curve, as show by the arrow in Figure 3.0. Stated another way, the proposed 2010 standard limits the calibration flexibility of the engine manufacturer to achieve the lowest feasible HC+NOx emission level. For the 2005 model year, eight engine families used in industrial applications emitted at levels at or below the proposed 2010 standards.

3.1.3 <u>Optional Certification Standards</u>

The staff also proposes to establish optional emission standards that are numerically lower than the 2007 and 2010 mandatory standards. During model years 2007 through 2009, engines could be certified to the optional new engine standards of 0.1, 0.2, 0.4, 0.6, 1.0, or 1.5 g/bhp-hr HC+NOx. For model year 2010 and beyond, engines could be certified to optional standards of 0.1, 0.2, or 0.4 g/bhp-hr HC+NOx. A January 20, 2005, Manufacturers Advisory Correspondence already allows manufacturers to certify their current engines to these interim lower-emission standards.

The optional standards provide manufacturers that produce cleaner engines an opportunity to certify at a lower standard. This may translate into a product that is available for Carl Moyer Program incentives. It may also be a more desirable product for the fleet owner that must meet an in-use fleet-average requirement.

3.1.4 <u>Enhanced Test Procedures and Other Manufacturer Requirements</u>

The U.S. EPA emissions standards that take effect in 2007 also include more rigorous certification requirements and test procedures. This proposal adopts by reference the U.S. EPA certification and testing requirements for the 2007 to 2009 model years, and, with minor revisions, those requirements that begin in the 2010 model-year, as described in Appendix A, parts 4 through 7. The revisions include production line testing and in-use compliance procedures.

The ARB staff also proposes to adopt the new U.S. EPA requirements for evaporative emissions and for engine-diagnostics systems.

3.2 In-Use Emission Standards

The ARB staff is proposing that operators of large and mid-size fleets of forklifts, sweeper/scrubbers,[1] GSE and industrial tow tractors meet an average emission standard for their in-use fleet. Fleet size is determined by aggregating an operator's equipment in the State of California. Large LSI fleets as proposed are those with more than 25 pieces of equipment while mid-size LSI fleets would be those with 4 to 25 pieces of equipment. The requirements would begin January 1, 2009.

Under the proposal, large fleets would have to meet a more stringent fleet average than mid-size fleets due to their greater flexibility in incorporating combinations of emission-reduction strategies. Likewise, the fleet average would be more stringent for the forklift portion of the fleet than for the non-forklift portion of the fleet reflecting the greater availability of zero- and low-emission technologies.

The fleet average would be determined using the certification levels of 2001 and newer LSI engines and the retrofit verification levels of engines with retrofit kits. To make the proposal less complex and less intrusive for the typical fleet operator while maintaining cost effective emission benefits, the fleet average will not incorporate load factors, horsepower, or hours of use.

The proposal provides the LSI fleet operator with the flexibility to use any combination of retrofits, lower-emission purchases, and zero-emission electric purchases to meet the fleet-average emission level, which becomes progressively more stringent over time. A detailed discussion of the various compliance scenarios identified by ARB staff can be found in Appendix B.2. The following table summarizes the proposed fleet average emission levels for forklift and non-forklift LSI fleets.

[1] With engine displacement greater than one liter. Of the engines certified in the 2004 model year for sweeper/ scrubbers, 46 percent had a displacement of one liter or less (ARB, 2005). Engines with less than one liter displacement are not subject to the LSI proposal and the equipment containing them is not subject to the fleet average requirement.

Table 3.0: In-Use Fleet Average Emission Requirements [g/bhp-hr (g/kW-hr) of HC+NOx]

LSI Fleet Type	Number of units	By 1/1/2009	By 1/1/2011	By 1/1/2013
Large fleet – forklift component	26 +	2.4 (3.2)	1.7 (2.3)	1.1 (1.5)
Mid-size fleet – forklift component	4-25	2.6 (3.5)	2.0 (2.7)	1.4 (1.9)
Non-forklift fleet	N/A	3.0 (4.0)	2.7 (3.4)	2.5 (3.6)
Small fleet	1-3	Exempt from Fleet Requirements		

The fleet average proposal provides additional flexibility to the fleet operator that increases its fleet size enough to jump from one category to the other by instituting two-year transition periods that correspond with the fleet average compliance dates. For example, on January 1, 2009, a mid-size fleet would have to meet a 2.6 g/bhp-hr standard. If that same fleet, through growth, becomes a large fleet, they would not have to meet the 2.4 g/bhp-hr requirement. However, they would have to meet the 1.7 g/bhp-hr requirement for large fleets, beginning on January 1, 2011, as that is the next fleet requirement.

3.2.1 Special Fleet Requirement for GSE in the South Coast Air Basin

On October 28, 2005, ATA notified ARB that the air carriers who had signed the MOU were terminating the GSE MOU. The termination became effective 60 days later, December 27, 2005. The terminated MOU included a 2.65 g/bhp-hr HC+NOx fleet-average standard for the LSI and diesel fleets, and a requirement that 30 percent of the baseline fleet be zero-emitting. Staff is proposing that GSE fleets in the South Coast air basin meet the same fleet-average emission requirements as other LSI fleets, and meet the MOU's zero-emission requirement for their current fleet.

3.2.2 Small Fleet Exemption

The ARB staff recognizes that small fleets, with one to three pieces of equipment, are least able to absorb the costs of an in-use proposal. In addition, it is believed that these users, in general, use their equipment fewer hours per year than the large- or mid-size fleets. Initially in considering these factors, the staff proposed that small fleets meet a relaxed requirement, consisting of two additional years to comply, relative to other fleets, and a less stringent fleet-average requirement. This was part of the proposal presented to the Board in June 2005.

Staff has since revised its proposal to exempt fleet operators of three or fewer LSI engines. The exemption reduces the number of fleets subject to the rule by as much as 60 percent while reducing the emission benefit by less than 20 percent. As discussed in Section 6.3, a substantial portion of the inventory of some forklift dealers is uncontrolled.

The cost of retrofit or disposal of a large number of forklifts imposes a large cost on these dealers compared to other fleet operators whose cost of operating forklifts is only a small portion of revenues. Thus, the small fleet exemption reduces the cost of compliance for forklift dealers by providing a sales outlet for some uncontrolled forklifts currently in their inventory.

3.2.3 Hours of Use Exemption

Low-use equipment may be temporarily exempted from the fleet-average emission level requirements if it meets the following provisions:

- The equipment is used, on average over any three year period, 250 hours per year or less,
- The equipment is equipped with an operational hours-of-use meter,
- The fleet operator maintains hours-of-use records for the piece of equipment, and
- The fleet operator addresses any uncontrolled emissions by January 1, 2011, by either retrofitting or repowering the equipment to meet at least Level 2 verification as described in Section 3.3.1 below or by replacing the equipment with a new or used piece of equipment certified to a 3.0 g/bhp-hr HC+NOx emission standard or better.

3.2.4 Specialty Equipment Exemption

Specialty equipment is defined as equipment that has unique or specialized performance capabilities that perform prescribed tasks. Specialty equipment used in large- and mid-size fleets is permanently exempted from the fleet average requirements provided that:

- The Executive Officer approves the listing of the piece of equipment as specialty equipment,
- The cost of replacing or retrofitting the equipment is deemed by the Executive Officer to be excessive, and
- The equipment meets the first three provisions of the hours of use exemption (see Section 3.2.3 above).

3.3 Proposed Verification Procedures for Retrofits

The ARB staff is proposing a procedure to verify the in-use emission performance of retrofit control systems that can be used to help meet the proposed fleet-average emission requirements. The proposed verification procedures (contained and described in Appendix C) would apply to manufacturers of retrofit systems sold in California. These systems include but are not limited to, closed-loop fuel-control systems, fuel-injection systems, and three-way catalysts.

3.3.1 Retrofit Emission Verification Levels

Table 3.1 presents the LSI retrofit system verification levels that a manufacturer could choose. Depending on the level selected, a system could be verified on the basis of a percentage reduction or on the basis of an absolute emission level. In addition, the proposed procedures allow retrofit technologies that reduce emissions from either uncontrolled engines or certified engines. These options provide flexibility for manufacturers to develop a variety of control systems and determine the appropriate level of emission control for each.

Table 3.1: Proposed LSI Engine Retrofit System Verification Levels

Classification	Percentage Reduction	Absolute Emission Level (g/bhp-hr HC+NOx)
LSI Level 1[1]	> 25%[2]	Not Applicable
LSI Level 2[1]	> 75%[3]	3.0
LSI Level 3a[1]	> 85%[4]	0.5, 1.0, 1.5, 2.0, 2.5
LSI Level 3b[5]	Not Applicable	0.5, 1.0, 1.5, 2.0

1 Applicable to uncontrolled engines only
2 The verified emissions reduction is 25 percent regardless of actual emission test values
3 The verified percentage reduction for LSI Level 2 is 75% or 3.0 g/bhp-hr regardless of actual emission test values
4 Verified in five percent increments, applicable to LSI Level 3a classifications only
5 Applicable to emission-controlled engines only

At the time of the June 2005 hearing, ARB staff believed that the majority of retrofit systems would be verified to Level 2, providing a 75 percent reduction from 12 g/bhp-hr to 3.0 g/bhp-hr. Comments from manufacturers indicated that the applicability of the system would likely be limited to equipment that was approximately 1996 or newer. Since then, however, the ARB has verified a retrofit system that brings uncontrolled 12 g/bhp-hr equipment to a level that is cleaner than current new equipment – down to 1.0 g/bhp-hr. In addition, this system is applicable to the majority of all forklifts as old as 1990. Two additional retrofit systems are now in the process of being verified. The verified system is now available for many pieces of uncontrolled equipment.

3.4 Alternative Compliance Option for Fleets used in Agricultural Crop-Preparation Services

Recognizing that forklift fleets owned and used in agricultural crop-preparation services are often significantly older than other fleets, and that these businesses are often not in a position to fully recover costs, ARB staff is proposing an alternative compliance option for these fleets.

In June 2005, staff presented an option for fleets owned by agricultural crop-preparation businesses that was less stringent than the basic fleet requirement and allowed additional time for compliance. Nonetheless, concern has continued regarding the cost of the proposal, especially the costs related to replacing equipment that could not be retrofitted. Staff has revised its proposal to further reduce costs by only requiring compliance of owned forklifts for which retrofit kits are available, thus avoiding the higher cost of replacing or retiring forklifts.

About 40 percent of the forklifts owned by agricultural-related business are expected to have retrofits commercially available and be subject to retrofit; the remaining forklifts would not be affected by the proposal. Specifically, owners of agricultural-related fleets would be required to reduce emissions (to a 3.0 g/bhp-hr level or less) of 20 percent of their equipment for which retrofits are available by January 1, 2009, and the remaining 80 percent by January 1, 2012. In addition, the agricultural proposal includes a low hours-of-use exemption and specialty equipment exemption, similar to those in the basic fleet average requirement. However, the low hours-of-use equipment exemption is permanent.

The economic impact of this alternative proposal is described in Section 6.5 and the emissions benefits achieved (and foregone) from this proposal are detailed in Section 5. In summary, the proposal will result in substantially reduced costs to operators of agricultural forklifts, and provide an opportunity to receive incentive funds. The agricultural summer ozone season emission benefit of the proposal is approximately one ton per day of HC+NOx by 2012, which is 1.5 tons per day less than if full applicability were sought.

4 TECHNOLOGY REVIEW

Off-road LSI engines are similar to automotive engines, but have traditionally lacked some of the automotive-style emission controls that have been in use for more than 25 years. While off-road LSI engines are exposed to duty cycles that can be more strenuous than those of their automotive cousins, they are suitable candidates for control, and manufacturers are now applying automotive-style emission control technologies to LSI engines to reduce emissions. These technologies include closed-loop fuel controls, fuel injection, and three-way catalytic converters.

4.1 Emission Control Strategies

Since 1980 automotive emission control systems have used a closed-loop fuel control system to help reduce emissions. These systems use sensors to monitor exhaust gas oxygen concentrations, and feed this information back to an electronic control module, which in turn keeps the air-to-fuel mixture at an optimum level. To help ensure more precise metering of fuel and optimum combustion, carburetors have been replaced by fuel injection. Today's advanced systems maintain an extremely tight stoichiometric air-to-fuel balance during nearly all engine operations. This is important because fluctuations from stoichiometric result in reduced efficiency in controlling HC, NOx, and CO emissions.

Central to automotive emission control systems is the three-way catalytic converter. Automotive manufacturers have installed tens of millions of them each year for more than 25 years. They are an integral component of automotive emission-control systems that have allowed the automotive fleet to meet progressively lower emission standards, effectively reducing emissions by more than 95 percent.

4.2 Emission Controls for LSI Engines

Current LSI engines use closed-loop fuel-control systems with three-way catalysts to meet State and federal emission standards. The components used, however, are generally cheaper and less effective than versions found in passenger cars. Even so, close to 50 percent of all LSI engines certified in 2004 emitted at 1.0 gram or less which is well below the 2007 2.0 grams per brake-horsepower-hour standard. In addition, several current LSI engines already emit at 0.5 grams or less, demonstrating the feasibility of the more stringent 2010 standards. Engines tested and evaluated by U.S. EPA were used to establish the curve shown in Figure 3.0, which has an endpoint of 0.8 g/kW-hr. Many of the engines being certified to meet the 2007 standard are expected to also be able to meet the 2010 standard through calibration changes alone. For others, modest improvements in precious metal loading, higher cell densities, and/or more effective washcoats may be needed. These technologies are readily available from the automotive sector.

4.3 Impact of Transient Testing

Some manufacturers have expressed concerns about the impact of the 2007 transient test cycle on the feasibility of achieving the proposed new engine standards. To date, information provided by the Southwest Research Institute indicates that, under the transient test cycle, hydrocarbon emissions from an LPG engine increased by about 30 percent, but NOx emissions remained relatively constant. In a review of 13 forklift engine families (of 19 total) in our 2004 certification test database, NOx constituted approximately 50 percent of the HC+NOx emissions.[2] At 50 percent HC, the new test cycle could lead to a potential emissions increase of 15 percent over emissions from the steady state test cycle. However, all but one of the 13 engine families would still have an HC+NOx certification level of less than 1.0 g/bhp-hr because in instances where the HC emissions were high, the corresponding NOx emissions were low. Clearly, the new test cycle does not prevent compliance with the proposed 2007 standard.

Test results from emission control device manufacturers using new catalysts and other emission control technologies, while not performed under the transient test cycle, show that emissions can be reduced by more than 90 percent when compared to the proposed 2007 standard (SwRI, 2004). The proposed 2010 standard requires a 70 percent emission reduction. Given that several current production LSI engines emit well below the proposed standard and the exceptionally low emission levels demonstrated on modern passenger cars, meeting the proposed 2010 LSI standard is feasible.

[2] Historically, NOx emissions constituted 80 percent of the total LSI emissions (September 1998, LSI Staff Report).

4.4 Lead Time

When U.S. EPA promulgated the federal LSI standards, the Agency stated that the three-year period between the 2004 Tier 1 and 2007 Tier 2 emission standards (3.0 and 2.0 g/bhp-hr, respectively) allowed manufacturers sufficient lead time to meet the more stringent standard. The U.S. EPA went on to state the expectation that the emission-control technologies for the 2004 emission standard would be able to meet the 2007 standard with additional optimization and testing. The ARB's staff expects that three years will also be sufficient time for manufacturers to further optimize the emission-control technologies needed to meet the 2010 ARB 0.6 g/bhp-hr requirement. It also provides sufficient time to incorporate hardware changes, should they be necessary.

4.5 Fuel Quality

Liquefied petroleum gas is a mixture of various hydrocarbons produced from crude oil refining or the processing of natural gas. Propane is the predominant component of LPG. The LPG used for motor vehicles must meet a quality specification to ensure proper operation of motor vehicles and to achieve and maintain exhaust emission standards. LPG fuel that does not meet these motor vehicle specifications can harm engine fueling systems and components and may prevent an engine from complying with existing and future emissions standards.

In 1992, ARB established motor vehicle fuel specifications for LPG limiting the propene content to 10 percent by volume. Other heavier hydrocarbons are also limited. Not all LPG produced meets the LPG motor vehicle specifications. The LPG not meeting the motor vehicle specification is considered commercial grade propane and is used mostly for space heating and recreational purposes.

There are two separate concerns about LPG motor vehicle fuel quality - fuel contamination and high olefin content. Contaminated fuel can have an immediate and sometimes damaging impact on the fuel delivery system and the emissions control system. Contamination typically occurs downstream of production during storage and distribution. For example, contamination can occur from fuel-hose degradation.

There is information to suggest that LPG containing high olefins, such as propene, can accumulate on fueling components and can adversely affect the fuel-delivery and emission-control systems. This accumulation is often the result of using commercial grade fuel in motor vehicles. Commercial grade fuel is intended primarily for heating and has a higher olefin content than motor vehicle grade LPG. Olefins react to create a plastic-like coating in the vaporizers, carburetors, and injectors. This coating gums up these engine components, reducing the effectiveness of heat transfer and ultimately causing poor delivery of the fuel and inaccurate fuel-to-air ratios. Heavy hydrocarbon residue may also cause similar problems.

The ARB is committed to working with industry to determine if the existing specifications are adequate to support more stringent emission standards. The ARB is executing a contract to analyze 150 LPG samples from various sites statewide. The ARB is also following activities of the control device manufacturers, refiners, and LPG distributors to make low olefin LPG fuel, advanced fuel filters, and fuel additives available to fleets, leading to reduced emissions and vehicle maintenance and improved fuel efficiency.

5 ENVIRONMENTAL IMPACTS

5.1 Air Quality Impacts

Staff used the ARB's OFFROAD model to estimate emissions from LSI engines. The key assumptions for population and activity are shown in Table 5.0.

Table 5.0: OFFROAD Model Input Factors

Input	Unit	All LSI Equipment[1]
Horsepower	hp	63
load factor	unitless	0.47
activity	hours/year	905
2010 population	unitless	92,507
2020 population	unitless	96,963
life	years	10.8

1 Population-weighted

Staff calculated the emission benefit from the introduction of the 0.6 g/bhp-hr low emission standard using the difference between that standard and the federal 2.0 g/bhp-hr standard, new equipment sales volume, and the above input standards. Staff calculated the emission benefit from the fleet-average requirements by taking the difference between an established baseline fleet-average emission level and the proposed fleet-average emission levels for all affected fleets. The baseline takes into consideration the current use of electric equipment in many fleets.

Table 5.1 lists the 2010 and 2020 emission benefits of the proposed regulation. The in-use benefits are roughly 20 percent lower than those presented at the June 2005 Board hearing. The reasons for the decrease in emission benefit are shown in Table 5.3.

Table 5.1: Statewide Emissions Benefits

Staff Proposal Element	HC+NOx Reductions (tons per day)	
	Year 2010	Year 2020
Fleet Average Emission Requirements[1]	4.5	< 1.0[2]
New Engine Standards	1.2	6.2
Total	5.7	6.2

1 These requirements apply to fleets with 4 or more pieces of off-road LSI equipment.

2 The benefits from the in-use standards are expected to be minimal in 2020 as the vast majority of the equipment will have been retired.

Table 5.2 shows the estimated 2010 and 2020 benefits of the staff's proposal for the South Coast relative to the SIP emission reduction commitment for that region. The benefits in the South Coast are expected to decrease in proportion to the statewide decrease, but will still represent 46 percent of the statewide total. As shown in Table 5.2, the emission benefits of staff's revised proposal are just below the 2003 SIP commitment for 2010 and well within the range for 2020.

Table 5.2: South Coast Air Basin Emissions Benefits

	HC+NOx Reductions (tons per day)	
	Year 2010	Year 2020
2003 SIP Commitment	2.8 -6.0[1]	1.5 – 5.1
Staff's Proposal	2.6	2.9

1 6.1 to 13.0 tons per day on statewide basis.

The staff's revised proposal contains provisions to reduce the costs to small fleets and agricultural-related businesses. The effect of these revisions is to reduce the emission benefit achieved in the post-2010 time-frame. The reduced benefits of the small fleet exemption does not impact the 2003 SIP commitment for 2010 because small fleets were not originally required to have their equipment comply with prescribed standards until 2011. It additionally is not reflected in the 2003 SIP commitment for 2020 because it is assumed all uncontrolled forklifts (except agricultural forklifts), will have been retired by that time.

The proposal for agricultural-related businesses is estimated to achieve 1.3 tons per day for the summer ozone season by 2012. The substantial portion of the previous and current agricultural proposal occurred after 2010, therefore the 2010 benefits are not significantly impacted by this revision. By 2020, staff assumes that 40 percent of the agricultural-related forklifts will have been retired, reducing the emissions loss to about 1.0 ton per day. Table 5.3 shows the impacts from these revisions.

Table 5.3: Impact of Revised In-Use Proposal
(tons per day HC+NOx)

Agriculture Retrofit Only[1]	(2.2)
Small Fleet Exemption	(1.0)

1 The agricultural benefits are for the summer ozone season, assuming that 75% of annual hours occur during this period.

It should be noted that dealers have questioned whether the existing LSI regulations have already achieved emission benefits not reflected in staff's inventory because a significant number of LSI engines are certifying well below the standards. The emission benefits attributable to the LSI regulations already in effect were determined using the applicable certification standards consistent with the methodology for most other mobile source regulations. The ARB staff will continue, nonetheless, to assess and improve the LSI emissions inventory, including in-use emissions, and other factors such as hours of use, emissions deterioration, and equipment life.

5.2 Other Impacts

The ARB staff has also assessed the impacts from the use of electric forklifts. An increase in their use would result in a corresponding increase in the electrical energy required to recharge the batteries on a regular basis and in turn, would create a greater demand for electricity supplied at generating facilities.

To determine the relative impact from the use of electric forklifts, staff assumed that the population of Class 1 electric rider-forklift trucks grew by 25 to 50 percent as a result of the regulation. Staff assumed that these electric forklifts had an average of 50 horsepower (37.3kW) and would be operated at a 30 percent load factor for 1,900 hours per year. Under these assumptions, the increased energy demand from the additional entire electric forklift fleet would be approximately 0.05 to 0.10 percent of the projected total energy demand in 2010. This increased demand, which includes losses associated with the distribution of electricity, will not have a significant impact on the overall system.

The use of electric forklifts will increase electricity demand and consequent upstream emissions, primarily NOx, from power plants. The NOx emissions from power plants attributed to the increased energy demand of electric forklifts will be small in comparison to the NOx emissions from the LSI forklifts that are being replaced. Additionally, air district permitting programs are in place to minimize these emission increases and previous estimates have determined these upstream emissions to be extremely small compared to the benefits achieved.

While electrification of forklifts will result in the increased production and use of batteries, lead-acid batteries are well regulated and banned from municipal solid waste landfills. Additionally, California has an established recycling infrastructure, and the recycle rate for lead-acid batteries is currently over 95 percent. With these mitigation measures in place, battery disposal impacts should not be significant.

6 ECONOMIC IMPACTS – COST AND COST-EFFECTIVENESS

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

State agencies are also required to estimate the costs or savings to any state or local agency and school district in accordance with instructions adopted by the Department of Finance. The estimate shall include any non-discretionary costs or savings to local agencies and costs or savings in federal funding to the state.

Any business involved in the production or use of LSI engines would potentially be affected by the proposed regulation. Also potentially affected are manufacturers that supply components for engines and industrial equipment, and distributors and retailers that sell such equipment.

6.1 Incentive Programs

Incentive programs have the ability to prompt emissions benefits early or beyond those required by regulations. California has the largest incentive program in the nation, with over $140 million available each year through State and local funds. Even so, this level of funding is far from sufficient to pay for all the reductions needed to provide clean air. Reductions required by regulations, and funded by owners of the affected equipment, will still provide the majority of emission reductions.

Currently, incentive programs, such as the Carl Moyer Program, provide modest funding for forklift projects. In some cases, the incremental cost of electric forklifts can be funded (about $5,000) if the applicant can demonstrate he or she is not in an occupation where electric forklifts are the norm. Purchase of low-emission forklifts has not previously been an eligible category because no low-emission standards existed ("low-emission standards" refers to optional standards more stringent than otherwise required of all LSI engines). With the adoption of the proposed optional low-emission standards, manufacturers could be eligible for the incremental cost of the low-emission equipment. Recently, retrofit systems for forklifts have become an eligible project category, with the full retrofit cost eligible for funding.

With the adoption of the proposed regulation, most of the incentive projects would no longer be eligible for funding. Several exceptions would remain:

Small Fleets

Small fleets, from one to three units, are exempt from the regulatory proposal. As such, they would continue to be eligible for incentive funding. Eligible projects include the incremental cost to purchase electric forklifts, low-emission forklifts, and retrofits.

Agricultural-Related Fleets

The alternative proposal for agricultural-related businesses would not require implementation of the retrofit requirements until January 1, 2012, for 80 percent of these fleets. As such, that portion of the fleet would be eligible for incentive funds to pay the full cost of the retrofit through January 1, 2009. After that point, the project could not demonstrate a three-year project life, as required by the Carl Moyer Program.

Complying Fleets

Fleets that demonstrate full compliance with their fleet-average requirements would be eligible for incentive funds to further reduce emissions. Eligible projects would include electric forklifts, low-emission forklifts, and retrofits.

6.2 Potential Impact on Manufacturers

The proposed engine standards will impact manufacturers of off-road LSI engines and original equipment using such engines. Engine manufacturers are located mostly outside of California. As manufacturers are already developing engines to comply with the federal 2.0 g/bhp-hr standard for 2007, the proposed adoption of California standards for 2007 to 2009 is not expected to result in significant additional work or costs. For reference, the U.S. EPA estimates that the additional cost to manufacturers of meeting the 2007 standards is approximately $50 per engine.

Most engines meeting the 2.0 g/bhp-hr standard are expected to use the same basic hardware to also meet the 2010 requirement of 0.6 g/bhp-hr, although calibration changes will be needed. To provide a conservative cost analysis, ARB staff assumed that 25 percent of all engines would need improvements to the catalyst system (increased volume and/or precious metal loading) resulting in an average hardware cost increase of 40 percent. This cost is shown in Table 6.0. U.S. EPA's rulemaking for 2007 is the source for the base catalyst cost.

**Table 6.0: Incremental Hardware Cost
2010 Emission Standard**

	per engine
Base catalyst/muffler (2 gram standard)	$295
Improved catalyst/muffler (0.6 gram standard)	$415
Incremental cost (for the 25 percent of engines needing improvements)	$120
Average incremental cost	**$30**

Spreading the cost of the catalyst upgrade across all engines sold in California results in an average incremental per engine cost of $30.

The U.S. EPA analysis determined the fixed and variable costs for manufacturers producing LPG, CNG, and gasoline engines to meet the 2.0 g/bhp-hr standard. The ARB staff used the compliance costs from this analysis to determine the engineering and compliance costs for engines designed to meet the 0.6 gram standard. The incremental hardware costs noted above were then included to determine the overall cost presented in Table 6.1. As shown, the proposed new standards for 2010 are expected to add less than $100 to the cost of a new engine. This cost will be passed onto the fleet operator and is small enough to not significantly impact California competitiveness, employment, or business status.

**Table 6.1: Incremental Retail Price Equivalent Costs
To Meet 2010 Standard**

	per engine
Research and development	$20
In-Use Testing	$10
Certification	$20
Hardware improvements (from Table 6.0)	$30
Total Incremental Cost	$80

The compliance costs in Table 6.1 assume that manufacturers will produce and sell most 0.6 g/bhp-hr engines nationwide (the 75 percent that do not require extra hardware to comply) and, thus, will be able to spread the fixed costs over a larger volume of engines. The ARB staff believes that this is reasonable given that the engines expected to be in production in 2010 are essentially the same as those that will be produced to meet the federal regulations. ARB staff did not, however, assume that the 25 percent of engines with more expensive and robust catalysts would be sold nationwide. Therefore, the per engine certification cost considers that these engines are only sold in California and, thus, the cost is greater than the per engine estimates presented by U.S. EPA.

The research and development costs in Table 6.1 reflect the calibration changes needed to meet the 2010 standards. A portion of the in-use testing cost derived by U.S. EPA is due to facility upgrades for transient testing to meet the federal 2007 standards. As these improvements will occur regardless of this proposed rulemaking, the in-use testing cost used by ARB staff is conservative.

6.3 Potential Impact on Distributors and Dealers

Most engine and equipment manufacturers sell their products through distributors and dealers. While distributors and dealers are not directly affected by the proposed standards, the proposed standards may affect them indirectly. Dealers earn income through the sale and lease of new forklifts, parts and service for in-use forklifts, forklift rental, and the sale of used forklifts. In the June 2005 proposal, staff believed that forklift dealers would be able to pass through the vast majority of all costs associated with the proposal to the operators of the equipment. Since that time, staff has learned that the business model for forklift dealers is more complex. The following discussion assesses how the various elements of the staff proposal may affect dealers.

Regarding the sale or lease of new forklifts, this proposal is not expected to have a significant positive or negative impact on dealers. An increase in price could potentially reduce sales. However, the projected increase in cost is modest (less than 1 percent) and it is expected that it will be passed on to end-users since all competing equipment will increase in price. It is more likely that an impact of the proposal will be that fleets will turn over equipment more quickly in order to comply with the fleet-average requirements. This would result in the increased sale and lease of new equipment.

In the sale of parts and service for in-use equipment, the proposal is likely to have a slightly positive impact since the proposal would result in increased business to install retrofit systems in order to comply with the fleet-average requirement.

With regard to rental forklifts, the proposal would require that forklifts rented for less than one year meet a 3.0 g/bhp-hr emission standard by 2009. The impact on the dealers would depend on several factors, including when the dealers began purchasing controlled equipment, the average turn-over rate of their rental fleet, and the ability to pass along any increased rental costs due to more expensive equipment. A dealer that was receiving controlled equipment since 2003 and is on a five-year lease turn-over cycle would not have any significant impact. A number of dealers are in this position. Most dealers, however, will have a small percentage of uncontrolled equipment still within their rental fleet by 2009. A few dealers were still receiving uncontrolled equipment in 2004 and if they are on a longer turn-over cycle may have to address a larger percentage of their fleet.

A dealer may employ several options to address the uncontrolled fleet. A straightforward option is to install a retrofit system. The cost of the retrofit system to the dealer and its installation are estimated to be $3,500. The extent to which these costs may be passed along to the rental customer is unknown. Dealers have stated that they do not believe any increase in costs could be passed along because they have not been able to increase rental costs for many years. However, in the new dynamic of a fleet rule, it seems reasonable to assume that some increase in costs could be accommodated. Staff does not believe the full cost could be recouped.

A second option for the dealer would be to slightly accelerate the turn-over of the rental fleet to incorporate new or used equipment that is controlled. Again, this would require added costs on the part of the dealership for a portion of the fleet, and it is unclear what percentage of that cost could be passed along. A related option is for dealers to adjust the make-up of their rental fleets. The revised staff proposal would allow uncontrolled equipment to be sold to small fleets. Therefore, dealers could guide uncontrolled equipment to small business sales and ensure more controlled equipment is moved into the rental fleet. A third ption is for dealers to utilize the low-hours exemption. As discussed, equipment that is used less than 250 hours per year would have two additional years to comply.

None of these solutions fits all the situations or provides the entire solution. Those dealers with some uncontrolled equipment remaining in their rental fleet will likely need to incorporate several of the options in order to comply with the regulations in the most cost-effective way. In addition, dealers will need to be prepared to make adjustments to how they currently conduct business in order to maintain a fleet of controlled equipment available to rent.

The final income source for dealers is used forklift sales. A number of dealers have portrayed this source of income as providing the largest profit for the dealership. In order for dealers to have an ample supply of used forklifts coming back to them for resale, dealers often guarantee the value of any new lease that they enter. Consequently, the fleet rule, as structured in the June 2005 proposal, could have had a significant economic impact on some dealers, since it would have devalued the uncontrolled equipment for which they had guaranteed a specific value. Staff believes the current proposal significantly reduces, although does not eliminate this impact. The proposed exemption of small fleets from the in-use fleet requirement will provide a continuing market for uncontrolled forklifts. However, not all used dealer forklifts are sold to small fleets.

Table 6.2 provides a range of potential costs to dealers. The total number impacted is based on information from industry and is largely affected by normal turnover and placement of equipment in small fleets. The cost range assumes that a large portion of the equipment procured in 2004 was uncontrolled, that all equipment impacted will be retrofit at a cost of $3,500 per unit, and that none of the cost is passed along to the consumer. These assumptions provide a worst-case analysis for the industry as a whole. As shown in the table, staff estimates the total cost to be between roughly $2 million to $5 million. Rather than retrofitting the forklifts, dealers may avoid this cost by limiting their sales of uncontrolled equipment to small fleets and selling the equipment over a longer period of time.

Staff's June 2005 proposal did not include the small fleet exemption and would have impacted this segment of uncontrolled forklifts. Since a large percentage of equipment is ultimately sold into small fleets, the June 2005 proposal would have represented two to three times the estimated costs presented in Table 6.2 below.

Table 6.2: Potential Costs to Dealers[1]
Revised Staff Proposal

Total Impacted - low estimate	250 units
- high estimate	1,400 units
Cost per Retrofit	$3,500
Total Cost to Equipment Dealers	$875,000 to $4,900,000

1 Dealers estimated a total of approximately 12,000 forklifts statewide. Based on a typical lease life of 5 years and typical rental life of 5-8 years, and an estimate of 85 percent of forklifts sold to small fleets, the low and high estimates were derived for the number of uncontrolled forklifts.

6.4 Potential Impact on Equipment Operators

Under the staff proposal, fleets would have the flexibility to decide the mix of options to achieve the required fleet average emission levels. The fleet average approach will allow LSI fleet users to choose the lowest cost option for their particular application. Among the possible options are retrofit equipment, purchase of certified cleaner equipment or purchase of zero-emission electric equipment. To determine a range of potential cost, staff analyzed the potential impact to end users of the requirements applicable to fleets of different sizes.

6.4.1 Lower-Emission Engines

Fleet operators can purchase new engines as necessary to meet the fleet standards. Incremental costs for engines in the 2007 to 2009 timeframe are attributable to federal regulations that will require equipment to meet the 2.0 g/bhp-hr standard. For engines purchased in 2010 and beyond, staff expects that the incremental cost will be minimal, less than $100. Fleet operators may also be able to buy optional, lower emission engines. The incremental costs for these engines is not known, but these costs are not expected to be significant as some engines already being sold emit at these low levels.

6.4.2 Zero-Emission

An electric forklift typically costs from $1,500 to $5,000 more than a comparable LSI forklift (EPRI, 2001). However, since an electric forklift has a longer useful life and reduced fuel and maintenance costs, the electric forklift can reduce life-cycle costs compared to a LSI forklift.

Electric forklifts can provide reductions from 2.0 g/bhp-hr to 12.0 g/bhp-hr depending on the emissions rate of the equipment they replace. Assuming an average emissions-rate reduction of 7.0 g/bhp-hr (combined with horsepower, hours of use, and load factor, as noted above) yields an average emissions reduction of 500 pounds per year per forklift.

6.4.3 Retrofit

Retrofit systems reduce emissions from older, uncontrolled forklifts, which produce 12 g/bhp-hr HC+NOx, to a level of 3.0 g/bhp-hr HC+NOx or lower. The cost of a retrofit system is estimated to be $3,500 as installed (Lubrizol, 2005). These systems provide an average benefit of approximately 690 pounds of HC+NOx reductions per forklift per year. It should also be noted that many of the 2001 through 2003 engines that were certified as uncontrolled during the phase-in of the 3.0 g/bhp-hr standard are already equipped with some of the emission-control components. Lower cost retrofit systems could be available for these engines.

The installation of a retrofit system will improve engine operation and reduce fuel use. Closed-loop fuel systems generally operate close to stoichiometry, improving the engine's efficiency. Information from retrofit control-system manufacturers and data from U.S. EPA indicate an estimated 10- to 20-percent reduction in fuel consumption with engines employing closed-loop systems (U.S. EPA, 2002). For a typical LPG or gasoline forklift, the annual fuel savings from a retrofit system used in California is estimated at $600 as shown in Table 6.3. Thus, the retrofitting of existing uncontrolled engines can provide net savings over the equipment's life.

Table 6.3: Estimated Fuel Savings

Input	LPG
Horsepower (hp)	66
Load factor (unit-less)	0.30
Use (hours)[1]	1,200
Improved brake-specific fuel consumption (pound/hp-hour)	0.075
Fuel density (pounds per gallon)	4.2
Fuel cost (dollars per gallon)	1.50
Annual savings (dollars)	600

1 The fuel savings estimate is based on an annual usage of 1,200 hours as opposed to the average use-rate of 1,800 hours to reflect the fact that older equipment is used less than the average.

6.4.4 Incremental Capital Cost

Table 6.4 summarizes the estimated initial costs of each option available to fleet operators. These values were used to generate the estimated cost effectiveness presented below. Staff did not include in its calculation the reduced fuel and maintenance costs resulting from use of retrofitted and zero-emission equipment, which over the equipments' life may exceed the incremental capital cost.

Table 6.4: Incremental Capital Cost

Compliance Option	
Retrofit	$3,500
Lower-Emission	$30 - $80
Zero-Emission	$1,500 - $5,000

6.5 Potential Impact on Agriculture

The proposed regulations include an alternative compliance option for forklifts owned by agricultural fleets to address issues specific to that industry. This option reduces costs to agricultural businesses to a minimal level.

Applying the fleet average proposal to agricultural-related fleets results in a total cost to industry of over $30 million. Staff identified this as a concern, and prior to the June 2005 Board hearing staff developed a proposal that significantly reduced the cost and spread it over 10 years. Staff estimated that the June 2005 proposal would have a cost of between $5 million and $6 million. At that time, industry estimated the cost to be significantly higher. The main differences were that staff assumed a modest level of turnover and industry assumed no turnover. In addition, staff assumed industry would purchase used forklifts when replacing an old forklift, and industry assumed new forklifts would be purchased.

Staff has revised its proposal for agricultural-related fleets. Equipment for which a retrofit system is available must be retrofit. Equipment for which no retrofit system is available may continue to be used. This avoids the higher cost of replacing this typically older equipment, which would have been required under staff's June 2005 proposal.

Based on the information provided by the agricultural industry, uncontrolled forklifts that can be retrofitted and thus would be impacted by staff's revised proposal account for 40 percent of their total owned forklifts. Assuming a conservative 10 percent of the affected forklifts will take advantage of one of the two exemptions proposed (low-use, specialized equipment), only 830 forklifts will be required to be retrofitted. Table 6.5 presents the total costs, and the estimated cost to industry if the fleets take full advantage of the incentive monies that are available under the revised proposal.

Table 6.5: Potential Costs to Agriculture

Equipment	2,300 units
Equipment Impacted[1]	830 units
Cost per Retrofit	\$3,000 - \$4,000
Total Capital Cost	\$2.5-\$3.3 million
Eligible for Financial Assistance	80 percent
Potential Net Cost	\$500,000-\$660,000

1 As estimated by industry, 40 percent of the fleet is model-year 1990 or newer and can be controlled. 10 percent of this portion of the fleet is assumed to meet the low usage or specialty equipment exemption.

On a per fleet basis, a typical business such as a packinghouse might have between 10 and 20 owned forklifts potentially impacted by this proposal. Of those, between four and eight would be required to have a retrofit. Incentive funding could be available for up to 80 percent of these. If the typical packinghouse takes advantage of maximum incentive funding and only needs to fund two retrofit systems, the cost to the packinghouse could be as low as \$6,000 to \$8,000. If incentive funding is not utilized, maximum cost would be in the range of \$32,000. For simplicity, the cost estimates do not incorporate fuel savings that the retrofit systems provide.

6.6 Cost-Effectiveness

The incremental capital cost estimates in Section 6.4.4 were amortized over the expected life of the equipment[3] with an interest rate of five percent. The amortization formula yields a capital recovery factor, which when multiplied with the initial capital cost, gives the annual cost of the compliance option over its expected lifetime. Dividing the annual cost of the compliance option by the emissions benefit in pounds for that option yields the cost-effectiveness. For both retrofitted and electric forklifts, the cost-effectiveness is presented as a range to reflect both the full incremental capital costs and the overall life-cycle costs.

For those businesses that can incorporate electric equipment without the need for battery-swapping or fast-charging, staff believes electric equipment provides a life-cycle saving. However, as many businesses are sensitive to the initial capital costs, the cost-effectiveness is also listed with the full capital cost. Staff did not estimate the full life-cycle cost of electric equipment if fast-charging or battery-swapping were necessary. Because the proposed fleet-average requirement provides flexibility, staff assumed that an operator would not choose to convert to electric equipment unless the operator could reasonably and cost-effectively incorporate such equipment within the fleet or had other reasons for doing so.

[3] Conservatively, the expected life of a retrofitted forklift is five years, while that of a lower-emission forklift is seven years and an electric forklift is nine years.

Table 6.6: Cost-Effectiveness

Compliance Option	Dollars per pound
Retrofit	0 – 1.20
Lower-emission	0.13
Zero-Emission	0 – 1.40[1]

1 Cost-effectiveness based on replacement of both controlled and uncontrolled equipment.

Thus, as illustrated in Table 6.6 above, fleet operators have several cost-effective options to comply with the fleet standards. The cost-effectiveness for all options compares favorably with other regulatory programs adopted by ARB.

6.7 Potential Impact on Business Competitiveness, Employment, and Business Creation and Elimination

The proposed regulation is not expected to have a significant impact on the ability of California businesses to compete with businesses in other states. Requirements for the end users are not expected to be significant as new engines, electric equipment, and retrofit kits all provide performance and cost benefits. The resale value of existing uncontrolled equipment that is not retrofitted will be reduced.

The proposed regulation is not expected to cause a noticeable change in California employment. California accounts for only a small share of the manufacturing employment in industrial equipment and components.

The proposed regulations are not expected to cause any significant change in the status of California businesses. The regulation would potentially increase the retail price of LSI equipment. However, these costs are expected to be minor. The regulation will stimulate demand for fuel-system components and retrofit systems, resulting in an increase in business for some California manufacturers.

7 ALTERNATIVES AND RECOMMENDATION

7.1 Alternatives Considered

In June 2005, ARB staff presented a proposal that was similar in structure to the current proposal, except that it retained a fleet average requirement for small fleets and a more aggressive alternative option for agricultural-related businesses. The June proposal achieved greater reductions; however, staff believes the economic impact of that proposal was too high. The current proposal provides a more appropriate balance between technical feasibility and cost to affected industries.

During the regulatory development process, ARB staff evaluated various strategies for reducing emissions from LSI engines including:

- Lowering Manufacturer Emission Standards
- Manufacturer-based Fleet-Average Standards
- Owner or User Fleet-Average Standards
- Near-Zero Emission Requirements
- Zero-Emission Requirements
- In-Use Retrofit Requirements

Each of the elements noted was considered both independently and in combination. At one point, ARB staff actively pursued a requirement for electric purchase. This concept would have required medium and large fleets to meet a 10 percent electric component in 2007, 20 percent in 2008, 30 percent in 2009, and 40 percent in the years 2010 through 2015. ARB staff decided this concept would not provide the necessary flexibility to industry, and might force the use of a specific technology in applications where it would be unsuitable.

ARB staff also considered requiring that medium and large fleets reduce emissions from their existing uncontrolled LSI engines by the end of 2008 through the use of retrofit emission-control systems. Small fleets of one to three units would have had additional time to retrofit their equipment, and would have been exempt from the electric purchase requirement. Again, staff rejected these concepts and instead developed a fleet average concept to allow fleets greater flexibility in reducing their emissions.

7.2 Conclusion

The proposal described herein would reduce HC+NOx emissions in a cost-effective manner. No alternative considered by the agency would be more effective in carrying out the purpose for which the regulation is proposed or would be as effective as or less burdensome to affected private persons than the proposed regulation.

REFERENCES

ARB, 1998a. "Public Hearing to Consider Adoption of Emission Standards and Test Procedures for New 2001 and Later Off-Road Large Spark-Ignition Engines," California Air Resources Board, September 4, 1998.

ARB, 1998b. "Notice of Public Meeting to Consider the Approval of California's Off-Road Large Spark-Ignited Engine Emissions Inventory," California Air Resources Board, October 22, 1998.

ARB, 1998c. "Notice of Public Meeting to Consider the Approval of California's Off-Road Large Spark-Ignited Engine Emissions Inventory," Attachment 1, Input Factors, California Air Resources Board, October 22, 1998.

ARB, 2001. "Policies and Actions for Environmental Justice. "Sacramento, California. California Air Resources Board, December 13, 2001.

ARB, 2003. "Proposed 2003 State and Federal Strategy for California State Implementation Plan," Section II Mobile Sources, Introduction and Chapter D, California Air Resources Board, August 25, 2003.

ARB, 2005a. California Air Resources Board, Large Spark-Ignition Off-Road Summary, 2005 Model Year Certified Large Spark-Ignition Engine List: http://www.arb.ca.gov/msprog/offroad/cert/search_result.php , undated web page.

ARB, 2005b. Cost-Effectiveness Calculations Spreadsheet, Air Resources Board, April 2005

ARB, 2006a. Criteria Pollutant Emission Benefits Spreadsheet, Air Resources Board, February 2006

ARB, 2006b. Agricultural-Related Emissions Analysis, Air Resources Board, February 2006

ARB, 2006c. Dealer Costs Spreadsheet, Air Resources Board, February 2006

EPRI, 2001. "Increasing Profits with Electric Industrial Vehicles: A Case Study on the Alabama Power Company Electric Forklift Incentive Program," Electric Power Research Institute Inc., 2001.

GRI, 1995. "Industrial Truck Market Analysis," Final Report (GRI-95/0422), page 12, Gas Research Institute, October 1995.

GSE MOU, 2002. "South Coast Ground Service Equipment Memorandum of Understanding," An agreement between the California Air Resources Board and 17 airlines, November 27, 2002

ITA, 2005. Regular Member Products (by Class and Lift Code), http://www.indtrk.org/products.asp?id=rmp , April 25, 2005.

Lubrizol, 2006. Email from Cesar Baumann of Lubrizol Engine Control Systems, February 2, 2006.

MECA, 2003. "Emission Control Systems for Spark Ignited Vehicles & Engines: From PZEVs to Clean Lawn Mowers," Manufacturers of Emission Controls Association presentation, May 2003.

MECA, 2004. "MECA Responses to ARB Questions Regarding Three Way Catalyst (TWC) Technology for LSI Applications," Manufacturers of Emission Controls Association, prepared by Dr. Joseph Kubsh, MECA Deputy Director, June 30, 2004.

Nett Technologies, 2006. Email from Wayne Borean, of Nett Technologies, February 2, 2006.

SwRI, 2004. "Investigation of LPG Fuel System Technologies and Fuel Composition Effects on Emissions," Presentation to the Industrial Truck Association Spring Meeting, Southwest Research Institute, March 23, 2004.

U.S. EPA, 2002. "Control of Emissions from Nonroad Large Spark-Ignition Engines, and Recreational Engines (Marine and Land Based); Final Rule," Federal Register, Volume 67, Number 217, pages 68242 - 68447, November 8, 2002.

APPENDIX A: MANUFACTURER STANDARDS AND TEST PROCEDURES

1. Proposed Regulation Order, Part 1: Amend California Code of Regulations, Title 13, Sections 2430, 2433, and 2434 for Off-Road Large Spark-Ignition Engines.

2. Proposed Regulation Order Part 2: Amendments to the incorporated "California Exhaust Emission Standards and Test Procedures for New 2001 and Later Off-Road Large Spark-Ignition Engines" (40 CFR, Part 86, Subpart A)

3. Proposed Regulation Order Part 3: Amendments to the incorporated "California Exhaust Emission Standards and Test Procedures for New 2001 and Later Off-Road Large Spark-Ignition Engines" (ISO 8178)

4. Proposed Regulation Order Part 4: Adoption of incorporated "California Exhaust Emission Standards and Test Procedures for New 2007 through 2009 Model-Year Off-Road Large Spark-Ignition Engines" (40 CFR, Part 1048)

5. Proposed Regulation Order Part 5: Adoption of incorporated "California Exhaust Emission Standards and Test Procedures for New 2010 Model-Year and Later Off-Road Large Spark-Ignition Engines" (40 CFR, Part 1048)

6. Proposed Regulation Order Part 6: Adoption of incorporated "California Exhaust Emission Standards and Test Procedures for New 2007 Model-Year and Later Off-Road Large Spark-Ignition Engines" (40 CFR, Parts 1065 and 1068)

APPENDIX B: FLEET AVERAGE EMISSION LEVEL REQUIREMENTS

1. Proposed Regulation Order Part 8: Adopt California Code of Regulations, Title 13, Sections 2775, 2775.1, and 2775.2 for Large Spark-Ignition (LSI) Engine Fleet Requirements.

2. Fleet Average Compliance Scenarios

APPENDIX C: VERIFICATION PROCEDURE

1. Proposed Regulation Order Part 9: Adopt California Code of Regulations, Title 13, Sections 2780, 2781, 2782, 2783, 2784, 2785, 2786, 2787, 2788, and 2789 for Verification Procedures for Retrofit Systems Verification Procedure, Warranty, and In-Use Compliance Requirements for Retrofits to Control Emissions from Off-Road Large Spark-Ignition Engines.

2. Description of the Proposed Verification Procedures for Retrofit Emission Control Systems for Off-Road Industrial Engines

APPENDIX A: MANUFACTURER STANDARDS AND TEST PROCEDURES
Part 1

Proposed Regulation Order, Part 1: Amend California Code of Regulations, Title 13, Sections 2430, 2433, and 2434 for Off-Road Large Spark-Ignition Engines.

PROPOSED REGULATION ORDER, PART 1.

Note: Amendments to the regulations are shown with underline text for additions and ~~strikeout text for deletions~~.

Amend California Code of Regulations, title 13, sections 2430, 2433, and 2434 to read:

Article 4.5. Off-Road Large Spark-Ignition Engines

§ 2430. Applicability.

(a) (1) This article applies to large off-road spark-ignition engines 25 horsepower and greater produced on or after January 1, 2001 and all equipment and vehicles produced on or after January 1, 2001 that use such engines.

(2) Every new off-road large spark-ignition (LSI) engine that is manufactured for sale, sold, or offered for sale in California, or that is introduced, delivered or imported into California for introduction into commerce and that is subject to any of the standards prescribed in this article and documents incorporated by reference therein, must be certified for use and sale by the manufacturer through the Air Resources Board and covered by an Executive Order, issued pursuant to Chapter 9, Article 4.5, Section 2433.

(3) This article does not apply to engines in vehicles that are subject to the U.S. Environmental Protection Agency Regulations in Title 40, Code of Federal Regulations, Part 1051. In California, such engines and vehicles are subject to requirements of Title 13, California Code of Regulations, Chapter 9, Article 3, Off-Highway Recreational Vehicles and Engines, including any related provisions and guidelines that are applicable to Off-Highway Recreational Vehicles and Engines.

(b) Each part of this article is severable, and in the event that any part of this chapter or article is held to be invalid, the remainder of the article remains in full force and effect.

(c) This article and documents incorporated by reference herein include provisions for emissions certification, labeling requirements, warranty, in-use compliance testing, and production line testing.

NOTE: Authority cited: Sections 39600, 39601, 43013, 43018, 43101, 43102 and 43104, Health and Safety Code. Reference: Sections 43013, 43017, 43018, 43101, 43102, 43104, 43105, 43150, 43151, 43152, 43153,~~-~~ 43154, 43205.5, ~~and~~ 43210, 43210.5, 43211 and~~-~~43212, Health and Safety Code.

§ 2433. ~~Exhaust~~ Emission Standards and Test Procedures - Off- Road Large Spark-ignition Engines.

(a) This section applies to new off-road large spark-ignition engines produced on or after January 1, 2001. For the purpose of this section, these engines are also referred to as "new off-road LSI engines."

(b) *Standards.*

(1) *Exhaust Emission Standards.* Exhaust emissions from off-road large spark-ignition engines manufactured for sale, sold, or offered for sale in California, or that are introduced, delivered or imported into California for introduction into commerce, must not exceed:

Exhaust Emission Standards
(grams per brake horsepower-hour)
[grams per kilowatt-hour](1)

Model Year	Engine Displacement	Durability Period	Hydrocarbon plus Oxides of Nitrogen	Carbon Monoxide
2002 and subsequent	<1.0 liter	1,000 hours or 2 years	9.0 [12.0]	410 [549]
2001 - 2003(2),(3)	> 1.0 liter	N/A	3.0 [4.0]	37.0 [49.6]
2004 - 2006(4)	> 1.0 liter	3500 hours or 5 years	3.0 [4.0]	37.0 [49.6]
2007 ~~and subsequent~~ - 2009	> 1.0 liter	5000 hours or 7 years	~~3.0~~ 2.0 ~~[4.0]~~ [2.7]	~~37.0~~ 15.5 ~~[49.6]~~ [20.8]
2010 and subsequent (5)	> 1.0 liter	5000 hours or 7 years	0.6 [0.8]	15.5 [20.8]

Note:
(1) Standards in grams per kilowatt-hour are given only as a reference. Pollutant emissions reported to ARB by manufacturers must be in grams per brake horsepower-hour.
(2) Small volume manufacturers are not required to comply with these emission standards.
(3) Manufacturers must show that at least 25 percent of its California engine sales comply with the standards in 2001, 50 percent in 2002, and 75 percent in 2003.
(4) The standards for in-use compliance for engine families certified to the standards in the row noted are 4.0 g/bhp-hr (5.4 g/kW-hr) hydrocarbon plus oxides of nitrogen and 50.0 g/bhp-hr (67.0 g/kW-hr) carbon monoxide, with a useful life of 5000 hours or 7 years. In-use averaging, banking, and trading credits may be generated for engines tested in compliance with these in-use compliance

standards. If the in-use compliance level is above 3.0 but does not exceed 4.0 g/bhp-hr hydrocarbon plus oxides of nitrogen or is above 37.0 but does not exceed 50.0 g/bhp-hr carbon monoxide, and based on a review of information derived from a statistically valid and representative sample of engines, the Executive Officer determines that a substantial percentage of any class or category of such engines exhibits within the warranty periods noted in Section 2435, an identifiable, systematic defect in a component listed in that section, which causes a significant increase in emissions above those exhibited by engines free of such defects and of the same class or category and having the same period of use and hours, then the Executive Officer may invoke the enforcement authority under Section 2439, Title 13, California Code of regulations to require remedial action by the engine manufacturer. Such remedial action is limited to owner notification and repair or replacement of defective components, without regard to the requirements set forth in Section 2439(b)(5) or Section 2439(c)(5)(B)(vi). As used in the section, the term "defect" does not include failures that are the result of abuse, neglect, or improper maintenance.

(5) Small volume manufacturers are required to comply with these emission standards in 2013.

Optional Exhaust Emission Standards
(grams per brake horsepower-hour)
[grams per kilowatt-hour]

Model Year	Engine Displacement	Durability Period	Hydrocarbon plus Oxides of Nitrogen	Carbon Monoxide
2007 - 2009	> 1.0 liter	5000 hours or 7 years	1.5 [2.0]	15.5 [20.8]
2007 - 2009	> 1.0 liter	5000 hours or 7 years	1.0 [1.3]	15.5 [20.8]
2007 - 2009	> 1.0 liter	5000 hours or 7 years	0.6 [0.8]	15.5 [20.8]
2007 - 2009	> 1.0 liter	5000 hours or 7 years	0.4 [0.5]	15.5 [20.8]
2007 - 2009	> 1.0 liter	5000 hours or 7 years	0.2 [0.3]	15.5 [20.8]
2007 - 2009	> 1.0 liter	5000 hours or 7 years	0.1 [0.1]	15.5 [20.8]
2010 and subsequent	> 1.0 liter	5000 hours or 7 years	0.4 [0.5]	15.5 [20.8]
2010 and subsequent	> 1.0 liter	5000 hours or 7 years	0.2 [0.3]	15.5 [20.8]
2010 and subsequent	> 1.0 liter	5000 hours or 7 years	0.1 [0.1]	15.5 [20.8]

(2) *Crankcase Emissions.* No crankcase emissions shall be discharged into the ambient atmosphere from any new 2001 or later model year off-road LSI engines.

(3) *Evaporative Emission Standards.*

(A) Starting in the 2007 model year, engines that run on a volatile liquid fuel (such as gasoline), must meet the following evaporative emissions standards and requirements:

(i) Evaporative hydrocarbon emissions may not exceed 0.2 grams per gallon of fuel tank capacity when measured with the test procedures for evaporative emissions as described in subpart F, Title 40 Code of Federal Regulations (CFR) Sec.1048.

(ii) For nonmetallic fuel lines, you must specify and use products that meet the Category 1 specifications in SAE J2260.

(iii) Liquid fuel in the fuel tank may not reach boiling during continuous engine operation in the final installation at an ambient temperature of 30° C. Note that gasoline with a Reid vapor pressure of 62 kPa (9 psi) begins to boil at about 53° C.

(c) *Test Procedures.* The test procedures for determining certification and compliance with the standards for exhaust emissions from new model year 2001 through 2006 off-road LSI engines with engine displacement greater than 1.0 liter sold in the state are set forth in "California Exhaust Emission Standards and Test Procedures for New 2001 ~~and Later~~ through 2006 Off-Road Large Spark-ignition Engines," adopted September 1, 1999, and as last amended [*insert date of amendment*]. The test procedures for determining certification and compliance with the standards for exhaust and evaporative emissions from new model year 2007 and subsequent off-road LSI engines with engine displacement greater than 1.0 liter sold in the state are set forth in "California Exhaust Emission Standards and Test Procedures for New 2007 and Later Off-Road Large Spark-ignition Engines," adopted *[Insert date of adoption]*.

(d) The test procedures for determining certification and compliance with the standards for exhaust emissions from new off-road LSI engines with engine displacement equal to or less than 1.0 liter sold in the state are set forth in "California Exhaust Emission Standards and Test Procedures for 1995 and Later Small Off-Road Engines," as last amended March 23, 1999.

(e) ~~Replacement Engines~~ *Replacement Engines*.

(1) [Reserved]

(2) (A) Beginning in 2004, a new off-road large spark-ignition engine intended solely to replace an engine in a piece of off-road equipment that was originally produced with an engine manufactured prior to the applicable implementation date as described in paragraph (b), shall not be subject to the emissions requirements of paragraph (b) provided that:

(i) The engine manufacturer has ascertained that no engine produced by itself or the manufacturer of the engine that is being replaced, if different, and certified to the requirements of this article, is available with the appropriate physical or performance characteristics to repower the equipment; and

(ii) Unless an alternative control mechanism is approved in advance by the Executive Officer, the engine manufacturer or its agent takes ownership and possession of the engine being replaced; and

(iii) The replacement engine is clearly labeled with the following language, or similar alternate language approved in advance by the Executive Officer:

THIS ENGINE DOES NOT COMPLY WITH CALIFORNIA OFF-ROAD OR ON-HIGHWAY EMISSION REQUIREMENTS. SALE OR INSTALLATION OF THIS ENGINE FOR ANY PURPOSE OTHER THAN AS A REPLACEMENT ENGINE IN AN OFF-ROAD VEHICLE OR PIECE OF OFF-ROAD EQUIPMENT WHOSE ORIGINAL ENGINE WAS NOT CERTIFIED IS A VIOLATION OF CALIFORNIA LAW SUBJECT TO CIVIL PENALTY.

(B) At the beginning of each model year, the manufacturer of replacement engines must provide, by engine model, an estimate of the number of replacement engines it expects to produce for California for that model year.

(C) At the conclusion of the model year, the manufacturer must provide, by engine model, the actual number of replacement engines produced for California during the model year, and a description of the physical or performance characteristics of those models that indicate that certified replacement engine(s) were not available as per paragraph (A).

NOTE: Authority cited: Sections 39600, 39601, 43013, 43018, 43101, 43102 and 43104, Health and Safety Code. Reference: Sections 43013, 43017, 43018, 43101, 43102, 43104, 43105, 43150, 43151, 43152, 43153, ~~-~~ 43154, 43205.5, ~~and~~ 43210, 43210.5, 43211 and ~~-~~ 43212, Health and Safety Code.

2434. Emission Control Labels - 2001 and Later Off-Road Large Spark-ignition Engines

(a) Purpose.

The Air Resources Board recognizes that certain emissions-critical or emissions-related parts must be properly identified and maintained in order for engines to meet the applicable emission standards. The purpose of these specifications is to require engine manufacturers to affix a label (or labels) on each production engine (or equipment) to provide the engine or equipment owner and service mechanic with information necessary for the proper maintenance of these parts in customer use.

(b) Applicability. This section applies to:

(1) 2001 and later model year off-road LSI engines with engine displacement greater than 1.0 liter, that have been certified to the applicable emission standards pursuant to Section 2433(b).

(2) Engine manufacturers and original equipment manufacturers, as applicable, that have certified such engines.

(3) Original equipment manufacturers, regardless of whether they have certified the engine, if their equipment obscures the emission control labels of such certified engines.

(4) 2002 and later model year off-road LSI engines with engine displacement less than or equal to 1.0 liter must comply with the applicable labeling specifications set forth in the California Code of Regulations, Title 13, Section 2404.

(c) Label Content and Location.

(1) A tune-up label made of a permanent material must be welded, riveted or otherwise permanently attached to the engine block or other major component in such a way that it will be readily visible after installation of the engine in the equipment. If the equipment obscures the label on the engine, the equipment manufacturer must attach a supplemental label such that it is readily visible.

(2) In selecting an acceptable location, the manufacturer must consider the possibility of accidental damage (e.g., possibility of tools or sharp instruments coming in contact with the label). Each label must be affixed in such a manner that it cannot be removed without destroying or defacing the label, and must not be affixed to any part which is likely to be replaced during the equipment's useful life. The label(s) must not be affixed to any component which is easily detached from the engine.

(3) In addition, an engine serial number and date of engine manufacture (month and year) must be stamped on the engine block or stamped on a metal label riveted or permanently attached to the engine block. Engine manufacturers must keep records such that the engine serial number can easily be used to determine if an engine was certified for the applicable model year. Alternative engine serial number identification methods or tracking number may be allowed with prior approval from the Executive Officer.

(4) The label must be in the English language and use block letters and numerals which must be of a color that contrasts with the background of the label.

(5) The label must contain the following information:

(A) The label heading must read:

"Important Engine Information."

(B) Full corporate name and trademark of the manufacturer.

(C) "THIS ENGINE IS CERTIFIED TO OPERATE ON (specify operating fuel(s))."

(D) Identification of the Exhaust Emission Control System. Abbreviations may be used and must conform to the nomenclature and abbreviations found in the Society of Automotive Engineers document J1930 which is incorporated by reference in Section 1977, Title 13, CCR, entitled "Electrical/Electronic Systems Diagnostic Terms, Definitions, Abbreviations, and Acronyms."

(E) The maintenance specifications and adjustments recommended by the engine manufacturer, including, as applicable: spark plug gap width, valve lash, ignition timing, idle air/fuel mixture setting procedure and value (e.g., idle CO, idle speed drop), and high idle speed. These specifications must indicate the proper transmission position, (if applicable), during tune-up and what accessories, if any, should be in operation, and what systems, if any (e.g., vacuum advance, air pump), should be disconnected during the tune-up. If the manufacturer does not recommend adjustment of the foregoing specifications, the manufacturer must include in lieu of the "specifications" the single statement "No other adjustments needed." For all engines, the instructions for tune-up adjustments must be sufficiently clear on the label to preclude the need for a mechanic or equipment owner to refer to another document in order to correctly perform the adjustments.

(F) Any specific fuel or engine lubricant requirement (e.g., research octane number, engine lubricant type).

(G) An unconditional statement of compliance with the appropriate model year (for 2001-2003) or (2004 and subsequent) California regulations; for example, "This engine conforms to 2002 California regulations for off-road large spark-ignition engines and is certified to 3.0 g/bhp-hr HC+NOx and 37 g/bhp-hr CO." or "This engine conforms to 200~~6~~7 California regulations for off-road large spark-ignition engines and is certified to 0.6 g/bhp-hr HC+NOx and 15.5 g/bhp-hr CO."

(H) Total engine displacement (in cubic inches and/or liters) of the engine upon which the engine label is attached.

(I) The engine family identification (i.e., engine family name and manufacturer's own engine group/code).

(6) (A) The manufacturer of any engine certified with a clean fuel (i.e. natural gas) must at the time of engine manufacture, affix a permanent legible label specifying the appropriate operating fuel(s).

(B) The label must be located immediately adjacent to each fuel tank filler inlet and outside of any filler inlet compartment. It must be located so that it is readily visible to any person introducing fuel to such filler inlet; provided, however, that the Executive Officer must upon application from an engine manufacturer, approve other label locations that achieve the purpose of this paragraph. If the engine is manufactured separately from the equipment, the label must be affixed to the engine and located so that it is readily visible. Such labels must be in English and in block letters which must be of a color that contrasts with their background.

(d) An engine label may state that the engine or equipment conforms to any applicable federal emission standards for new engines, or any other information that such manufacturer deems necessary for, or useful to, the proper operation and satisfactory maintenance of the equipment or engine.

(e) Supplemental Engine Label Content and Location.

(1) When a final equipment assembly that is marketed to any ultimate purchaser is manufactured and the engine label attached by the engine manufacturer is obscured (i.e., not readily visible), the manufacturer of the final equipment assembly (i.e., original equipment manufacturer) must attach a supplemental engine label upon the engine or equipment. The supplemental engine label must be plastic or metal, and must be welded, riveted or otherwise attached permanently to an area of the engine or equipment assembly so as to be readily visible to the average person.

(2) The manufacturer required to attach a supplemental engine label must consider the possibility of accidental damage to the supplemental engine label in the determination of the label location. Such a label must not be attached to any engine or equipment component that is likely to be replaced during the useful life of the engine or equipment (as applicable). Such a label must not be attached to any engine or equipment component that is detached easily from the engine or equipment (as applicable).

(3) The supplemental engine label information must be written in the English language and use block letters and numerals (i.e., sans serif, upper-case characters) that must be of a color that contrasts with the background of the label.

(4) A supplemental engine label must contain the information as specified in Subsection (c)~~(4)~~(5), except that the date of engine manufacture specified in (c)(3) may be deleted from the supplemental engine label. When the date of engine manufacture does not appear on the supplemental engine label, the responsible original equipment manufacturer must display (e.g., label, stamp, etc.) the date elsewhere on the engine or equipment so as to be readily visible.

(f) As used in these specifications, readily visible to the average person means that the label must be readable from a distance of eighteen inches (46 centimeters) without any obstructions from equipment or engine parts (including all manufacturer available optional equipment) except for flexible parts (e.g., vacuum hoses, ignition wires) that can be moved out of the way without disconnection. Alternatively, information required by these specifications to be printed on the label must be no smaller than 8 point type size (2 millimeter in height) provided that no equipment or engine parts (including all manufacturer available optional equipment), except for flexible parts, obstruct the label.

(g) The labels and any adhesives used must be designed to withstand, for the engine's or equipment's total expected life, typical equipment environmental conditions in the area where the label is attached. Typical equipment environmental conditions must include, but are not limited to, exposure to engine fuels, lubricants and coolants (e.g., gasoline, motor oil, water, ethylene glycol). The manufacturer must submit, with its certification application, a statement attesting that its labels comply with these requirements.

(h) The manufacturer must obtain approval from the Executive Officer for all label formats and locations prior to use. Approval of the specific maintenance settings is not required; however, the format for all such settings and tolerances, if any, is subject to review. If the Executive Officer finds that the information on the label is vague or subject to misinterpretation, or that the location does not comply with these specifications, he or she may require that the label or its location be modified accordingly.

(i) Samples of all actual production labels used within an engine family must be submitted to the Executive Officer within thirty days after the start of production. Engine manufacturers must provide samples of their own applicable production labels, and samples of applicable production original equipment manufacturer labels that are accessible to the engine manufacturer due to the direct market arrangement between such manufacturers.

(j) The Executive Officer may approve alternate label locations or may, upon request, waive or modify the label content requirements provided that the intent of these specifications is met.

(k) The manufacturer of any engine must furnish to the Executive Officer, at the beginning of the model year, any engine identification number coding system which identifies whether such engine(s) are covered by an Executive Order.

(l) (1) If the Executive Officer finds any engine manufacturer using labels that are different from those approved or that do not substantially comply with the readability or durability requirements set forth in these specifications, the engine manufacturer will be subject to revocation or suspension of Executive Orders for the applicable engine families, or enjoined from any further sales, or distribution, of such noncompliant engine families, or subgroups within the engine families, in the State of California pursuant to Section 43017 of the Health and Safety Code. Before seeking to enjoin an engine manufacturer, the Executive Officer will consider any information provided by the engine manufacturer. In addition, the engine manufacturer may be subject to, on a per engine basis, any and all remedies available under Part 5, Division 26 of the Health and Safety Code, sections 43000 et seq.

(2) If the Executive Officer finds any original equipment manufacturer using labels for which it has responsibility for attaching that are different from those approved or that do not substantially comply with the readability or durability requirements set forth in these specifications, the equipment manufacturer will be subject to being enjoined from any further sales, or distribution, of the applicable equipment product line that uses such noncompliant labels in the State of California pursuant to Section 43017 of the Health and Safety Code. Before seeking to enjoin an equipment manufacturer, the Executive Officer will consider any information provided by the equipment manufacturer. In addition, the equipment manufacturer may be subject to, on a per engine basis, any and all remedies available under Part 5, Division 26 of the Health and Safety Code, sections 43000 et seq.

NOTE: Authority cited: Sections 39600, 39601, 43013, 43018, 43101, 43102 and 43104, Health and Safety Code. Reference: Sections 43013, 43017, 43018, 43101, 43102, 43104, 43105, 43150, 43151, 43152, 43153,~~-~~ 43154, 43205.5, ~~and~~ 43210, 43210.5, 43211 and~~-~~43212, Health and Safety Code.

APPENDIX A: MANUFACTURER STANDARDS AND TEST PROCEDURES
Part 2

Proposed Regulation Order Part 2: Amendments to the incorporated "California Exhaust Emission Standards and Test Procedures for New 2001 and Later Off-Road Large Spark-Ignition Engines" (40 CFR, Part 86, Subpart A)

State of California
AIR RESOURCES BOARD

CALIFORNIA EXHAUST EMISSION STANDARDS AND TEST PROCEDURES FOR NEW 2001 ~~AND LATER~~ THROUGH 2006 OFF-ROAD LARGE SPARK-IGNITION ENGINES

PART I

Adopted: September 1, 1999
Amended: [insert date of amendment]

NOTE: The general provisions herein have been adapted and modified from similar provisions set forth in 40 CFR, Part 86, Subpart A - General Provisions for Emission Regulations for 1977 and Later Model Year New Light-Duty Vehicles, 1977 and Later Model Year New Light Duty Trucks, 1977 and Later Model Year New Heavy-Duty Engines, and for 1985 and Later Model Year New Gasoline-Fueled Heavy-Duty Vehicles.

~~This document is all newly adopted text.~~ The sole amendments are to the title and years of applicability of the regulations.

TABLE OF CONTENTS

I. Emission Regulations for New 2001 ~~and Later~~ through 2006 Off-Road Large Spark-Ignition Engines, General Provisions

1. General Applicability.

(a) These provisions apply to new off-road large spark-ignition engines with displacement greater than 1.0 liter, produced on or after January 1, 2001 through December 31, 2006.

(b) For any engine that is not a distinctly Otto cycle engine, the Executive Officer shall determine whether the engine shall be subject to these regulations, taking into consideration the relative similarity of the engine's basic characteristics with those of Otto cycle engines.

(c) Every new off-road large spark-ignition engine that is manufactured for sale, sold, offered for sale, introduced or delivered for introduction into commerce into California which is subject to any of the standards prescribed in these provisions, is required to meet California air pollution requirements as certified for use and sale by the manufacturer through the Air Resources Board and covered by an Executive Order issued under these provisions.

(d) The test procedures for determining certification and compliance with the standards for exhaust emissions from new off-road LSI engines with engine displacement equal to or less than 1.0 liter sold in the state are set forth in "California Exhaust Emission Standards and Test Procedures for 1995 and Later Small Off-Road Engines," as last amended March 23, 1999.

2. Definitions.

"Accuracy" means the difference between a measurement and true value.

"Alternate Fuel" means any fuel that will reduce non-methane hydrocarbons (on a reactivity-adjusted basis), NOx, CO, and the potential risk associated with toxic air contaminants as compared to gasoline or diesel fuel and would not result in increased deterioration of the engine. Alternate fuels include, but are not limited to, methanol, ethanol, liquefied petroleum gas, compressed natural gas, and electricity.

"ARB Enforcement Officer" means any officer or employee of the Air Resources Board so designated in writing by the Executive Officer or by the Executive Officer's designee.

"Auxiliary Emission Control Device (AECD)" means any element of design which senses temperature, vehicle speed, engine RPM, transmission gear, manifold vacuum, or any other parameter for the purpose of activating, modulating, delaying, or deactivating the operation of any of the emission control system.

"Basic Engine" means an engine manufacturer's description of their unique combination of engine displacement, number of cylinders, fuel system, emission control system, and other engine and emission control system characteristics as determined or specified by the Executive Officer.

"Calibrating gas" means a gas of known concentration that is used to establish the response curve of an analyzer.

"Calibration" means the set of specifications, including tolerances, unique to a particular design, version, or application of a component or components assembly capable of functionally describing its operation over its working range.

"Configuration" means a subclassification of an engine-system combination on the basis of engine code, inertia weight class, transmission type and gear ratios, final drive ratio, and other parameters that may be designated by the Executive Officer.

"Confirmatory testing" means ARB directed emissions tests and inspections of the test engines and/or test vehicles used by the manufacturer to obtain test data for submittal with the certification application. The emissions tests may be conducted at ARB, contracted facilities, or at the manufacturer's facility. The testing will be done at the expense of the manufacturer.

"Conveniently available service facility and spare parts for small- volume manufacturers" means that the engine manufacturer has a qualified service facility at or near the authorized point of sale or delivery of its engines and maintains an inventory of all emission-related spare parts or has made arrangements for the part manufacturers to supply the parts by expedited shipment (e.g., using overnight express delivery service, UPS, etc.).

"Crankcase emissions" means airborne substances emitted to the atmosphere from any portion of the engine crankcase ventilation or lubrication systems.

"Critical emission-related components" are those components that are designed primarily for emission control, or whose failure may result in a significant increase in emissions accompanied by no significant impairment (or perhaps even an improvement) in performance, driveability, and/or fuel economy as determined by the Executive Officer.

"Critical emission-related maintenance" means that maintenance to be performed on critical emission-related components.

"Curb-idle" means: (1) For manual transmission code engines, the manufacturer's recommended engine speed with the clutch disengaged. (2) For automatic transmission code engines, curb idle means the manufacturer's recommended engine speed with the automatic transmission in gear and the output shaft stalled.

"Defeat Device" means an AECD that reduces the effectiveness of the emission control system under conditions that may reasonably be expected to be encountered in normal operation and use, unless (1) such conditions are substantially included in the emission test procedure, (2) the need for the AECD is justified in terms of protecting the engine against damage or accident, or (3) the AECD does not go beyond the requirements of engine starting.

"Deterioration Factor" means the calculated or assigned number that represents the certification engine's emissions change over the durability period. It is multiplied by zero hour (new) engine test results to determine the engine family compliance level. The deterioration factor is determined as per the Test Procedures. See "Emission Durability Period" below.

"Emission-related maintenance" means that maintenance that substantially affects emissions or is likely to affect the emissions deterioration of the equipment, vehicle, or engine during normal in-use operation, even if the maintenance is performed at some time other than that which is recommended.

"Emissions Durability Period" is the period over which, for purposes of certification, a manufacturer must demonstrate compliance with the standards set forth in Section 2433(b), Title 13, of the California Code of Regulations. The durability periods are also noted in the table in Section 2433 (b). The emissions durability period is used to determine an engine family's deterioration factors.

"Engine code" means a unique combination, within an engine-system combination, of displacement, air/fuel calibration, spark/timing calibration, distributor calibration, auxiliary emission control devices, and other engine and emission control system components specified by the Executive Officer.

"Engine family" is a subclass of a basic engine based on similar emission characteristics. The engine family is the grouping of engines that is used for the purposes of certification and determined in accordance with Section 11.

"Engine family group" means a collection of similar engine families used for the purpose of off-road certification and determined in accordance with Section 11. Generally, the engine family group concept is used to determine the deterioration factors for one or more engine families as determined in accordance with Section 11.

"Engine-system combination" means an engine family-exhaust emission control system combination.

"Executive Officer" means the Executive Officer of the Air Resources Board or an authorized representative.

"Exhaust emissions" means substances emitted to the atmosphere from any opening downstream from the exhaust port of an engine.

"Flexible fuel engine (or equipment or vehicle)" means any engine (or equipment or vehicle) engineered and designed to be operated on a petroleum fuel, a methanol fuel, a gaseous fuel, or any mixture of the above.

"Fuel system" means the combination of fuel tank(s), fuel pump, fuel lines, and carburetor or fuel injection components, and includes all fuel system vents and fuel evaporative emission control system components.

"Gross Power" means the power measured at the crankshaft or its equivalent, the engine being equipped only with the standard auxiliaries necessary for its operation on the test bed.

"Malfunction" means not operating according to specifications (e.g. those specifications listed in the application for certification).

"Maximum rated horsepower" means the maximum brake horsepower output of an engine as stated by the manufacturer in his sales and service literature and his application for certification under Section 8.

"Maximum rated torque" means the maximum torque produced by an engine as stated by the manufacturer in his sales and service literature and his application for certification under Section 8.

"Methanol-fueled" means any equipment, motor vehicle or engine that is engineered and designed to be operated using methanol fuel (i.e., a fuel that contains at least 50 percent methanol (CH_3OH) by volume) as fuel. Flexible fuel engines are methanol-fueled engines.

"Military engine" means any engine manufactured solely for the Department of Defense to meet military specifications.

"New Engine Compliance testing" means ARB directed emissions tests and inspections of a reasonable number of production engines and/or equipment that are offered for sale, or manufactured for sale, in California in order to verify compliance with the applicable certification emission standards. The emissions tests must be conducted at a qualified testing facility. The testing facility is chosen by the manufacturer and approved by the Executive

Officer. This may include ARB facilities, contracted facilities, or at the manufacturer's facility. The testing will be done at the expense of the manufacturer.

"Non-emission-related maintenance" means that maintenance that does not substantially affect emissions and that does not have a lasting effect on the emissions deterioration of the equipment, vehicle, or engine during normal in-use operation once the maintenance is performed.

"Non-oxygenated hydrocarbon" means organic emissions measured by a flame ionization detector excluding methanol.

"Off-Road Large Spark-ignition Engines" or "LSI Engines" means any engine that produces a gross horsepower 25 and greater horsepower or is designed (e.g., through fueling, engine calibrations, valve timing, engine speed modifications, etc.) to produce 25 and greater horsepower. If an engine family has models at or above 25 horsepower and models below 25 horsepower, only the models at or above 25 horsepower would be considered LSI engines. The engine's operating characteristics are significantly similar to the theoretical Otto combustion cycle with the engine's primary means of controlling power output being to limit the amount of air that is throttled into the combustion chamber of the engine. LSI engines or alternate fuel powered LSI internal combustion engines are designed for powering, but not limited to powering, forklift trucks, sweepers, generators, and industrial equipment and other miscellaneous applications. All engines and equipment that fall within the scope of the preemption of Section 209(e)(1)(A) of the Federal Clean Air Act, as amended, and as defined by regulation of the Environmental Protection Agency, are specifically excluded from this category.

Specifically excluded from this category are: 1) engines operated on or in any device used exclusively upon stationary rails or tracks; 2) engines used to propel marine vessels; 3) internal combustion engines attached to a foundation at a location for at least 12 months; 4) off-road recreational vehicles and snowmobiles; and 5) stationary or transportable gas turbines for power generation

"Option" means any available equipment or feature not standard equipment on a model.

"Organic Material Hydrocarbon Equivalent" means the sum of the carbon mass contributions of non-oxygenated hydrocarbons, methanol and formaldehyde as contained in a gas sample, expressed as gasoline fueled engine hydrocarbons. In the case of exhaust emissions, the hydrogen-to-carbon ratio of the equivalent hydrocarbon is 1.85:1.

"Oxides of nitrogen" means the sum of the nitric oxide and nitrogen dioxide contained in a gas sample as if the nitric oxide was in the form of nitrogen dioxide.

"Peak torque speed" means the speed at which an engine develops maximum torque.

"Percent load" means the fraction of the maximum available torque at a specified engine speed.

"Precision" means the standard deviation of replicated measurements.

"Rated speed" means the speed at which the manufacturer specifies the maximum rated horsepower of an engine.

"Reconfigured emission-data engine" means an emission-data engine obtained by modifying a previously used emission-data engine to represent another emission-data engine.

"Scheduled maintenance" means any adjustment, repair, removal, disassembly, cleaning, or replacement of equipment or engine components or systems required by the manufacturer that is performed on a periodic basis to prevent part failure or equipment or engine malfunction, or anticipated as necessary to correct an overt indication of equipment or engine malfunction or failure for which periodic maintenance is not appropriate.

"Similar systems" are engine, fuel metering and emission control system combinations that use the same fuel (e.g., gasoline, LPG, etc.), combustion cycle (i.e., two or four stroke), general type of fuel system (i.e., carburetor or fuel injection), catalyst system (e.g., none, oxidation, three-way only, etc.), fuel control system (i.e., feedback or non-feedback), secondary air system (i.e., equipped or not equipped) and EGR (i.e., equipped or not equipped).

"Small Volume Manufacturer" means an engine manufacturer that produces a total of less than 2000 large spark-ignition engines annually for sale in the United States.

"Span gas" means a gas of known concentration that is used routinely to set the output level of an analyzer.

"Specific emissions" means emissions expressed on the basis of observed gross power or net power in grams per brake horsepower hour. For many engine types the auxiliaries that will be fitted to the engine in service are not known at the time of manufacture or certification. For this reason the emissions shall be expressed on the basis of gross power. When it is not convenient to test the engine in the gross conditions, e.g., if the engine and transmission form a single integral unit, the engine may be tested in the net condition.

"Standard equipment" means those features or equipment that are marketed on a product over which the purchaser can exercise no choice.

"System" includes any engine modification that controls or causes the reduction of substances emitted from an engine or piece of equipment.

"Test engine" means any engine used in certification, production line testing, quality audit, or compliance testing. A test engine can be a prototype engine or a production engine depending on the testing program in which it is used.

"Test Procedures" means the procedures specified in both Part I and Part II of the "California Exhaust Emission Standards and Test Procedures for New 2001 ~~and Later~~ through 2006 Off-Road Large Spark-Ignition Engines."

"Throttle" means a device used to control an engines power output by limiting the amount of air entering the combustion chamber.

"Transmission class" means the basic type of transmission, e.g. manual, automatic, semiautomatic.

"Transmission configuration" means a unique combination, within a transmission class, of a number of the forward gears and, if applicable, overdrive. The Executive Officer may further subdivide a transmission configuration (based on such criteria as gear ratios, torque converter multiplication ratio, stall speed and shift calibration, etc.), if he determines that significant fuel economy or exhaust emission differences exist within that transmission configuration.

"Unscheduled maintenance" means any inspection, adjustment, repair, removal, disassembly, cleaning, or replacement of engine, equipment, or vehicle components or systems that is performed to correct or diagnose a part failure or equipment or vehicle (if the engine were installed in a vehicle) malfunction that was not anticipated.

"Useful life" means a period of 7 years or 5000 hours of operation, whichever first occurs for engines having engine displacement greater than 1.0-liter, and 2 years or 1,000 hours of operations, whichever occurs first, for engines having engine displacement equal to or less than 1.0-liter. However, in no case may this period be less than the manufacturer's basic mechanical warranty period for the engine family.

"Zero (0) hours" means that point after normal assembly line operations and adjustments are completed and before fifty (50) additional operating hours have been accumulated, including emission testing, if performed.

3. Abbreviations.

(a) The abbreviations in this section apply to these provisions and have the following meanings:

AECD--Auxiliary emission control device.
API--American Petroleum Institute.
ARB--California Air Resources Board.
ASTM--American Society for Testing and Materials.
BHP--Brake horsepower.
BSCO--Brake specific carbon monoxide.
BSHC--Brake specific hydrocarbons.
BSNO --Brake specific oxides of nitrogen.
C--Celsius.
CFV--Critical flow venturi.
CFV-CVS--Critical flow venturi-constant volume sampler.
CH_4--Methane.
CL--Chemiluminescence.
CLD--Unheated chemiluminescence detector.
CO_2 --Carbon dioxide.
CO--Carbon monoxide.
conc.--concentration.
cfm--cubic feet per minute.
CVS--Constant volume sampler.
ECS--Electro-chemical sensor.
F--Fahrenheit.
FID--Flame ionization detector.
ft.--feet.
g--gram(s).
gal.--U.S.gallon(s).
GC--Gas chromatograph.
GVW--Gross vehicle weight.
GVWR--Gross vehicle weight rating.
h--hour(s).
hr--hour(s).

H_2O--water.
HC--Hydrocarbon(s).
HCLD--Heated chemiluminescence detector.
HCHO--Formaldehyde.
HFID--Heated flame ionization detector.
hp.--horsepower.
IBP--Initial boiling point.
ID--Internal diameter.
in.--inch(es).
K--Kelvin.
kg--kilogram(s).
kPa--kilopascal(s).
lb.--pound(s).
lb.-ft.--pound-feet.
m--meter(s).
max.--maximum.
MeOH--Methanol (CH_3OH).
mg--milligram(s).
mi.--mile(s).
min.--minute(s).
ml--milliliter(s).
mm--millimeter(s).
mph--miles per hour.
mv--millivolt(s).
N_2--Nitrogen.
NDIR-Nondispersive infrared.
NH_3--Ammonia.
NMC--Non-methane cutter.
NMHC--Non-methane hydrocarbons.
NO--nitric oxide.
NO_2--nitrogen dioxide.
NOx--oxides of nitrogen.
No.--Number.
O_2 --oxygen.
OMHCE--Organic Material Hydrocarbon Equivalent.
PDP-CVS--Positive displacement pump-constant volume sampler.
PMD--Paramagnetic detector.
ppm--parts per million by volume.
ppm C--parts per million, carbon.
psi--pounds per square inch.
R--Rankin.
rpm--revolutions per minute.
s--second(s).

SAE--Society of Automotive Engineers.
SI--International system of units.
SO_2 --Sulfur dioxide.
V--volt(s).
W--watt(s).
WF--Weighting factor.
wt.--weight.
ZROD--Zirconium dioxide sensor.
'--feet.
"--inch(es).
°--degree(s).
Σ--summation.

(b) The symbols defined in this section apply to this part and have the following meanings and units:

Symbol	Meaning	Unit
A_p	Cross sectional area of the isokinetic sampling probe	m^2
A_T	Cross sectional area of the exhaust pipes	m^2
F	Engine specific parameter considering atmospheric conditions	
F_{FCB}	Fuel specific factor for the carbon balance calculation	
F_{FD}	Fuel specific factor for exhaust flow calculation on dry basis	
F_{FH}	Fuel specific factor representing the hydrogen to carbon ratio	
F_{FW}	Fuel specific factor for exhaust flow calculation on wet basis	
G_{AIRW}	Intake air mass flow rate on wet basis	kg/h
G_{AIRD}	Intake air mass flow rate on dry basis	kg/h
G_{DIL}	Dilution air mass flow rate	kg/h
G_{EDF}	Equivalent diluted mass flow rate	kg/h
G_{EDFW}	Equivalent diluted mass flow rate wet basis	kg/h
G_{EXHW}	Exhaust gas mass flow rate on wet basis	kg/h
G_{Fuel}	Fuel mass flow rate	kg/h
G_{TOT}	Diluted exhaust gas mass flow rate	kg/h
H	Absolute humidity (water content related to dry air)	g/kg
i	Subscript denoting an individual mode	
K_H	Humidity correction factor	
K_{HDIE}	Humidity correction factor for diesel engines.	
K_{HPET}	Humidity correction factor for gasoline engines.	
L	Percent torque related to max. torque for the test mode	%
mass	Pollutant mass flow	g/h
M_{SAM}	Mass of sample through particulate sampling filters	kg
p_s	Dry Atmospheric pressure	kPa
P	Gross power output uncorrected	kW
p_d	Test ambient saturation vapor pressure at ambient temperature	kPa
P_{AUX}	Declared total power absorbed by auxiliaries fitted for the test	kW

P_M	Maximum power measured at the test speed under test conditions	kW
q	Dilution ratio -	
r	Ratio of cross sectional areas of sampling probe and exhaust pipe	-
R_a	Relative humidity of the ambient air	%
S	Dynamometer setting	kW
T	Absolute temperature at air inlet	K
V_{SAM}	Volume of sample through particulate sampling filters	m^3
T_{Dd}	Absolute dewpoint temperature	K
V_{EXHD}	Exhaust gas volume flow rate on dry basis	m^3/h
V_{AIRW}	Intake air volume flow rate on wet basis	m^3/h
V_{DILW}	Dilution air volume flow rate on wet basis	m^3/h
V_{EDFW}	Equivalent diluted volume flow rate on wet basis	m^3/h
p_B	Total barometric pressure	kPa
V_{EXHW}	Exhaust gas volume flow rate on wet basis	m^3/h
V_{TOTW}	Diluted exhaust gas volume flow rate on wet basis	m^3/h
WF	Weighting factor	
WF_E	Effective weighting factor	

4. General Standards; Increase in Emissions; Unsafe Conditions.

(a) Any system installed on or incorporated in a new off-road large spark-ignition engine to enable such engine to conform to standards imposed by these procedures:

(1) Shall not in its operation or function cause the emission into the ambient air of any noxious or toxic substance that would not be emitted in the operation of such engine without such system, except as specifically permitted by regulation; and

(2) Shall not in its operation, function or malfunction result in any unsafe condition endangering the engine, its operator, or persons or property in close proximity to the engine.

(b) In establishing the physically adjustable range of each adjustable parameter on a new off-road large spark-ignition engine, the manufacturer shall take into consideration the production tolerances and ensure that safe operability characteristics are available within that range.

(c) Every manufacturer of new off-road large spark-ignition engines subject to any of the standards imposed by these procedures shall, prior to selling or offering for sale any engines, test or cause to be tested off-road large spark-ignition engines in accordance with good engineering practices to ascertain that such test engines will meet the requirements of this section for the useful life of the engine as defined in these Test Procedures.

5. Adjudicatory Hearing.

Parties affected by an Executive Officer's determination may file a request for an adjudicatory hearing under Title 17, Division 3, Chapter 1, California Code of Regulations Subchapter 1.25. If, after reviewing the request and supporting data, the Executive Officer finds that the request raises a substantial issue of fact, a hearing in accordance with Subchapter 1.25 shall be granted.

6. Maintenance of Records; Submittal of Information; Right of Entry.

(a) The manufacturer of any new large spark-ignition off-road engine subject to any of the standards or procedures prescribed herein shall establish, maintain and retain the following adequately organized and indexed records.

(1) **General records.**

(i) The records required to be maintained by this paragraph shall consist of:

(A) Identification and description of all certification engines for which testing is required under these procedures.

(B) A description of all emission control systems that are installed on or incorporated in each certification engine.

(C) A description of all procedures used to test each such certification engine.

(ii) A properly filed application for certification, following the format prescribed by the ARB for the appropriate model year, fulfills each of the requirements of this paragraph (a)(1)(i).

(2) **Individual records.**

(i) A brief history of each off-road large spark-ignition engine used for certification under these procedures including:

(A) In the case where a current production engine is modified for use as a certification engine, a description of the process by which the engine was selected and of the modification made. In the case where the certification engine is not derived from a current production engine, a general description of the buildup of the engine (e.g., experimental heads, air intake manifolds, cams, and valves were cast and machined according to supplied drawings, etc.). In both cases above, a description of the origin and selection process for the closed-loop air/fuel system components (carburetor and/or fuel injection components and feedback sensor(s)), auxiliary emission control system components, exhaust emission control system components, and exhaust aftertreatment devices as applicable, shall be included. The required descriptions shall specify the steps taken to assure that the engine used for certification with respect to air/fuel system, emission control system components, exhaust aftertreatment devices, exhaust emission control system components, or any other devices or components, as applicable that can reasonably be expected to influence exhaust emissions, as applicable, will be representative of production engines, and that all components and/or engine construction processes, component inspection and selection techniques, and assembly techniques employed in the construction of the certification engines are reasonably likely to be implemented for production engines, or that they are as closely analogous as practicable to planned construction and assembly processes.

(B) A complete record of all emission tests performed (except tests performed by ARB directly), including test results, the date and purpose of each test, and the number of hours accumulated on the engine.

(C) The date of each required service accumulation run, listing the number of operating hours accumulated, individual emission test data and results.

(D) [Reserved]

(E) A record and description of all maintenance and other service performed, giving the date of the maintenance or service and the reason for it.

(F) A record and description of each test performed to diagnose engine or emission control system performance, giving the date and time of the test and the reason for it.

(G) [Reserved]

(H) A brief description of any significant events affecting the engine during any time in the period covered by the history not described by an entry under one of the previous headings including such extraordinary events as accidents involving the engine or dynamometer runaway.

(ii) Each such history shall be started on the date that the first of any of the selection or buildup activities in paragraph (a)(2)(i)(A) of this section occurred with respect to the certification engine, shall be updated each time the operational status of the engine changes or additional work is done on it, and shall be kept in a designated location.

(3) All records, other than routine emission test records, required to be maintained under these procedures shall be retained by the manufacturer for a period of eight (8) years after issuance of all Executive Orders to which they relate. Routine emission test records shall be retained by the manufacturer for a period of two (2) year after issuance of all Executive Orders to which they relate. Records may be retained as hard copy or reduced to microfilm, electronic format, punch cards, etc., depending on the record retention procedures of the manufacturer, **provided,** which in every case all the information contained in the hard copy shall be retained.

(b) At the time of issuance of any instructions or explanations regarding the use, repair, adjustment, maintenance, or testing relevant to the control of crankcase or exhaust emissions of any new off-road large spark-ignition engine subject to any of the standards prescribed in these procedures, the engine manufacturer shall submit to the Executive Officer copies of all such instructions issued by the engine manufacturer for use by other manufacturers, assembly plants, distributors, dealers, and ultimate purchasers. However, the manufacturer need not submit any material not translated into the English language unless specifically requested by the Executive Officer.

(c) (1) Any manufacturer who has applied for certification of a new off-road large spark-ignition engine subject to certification testing under these procedures shall admit, or cause to be admitted, to any of the following facilities during operating hours, any ARB Enforcement Officer upon presentation of credentials or if necessary, an inspection warrant obtained pursuant to the California Code of Civil Procedures, Section 1822.50 et seq.

(i) Any facility where any such tests or procedures or activities connected with such tests are or were performed.

(ii) Any facility warehousing any new off-road large spark-ignition engine that has been, is being, or will be tested.

(iii) Any facility where any construction process or assembly process used in the modification or buildup of such an engine into a certification engine is taking place or has taken place.

(iv) Any facility where any record or other document relating to any of the above is located.

(2) Upon admission to any facility referred to in paragraph (c)(1) of this section, any ARB Enforcement Officer shall be allowed:

(i) To inspect and monitor any part or aspect of such procedures, activities and testing facilities, including, but not limited to, monitoring engine preconditioning, emissions tests and service accumulation, maintenance, and engine storage procedures, and to verify correlation or calibration of test equipment;

(ii) To inspect and make copies of any such records, designs, or other documents; and

(iii) To inspect and/or photograph any part or aspect of any such certification engine and any components to be used in the construction thereof.

(3) In order to allow the Executive Officer to determine whether or not production off-road large spark-ignition engines conform in all material respects to the design specifications that applied to those engines described in the application for certification for which an Executive Order has been issued, any manufacturer shall admit, or cause to be admitted, to any of the following facilities any ARB Enforcement Officer upon presentation of credentials or if necessary, an inspection warrant obtained pursuant to the California Code of Civil Procedures, Section 1822.50 et seq.

(i) Any facility where any document, design, or procedure relating to the translation of the design and construction of engines and emission related components described in the application for certification testing into production engines is located or carried on; and

(ii) Any facility where any off-road large spark-ignition engines, or equipment, to be introduced into commerce are manufactured or assembled.

(4) On admission to any such facility referred to in paragraph (c)(3) of this section, any ARB Enforcement Officer shall be allowed:

(i) To inspect and monitor any aspect of such manufacture or assembly and other procedures;

(ii) To inspect and make copies of any such records, documents or design; and

(iii) To inspect and photograph any part or aspect of any such new off-road large spark-ignition engines (or new off-road equipment powered by a new off-road large spark-ignition engine) and any component used in the assembly thereof that is reasonably related to the purpose of his entry.

(5) Any ARB Enforcement Officer shall be furnished by those in charge of a facility being inspected with such reasonable assistance as he may request to help him discharge any function listed in this paragraph. Each applicant for or recipient of certification is required to cause those in charge of a facility operated for its benefit to furnish such reasonable assistance without charge to ARB whether or not the applicant controls the facility.

(6) The duty to admit or cause to be admitted any ARB Enforcement Officer applies whether or not the applicant owns or controls the facility in question and applies both to domestic and foreign manufacturers and facilities. ARB will not attempt to make any inspection that it has been informed that local law forbids. However, if local law makes it impossible to do what is necessary to insure the accuracy of data generated at a facility, no informed judgement that an engine is certifiable or is covered by an Executive Order can properly be based on those data. It is the responsibility of the manufacturer to locate its testing and manufacturing facilities in jurisdictions where this situation will not arise.

(7) For the purposes of this paragraph (c):

(i) "Presentation of credentials" shall mean display of the document designating a person as an ARB Enforcement Officer.

(ii) Where equipment, vehicle, component, or engine storage areas or facilities are concerned, "operating hours" shall mean all times during which personnel other than custodial personnel are at work in the vicinity of the area or facility and have access to it.

(iii) Where facilities or areas other than those covered by paragraph (c)(7)(ii) of this section are concerned, "operating hours" shall mean all times during which an assembly line is in operation or all times during which testing, maintenance, service accumulation, production or compilation of records, or any other procedure or activity related to certification testing, to translation of designs from the test stage to the production stage, or to engine (or equipment) manufacture or assembly is being carried out in a facility.

(iv) "Reasonable assistance" includes, but is not limited to, clerical, copying, interpretation and translation services, the making available on request of personnel of the facility being inspected during their working hours to inform the ARB Enforcement Officer of how the facility operates and to answer his questions, and the performance on request of emission tests on any engine that is being, has been, or will be used for certification testing. Such tests shall be nondestructive, but may require appropriate service accumulation. The Executive Officer of the ARB may compel a manufacturer to cause the personal appearance of any employee at such a facility before an ARB Enforcement Officer by signing a written request for the employee's appearance and serving it on the manufacturer. Any such employee who has been instructed by the manufacturer to appear will be entitled to be accompanied, represented, and advised by counsel.

(v) Any entry without 24 hour prior written or oral notification to the affected manufacturer shall be authorized in writing by the Executive Officer.

7. Emission Standards for 2001 ~~and Later~~ through 2006 Model Year Off-Road Large Spark-Ignition Engines.

(a) (1) Exhaust emissions from new 2001 ~~and later~~ through 2006 model year off-road large spark-ignition engines shall not exceed the following:

(i)

Exhaust Emission Standards
(grams per brake horsepower-hour)
[grams per kilowatt-hour](1)

Model Year	Engine Displacement	Durability Period	Hydrocarbon plus Oxides of Nitrogen	Carbon Monoxide
2002 and subsequent	≤1.0 liter	1,000 hours or 2 years	9.0 [12.0]	410 [549]
2001 - 2003(2),(3)	> 1.0 liter	N/A	3.0 [4.0]	37.0 [49.6]
2004 - 2006(4)	> 1.0 liter	3500 hours or 5 years	3.0 [4.0]	37.0 [49.6]
~~2007 and subsequent~~	~~> 1.0 liter~~	~~5000 hours or 7 years~~	~~3.0 [4.0]~~	~~37.0 [49.6]~~

Note: (1) Standards in grams per kilowatt-hour are given only as a reference. Pollutant emissions reported to ARB by manufacturers must be in grams per brake horsepower-hour.

(2) Small volume manufacturers are not required to comply with these emission standards.

(3) Manufacturers must show that at least 25 percent of its California engine sales comply with the standards in 2001, 50 percent in 2002, and 75 percent in 2003.

(4) The standards for in-use compliance for engine families certified to the standards in the row noted are 4.0 g/bhp-hr (5.4 g/kW-hr) hydrocarbon plus oxides of nitrogen and 50.0 g/bhp-hr (67.0 g/kW-hr) carbon monoxide, with a useful life of 5000 hours or 7 years. In-use averaging, banking, and trading credits may be generated for engines tested in compliance with these in-use compliance standards. If the in-use compliance level is above 3.0 but does not exceed 4.0 g/bhp-hr hydrocarbon plus oxides of nitrogen or is above 37.0 but does not exceed 50.0 g/bhp-hr carbon monoxide, and based on a review of information derived from a statistically valid and representative sample of engines, the Executive Officer determines that a substantial percentage of any class or category of such engines exhibits within the warranty periods noted in Section 2435, Title 13, California Code of Regulations, an identifiable, systematic defect in a component listed in that section, which causes a significant increase in emissions above those exhibited by engines free of such defects and of the same class or category and having the same period of use and hours, then the Executive Officer may invoke the enforcement authority under Section 2439, Title 13, California Code of regulations to require remedial action by the engine manufacturer. Such

remedial action is limited to owner notification and repair or replacement of defective components, without regard to the requirements set forth in Section 2439(b)(5) or Section 2439(c)(5)(B)(vi). As used in the section, the term "defect" does not include failures that are the result of abuse, neglect, or improper maintenance.

(b) Reserved

(c) No crankcase emissions shall be discharged into the ambient atmosphere from any new 2001 ~~or later~~ through 2006 model year off-road large spark-ignition engines.

(d) Reserved

8. Application for certification.

(a) A separate application for an Executive Order shall be made for each engine family or engine family group for each year. Such application shall be made to the Executive Officer by the manufacturer and shall be updated and corrected by amendment.

(b) The application shall be in writing, signed by an authorized representative of the manufacturer, and shall include the following:

(1) (i) Identification and description of the engines covered by the application and a description of their emission control system and fuel system components. This shall include a detailed description of each AECD to be installed in or on any certification test engine.

(ii) (A) The manufacturer shall provide to the Executive Officer in the application for certification:

(1) A list of those parameters that are physically capable of being adjusted (including those adjustable parameters for which access is difficult) and that, if adjusted to settings other than the manufacturer's recommended setting, may affect emissions;

(2) A specification of the manufacturer's intended physically adjustable range of each such parameter, and the production tolerances of the limits or stops used to establish the physically adjustable range;

(3) A description of the limits or stops used to establish the manufacturer's intended physically adjustable range of each adjustable parameter, or any other means used to inhibit adjustment;

(4) The nominal or recommended setting, and the associated production tolerances, for each such parameter.

(5) A copy of the warranty booklet for each engine family, for ARB staff to review and modify.

(6) A list of special test devices (such as adaptors, simulator, etc.) with detailed descriptions of its functionality necessary to conduct emission testing.

(B) The manufacturer may provide, in the application for certification, information relating to why certain parameters are not expected to be adjusted in actual use and to why the physically adjustable range of each parameter, or any other means used to inhibit adjustment, are effective in preventing adjustment of parameters on in-use engines to settings outside the manufacturer's intended physically adjustable ranges. This may include results of any tests to determine the difficulty of gaining access to an adjustment or exceeding a limit as intended or recommended by the manufacturer.

(C) The Executive Officer may require to be provided detailed drawings and descriptions of the various emission-related components and/or hardware samples of such components, for the purpose of making his determination of which engine parameter will be subject to adjustment for new certification and new engine compliance testing and of the physically adjustable range for each such engine parameter.

(2) Projected California sales data sufficient to enable the Executive Officer to select a test fleet representative of the engines for which certification is requested.

(3) A description of the test equipment and fuel proposed to be used.

(4) (i) For each engine family, a statement of recommended maintenance and procedures necessary to assure that the engines covered by a Executive Order in operation conform to the regulations, and a description of the program for training of personnel for such maintenance, and the equipment required.

(ii) At the option of the manufacturer, the proposed composition of the emission-data test fleet.

(c) The manufacturers shall submit to the Executive Officer the original application, any amendments thereto, and all notifications under Sections 17, 18, and 19. The Executive Officer may require that manufacturers submit additional copies of all required information up to a maximum of three copies.

9. Approval of Application for Certification; Test Fleet Selections; Determinations of Parameters Subject to Adjustment for Certification and New Engine Compliance Testing, Adequacy of Limits, and Physically Adjustable Ranges.

(a) After a review of the application for certification and any other information that the Executive Officer may require, the Executive Officer may approve the application and select a test fleet in accordance with Section 11.

(b) The Executive Officer may disapprove in whole or in part an application for certification for reasons including incompleteness, inaccuracy, inappropriate proposed service accumulation procedures, test equipment, or fuel, and incorporation of defeat devices on engines described by the application.

(c) Where any part of an application is rejected, the Executive Officer shall notify the manufacturer in writing and set forth the reasons for such rejection. Within 30 days following receipt of such notification, the manufacturer may request a hearing on the Executive Officer's determination in accordance with Section 5. The request shall be in writing, signed by an authorized representative of the manufacturer and shall include a statement specifying the manufacturer's objections to the Executive Officer's determinations, and data in support of such objections.

(d) When the Executive Officer selects emission-data engines for the test fleet, he will at the same time determine those engine parameters that will be subject to adjustment for certification, quality-audit and new engine compliance testing, the adequacy of the limits, stops, seals, or other means used to inhibit adjustment, and the resulting physically adjustable ranges for each such parameter and notify the manufacturer of his determinations.

(1) (i) Except as noted in paragraph (d)(1)(iv) of this section, the Executive Officer may determine that any parameter on any engine is subject to adjustment if it is physically capable of being adjusted, may significantly affect emissions, and was not present on the manufacturer's engines in the previous model year in the same form and function.

(ii) The Executive Officer may, in addition, determine that any other parameter on any engine that is physically capable of being adjusted and that may significantly affect emissions is subject to adjustment. However, the Executive Officer may make a determination only if he has previously notified the manufacturer that he might require such adjustments and has found, at the time he gave this notice that the intervening period would be adequate to permit the development and application of the requisite technology, giving appropriate consideration to the cost of compliance within such period.

(iii) In determining the parameters subject to adjustment, the Executive Officer shall consider the likelihood that, for each of the parameters listed in paragraphs (d)(1)(i) and (d)(1)(ii) of this section, settings other than the manufacturer's recommended setting will occur on in- use engines. In determining likelihood, the Executive Officer may consider such factors as, but not limited to, information contained in the application, surveillance information from similar in-use engines, the difficulty and cost of gaining access to an adjustment, damage to the engine if an attempt is made to gain such access and the need to replace parts following such attempt, and the effect of settings other than the manufacturer's recommended setting on engine performance characteristics including emission characteristics.

(iv) The Executive Officer shall not consider manual chokes of engines to be a parameter subject to adjustment under the parameter adjustment requirements.

(2) (i) The Executive Officer shall determine a parameter to be adequately inaccessible or sealed if:

(A) In the case of an idle mixture screw, the screw is recessed within the carburetor casting and sealed with lead, thermosetting plastic, or an inverted elliptical spacer; or the screw is sheared off after adjustment at the factory, and the inaccessibility is such that the screw cannot be accessed and/or adjusted with simple tools in one-half hour or for $52 (1998 dollars) or less.

(B) In the case of a choke bimetal spring, the plate covering the bimetal spring is riveted or welded in place, or held in place with nonreversible screws.

(C) In the case of a parameter that may be adjusted by elongating or bending adjustable members (e.g., the choke vacuum break), the elongation of the adjustable member is limited by design or, in the case of a bendable member, the member is constructed of a material that when bent would return to its original shape after the force is removed (plastic or spring steel materials).

(D) In the case of any other parameter, the manufacturer demonstrates that adjusting the parameter to settings other than the manufacturer's recommended setting cannot be performed in one-half hour or costs more than $52 (1998 dollars).

(ii) The Executive Officer shall determine a physical limit or stop to be an adequate restraint on adjustability if:

(A) In the case of a threaded adjustment, the threads are terminated, pinned or crimped so as to prevent additional travel without breakage or need for repairs that cannot be performed in one-half hour or for $52 (1998 dollars) or less.

(B) The adjustment is ineffective at the end of the limits of travel regardless of additional forces or torques applied to the adjustment.

(C) The manufacturer demonstrates that travel or rotation limits cannot be exceeded with the use of simple and common tools (screwdriver, pliers, cutters, drills, open-end or box wrenches, etc.) without incurring significant and costly damage to the engine, equipment, vehicle or control system or without taking more than one-half hour or costing more than $52 (1998 dollars).

(iii) If the manufacturer service manuals or bulletins describe routine procedures for gaining access to a parameter or for removing or exceeding a physical limit, stop, seal or other means used to inhibit adjustment, or if surveillance data indicate that gaining access, removing, or exceeding is likely, paragraphs (d)(2)(i) and (d)(2)(ii) of this section shall not apply for that parameter.

(iv) In determining the adequacy of a physical limit, stop, seal, or other means used to inhibit adjustment of a parameter not covered by paragraph (d)(2)(i) or (d)(2)(ii) of this section, the Executive Officer will consider the likelihood that it will be circumvented, removed, or exceeded on in-use engines. In determining likelihood, the Executive Officer may consider such factors as, but not limited to, information contained in the application; surveillance information from similar in-use engines; the difficulty and cost of circumventing, removing or exceeding the limit, stop, seal, or other means; damage to the engine if an attempt is made to circumvent, remove, or exceed it and the need to replace parts following such attempt; and the effect of settings beyond the limit, stop, seal, or other means on engine performance characteristics other than emission characteristics.

(3) The Executive Officer shall determine two physically adjustable ranges for each parameter subject to adjustment;

(i) (A) In the case of a parameter determined to be adequately inaccessible or sealed, the Executive Officer may include within the physically adjustable range applicable to testing under these procedures (certification testing) all settings within the production tolerance associated with the nominal setting for that parameter, as specified by the manufacturer in the application for certification.

(B) In the case of other parameters, the Executive Officer shall include within this range all settings within physical limits or stops determined to be adequate restraints on adjustability. The Executive Officer may also include the production tolerances on the location of these limits or stops when determining the physically adjustable range.

(ii) (A) In the case of a parameter determined to be adequately inaccessible or sealed, the Executive Officer shall include within the physically adjustable range applicable to testing under the Production-Line Testing Procedure, only the actual settings to which the parameter is adjusted during production.

(B) In the case of other parameters, the Executive Officer shall include within this range all settings within physical limits or stops determined to be adequate restraints on adjustability, as they are actually located on the test engine.

(e) (1) If the manufacturer submits the information specified in Section 8(b)(1)(ii) in advance of its application for certification, the Executive Officer shall review the information and make the determinations required in paragraph (d) of this section within 90 days of the manufacturer's submittal as required by Section 60030, Title 17, California Code of Regulations.

(2) The 90-day decision period is exclusive of the elapsed time during which ARB may request additional information from manufacturers regarding an adjustable parameter and the receipt of the manufacturers' response(s).

(f) Within 30 days following receipt of notification of the Executive Officer's determinations made under paragraph (d) of this section, the manufacturer may request a hearing on the Executive Officer's determinations in accordance with Section 5. The request shall be in writing, signed by an authorized representative of the manufacturer, and shall include a statement specifying the manufacturer's objections to the Executive Officer's determinations, and data in support of such objections.

10. Required data for certification.

(a) The manufacturer shall perform the tests required by the applicable test procedures, and submit to the Executive Officer the following information:

(1) **A record of all pertinent maintenance**. Such testing shall be designed and conducted in accordance with good engineering practice to assure that the engines covered by an Executive Order issued under Section 16 will meet the emission standards in Section 7 in actual use for the useful life of the engine as designated in these Test Procedures.

(2) **Emission data from certification engines**. Emission data on such engines tested in accordance with applicable emission test procedures herein and in such numbers as specified. These data shall include zero-hour data, if generated, and emission data generated for certification as required under Section 13(a)(2).

(3) A statement that the engines for which certification is requested conform to the requirements in Section 4, and that the descriptions of tests performed to ascertain compliance with the general standards in Section 4, and the data derived from such tests, are available to the Executive Officer upon request.

(4) A statement that the test engines with respect to which data are submitted to demonstrate compliance with the applicable standards of these procedures are in all material respects as described in the manufacturer's application for certification, have been tested in accordance with the applicable test procedures utilizing the fuels and equipment described in the application for certification and that on the basis of such tests the engines conform to the requirements of this part. If such statements cannot be made with respect to any engine tested, the engine shall be identified, and all pertinent data relating thereto shall be supplied to the Executive Officer. If, on the basis of the data supplied and any additional data as required by the Executive Officer, the Executive Officer determines that the test engine was not as described in the application for certification or was not tested in accordance with the applicable test procedures utilizing the fuels and equipment as described in the application for certification, the

Executive Officer may make the determination that the engine does not meet the applicable standards. The provisions of Section 16(b) shall then be followed.

(b) The above information must be provided unless the Executive Officer, upon request of the manufacturer, waives the requirement. The Executive Officer may waive any requirement of this section for testing of an engine for which emission data are available or will be available under the provisions of Section 15.

(c) If the manufacturer elects to use a measurement procedure other than the applicable Test Procedures to determine compliance with the standards, the manufacturer shall:

(1) Determine the correlation between the alternative measurement procedure chosen and the procedure set forth in the Test Procedures.

(2) Maintain a description of the procedure and test(s) used to determine the correlation and the data derived from such tests.

(3) Make available to the Executive Officer, upon request, any of the information or data required in paragraphs (c)(1) and (2); and

(4) For each engine family for which a certificate is requested:

(i) Provide a statement that the results obtained by the alternative measurement procedure correlate with the results that would be expected when determined by the Test Procedures and

(ii) Provide these results, adjusted if necessary with the applicable correlation offset, to be compared with the standards of Section 7(a).

11. Test Engines.

(a) **Engine Families and Engine Family Groups.**

(1) The engines covered by an application for certification will be divided into groupings of engines that are expected to have similar emission characteristics throughout their useful life. Each group of engines with similar emission characteristics shall be defined as a separate engine family group. An engine family group is defined similarly to an engine family, with the exception that the displacement per cylinder is used as a criterion for grouping the engines rather than the cylinder block configuration.

(2) (i) To be classed in the same engine family, engines must be identical in all the following respects:

(A) The cylinder bore center-to-center dimensions.
(B)-(C) [Reserved]
(D) The cylinder block configuration (air cooled or liquid cooled; L-6, 90° V-8, etc.).
(E) The location of the intake and exhaust valves (or ports).
(F) The method of air aspiration.
(G) The combustion cycle.
(H) Catalytic converter characteristics.
(I) Thermal reactor characteristics.
(J) Type of air inlet cooler (e.g., intercoolers and after-coolers).

(ii) To be classed in the same engine family group for off- road certification, engines must have the same displacement per cylinder (within 15 percent) and must be identical in all the following respects:

(A) The cylinder bore center-to-center dimensions.

(B)-(C) [Reserved]

(D) [Reserved]

(E) The location of the intake and exhaust valves (or ports).

(F) The method of air aspiration.

(G) The combustion cycle.

(H) Catalytic converter characteristics.

(I) Thermal reactor characteristics.

(J) Type of air inlet cooler (e.g., intercoolers and after-coolers).

(3) Engines identical in all the respects listed in paragraph (a)(2) of this section may be further divided into different engine families if the Executive Officer determines that they may be expected to have different emission characteristics. This determination will be based upon a consideration of the following features of each engine:

(i) The bore and stroke.

(ii) The surface-to-volume ratio of the nominally dimensioned cylinder at the top dead center positions.

(iii) The intake manifold induction port size and configuration.

(iv) The exhaust manifold induction port size and configuration.

(v) The intake and exhaust valve sizes.

(vi) The fuel system.

(vii) The camshaft timing and ignition or injection timing characteristics.

(4) Where engines are of a type that cannot be divided into engine families based upon the criteria listed in paragraphs (a)(2) and (a)(3) of this section, the Executive Officer shall establish families for those engines based upon those features most related to their emission characteristics. Engines that are eligible to be included in the same engine family based on the criteria in paragraphs (a)(2) and (a)(3) of this section may be further divided into different engine families if the manufacturer determines that they may be expected to have different emission characteristics. This determination will be based upon a consideration of the following features of each engine:

(i) The dimension from the center line of the crankshaft to the center line of the camshaft.

(ii) The dimension from the center line of the crankshaft to the top of the cylinder block head face.

(iii) The size of the intake and exhaust valves (or ports).

(5) Engines identical in all the respects listed in paragraph (a)(2) of this section but which use differing fuels may be certified as one engine family, provided the engine family is certified using the fuel that would yield the worst-case emission scenario.

(b) **Emission-data engines.**

(1) Engines will be chosen to be run for emission data based upon engine family groups. Within each engine family group, the requirements of this paragraph must be met.

(2) Engines of each engine family group will be divided into groups based upon

their exhaust emission control systems. One engine of each system combination shall be run for gaseous emission data. The complete gaseous emission test must be conducted. Within each combination, the engine that features the highest horsepower, primarily at or near the rated speed, will usually be selected. The engine manufacturer may elect to test the worst-case emissions engine within each combination with prior approval from the Executive Officer. The engine with the highest horsepower will usually be selected. For engine families that contain multiple fuel systems, the engine manufacturer shall conduct separate individual gaseous emission test based on the worst-case emissions configuration for each different fuel system within the engine family's engine configuration.

(3) The Executive Officer may select a maximum of one additional engine within each engine-system combination based upon features indicating that it may have the highest emission levels of the engines of that combination. In selecting this engine, the Executive Officer will consider such features as the injection system, fuel system, engine control system, rated speed, rated horsepower, peak torque speed, and peak torque.

(4) Within an engine family control system combination, the manufacturer may alter any emission-data engine (or other engine including current or previous model year emission-data engines and development engines provided they meet the emission-data engines' protocol) to represent more than one selection under paragraph (b)(2) and (3) of this section.

(c) In lieu of testing an emission-data engine selected under paragraph (b) of this section, and submitting data therefore, a manufacturer may, with the prior written approval of the Executive Officer, submit exhaust emission data as applicable on a similar engine, for which certification has previously been obtained or for which all applicable data required under Section 10 has previously been submitted.

(d) **Durability-data Engine**

(1) The engine manufacturer shall select the engine configuration that best represents the entire engine family or groups of engine families to demonstrate engine and emission durability. The duration of the engine durability demonstration for the purpose of generating deterioration factors for the emission calculation shall be equivalent to the emissions durability period as defined in these Test Procedures.

(2) (i) The engine manufacturer shall use good engineering practice to determine engine and emission durability.

(ii) The engine manufacturer shall provide the Executive Officer with a written plan of the method used to determine engine and emission durability. The Executive Officer shall approve the plan if it demonstrates, according to good engineering judgement, the development of reasonable deterioration factors. The engine manufacturer shall not proceed with testing until the Executive Officer has approved the plan.

(iii) In the absence of a manufacturer's specific service accumulation cycle, engine durability demonstration shall be conducted using multiple runs of the ISO 8178, Part IV, test cycle C-2, or for constant speed engines using multiple runs of the ISO 8178, Part IV, D-2 test cycle. The engine manufacturer may request, with the advanced approval of the Executive Officer, to reduce the total amount of service accumulation hours for any durability / service accumulation engine. The engine manufacturer may make such request only after an engine has accumulated at a minimum one half of the engine's defined useful life period. The

Executive Officer shall base such approval on engine's durableness, maintenance events, emission test results, and the stability of engine out emissions.

(3) Regardless of which service accumulation cycle is used for generating the deterioration factors for emissions certification, the Executive Officer shall accept the manufacturer's deterioration factors for certification the first year; but, may deny the use of the manufacturer's deterioration factors for subsequent certification based on incorrect or inaccurate representativeness of actual in-use emissions test results.

12. Maintenance.

(a) This section specifies the maintenance schedule for emission-related parts that manufacturers shall include in the maintenance instructions furnished under Section 22 to purchasers of new off-road large spark-ignition engines and new off-road equipment powered by a off-road large spark-ignition engine.

(1) Any emission-related maintenance that is performed on equipment, vehicles, engines, subsystems, or components must be technologically necessary to assure in-use compliance with the emission standards. The manufacturer must submit data that demonstrate to the Executive Officer that all of the emission-related scheduled maintenance that is to be performed is technologically necessary. Scheduled maintenance must be approved by the Executive Officer prior to being performed or being included in the maintenance instructions provided to purchasers under Section 22. As provided below, ARB has determined that emission-related maintenance at shorter intervals than that outlined in paragraphs (a)(2)(i), (a)(2)(ii) and (a)(2)(iii) of this section is not technologically necessary to ensure in-use compliance. However, the Executive Officer may determine what maintenance intervals are technologically necessary.

(2) For off-road large spark-ignition engines, emission-related maintenance in addition to, or at shorter intervals than, the following will not be accepted as technologically necessary, except as provided in paragraph (a)(4) of this section.

(i) Fuel injector tips (cleaning **only**).

(ii) The adjustment, cleaning, repair, or replacement of the following parts and components, at 4,500 hours of use and at 4,500-hour intervals thereafter:

(A) Fuel injectors.

(B) Turbocharger.

(C) Electronic engine control unit and its associated sensors and actuators.

(D) Reserved

(3) (i) The following components are currently defined as critical emission-related components:

(A) Catalytic converter.

(B) Air injection system components.

(C) Electronic engine control unit and its associated sensors (including oxygen sensor if installed) and actuators.

(D) Exhaust gas recirculation system (including all related filters and control valves).

(E) Positive crankcase ventilation valve.

(F) Fuel system (carburetor, throttle-body, port injection system)

(ii) Scheduled maintenance on critical emission-related components must have a reasonable likelihood of being performed in-use. The manufacturer shall be required to show the reasonable likelihood of such maintenance being performed in-use. Critical emission-related scheduled maintenance items that satisfy one of the following conditions shall be accepted by the Executive Officer as showing a reasonable likelihood that the maintenance has been performed in-use:

(A) Data demonstrating a connection between emissions and equipment, engine, or vehicle performance by showing that as emissions increase due to lack of maintenance, its performance will simultaneously deteriorate to a point unacceptable for typical operation.

(B) Survey data which adequately demonstrates that, at an 80 percent confidence level, 80 percent of such engines already have this critical maintenance item performed in-use at the recommended interval(s).

(C) A clearly displayed visible signal system approved by the Executive Officer is installed to alert the engine or equipment operator or vehicle driver that maintenance is due. A signal bearing the message "maintenance needed" or "check engine," or a similar message approved by the Executive Officer, shall be actuated at the appropriate hours of usage point or by component failure. This signal must be continuous while the engine is in operation, and not easily eliminated without performance of the required maintenance. Resetting the signal shall be a required step in the maintenance operation. The method for resetting the signal system shall be approved by the Executive Officer.

(D) A survey, approved by the Executive Officer, showing that a critical maintenance item is likely to be performed without a visible signal on a maintenance item for which there is no prior in-use experience without the signal. To that end, the manufacturer may in a given model year market up to 200 randomly selected engines per critical emission-related maintenance item without such visible signals, and monitor the performance of the critical maintenance item by the owners to show compliance with paragraph (a)(3)(ii)(B) of this section. This option is restricted to two consecutive model years and may not be repeated until any previous survey has been completed. If the critical maintenance involves more than one engine family, the sample will be sales weighted to ensure that it is representative of all the families in question.

(E) The manufacturer provides the maintenance free of charge, and clearly informs the customer that the maintenance is free in the instructions provided under Section 22.

(F) Any other method that the Executive Officer approves as establishing a reasonable likelihood that the critical maintenance will be performed in-use.

(iii) Visible signal systems used under paragraph (a)(3)(ii)(C) of this section are considered an element of design of the emission control system. Therefore, disabling, resetting, or otherwise rendering such signals inoperative without also performing the indicated maintenance procedure is prohibited.

(4) (i) In the case of any new scheduled maintenance, the manufacturer must submit a request for approval to the Executive Officer for any maintenance that it wishes to recommend to purchasers. New scheduled maintenance is that maintenance which did not exist prior to the 2001 model year, including that which is a direct result of the implementation of new technology not found in production prior to the 2001 model year. The manufacturer must also include its recommendation as to the category (**i.e.**, emission-related or non-emission-related, critical or non-critical) of the subject maintenance and, for suggested emission-related maintenance, the maximum feasible maintenance interval. Such request must include detailed evidence supporting the need for the maintenance requested, and supporting data or other substantiation for the recommended maintenance category and for the interval suggested for emission-related maintenance. Requests for new scheduled maintenance must be approved prior to the introduction of the new maintenance. The Executive Officer will then designate the maintenance as emission-related or non-emission-related. For maintenance items established as emission-related, the Executive Officer will further designate the maintenance as critical if the component that receives the maintenance is a critical component under paragraph (a)(3) of this section. For each maintenance item designated as emission-related, the Executive Officer will also establish a technologically necessary maintenance interval, based on industry data and other information available to ARB. Designations of emission-related maintenance items, along with their identification as critical or non-critical, and establishment of technologically necessary maintenance intervals, will be announced through the certification process.

(ii) Any manufacturer may request a hearing in accordance with Section 5 on the Executive Officer's determinations in paragraph (a)(4) of this section. The request shall be in writing, and shall include a statement specifying the manufacturer's objections to the Executive Officer's determinations, and data in support of such objections.

(b) **Maintenance on emission-data engines.**

(1) Adjustment of idle speed on emission data engines may be performed once before the certification emission test point. Any other engine, emission control system, or fuel system adjustment, repair, removal, disassembly, cleaning, or replacement on emission-data engines shall be performed only with the advance approval of the Executive Officer.

(2) Repairs to engine components, other than the emission control system or the fuel system, on an emission-data engine, shall be performed only as a result of part failure, system malfunction, or with the advance approval of the Executive Officer.

(c) Equipment, instruments or tools may not be used to identify malfunctioning, maladjusted, or defective engine components unless the same or equivalent equipment, instruments, or tools will be available to dealerships and other service outlets and:

(1) Are used in conjunction with scheduled maintenance on such components, or

(2) Are used subsequent to the identification of an engine malfunction, as provided in paragraph (c)(1) of this section for emission- data engines, or

(3) Unless specifically authorized by the Executive Officer.

(d) **Durability-data Engine**

(1) The manufacturer may conduct scheduled (routine/scheduled maintenance items as normally appears in the engine owner's manual) engine maintenance during the

durability / service accumulation cycle test. The maintenance shall be consistent with the maintenance requirements set forth in Section 12(a).

(2) Manufacturer must receive advanced approval from the Executive Officer for any unscheduled maintenance on the durability engine. Engine components, sensors, or emission related components' maintenance conducted without the Executive Officer's approval may disqualify the engine and all related test results.

(e) All test data, maintenance reports, and required engineering reports shall be compiled and provided to the Executive Officer in accordance with Section 10.

13. Service Accumulation; Emission Measurements.

(a) (1) The manufacturer shall determine the engine operating schedule to be used for dynamometer service accumulation on emission-data engines selected under Section 11(b). This determination shall be consistent with good engineering practice. A single engine operating schedule shall be used for all engines in an engine family group-control system combination. Operating schedules may be different for different combinations.

(2) The manufacturer shall determine, for each engine family or group of engine families, the number of hours at which the engine-system combination is stabilized (no more than 50 hours for catalyst equipped) for emission-data testing.

(3) The manufacturer shall maintain, and provide to the Executive Officer if requested, a record of the rationale used in making this determination. The manufacturer may elect to accumulate 50 hours on each test engine within an engine family group without making a determination. However, the Executive Officer may determine under Section 11(c) that no testing is required.

(b) (1) (i) The results of all emission testing shall be supplied to the Executive Officer. The manufacturer shall furnish to the Executive Officer an explanation for voiding any test. The Executive Officer will determine if voiding the test was appropriate based upon the explanation given by the manufacturer for the voided test. Tests between test points may be conducted as required by the Executive Officer. Data from all tests (including voided tests) may be submitted weekly to the Executive Officer, but shall be air posted or delivered to the Executive Officer within 7 days after completion of the test. In addition, all test data shall be compiled and provided to the Executive Officer in accordance with Section 10.

(ii) The results of all emission tests shall be recorded and reported to the Executive Officer. These results shall be rounded, in accordance with ASTM E 29-90 to the number of decimal places contained in the applicable emission standard expressed to one additional significant figure.

(2) Whenever a manufacturer intends to operate and test an engine that may be used for emission data, the manufacturer shall retain in its records all information concerning all emissions tests and maintenance, including engine alterations to represent other engine selections. This information shall be submitted, including the engine description and specification information required by the Executive Officer, to the Executive Officer following the emission-data test.

(3) Emission testing of any type with respect to any certification engine other than that specified in these procedures is not allowed except as such testing may be specifically

authorized by the Executive Officer.

14. Test Procedures, General Requirements.

(a) Manufacturers shall use the procedures in Part II of these Test Procedures and all of this Part I.

(b) The Executive Officer may, on the basis of written application by a manufacturer, prescribe test procedures, other than those set forth in this part, for any off-road large spark-ignition engine that the Executive Officer determines cannot be satisfactorily tested by the procedures set forth in this part.

(c) If the manufacturer does not submit a written application for use of special test procedures but the Executive Officer determines that an off-road large spark-ignition engine cannot be satisfactorily tested by the procedures set forth in this part, the Executive Officer shall notify the manufacturer in writing that the application for certification has been rejected, and set forth the reasons for such rejection in accordance with the provisions of Section 9(c).

(d) The Executive Officer may amend these procedures when the amendment is supported by data showing the necessity for the correction.

15. Confirmatory Testing by the Executive Officer.

(a) The Executive Officer may require that a manufacturer provide to the ARB one or more of the test engines for confirmatory testing at the manufacturer's expense. Such testing shall take place at such place or places as the Executive Officer may designate. The Executive Officer may specify that he will conduct such testing at the manufacturer's facility, in which case instrumentation and equipment specified by the Executive Officer shall be made available by the manufacturer for test operations. Any testing conducted at a manufacturer's facility pursuant to this paragraph shall be scheduled by the manufacturer as promptly as possible.

(b) (1) Whenever the Executive Officer conducts a test on a test engine the results of that test, unless subsequently invalidated by the Executive Officer, shall comprise the official data for the engine at that prescribed test point and the manufacturer's data for that prescribed test point shall not be used in determining compliance with emission standards.

(2) Whenever the Executive Officer does not conduct a test on a test engine at a test point, the manufacturer's test data will be accepted as the official data for that point; **provided** that if the Executive Officer makes a determination that there is a lack of correlation between the manufacturer's test equipment and the test equipment used by the Executive Officer, no manufacturer's test data will be accepted for the purposes of certification until the reasons for the lack of correlation are determined and the validity of the data is established by the manufacturer; **and further provided** that if the Executive Officer has reasonable basis to believe that any test data submitted by the manufacturer is not accurate or has been obtained in violation of any provision of this part, the Executive Officer may refuse to accept that data as the official data pending retesting or submission or further information.

(3) (i) (A) The Executive Officer may adjust or cause to be adjusted any adjustable parameter of an emission-data engine that the Executive Officer has determined to be

subject to adjustment for certification testing in accordance with Section 9(d)(1), to any setting within the physically adjustable range of that parameter, as determined by the Executive Officer in accordance with Section 9(d)(3)(i), prior to the performance of any tests to determine whether such engine conforms to applicable emission standards, including tests performed by the manufacturer under Section 10(c). The Executive Officer, in making or specifying such adjustments, may consider the effect of the deviation from the manufacturer's recommended setting on emissions performance characteristics as well as the likelihood that similar settings will occur on in-use engines. In determining likelihood, the Executive Officer may consider factors such as, but not limited to, the effect of the adjustment on engine performance characteristics and surveillance information from similar in-use engines.

(B) For those engine parameters that the Executive Officer has not determined to be subject to adjustment during certification testing in accordance with Section 9(d)(1), the emission-data engine presented to the Executive Officer for testing shall be calibrated within the production tolerances applicable to the manufacturer's specifications to be shown on the engine label (see the Section 2434, Title 13, California Code of Regulations) as specified in the application for certification. If the Executive Officer determines that an engine is not within such tolerances, the engine shall be adjusted at the facility designated by the Executive Officer prior to the test and an engineering report shall be submitted to the Executive Officer describing the corrective action taken. Based on the engineering report, the Executive Officer will determine if the engine shall be used as an emission-data engine.

(ii) If the Executive Officer determines that the test data developed under paragraph (b)(3)(i) of this section would cause the emission-data engine to fail due to excessive 50-hour emission values, then the following procedure shall be observed:

(A) The manufacturer may request a retest. Before the retest, those engine parameters that the Executive Officer has not determined to be subject to adjustment for certification testing in accordance with Section 9(d)(1) may be readjusted to manufacturer's specification, if these adjustments were made incorrectly prior to the first test. The Executive Officer may adjust or cause to be adjusted any parameter that the Executive Officer has determined to be subject to adjustment in accordance with Section 9(d)(3)(i). However, if the idle speed parameter is one that the Executive Officer has determined to be subject to adjustment, the Executive Officer shall not adjust it to a setting that causes a higher engine idle speed than would have been possible within the physically adjustable range of the idle speed parameter on the engine before it accumulated any dynamometer service, all other parameters being identically adjusted for the purpose of the comparison. Other maintenance or repairs may be performed in accordance with Section 12. All work on the engine shall be done at such location and under such conditions as the Executive Officer may prescribe.

(B) The engine will be retested by the Executive Officer and the results of this test shall comprise the official data for the emission-data engine.

16. Certification.

(a) (1) If, after a review of the test reports and data submitted by the manufacturer, data derived from any inspection carried out under Section 6(c), and any other pertinent data or information, the Executive Officer determines that a test engine(s) meet(s) the requirements of these procedures, he will issue an Executive Order with respect to such test engine(s) except in cases covered by paragraph (c) of this section.

(2) Such certificate will be issued for such period not to exceed one model year as the Executive Officer may determine and upon such terms as he may deem necessary or appropriate to assure that any new off- road large spark-ignition engine covered by the Executive Order will meet the requirements of this part.

(3) One such Executive Order will be issued for each engine family.

(b) (1) The Executive Officer will determine whether an engine covered by the application complies with applicable standards by observing the following relationships:

(i) An emission-data test engine selected under Section 11(b)(3) shall represent all engines in the same engine-system combination.

(ii) An emission-data test engine selected under Section 11(b)(3) shall represent all engines containing that emission control system and having similar peak horsepower.

(2) The Executive Officer will proceed as in paragraph (a) of this section with respect to the engines belonging to an engine family group, all of which comply with all applicable standards.

(3) If, after a review of the test reports and data submitted by the manufacturer, data derived from any additional testing conducted pursuant to Section 15, data or information derived from any inspection carried out under Section 6(c) or any other pertinent data or information, the Executive Officer determines that one or more test engines of the certification test fleet do not meet applicable standards, the Executive Officer will notify the manufacturer in writing, setting forth the basis for his determination. Within 30 days following receipt of the notification, the manufacturer may request a hearing on the Executive Officer's determination under Title 17, California Code of Regulations, Division 3, Chapter 1, Subchapter 1.25.

(4) The manufacturer may, at his option, proceed with any of the following alternatives with respect to any engine family group represented by a test engine(s) determined not in compliance with applicable standards:

(i) Request a hearing under Section 5; or

(ii) Delete from the application for certification the engines represented by the failing test engine. (Engines so deleted may be included in a later request for certification under Section 17.) The Executive Officer may then select in place of each failing engine an alternate engine chosen in accordance with the selection criteria employed in selecting the engine that failed; or

(iii) Modify the test engine and demonstrate by testing that it meets applicable standards. Another engine that is in all material respect the same as the first engine, as modified, may then be operated and tested in accordance with applicable test procedures.

(5) If the manufacturer does not request a hearing or present the required data for certification under paragraphs (b)(4) of this section (as applicable), the Executive Officer will deny certification.

(c) (1) Notwithstanding the fact that any certification engine(s) may comply with other provisions of these procedures, the Executive Officer may withhold or deny the issuance of an Executive Order (or suspend or revoke any such Executive Order that has been issued) with respect to any such engine(s) if:

(i) The manufacturer submits false or incomplete information in his application for certification thereof;

(ii) The manufacturer renders inaccurate any test data that he submits pertaining thereto or otherwise circumvents the intent of the Act, or of this part with respect to such engine:

(iii) Any ARB Enforcement Officer is denied access on the terms specified in Section 6(c) to any facility or portion thereof that contains any of the following:

(A) The engine;

(B) Any components used or considered for use in its modification or buildup into a certification engine;

(C) Any production engine that is or will be claimed by the manufacturer to be covered by the Executive Order;

(D) Any step in the construction of an engine described in paragraph (c)(iii)(C) of this section;

(E) Any records, documents, reports, or histories required by this part to be kept concerning any of the above;

(iv) Any ARB Enforcement Officer is denied "reasonable assistance" (as defined in Section 6(c)) in examining any of the items listed in paragraph (c)(1)(iii) of this section.

(2) The sanctions of withholding, denying, revoking, or suspending of a certificate may be imposed for the reasons in paragraphs (c)(1)(i), (ii), (iii), or (iv) of this section only when the infraction is substantial.

(3) In any case in which a manufacturer knowingly submits false or inaccurate information or knowingly renders inaccurate or invalid any test data or commits any other fraudulent acts and such acts contribute substantially to the Executive Officer's decision to issue an Executive Order, the Executive Officer may deem such certificate void **ab initio.**

(4) In any case in which certification of an engine is proposed to be withheld, denied, revoked, or suspended under paragraph (c)(1)(iii) or (iv) of this section, and in which the Executive Officer has presented to the manufacturer involved reasonable evidence that a violation of Section 6(c) in fact occurred, the manufacturer shall have the burden of establishing any contention to the satisfaction of the Executive Officer that even though the violation occurred, the engine in question was not involved in the violation to a degree that would warrant withholding, denial, revocation, or suspension of certification under either paragraph (c)(1)(iii) or (iv) of this section.

(5) Any revocation or suspension of certification under paragraph (c)(1) of this section shall:

(i) Be made only after the manufacturer concerned has been offered an opportunity for a hearing conducted in accordance with Section 5 hereof.

(ii) Extend no further than to forbid the introduction into commerce of engines previously covered by the certification that are still in the hands of the manufacturer, except in cases of such fraud or other misconduct as makes the certification invalid **ab initio.**

17. Addition of an Engine After Certification.

(a) If a manufacturer proposes to add to his product line an engine of the same engine-system combination as engines previously certified but that was not described in the application for certification when the test engine(s) representing other engines of that combination was certified, he shall notify the Executive Officer. Such notification shall be in advance of the addition unless the manufacturer elects to follow the procedure described in Section 19. This notification shall include a full description of the engine to be added.

(b) The Executive Officer may require the manufacturer to perform such tests on the test engine(s) representing the engine to be added that would have been required if the engine had been included in the original application for certification.

(c) If, after a review of the test reports and data submitted by the manufacturer, and data derived from any testing conducted under Section 15, the Executive Officer determines that the test engine(s) meets all applicable standards, the appropriate Executive Order will be amended accordingly. If the Executive Officer determines that the test engine(s) does not meet applicable standards, he will proceed under Section 16(b).

18. Changes to an Engine Covered by Certification.

(a) The manufacturer shall notify the Executive Officer of any change in production engines in respect to any of the parameters listed in Section 11(a)(1) thru 11(a)(4), as applicable, giving a full description of the change. Such notification shall be in advance of the changes unless the manufacturer elects to follow the procedure described in Section 19.

(b) Based upon the description of the change, and data derived from such testing as the Executive Officer may require or conduct, the Executive Officer shall determine whether the engine, as modified, would still be covered by the Executive Order then in effect.

(c) If the Executive Officer determines that the outstanding Executive Order would cover the modified engines he will notify the manufacturer in writing. Except as provided in Section 19 the change may not be put into effect prior to the manufacturer's receiving this notification. If the Executive Officer determines that the modified engines would not be covered by the Executive Order then in effect, the modified engines shall be treated as additions to the product line subject to Section 17.

19. Alternative Procedures for Notification of Additions and Changes.

(a) A manufacturer may, in lieu of notifying the Executive Officer in advance of an addition of an engine under Section 17 or a change in an engine under Section 18, notify the Executive Officer concurrently with making an addition of an engine or a change in an engine, if the manufacturer determines that following the change all engines affected by the addition or change will still meet the applicable emission standards. Such notification shall include a full description of the addition or change and any supporting documentation the manufacturer may desire to include to support the manufacturer's determination. The manufacturer's determination that the addition or change does not cause noncompliance shall be based on an engineering evaluation of the addition or change and/or testing.

(b) The Executive Officer may require that additional emission testing be performed to support the manufacturer's original determination submitted in paragraph (a) of this section. If additional testing is required the Executive Officer shall proceed as in Section 17(b) and (c) or Section 18(b) and (c) as appropriate. Additional test data, if requested, must be provided within 30 days of the request or the manufacturer must rescind the addition or change immediately. The Executive Officer may grant additional time to complete testing. If based on this additional testing or any other information, the Executive Officer determines that the engines affected by the addition or change do not meet the applicable standards the Executive Officer will notify the manufacturer to rescind the addition or change immediately upon receipt of the notification.

(c) Election to produce engines under this section will be deemed to be a consent to recall all engines that the Executive Officer determines under Section 17(c) do not meet applicable standards, and cause such nonconformity to be remedied at no expense to the owner.

20. Submission of Engine Identification Numbers.

(a) Upon request of the Executive Officer, the manufacturer of any off-road large spark-ignition engine covered by an Executive Order shall, within 30 days, identify by engine identification number or alternative tracking method, the engine(s) covered by the Executive Order.

(b) The manufacturer of any off-road large spark-ignition engine covered by an Executive Order shall provide to the Executive Officer, within 60 days of the issuance of an Executive Order, an explanation of the elements in any engine identification coding system in sufficient detail to enable the Executive Officer to identify those engines that are covered by an Executive Order.

21. Production Engines.

Any off-road large spark-ignition engine manufacturer obtaining certification under this part shall notify the Executive Officer, on a yearly basis, of the number of engines of such engine family-engine displacement-exhaust emission control system-fuel system combination produced for sale in California during the preceding year.

22. Maintenance Instructions.

(a) The manufacturer shall furnish or cause to be furnished to the purchaser of each new off-road large spark-ignition engine subject to the standards prescribed in Section 7 written instructions for the proper maintenance and use of the engine by the purchaser consistent with the provisions of Section 12, which establishes what scheduled maintenance the Executive Officer approves as being reasonable and necessary.

(1) The maintenance instructions required by this section shall be in clear, and to the extent practicable, nontechnical language.

(2) The maintenance instructions required by this section shall contain a general description of the documentation that the manufacturer will require from the ultimate purchaser

or any subsequent purchaser as evidence of compliance with the instructions.

(b) Instructions provided to purchasers under paragraph (a) of this section may specify the performance of any scheduled maintenance allowed under Section 12.

(c) Scheduled emission-related maintenance in addition to that performed under Section 12(b) may only be recommended to offset the effects of abnormal in-use operating conditions, except as provided in paragraph (d) of this section. The manufacturer shall be required to demonstrate, subject to the approval of the Executive Officer that such maintenance is reasonable and technologically necessary to assure the proper functioning of the emission control system. Such additional recommended maintenance shall be clearly differentiated, in a form approved by the Executive Officer, from that approved under Section 12(b).

(d) Inspections of emission-related parts or systems with instructions to replace, repair, clean, or adjust the parts or systems if necessary, are not considered to be items of scheduled maintenance that insure the proper functioning of the emission control system. Such inspections, and any recommended maintenance beyond that approved by the Executive Officer as reasonable and necessary under paragraphs (a), (b), and (c) of this section, may be included in the written instructions furnished to engine or equipment owners under paragraph (a) of this section; **provided** that such instructions clearly state, in a form approved by the Executive Officer that the owner need not perform such inspections or recommended maintenance in order to maintain the emission warranty.

23. Submission of Maintenance Instructions.

(a) The manufacturer shall provide to the Executive Officer, no later than the time of the submission required by Section 10, a copy of the maintenance instructions that the manufacturer proposes to supply to the ultimate purchaser in accordance with Section 22(a). The Executive Officer will review such instructions to determine whether they are reasonable and necessary and sufficient to assure the proper functioning of the engine's (or equipment's) emission control systems. The Executive Officer will notify the manufacturer of his determination whether such instructions are reasonable and necessary and sufficient to assure the proper functioning of the emission control systems.

(b) Any revision to the maintenance instructions that will affect emissions shall be supplied to the Executive Officer at least 30 days before being supplied to the ultimate purchaser unless the Executive Officer consents to a lesser period of time.

24. Alternative Certification Procedures.

(a) (1) The Executive Officer shall determine that of the following certification procedures (paragraph (a)(3) or (a)(4) of this section), if any, may be used to demonstrate compliance for each off-road large spark-ignition engine family group for which certification is sought. In making this determination, the Executive Officer will consider whether the following criteria have been met.

(i) In prior certifications:

(A) The applications have been properly completed and demonstrate understanding of the certification protocol.

(B) The test engine selection has been acceptable to the Executive Officer.

(C) All applicable emission control label requirements have been complied with.

(D) The applications have not included requests for deviations from the test procedures.

(ii) For the engine family group in question:

(A) The test engine includes technology similar to previously certified engines.

(B) Such other criteria as the Executive Officer determines on a case-by-case basis.

(2) The engine family groups selected for the procedure described in paragraph (a)(3) of this section shall be subject to this procedure at the option of the manufacturer.

(3) The following provisions apply to those off-road large spark-ignition engine family groups that the Executive Officer has specified may be subject to the abbreviated certification review procedure.

(i) The manufacturer shall satisfy all applicable requirements of these provisions necessary to demonstrate compliance with the applicable standards.

(ii) As specifically allowed by the Executive Officer, the manufacturer shall assume the responsibility for part or all of the decisions applicable to the family group for which certification is sought and that are within the jurisdiction of the Executive Officer, with the exception that the Executive Officer shall determine whether a test engine has met the applicable emission standards.

(iii) The manufacturer shall maintain, update, and correct all records and information required.

(iv) The Executive Officer may review a manufacturer's records at any time. At the Executive Officer's discretion, this review may take place either at the manufacturer's facility or at another facility designated by the Executive Officer.

(v) At the Executive Officer's request, the manufacturer shall notify the Executive Officer of the status of the certification program, including projected schedules of those significant accomplishments specified by the Executive Officer.

(vi) The manufacturer shall permit the Executive Officer to inspect any facilities, records, and vehicles from which data are obtained under the abbreviated certification review procedure.

(vii) Upon completing all applicable requirements of these provisions, the manufacturer shall submit an application for certification. Such application shall be made in writing to the Executive Officer by the manufacturer.

(A) The Executive Officer may approve or disapprove, whole or in part, an application for certification according to the procedures specified in Section 9(b).

(B) If, after a review of the application for certification, test reports and data submitted by the manufacturer, data obtained during an inspection, and any other pertinent data or information, the Executive Officer determines that a test engine(s) has not met the applicable provisions, the Executive Officer shall notify the manufacturer in writing and set forth the reason(s) for the determination as specified in Section 9.

(4) Those engine family groups that are to be subjected (to the complete ARB review procedure) shall follow the procedures specified in these provisions, with the exception of paragraph (a)(3) of this section.

(b) The manufacturer may request that an engine family group be subject (to the abbreviated certification review procedure) shall make such request during annual certification preview program or at least 6 months before the start of the model year for abbreviated certification review procedure.

(c) The Executive Officer may require that an engine family group previously allowed to be subject (to the abbreviated certification review procedure) be transferred to the complete review procedure.

25. Test Fuel.

(a) (1) If the engine is a gasoline-fueled large spark-ignition engine, then the test fuel used shall be consistent with the fuel specifications as outlined in the "California Exhaust Emission Standards and Test Procedures for 1988 and Subsequent Model Passenger Cars, Light-Duty Trucks, and Medium- Duty Vehicles," as adopted May 20, 1987, and last amended June 24, 1996, and incorporated by reference herein. The California fuel specifications are contained in the California Code of Regulations, Title 13, Chapter 5, Article 1, Sections 2260-2272. If the engine is tested using the U.S. EPA test fuel, consistent with the fuel specifications as outlined in Title 40 Code of Federal Register, Part 86, the manufacturer shall demonstrate that the emission test results complies with these Test Procedures.

(2) If the engine is not a gasoline-fueled large spark-ignition engine, then the test fuel used shall be consistent with the fuel specifications as outlined in the "California Exhaust Emission Standards and Test Procedures for 1988 and Subsequent Model Passenger Cars, Light-Duty Trucks, and Medium- Duty Vehicles," as adopted May 20, 1987, and last amended June 24, 1996, and incorporated by reference herein. The California fuel specifications are contained in the California Code of Regulations, Title 13, Chapter 5, Article 3, Sections 2290-2293.5. If the engine is tested using the U.S. EPA test fuel, consistent with the fuel specifications as outlined in Title 40 Code of Federal Register, Part 86, the manufacturer shall demonstrate that the emission test results complies with these Test Procedures.

(b) During all engine tests, the engine shall employ a lubricating oil consistent with the engine manufacturer's specifications for that particular engine. These specifications shall be recorded and declared in the certification application.

APPENDIX A: MANUFACTURER STANDARDS AND TEST PROCEDURES
Part 3

Proposed Regulation Order Part 3: Amendments to the incorporated "California Exhaust and Standards and Test Procedures for New 2001 and Later Off-Road Large Spark-Ignition Engines" (ISO 8178)

State of California
AIR RESOURCES BOARD

CALIFORNIA EXHAUST EMISSION STANDARDS AND TEST PROCEDURES FOR NEW 2001 ~~AND LATER~~ THROUGH 2006 OFF-ROAD LARGE SPARK-IGNITION ENGINES

PART II

Adopted: September 1, 1999

NOTE: This document incorporates by reference the International Standards Organization (ISO) 8178 test procedure, Part 1, August 15, 1996, Part 4, August 15, 1996, and Part 5, May 15, 1998, with modifications. Sections which have been included in their entirety are set forth with the section number and title. California provisions which modify specific ISO provisions are denoted by the words "DELETE" for the ISO language and "REPLACE WITH" for the new California language. The symbols "*****" and "..." mean that the remainder of the ISO text for a specific section is not shown in these procedures but has been included by reference, unchanged. ISO sections which are not listed are not part of the procedures.

~~This document is all newly adopted text.~~
The sole amendments are to the title and years of applicability of the regulations.

CALIFORNIA EXHAUST EMISSION STANDARDS AND TEST PROCEDURES FOR NEW 2001 ~~AND LATER~~ THROUGH 2006 OFF-ROAD LARGE SPARK-IGNITION ENGINES

PART II

To the extent the following provisions of ISO 8178, Part 1, August 15, 1996, Part 4, August 15, 1996, and Part 5, May 15, 1998, pertain to the testing and compliance of exhaust emissions from off-road large spark-ignition engines, they are adopted and incorporated herein by this reference as Part II of the California Exhaust Emission Standards and Test Procedures for New 2001 ~~and Later~~ through 2006 Off-Road Large Spark-Ignition Engines (Test Procedures), except as altered or replaced by the provisions set forth below.

Since the scope of this regulation is limited to off-road spark-ignition engines, the ISO provisions contained in the procedure identified above which pertain to Diesel cycle engines or to engines used for applications other than off-road purposes shall not be applicable to Part II of these Test Procedures.

International Standards Organization (ISO) 8178, RIC Engines - Exhaust emission measurement - Part 1: Test bed measurement of gaseous and particulate exhaust emissions from RIC engines.

1. Scope

2. Normative References

3. Definitions

   ADD:
   Note: In addition to the definitions listed here, those definitions listed in section 2 of Part I of these Test Procedures apply.

   * * * * *

4. Symbols and Abbreviations

   ADD:
   Note: In addition to the symbols and abbreviations listed here, those symbols and abbreviations listed in section 3 of Part I of these Test Procedures shall apply.

   * * * * *

5. Test Conditions

6. DELETE and

REPLACE WITH:

6. Test fuels

Test fuels shall meet the requirements specified in section 25 of Part I of these Test Procedures.

7. Measurement Equipment and data to be measured

DELETE all references to subsection 7.5 (Determination of the Particulates).

8. Calibration of the analytical instruments

9. DELETE

10. Running conditions (Test cycles)

11. Test run

DELETE all references to the particulates and particulate sampling method.

12. Data evaluation for gaseous and particulate emission

DELETE all references to the particulate emission.

13. Calculation of gaseous emissions

14. DELETE

15. Determination of the gaseous emissions

ADD:

NOTE: Manufacturers may use the raw exhaust gas sampling methods for certification testing through 2004 model year with prior Executive Officer approval.

* * * *

16. DELETE

Figures and Explanations

ISO 8178, RIC Engines - Exhaust emission measurement - Part 4: Test cycles for different engine applications.

1. Scope

2. Normative References

3. Definitions

ADD:

Note: In addition to the definitions listed here, those definitions listed in section 2 of Part I of these Test Procedures shall apply.

* * * * *

4. Symbols and Abbreviations

ADD:

Note: In addition to the symbols and abbreviations listed here, those symbols and abbreviations listed in section 3 of Part I of these Test Procedures shall apply.

* * * * *

5. Torque

6. Intermediate speed

7. Information regarding of the test

8. Modes and weighting factors for test cycles

8.2 DELETE

8.3 Test cycle types C "Off-road vehicles and industrial equipment"

8.3.1 DELETE

8.4 Test cycle type D "Constant"

DELETE all references to D-1 test cycle

8.5 DELETE

8.6 DELETE

8.7 Test cycles type G "Utility, lawn and garden", typically < 25 hp.

DELETE all reference to G-2 and G-3 test cycles.

ADD:

Note: Manufacturers may use the G-1 test cycle for engines equal to or less than 1.0 liter. Manufacturer must show that the engines tested with the G-1 test cycle have engine characteristics and operating characteristics similar to small off-road equipment engines (less than 25 hp).

* * * *

Annex A DELETE

Annex B Combined table of the weighting factors

Annex C Bibliography

ISO 8178, RIC Engines - Exhaust emission measurement - Part 5: Test fuels.

1. DELETE and

REPLACE WITH:

1. Scope

This part specifies the calculation of the fuel specific factors and exhaust gas flow, which are necessary to determine the emission test results in accordance with ISO 8178, Part 1.

2. Normative References

3. Definitions

ADD:

Note: In addition to the definitions listed here, those definitions listed in section 2 of Part I of these Test Procedures apply.

* * * * *

4. Symbols and Abbreviations

ADD:

Note: In addition to the symbols and abbreviations listed here, those symbols and abbreviations listed in section 3 of Part I of these Test Procedures apply.

* * * * *

5. DELETE and REPLACE WITH:

5. Choice of Fuels

Test fuels shall meet the requirements specified in section 25 of Part I of these Test Procedures.

6. DELETE

7. Calculation of the Exhaust Gas Flow Using Fuel Specific Factors

8. Calculation of the Fuel Specific Factors
Tables

APPENDIX A: MANUFACTURER STANDARDS AND TEST PROCEDURES
Part 4

Proposed Regulation Order Part 4: Adoption of incorporated "California Exhaust and Standards and Test Procedures for New 2007 through 2009 Off-Road Large Spark-Ignition Engines" (40 CFR, Part 1048)

State of California
AIR RESOURCES BOARD

PROPOSED CALIFORNIA EXHAUST AND EVAPORATIVE EMISSION STANDARDS AND TEST PROCEDURES FOR NEW 2010 AND LATER OFF-ROAD LARGE SPARK-IGNITION ENGINES

PART 1: 2007 - 2009 Emission Standards

Adopted: [insert date of adoption]

NOTE: This document incorporates by reference Title 40, Code of Federal Regulations (CFR), Part 1048 – **CONTROL OF EMISSIONS FROM NEW, LARGE NONROAD SPARK-IGNITION ENGINES**, Subparts A, B, C, D, F, G, H, and I, including Appendix I and II to Part 1048 as amended on July 13, 2005 (Federal Register, Volume 70, pages 40465 through 40486), and the internally referenced subparts of 40 CFR Part 86, 40 CFR Part 1065, and 40 CFR Part 1068. Sections that have been included in their entirety are set forth with the section number and title. California provisions that replace specific federal provisions are denoted by the words "DELETE" for the federal language and "REPLACE WITH" or "ADD" for the California regulations. The symbols "* * * * *" and "..." mean that the remainder of the CFR text for a specific section, which is not shown in these regulations, has been included by reference, with only the printed text changed. Federal regulations that are not listed are not part of the California regulations. Text in *Italics* is provided as rationale for replacement language.

This document is all newly adopted text. *[The italicized text in brackets describes the purpose of the California provisions.]*

PART 1048 – CONTROL OF EMISSIONS FROM NEW, LARGE NONROAD SPARK-IGNITION ENGINES

Subpart A—Overview and Applicability

§1048.1 Does this part apply to me?

* * * * *

This part 1048 applies for engines built from January 1, 2007 through December 31, 2009. You need not follow this part for engines you produce before January 1, 2007. See §1048.101 through 1048.115, and the definition of model year in §1048.801 for more information about the timing of new requirements.

[Applicability is changed to reflect an end date of December 31, 2009 to coincide with the introduction of the 0.8 g/kW-hr standard on January 1, 2010. Additionally, the reference to §1048.145 is removed because that section has been deleted; see §1048.145 for deletion rationale.]

* * * * *

(d) DELETE AND REPLACE WITH:
Engines with a maximum engine power at or below 19 kW are covered by Title 13, California Code of Regulations, Chapter 9, Article 1, Small Off-Road Engines

[The language was changed to reference appropriate California standards for Small Off-Road Engines, which are more stringent than the EPA standards.]

§1048.5 Which engines are excluded from this part's requirements?

This part does not apply to the following nonroad engines:

(a) DELETE AND REPLACE WITH:
Engines that are subject to the requirements of Title 13, California Code of Regulations, Chapter 9, Article 3, Off-Highway Recreational Vehicles and Engines, including any related provisions and guidelines that are applicable to Off-Highway Recreational Vehicles and Engines.

[The language was changed to reference appropriate ARB regulations for Off-Highway Recreational Vehicles and Engines]

(b) DELETE AND REPLACE WITH:
Propulsion marine engines. See Title 13, California Code of Regulations, Chapter 9, Article 4.7, Spark-Ignition Marine Engines. This part applies with respect to auxiliary marine engines.

[The language was changed to reference appropriate ARB regulations for Marine Engines]

§1048.10 How is this part organized?

§1048.15 Do any other regulation parts affect me?

* * * * *

(b)(6) DELETE AND REPLACE WITH:
Procedures for In-Use Engine Recalls for Large Off-Road Spark-Ignition Engines with an Engine Displacement Greater Than 1.0 Liter, Chapter 9, Article 4.5, section 2439, Title 13, California Code of Regulations

* * * * *

(b)(7) DELETE AND REPLACE WITH:
Administrative Procedures – Hearings, Subchapter 1, Article 1, Sections 60040 – 60094, Title 17, California Code of Regulations

* * * * *

(b)(8) ADD
Large Spark-Ignition (LSI) Engine Fleet Requirements, Chapter 15, Article 2, sections 2775, 2775.1, and 2775.2, Title 13, California Code of Regulations

§1048.20 What requirements from this part apply to excluded stationary engines?

Subpart B—Emission Standards and Related Requirements

§1048.101 What exhaust emission standards must my engines meet?

* * * * *

(e) Fuel types. DELETE AND REPLACE WITH:
Fuel types (a)

* * * * *

ADD

(b) Test Fuel.
(a) (1) If the engine is a gasoline-fueled large spark-ignition engine, then the test fuel used shall be consistent with the fuel specifications as outlined in the " The "California Exhaust Emission Standards and Test Procedures for 2001 and Subsequent Model

Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles," as of January 1, 2006 (last amended August 4, 2005) incorporated by reference in Section 1961(d), Title 13, CCR). The California fuel specifications are contained in the California Code of Regulations, Title 13, Chapter 5, Article 1, Sections 2260-2272. If the engine is tested using the U.S. EPA test fuel, consistent with the fuel specifications as outlined in Title 40 Code of Federal Register, Part 1065, subpart H, the manufacturer shall demonstrate that the emission test results complies with these Test Procedures.
(2) If the engine is not a gasoline-fueled large spark-ignition engine, then the test fuel used shall be consistent with the fuel specifications as outlined in the " The "California Exhaust Emission Standards and Test Procedures for 2001 and Subsequent Model Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles," as of January 1, 2006 (last amended August 4, 2005) incorporated by reference in Section 1961(d), Title 13, CCR). The California fuel specifications are contained in the California Code of Regulations, Title 13, Chapter 5, Article 3, Sections 2290- 2293.5. If the engine is tested using the U.S. EPA test fuel, consistent with the fuel specifications as outlined in Title 40 Code of Federal Register, Part 1065, subpart H, the manufacturer shall demonstrate that the emission test results complies with these Test Procedures.
(b) During all engine tests, the engine shall employ a lubricating oil consistent with the engine manufacturer's specifications for that particular engine. These specifications shall be recorded and declared in the certification application.

(f) DELETE AND REPLACE WITH:
Small engines. Engines with total displacement at or below 1000 cc may comply with the requirements of Title 13, California Code of Regulations, Chapter 9, Article 1, Small Off-Road Engines and Chapter 15, Article 1, Evaporative Emission Requirements for Off-Road Equipment instead of complying with the requirements of this part, as described in §1048.615.

[The language was changed to reference appropriate California standards for Small Off-Road Engines, which are more stringent than the EPA standards.]

* * * * *

§1048.105 What evaporative emission standards and requirements apply?

§1048.110 How must my engines diagnose malfunctions?

§1048.115 What other requirements must my engines meet?
Engines subject to this part must meet the following requirements:
(a) DELETE AND REPLACE WITH:

Crankcase emissions. No crankcase emissions shall be discharged directly into the ambient atmosphere from any new 2001 or later engines subject to the provisions of this part.

[The EPA allows crankcase emissions to be added to the exhaust. This is inconsistent with the existing LSI regulation and ARB policy.]

* * * * *

§1048.120 What emission-related warranty requirements apply to me?

§1048.125 What maintenance instructions must I give to buyers?

§1048.130 What installation instructions must I give to equipment manufacturers?

§1048.135 How must I label and identify the engines I produce?

§1048.140 What are the provisions for certifying Blue Sky Series engines?

§1048.145 Are there interim provisions that apply only for a limited time?
(a) DELETE

[§1048.145 allows for the generation of offset credits. This is inconsistent with current ARB policy and has been deleted.]

Subpart C—Certifying Engine Families

§1048.201 What are the general requirements for obtaining a certificate of conformity?

§1048.205 What must I include in my application?

* * * * *

(aa) DELETE AND REPLACE WITH:
Name an agent for service of process located in the United States. Service on this agent constitutes service on you or any of your officers or employees for any action by the California Air Resources Board.

[The revised language provides the ARB the ability to serve process]

§1048.210 May I get preliminary approval before I complete my application?

§1048.220 How do I amend the maintenance instructions in my application?

§1048.225 How do I amend my application for certification to include new or modified engines?

§1048.230 How do I select engine families?

* * * * *

(f) DELETE

[The language has been deleted as the current LSI program and ARB policy does not allow manufacturers to divide engine families into subfamilies with multiple standards.]

§1048.235 What emission testing must I perform for my application for a certificate of conformity?

§1048.240 How do I demonstrate that my engine family complies with exhaust emission standards?

§1048.245 How do I demonstrate that my engine family complies with evaporative emission standards?

§1048.250 What records must I keep and make available to ARB?

* * * * *

(e) ADDED
Maintain certification engines for a period of two years

[ARB policy, as expressed in other motor vehicle regulations, requires engine manufacturers to maintain certification engines for a specified period.]

§1048.255 When may EPA deny, revoke, or void my certificate of conformity?

Subpart D—Testing Production-line Engines

§1048.301 When must I test my production-line engines?

§1048.305 How must I prepare and test my production-line engines?

§1048.310 How must I select engines for production-line testing?

§1048.315 How do I know when my engine family fails the production-line testing requirements?

§1048.320 What happens if one of my production-line engines fails to meet emission standards?

§1048.325 What happens if an engine family fails the production-line requirements?

§1048.330 May I sell engines from an engine family with a suspended certificate of conformity?

§1048.335 How do I ask EPA to reinstate my suspended certificate?

§1048.340 When may EPA revoke my certificate under this subpart and how may I sell these engines again?

§1048.345 What production-line testing records must I send to EPA?

§1048.350 What records must I keep?

Subpart E—Testing In-use Engines

§1048.401 What testing requirements apply to my engines that have gone into service?

* * * * *

(b) We may approve an alternate plan for showing that in-use engines comply with the requirements of this part if one of the following is true:

(1) DELETE AND REPLACE WITH:

You produce a total of less than 2000 large spark-ignition engines annually for sale in the United States of America.

[The language has been revised to make the definition for small volume manufacturer definition consistent with other ARB regulations.]

* * * * *

§1048.405 How does this program work?
DELETE

[Replaced by 2438 language in §1048.410]

§1048.410 How must I select, prepare, and test my in-use engines?
DELETE AND REPLACE WITH:

(a) This section applies to new 2010 and later model year off-road large spark-ignition engines with engine displacement greater than 1.0 liter.

(b) Manufacturer In-Use Testing Program.

Standards and Test Procedures. The emission standards, exhaust sampling and analytical procedures are those described in the Test Procedures, and are applicable to engines tested only for exhaust emissions. An engine is in compliance with these standards and test procedures only when all portions of these in-use test procedures and specified requirements from the Test Procedures are fulfilled, except that any adjustable engine parameters must be set to the nominal value or position as indicated on the engine label.

(1) Within a manufacturer's model-year engine production period, the ARB will identify those engine families, and the specific configurations within an engine family, that the manufacturer must subject to in-use testing as described below. For each model year, ARB may identify a number of engine families that is no greater than 25 percent of the number of engine families to which this article is applicable. For those manufacturers producing three or less engine families in a model year, ARB may designate a maximum of one engine family per model year for in-use testing.

(2) For each engine family identified by ARB, engine manufacturers must perform emission testing of an appropriate sample of in-use engines from each engine family. Manufacturers must submit data from this in-use testing to ARB.

(3) An engine manufacturer must test in-use engines from each engine family identified by ARB. All engines selected by the manufacturer for testing must be identified by the manufacturer, and a list of the selected engines must be submitted to the Executive Officer, prior to the onset of testing. Engines to be tested must have accumulated a minimum of 0.50 (50 percent) of the family's certified useful life period. The number of engines to be tested by a manufacturer will be determined by the following method:

(A) a minimum of four engines per family, provided that no engine fails any emission standard. For each exceedance, two additional engines must be tested until the total number of engines equals ten.

(B) For engine families of less than 500 engines (national production) for the identified model year or for engine manufacturers who make less than or equal to 2,000 engines nationally for that model year, a minimum of two (2) engines per family provided that no engine fails any emission standard. For each failing engine, two more engines shall be tested until the total number of engines equals ten (10).

(C) If an engine family was certified using carryover emission data and has been previously tested under paragraphs (b)(3)(A) or (b)(3)(B) of this section (and a recall for that family has not occurred), then only one engine for that family must be tested. If that one engine fails any emission standard, testing must be conducted as outlined in subsections (b)(3)(A) or (b)(3)(B), whichever is appropriate.

(4) The Executive Officer may approve an alternative to manufacturer in-use testing, where:

(A) Engine family production is less than or equal to 200 per year, nationally;

(B) Engines cannot be obtained for testing because they are used substantially in vehicles or equipment that are not conducive to engine removal such as large vehicles or equipment from which the engine cannot be removed without dismantling either the engine, vehicle, or equipment; or

(C) Other compelling circumstances associated with the structure of the industry and uniqueness of engine applications. Such alternatives shall be designed to determine whether the engine family is in compliance.

(5) The engine manufacturer shall procure in-use engines which have been operated between 0.50 and 1.0 times the certified engine's useful life period. The engine manufacturer may test engines from more than one model year in a given year. The manufacturer shall submit a plan for testing within twelve calendar months after receiving notice that ARB has identified a particular engine family for testing and shall complete testing of such engine family within 24 calendar months from the date of approval of the plan by ARB. Test engines may be procured from sources associated with the engine manufacturer (i.e., manufacturer-established fleet engines, etc.) or from sources not associated with the manufacturer (i.e., consumer-owned engines, independently owned fleet engines, etc.).

(c) Maintenance, procurement and testing of in-use engines.

(1) A test engine must have a maintenance and use history representative of in-use conditions.

(A) To comply with this requirement a manufacturer must obtain information from the end users regarding the accumulated usage, maintenance, repairs, operating conditions, and storage of the test engines.

(B) Documents used in the procurement process must be maintained as required.

(2) The manufacturer may perform minimal restorative maintenance on components of a test engine that are not subject to parameter adjustment. Maintenance may include only that which is listed in the owner's instructions for engines with the amount of service and age of the acquired test engine. Repairs may be performed on a test engine with prior Executive Officer approval. Documentation of all maintenance, repairs, defects, and adjustments shall be maintained and retained as required.

(3) At least one valid emission test, according to the Test Procedure, is required for each in-use engine.

(4) The Executive Officer may waive portions or requirements of the test procedure, if any, that are not necessary to determine in-use compliance.

(5) If a selected in-use engine fails to comply with any applicable emission standards, the manufacturer shall determine the reason for noncompliance. The manufacturer must report within 72 hours after the completion of the test specifying the emission results and identifying the pollutant which failed to comply with the emission standard. The manufacturer must report all such reasons of noncompliance within fifteen business days of completion of testing. Additional time beyond the initial fifteen days may be granted providing that the manufacturer receives prior approval from the Executive Officer. The reports may be filed electronically or mailed to the following address: Chief of Mobile Source Operations Division, 9528 Telstar Avenue, El Monte, CA 91731.

(6) At the discretion of the Executive Officer, an engine manufacturer may test more engines than the minima described in paragraph (b)(3) of this section or may concede failure before testing a total of ten engines. Upon conceding failure the manufacturer shall proceed with a voluntary recall program as specified in Section 2439.

(7) The Executive Officer will consider failure rates, average emission levels and the existence of any defects, among other factors, in determining whether to pursue remedial action under this subpart. The Executive Officer may order a recall pursuant to Section 2439 before testing reaches the tenth engine whenever the Executive Officer has determined, based on production-line test results or in-use test results, enforcement testing results, or any other information, that a substantial number of a class or category of equipment or engines produced by that manufacturer, although properly maintained and used, contain a failure in an emission-related component which, if uncorrected, may result in the equipments' or engines' failure to meet applicable standards over their useful lives; or whenever a class or category of equipment or engines within their useful lives, on average, do not conform to the emission standards prescribed pursuant to Part 5 (commencing with Section 43000) of Division 26 of the Health and Safety Code, or any regulation adopted by the state board pursuant thereto, other than an emissions standard applied to new engines to determine "certification" as specified in Chapter 9, as applicable to the model year of such equipment or engines.

(8) Prior to an ARB-ordered recall, the manufacturer may perform a voluntary emissions recall pursuant to Article 4.5, Section 2439(b). Such manufacturer is subject to the reporting requirements in subsection (d) below.

(9) Once ARB determines that a substantial number of engines fail to conform with the requirements, the manufacturer will not have the option of a voluntary emissions recall.

(d) In-use test program reporting requirements.

(1) The manufacturer shall electronically submit to the Executive Officer within three months of completion of testing all emission testing results generated from the in-use testing program. The following information must be reported for each test engine:

(A) engine family,

(B) model,

(C) engine serial number or alternate identification, as applicable,

(D) date of manufacture,

(E) estimated hours of use,

(F) date and time of each test attempt,

(G) results (if any) of each test attempt,

(H) results of all emission testing,

(I) summary of all maintenance, repairs, and adjustments performed,

(J) summary (if any) of all ARB pre-approved modifications and repairs,

(K) determinations of noncompliance or compliance.

(2) The manufacturer must electronically submit the results of its in-use testing with a pre-approved information heading. The Executive Officer may exempt manufacturers from this requirement upon written request with supporting justification.

(3) All testing reports and requests for approvals made under this subpart shall be sent to the Executive Officer.

(4) The Executive Officer may require modifications to a manufacturer's in-use testing programs.

[All sections referring to in-use compliance have been replaced with existing the ARB program. The ARB in-use compliance program provides greater assurance that engines will maintain their emissions during their useful life.]

§1048.415 What happens if in-use engines do not meet requirements?
DELETE AND REPLACE WITH:

Procedures for In-Use Engine Recalls for Large Off-Road Spark-Ignition Engines with an Engine Displacement Greater Than 1.0 Liter.

(a) The recall procedures in this section apply as set forth in Title 13, California Code of Regulations, Sections 2433 and 2438.

(b) Voluntary Emissions Recall

(1) When any manufacturer initiates a voluntary emission recall, the manufacturer shall notify the Executive Officer of the recall at least 30 days before owner notification is to begin. The manufacturer shall also submit to the Executive Officer a voluntary recall plan for approval, as prescribed in the following:

(A)(i) a description of each class or category of engines to recall, including the number of engines to be recalled, the engine family or a sub-group thereof, the model year, and such other information as may be required to identify the engines:

(ii) a description of the specific modifications, alterations, repairs, corrections, adjustments, or other changes to be made to correct the engines affected by the nonconformity;

(iii) a description of the method by which the manufacturer will notify engine owners including copies of any letters of notification to be sent to engine owners;

(iv) a description of the proper maintenance or use, if any, upon which the manufacturer conditions eligibility for repair under the recall plan, and a description of the proof to be required of an engine owner to demonstrate compliance with any such conditions;

(v) a description of the procedure to be followed by engine owners to obtain correction of the nonconformity. This shall include designation of the date on or after which the owner can have the nonconformity remedied, the time reasonably necessary to perform the labor to remedy the nonconformity, and the designation of facilities at which the nonconformity can be remedied;

(vi) a description of the class of persons other than dealers and authorized warranty agents of the manufacturer who will remedy the nonconformity;

(vii) a description of the system by which the manufacturer will assure that an adequate supply of parts is available to perform the repair under the plan; or

(B)(i) a description of each class or category of engines subject to recall, including the number of engines subject to being recalled, the engine family or a sub-group thereof, the model year, and such other information as may be required to identify the engines;

(ii) a description of the method by which the manufacturer will use the in-use emissions credit, averaging, banking, and trading program, as described in Section 2438(e), to remedy the nonconformity.

(2) Voluntary Recall Progress Report. A manufacturer who initiates a voluntary emission recall campaign pursuant to paragraph (b)(1)(A) of this section must submit at least one report on the progress of the recall campaign. This report shall be submitted to the Executive Officer by the end of the fifth quarter, as defined in Section 2112(j), Chapter

2, Title 13 of the California Code of Regulations, following the quarter in which the notification of equipment or engine owners was initiated, and include the following information:

(A) Engine family involved and recall campaign number as designated by the manufacturer.

(B) Date owner notification was begun, and date completed.

(C) Number of equipment or engines involved in the recall campaign.

(D) Number of equipment or engines known or estimated to be affected by the nonconformity.

(E) Number of equipment or engines inspected pursuant to the recall plan and found to be affected by the nonconformity.

(F) Number of inspected equipment or engines.

(G) Number of equipment or engines receiving repair under the recall plan.

(H) Number of equipment or engines determined to be unavailable for inspection or repair under the recall plan due to exportation, theft, scrapping, or for other reasons (specify).

(I) Number of equipment or engines determined to be ineligible for recall action due to removed or altered components.

(J) A listing of the identification numbers of equipment or engines subject to recall but for whose repair the manufacturer has not been invoiced. This listing shall be supplied in a standardized computer data storage device to be specified by the Executive Officer.

(K) Any service bulletins transmitted to dealers which relate to the nonconformity and which have not previously been submitted.

(L) All communications transmitted to equipment or engine owners which relate to the nonconformity and which have not previously been submitted.

(3) The information gathered by the manufacturer to compile the reports must be retained for not less than seven years from the date of the manufacture of the engines and must be made available to the Executive Officer or designee of the Executive Officer upon request.

(4) A voluntary recall plan shall be deemed approved unless disapproved by the Executive Officer within 20 business days after receipt of the recall plan.

(5) Under a voluntary recall program, initiated and conducted by a manufacturer or its agent or representative as a result of in-use enforcement testing or other evidence of noncompliance provided or required by the Board to remedy any nonconformity, the capture rate shall be at a minimum 55 percent of the equipment or engine within the subject engine family or a sub-group thereof. The manufacturer shall comply with the capture rate by the end of the fifth quarter, as defined in Section 2112(j), Chapter 2, Title 13 of the California Code of Regulations, following the quarter in which the notification of equipment or engine owners was initiated. If the manufacturer cannot correct the percentage of equipment specified in the plan by the applicable deadlines, the manufacturer must use good faith efforts through other measures, subject to approval by the Executive Officer, to bring the engine family into compliance with the standards. If the Executive Officer does not approve the manufacturer's efforts, the manufacturer shall propose mitigation measures to offset the emissions of the unrepaired equipment within 45 days from the last report filed pursuant to paragraph (b)(2), above. The Executive Officer shall approve such measures provided that:

(A) The emission reductions from the recalled and repaired equipment or engines and the mitigation measures are equivalent to achieving the capture rate; and

(B) The emission reductions from the mitigation measures are real and verifiable; and

(C) The mitigation measures are implemented in a timely manner.

(c) Initiation and Notification of Ordered Emission-Related Recalls.

(1) A manufacturer shall be notified whenever the Executive Officer has determined, based on production-line test results or in-use test results, enforcement testing results, or any other information, that a substantial number of a class or category of equipment or engines produced by that manufacturer, although properly maintained and used, contain a failure in an emission-related component which, if uncorrected, may result in the equipments' or engines' failure to meet applicable standards over their useful lives; or whenever a class or category of equipment or engines within their useful lives, on average, do not conform to the emission standards prescribed pursuant to Part 5 (commencing with Section 43000) of Division 26 of the Health and Safety Code, or any regulation adopted by the state board pursuant thereto, other than an emissions standard applied to new engines to determine "certification" as specified in Chapter 9, as applicable to the model year of such equipment or engines.

(2) It shall be presumed for purposes of this section that an emission-related failure will result in the exceedance of emission standards unless the manufacturer presents evidence in accordance with the procedures set forth in subsections (A), (B), and (C) which demonstrates to the satisfaction of the Executive Officer that the failure will not result in exceedance of emission standards within the useful life of the equipment or engine.

(A) In order to overcome the presumption of noncompliance set forth in paragraph (c)(2) above, the average emissions of the equipment and engines with the failed emission-related component must comply with applicable emission standards. A manufacturer may demonstrate compliance with the emission standards by following the procedures set forth in either paragraphs (c)(2)(B) or (c)(2)(C) of this section.

(B) A manufacturer may test properly maintained in-use equipment with the failed emission-related component pursuant to the applicable certification emission tests specified in Section 2433, Title 13 of the California Code of Regulations. The emissions shall be projected to the end of the equipment's or engine's useful life using in-use deterioration factors. The in-use deterioration factors shall be chosen by the manufacturer from among the following:

(i) "Assigned" in-use deterioration factors provided by the ARB on a manufacturer's conditions; request and based on ARB in-use testing; or,

(ii) deterioration factors generated during certification, provided adjustments are made to account for equipment aging, customer hour usage-accumulation practices, type of failed component, component failure mode, effect of the failure on other emission-control components, commercial fuel and lubricant quality, and any other factor which may affect the equipment's or engine's operating or,

(iii) subject to approval by the Executive Officer, a manufacturer-generated deterioration factor. Such deterioration factor must based on in-use data generated from certification emission tests performed on properly maintained and used equipment in accordance with the procedures set forth in Section 2433 of Title 13 of the California Code of Regulations, and the equipment from which it was derived must be representative of the in-use fleet with regard to emissions performance and equipped with similar emission control technology as equipment with the failed component.

(C) In lieu of the equipment or engine emission testing described in subsection (B) above and subject to approval by the Executive Officer, a manufacturer may perform an engineering analysis, laboratory testing or bench testing, when appropriate, to demonstrate the effect of the failure.

(3) The notification shall include a description of each class or category of equipment or engines encompassed by the determination of nonconformity, shall set forth the factual basis for the determination and shall designate a date at least 45 business days from the date of receipt of such notification by which the manufacturer shall submit a plan to remedy the nonconformity.

(4) Availability of Public Hearing.

(A) The manufacturer may request a public hearing pursuant to the procedures set forth in Subchapter 1.25, Division 3, Chapter 1, Title 17, California Code of Regulations to contest the finding of nonconformity and the necessity for or the scope of any ordered corrective action.

(B) If a manufacturer requests a public hearing pursuant to subsection (A) above, and if the Executive Officer's determination of nonconformity is confirmed at the hearing, the manufacturer shall submit the recall plan required by Section 2439 within 30 days after receipt of the Board's decision.

(5) Ordered Recall Plan.

(A) Unless a public hearing is requested by the manufacturer, a recall plan shall be submitted to the Chief, Mobile Source Operations Division, 9528 Telstar Avenue, El Monte, CA 91731, within the time limit specified in the notification. The Executive Officer may grant the manufacturer an extension upon good cause shown.

(B) The recall plan shall contain the following:

(i) A description of each class or category of equipment or engine to be recalled, including the engine family or sub-group thereof, the model-year, the make, the model, and such other information as may be required to identify the equipment or engines to be recalled.

(ii) A description of the nonconformity and the specific modifications, alterations, repairs, corrections, adjustments or other changes to be made to bring the equipment or engines into conformity including a brief summary of the data and technical studies which support the manufacturer's decision regarding the specific corrections to be made.

(iii) A description of the method by which the manufacturer will determine the names and addresses of equipment or engine owners and the method by which they will be notified.

(iv) A description of the procedure to be followed by equipment or engine owners to obtain correction of the nonconformity including the date on or after which the owner can have the nonconformity remedied, the time reasonably necessary to perform the labor required to correct the nonconformity, and the designation of facilities at which the nonconformity can be remedied. The repair shall be completed within a reasonable time designated by the Executive Officer from the date the owner delivers the equipment or engine for repair. This requirement becomes applicable on the date designated by the manufacturer as the date on or after which the owner can have the nonconformity remedied.

(v) If some or all of the nonconforming equipment or engines are to be remedied by persons other than dealers or authorized warranty agents of the manufacturer, a description of such class of persons and a statement indicating that the participating members of the class will be properly equipped to perform such remedial action.

(vi) The capture rate required for each class or category of equipment or engine to be recalled. Under recalls based on exceedance of emission standards, the capture rate shall be at a minimum 80 percent of the equipment or engine within the subject engine family.

(vii) The plan may specify the maximum incentives (such as a free tune-up or specified quantity of free fuel), if any, the manufacturer will offer to induce equipment or engine owners to present their equipment for repair, as evidence that the manufacturer has made a good faith effort to repair the percentage of equipment or engines specified in the plan. The plan shall include a schedule for implementing actions to be taken including identified increments of progress towards implementation and deadlines for completing each such increment.

(viii) A copy of the letter of notification to be sent to equipment or engine owners.

(ix) A description of the system by which the manufacturer will assure that an adequate supply of parts will be available to perform the repair under the recall plan including the date by which an adequate supply of parts will be available to initiate the repair campaign, and the method to be used to assure the supply remains both adequate and responsive to owner demand.

(x) A copy of all necessary instructions to be sent to those persons who are to perform the repair under the recall plan.

(xi) A description of the impact of the proposed changes on fuel economy, operation, performance and safety of each class or category of equipment or engines to be recalled and a brief summary of the data, technical studies, or engineering evaluations which support these descriptions.

(xii) A description of the impact of the proposed changes on the average emissions of the equipment or engines to be recalled based on noncompliance described in subsection (c)(1), above. The description shall contain the following:

(1.) Average noncompliance emission levels.

(2.) Average emission reduction or increase per pollutant resulting from the recall repair. These averages shall be verified by the manufacturer by applying the proposed recall repairs to two or more in-use equipment or engines representing the average noncompliance emission levels. Only those equipment or engines with baseline emission levels within 25 percent of the average emission levels of noncomplying pollutant(s) established under the in-use enforcement test program may be used by manufacturers to verify proposed recall repairs. The Executive Officer may allow the use of equipment or engines exceeding these upper averaging noncompliance limits if none which meet the limits can be reasonably procured.

(3.) An estimate of the average emission level per pollutant for a class or category of equipment or engines after repair as corrected by the required capture rate. The estimated average emission level shall comply with the applicable emission standards. If the average emissions levels achieved by applying the average emission reduction per equipment or engine after repair and the estimated capture rate, do not achieve compliance with the emissions standards, a manufacturer shall propose other measures to achieve average emissions compliance.

(xiii) Any other information, reports, or data which the Executive Officer may reasonably determine to be necessary to evaluate the recall plan.

(6) Approval and Implementation of Recall Plan.

(A) If the Executive Officer finds that the recall plan is designed effectively to correct the nonconformity and complies with the provisions of this Section, he or she will so notify the manufacturer in writing. Upon receipt of the approval notice from the Executive Officer, the manufacturer shall commence implementation of the approved plan. Notification of equipment or engine owners and the implementation of recall repairs shall commence within 45 days of the receipt of notice unless the manufacturer can show good cause for the Executive Officer to extend the deadline.

(B) If the Executive Officer does not approve the recall plan or the mitigation measures provided in this Section as submitted, the Executive Officer shall order modification of the plan or mitigation measures with such changes and additions as he or she determines to be necessary. The Executive Officer shall notify the manufacturer in writing of the disapproval and the reasons for the disapproval.

(C) The manufacturer may contest the Executive Officer's disapproval by requesting a public hearing pursuant to the procedures set forth in Subchapter 1.25, Division 3, Chapter 1, Title 17, California Code of Regulations. As a result of the hearing, the Board may affirm, overturn or modify the Executive Officer's action. In its decision, affirming or modifying, the Board shall specify the date by which the manufacturer shall commence notifying equipment or engine owners and implementing the required recall repairs.

(D) If no public hearing is requested in accordance with (C) above, the manufacturer shall incorporate the changes and additions required by the Executive Officer and shall commence notifying equipment or engine owners and implementing the required recall repairs within 60 days of the manufacturer's receipt of the Executive Officer's disapproval.

(7) Notification of Owners.

(A) Notification to equipment or engine owners shall be made by first class mail or by such other means as approved by the Executive Officer provided, that for good cause, the Executive Officer may require the use of certified mail to ensure an effective notification.

(B) The manufacturer shall use all reasonable means necessary to locate equipment or engine owners provided, that for good cause, the Executive Officer may require the manufacturer to use motor equipment registration lists, as applicable, available from State or commercial sources to obtain the names and addresses of equipment or engine owners to ensure effective notification.

(C) The Executive Officer may require subsequent notification by the manufacturer to equipment or engine owners by first class mail or other reasonable means provided, that for good cause, the Executive Officer may require the use of certified mail to ensure effective notification.

(D) The notification of equipment or engine owners shall contain the following:

(i) The statement: "The California Air Resources Board has determined that your (equipment or engine) (is or may be) releasing air pollutants which exceed (California or California and Federal) standards. These standards were established to protect your health and welfare from the dangers of air pollution."

(ii) A statement that the nonconformity of any such equipment or engines will be remedied at the expense of the manufacturer.

(iii) A statement that eligibility may not be denied solely on the basis that the equipment or engine owner used parts not manufactured by the original equipment manufacturer, or had repairs performed by outlets other than the equipment or engine manufacturer's franchised dealers.

(iv) A clear description of the components which will be affected by the recall action and a general statement of the measures to be taken to correct the nonconformity.

(v) [Reserved]

(vi) A description of the adverse effects, if any, that an uncorrected nonconformity would have on the performance, fuel economy, or driveability of the equipment or engine or to the function of other engine components.

(vii) A description of the procedure which the equipment or engine owner should follow to obtain correction of the nonconformity including the date on or after which the owner can have the nonconformity remedied, the time reasonably necessary to correct the nonconformity, and a designation of the facilities located in California at which the nonconformity can be remedied.

(viii) After the effective date of the recall enforcement program referred to above, a statement that a certificate showing that the equipment has been repaired under the recall program shall be issued by the service facilities and that such a certificate may be required as a condition of equipment registration or operation, as applicable.

(ix) A card to be used by a equipment or engine owner in the event the equipment or engine to be recalled has been sold. Such card should be addressed to the manufacturer, have postage paid, and shall provide a space in which the owner may indicate the name and address of the person to whom the equipment or engine was sold.

(x) The statement: "In order to ensure your full protection under the emission warranty made applicable to your (equipment or engine) by State or Federal law, and your right to participate in future recalls, it is recommended that you have your (equipment or engine) serviced as soon as possible. Failure to do so could be determined to be a lack of proper maintenance of your (equipment or engine)".

(xi) A telephone number provided by the manufacturer, which may be used to report difficulty in obtaining recall repairs.

(xii) The manufacturer shall not condition eligibility for repair on the proper maintenance or use of the equipment except for strong or compelling reasons and with approval of the Executive Officer; however, the manufacturer shall not be obligated to repair a component which has been removed or altered so that the recall action cannot be performed without additional cost.

(xiii) No notice sent pursuant to Section (D), nor any other communication sent to equipment or engine owners or dealers shall contain any statement, express or implied, that the nonconformity does not exist or will not degrade air quality.

(xiv) The manufacturer shall be informed of any other requirements pertaining to the notification under this section which the Executive Officer has determined are reasonable and necessary to ensure the effectiveness of the recall campaign.

(8) Repair Label.

(A) The manufacturer shall require those who perform the repair under the recall plan to affix a label to each equipment or engine repaired or, when required, inspected under the recall plan.

(B) The label shall be placed in a location as approved by the Executive Officer and shall be fabricated of a material suitable for such location and which is not readily removable.

(C) The label shall contain the recall campaign number and a code designating the facility at which the repair, inspection for repair, was performed.

(9) Proof of Correction Certificate. The manufacturer shall require those who perform the recall repair to provide the owner of each equipment or engine repaired with a certificate, through a protocol and in a format prescribed by the Executive Officer, which

indicates that the noncomplying equipment or engine has been corrected under the recall program. This requirement shall become effective and applicable upon the effective date of the recall enforcement program referred to in this section, above.

(10) Capture Rates and Alternative Measures.

The manufacturer shall comply with the capture rate specified in the recall plan as determined pursuant to this Section, above, by the end of the fifth quarter, as defined in Section 2112(j), Chapter 2, Title 13 of the California Code of Regulations, following the quarter in which the notification of equipment or engine owners was initiated. If, after good faith efforts, the manufacturer cannot correct the percentage of equipment specified in the plan by the applicable deadlines and cannot take other measures to bring the engine family into compliance with the standards, the manufacturer shall propose mitigation measures to offset the emissions of the unrepaired equipment within 45 days from the last report filed pursuant to Section 2439(c)(13), below. The Executive Officer shall approve such measures provided that:

(A) The emission reductions from the recalled and repaired equipment or engines and the mitigation measures are equivalent to achieving the capture rate; and

(B) The emission reductions from the mitigation measures are real and verifiable; and

(C) The mitigation measures are implemented in a timely manner.

(11) Preliminary Tests. The Executive Officer may require the manufacturer to conduct tests on components and equipment or engines incorporating a proposed correction, repair, or modification reasonably designed and necessary to demonstrate the effectiveness of the correction, repair, or modification.

(12) Communication with Repair Personnel. The manufacturer shall provide to the Executive Officer a copy of all communications which relate to the recall plan directed to dealers and other persons who are to perform the repair. Such copies shall be mailed to the Executive Officer contemporaneously with their transmission to dealers and other persons who are to perform the repair under the recall plan.

(13) Recordkeeping and Reporting Requirements.

(A) The manufacturer shall maintain sufficient records to enable the Executive Officer to conduct an analysis of the adequacy of the recall campaign. For each class or category of equipment or engine, the records shall include, but need not be limited to, the following:

(i) Engine family involved and recall campaign number as designated by the manufacturer.

(ii) Date owner notification was begun, and date completed.

(iii) Number of equipment or engines involved in the recall campaign.

(iv) Number of equipment or engines known or estimated to be affected by the nonconformity.

(v) Number of equipment or engines inspected pursuant to the recall plan and found to be affected by the nonconformity.

(vi) Number of inspected equipment or engines.

(vii) Number of equipment or engines receiving repair under the recall plan.

(viii) Number of equipment or engines determined to be unavailable for inspection or repair under the recall plan due to exportation, theft, scrapping, or for other reasons (specify).

(ix) Number of equipment or engines determined to be ineligible for recall action due to removed or altered components.

(x) A listing of the identification numbers of equipment or engines subject to recall but for whose repair the manufacturer has not been invoiced. This listing shall be supplied in a standardized computer data storage device to be specified by the Executive Officer. The frequency of this submittal, as specified in subsection (C) below, may be changed by the Executive Officer depending on the needs of recall enforcement.

(xi) Any service bulletins transmitted to dealers which relate to the nonconformity and which have not previously been submitted.

(xii) All communications transmitted to equipment or engine owners which relate to the nonconformity and which have not previously been submitted.

(B) If the manufacturer determines that the original responses to subsections (A)(iii) and (iv) of these procedures are incorrect, revised figures and an explanatory note shall be submitted. Responses to subsections (A)(v), (vi), (vii), (viii), and (ix) shall be cumulative totals.

(C) Unless otherwise directed by the Executive Officer, the information specified in subsection (A) of these procedures shall be included in six quarterly reports or two annual reports, beginning with the quarter in which the notification of owners was initiated, or until all nonconforming equipment or engines involved in the campaign have been remedied, whichever occurs sooner. Such reports shall be submitted no later than 25 days after the close of each calendar quarter.

(D) The manufacturer shall maintain in a form suitable for inspection, such as computer information storage devices or card files, and shall make available to the Executive

Officer or his or her authorized representative upon request, lists of the names and addresses of equipment or engine owners:

(i) To whom notification was given;

(ii) Who received remedial repair or inspection under the recall plan; and

(iii) Who were denied eligibility for repair due to removed or altered components.

(E) The records and reports required by these procedures shall be retained for not less than one year beyond the useful life of the equipment or engines involved, or one year beyond the reporting time frame specified in subsection (C) above, whichever is later.

(14) Penalties.

Failure by a manufacturer to carry out all recall actions ordered by the Executive Officer pursuant to Sections 2439(c) of these procedures is a violation of Health and Safety Code Section 43013 and 43105 and shall subject the manufacturer, on a per engine basis, to any and all remedies available under Part 5, Division 26 of the Health and Safety Code, sections 43000 et seq.

(d) Extension of Time. The Executive Officer may extend any deadline in the plan if he or she finds in writing that a manufacturer has shown good cause for such extension.

(e) The Executive Officer may waive any or all of the requirements of these procedures if he or she determines that the requirement constitutes an unwarranted burden on the manufacturer without a corresponding emission reduction.

[All sections referring to in-use compliance have been replaced with existing the ARB program. The ARB in-use compliance program provides greater assurance that engines will maintain their emissions during their useful life.]

§1048.420 What in-use testing information must I report to EPA?
DELETE

[Replaced by 2438-9 language in §1048.410-415]

[The language is not necessary as information regarding the reporting of in-use testing is already contained in §1048.415.]

§1048.425 What records must I keep?
DELETE

[Replaced by 2438-9 language in §1048.410-415;The provisions contained in §1048.415 include submittal of an electronic report to ARB; as such, there is no need to retain records.]

Subpart F—Test Procedures

§1048.501 How do I run a valid emission test?

§1048.505 How do I test engines using steady-state duty cycles, including ramped-modal testing?

§1048.510 Which duty cycles do I use for transient testing?

§1048.515 What are the field-testing procedures?

Subpart G—Compliance Provisions

§1048.601 What compliance provisions apply to these engines?

§1048.605 What provisions apply to engines certified under the motor-vehicle program?

§1048.610 What provisions apply to vehicles certified under the motor-vehicle program?

§1048.615 What are the provisions for exempting engines designed for lawn and garden applications?

* * * * *

(a)

(3) DELETE AND REPLACE WITH:
The engine must be in an engine family that has a valid executive order showing that it meets emission standards for Class II engines under Title 13, California Code of Regulations, Chapter 9, Article 1, Small Off-Road Engines and Chapter 15, Article 1, Evaporative Emission Requirements for Off-Road Equipment.

* * * * *

(d) DELETE AND REPLACE WITH:
Engines exempted under this section are subject to all the requirements affecting engines under Title 13, California Code of Regulations, Chapter 9, Article 1, Small Off-Road Engines and Chapter 15, Article 1, Evaporative Emission Requirements for Off-Road Equipment. The requirements and restrictions of Title 13, California Code of Regulations, Chapter 9, Article 1, Small Off-Road Engines and Chapter 15, Article 1, Evaporative Emission Requirements for Off-Road Equipment apply to anyone manufacturing these engines, anyone manufacturing equipment that uses these engines, and all other persons in the same manner as if these engines had a total maximum engine power at or below 19 kW.

§1048.620 What are the provisions for exempting large engines fueled by natural gas?

§1048.625 What special provisions apply to engines using noncommercial fuels?

§1048.630 What are the provisions for exempting engines used solely for competition?

§1048.635 What special provisions apply to branded engines?

Subpart H—[Reserved]

Subpart I—Definitions and Other Reference Information

§1048.801 What definitions apply to this part?
The following definitions apply to this part. The definitions apply to all subparts unless we note otherwise. All undefined terms have the meaning the Act gives to them. The definitions follow:

* * * * *

All-terrain vehicle has the meaning given in 40 CFR 1051.801
DELETE AND REPLACE WITH: All-terrain vehicle has the meaning given in Title 13, California Code of Regulations, Chapter 9, Article 3, Off-Highway Recreational Vehicles and Engines.

[EPA's definition is inconsistent with the existing California definition for Off-Highway Recreational Vehicles and Engines]

* * * * *

Designated Compliance Officer means the Manager, Engine Programs Group (6405-J), U.S. Environmental Protection Agency, 1200 Pennsylvania Ave., NW., Washington, DC 20460.
DELETE AND REPLACE WITH:
Designated Compliance Officer means the Executive Officer of the California Air Resources Board or a designee of the Executive Officer.

Designated Enforcement Officer means the Director, Air Enforcement Division (2242A), U.S. Environmental Protection Agency, 1200 Pennsylvania Ave., NW.,Washington, DC 20460.
DELETE AND REPLACE WITH:
Designated Enforcement Officer means any officer or employee of the California Air Resources Board so designated in writing by the Executive Officer or by the Executive Officer's designee.

* * * * *

Small-volume engine manufacturer means a company with fewer than 200 employees. This includes any employees working for parent or subsidiary companies.

DELETE AND REPLACE WITH:

Small-volume manufacturer means an engine manufacturer that produces a total of less than 2000 large spark-ignition engines annually for sale in the United States of America.

* * * * *

§1048.805 What symbols, acronyms, and abbreviations does this part use?

§1048.810 What materials does this part reference?

§1048.815 What provisions apply to confidential information?

§1048.820 How do I request a hearing from the executive officer of the ARB?

(a) You may request a hearing under certain circumstances, as described elsewhere in this part. To do this, you must file a written request, including a description of your objection and any supporting data, within 30 days after we make a decision.

(b) For a hearing you request under the provisions of this part, we will approve your request if we find that your request raises a substantial factual issue.

(c) If we agree to hold a hearing, we will use the procedures specified in §1048.15(b)(7).

APPENDIX A: MANUFACTURER STANDARDS AND TEST PROCEDURES
Part 5

Proposed Regulation Order Part 5: Adoption of incorporated "California Exhaust and Standards and Test Procedures for New 2010 and Later Off-Road Large Spark-Ignition Engines" (40 CFR, Part 1048)

State of California
AIR RESOURCES BOARD

PROPOSED CALIFORNIA EXHAUST AND EVAPORATIVE EMISSION STANDARDS AND TEST PROCEDURES FOR NEW 2010 AND LATER OFF-ROAD LARGE SPARK-IGNITION ENGINES

2010 Emission Standards

Adopted: [insert date of adoption]

NOTE: This document incorporates by reference Title 40, Code of Federal Regulations (CFR), Part 1048 – **CONTROL OF EMISSIONS FROM NEW, LARGE NONROAD SPARK-IGNITION ENGINES,** Subparts A, B, C, F, G, H, and I, including Appendix I and II to Part 1048 as amended on July 13, 2005 (Federal Register, Volume 70, pages 40465 through 40486), and the internally referenced subparts of 40 CFR Part 86, 40 CFR Part 1065, and 40 CFR Part 1068. Sections that have been included in their entirety are set forth with the section number and title. California provisions that replace specific federal provisions are denoted by the words "DELETE" for the federal language and "REPLACE WITH" or "ADD" for the California regulations. The symbols "* * * * *" and "..." mean that the remainder of the CFR text for a specific section, which is not shown in these regulations, has been included by reference, with only the printed text changed. Federal regulations that are not listed are not part of the California regulations. Text in *Italics* is provided as rationale for replacement language.

This document is all newly adopted text. *[The italicized text in brackets describes the purpose of the California provisions.]*

PART 1048 – CONTROL OF EMISSIONS FROM NEW, LARGE NONROAD SPARK-IGNITION ENGINES

Subpart A—Overview and Applicability

§1048.1 Does this part apply to me?

* * * * *

(b) DELETE AND REPLACE WITH:
This part 1048 applies for engines built on or after January 1, 2010. You need not follow this part for engines you produce before January 1, 2010. See §1048.101 through 1048.115, and the definition of model year in §1048.801 for more information about the timing of new requirements.

[Applicability is changed to January 1, 2010 to coincide with introduction of the 0.8 g/kW-hr standard. Additionally, the reference to §1048.145 is removed because that section has been deleted; see §1048.145 for deletion rationale.]

* * * * *

(d) DELETE AND REPLACE WITH:
Engines with a maximum engine power at or below 19 kW are covered by Title 13, California Code of Regulations, Chapter 9, Article 1, Small Off-Road Engines

[The language was changed to reference appropriate California standards for Small Off-Road Engines, which are more stringent than the EPA standards.]

§1048.5 Which engines are excluded from this part's requirements?
This part does not apply to the following nonroad engines:

(a) DELETE AND REPLACE WITH:
Engines that are subject to the requirements of Title 13, California Code of Regulations, Chapter 9, Article 3, Off-Highway Recreational Vehicles and Engines, including any related provisions and guidelines that are applicable to Off-Highway Recreational Vehicles and Engines.

[The language was changed to reference appropriate ARB regulations for Off-Highway Recreational Vehicles and Engines]

(b) DELETE AND REPLACE WITH:
Propulsion marine engines. See Title 13, California Code of Regulations, Chapter 9, Article 4.7, Spark-Ignition Marine Engines. This part applies with respect to auxiliary marine engines.

[The language was changed to reference appropriate ARB regulations for Marine Engines]

§1048.10 How is this part organized?

* * * * *

(b) DELETE AND REPLACE WITH:

Subpart B of this part describes the emission standards and other requirements that must be met to certify engines under this part.

[The reference to §1048.145 is removed because that section has been deleted]

§1048.15 Do any other regulation parts affect me?

* * * * *

(b)(2) DELETE AND REPLACE WITH:
Certification Procedures for Aftermarket Parts for Off-road Vehicles, Engines, Equipment, Chapter 9, Article 4.7, sections 2470 – 2476, Title 13, California Code of Regulations

* * * * *

(b)(6) DELETE AND REPLACE WITH:
Procedures for In-Use Engine Recalls for Large Off-Road Spark-Ignition Engines with an Engine Displacement Greater Than 1.0 Liter, Chapter 9, Article 4.5, section 2439, Title 13, California Code of Regulations

* * * * *

(b)(7) DELETE AND REPLACE WITH:
Administrative Procedures – Hearings, Subchapter 1, Article 1, Sections 60040 – 60094, Title 17, California Code of Regulations

(b)(8) ADD
Large Spark-Ignition (LSI) Engine Fleet Requirements, Chapter 15, Article 2, sections 2775, 2775.1, and 2775.2, Title 13, California Code of Regulations

§1048.20 What requirements from this part apply to excluded stationary engines?

Subpart B—Emission Standards and Related Requirements

§1048.101 What exhaust emission standards must my engines meet?

* * * * *

(a) DELETE AND REPLACE WITH:
Emission standards for transient testing. Starting in the 2010 model year, transient exhaust emissions from your engines may not exceed the following emission standards:
(1) Measure emissions using the applicable transient test procedures described in subpart F of this part.

(2) The HC+NOx standard is 0.8 g/kW-hr and the CO standard is 20.6 g/kW-hr. For severe-duty engines, the HC+NOx standard is 0.8 g/kW-hr and the CO standard is 130.0 g/kW-hr. The following engines are not subject to the transient standards in this paragraph (a):

(A) High-load engines.
(B) Engines with maximum engine power above 560 kW.
(C) Engines with maximum test speed above 3400 rpm.

[The language adds the new HC+NOx emission standard of 0.8 grams per kilowatt-hour]

* * * * *

(e) Fuel types. DELETE AND REPLACE WITH:
Fuel types (a)

* * * * *

ADD

(b) Test Fuel.
(1) If the engine is a gasoline-fueled large spark-ignition engine, then the test fuel used shall be consistent with the fuel specifications as outlined in the " The "California Exhaust Emission Standards and Test Procedures for 2001 and Subsequent Model Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles," as of January 1, 2006 (last amended August 4, 2005) incorporated by reference in Section 1961(d), Title 13, CCR). The California fuel specifications are contained in the California Code of Regulations, Title 13, Chapter 5, Article 1, Sections 2260-2272. If the engine is tested using the U.S. EPA test fuel, consistent with the fuel specifications as outlined in Title

40 Code of Federal Register, Part 1065, subpart H, the manufacturer shall demonstrate that the emission test results complies with these Test Procedures.
(2) If the engine is not a gasoline-fueled large spark-ignition engine, then the test fuel used shall be consistent with the fuel specifications as outlined in the " The "California Exhaust Emission Standards and Test Procedures for 2001 and Subsequent Model Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles," as of January 1, 2006 (last amended August 4, 2005) incorporated by reference in Section 1961(d), Title 13, CCR). The California fuel specifications are contained in the California Code of Regulations, Title 13, Chapter 5, Article 3, Sections 2290- 2293.5. If the engine is tested using the U.S. EPA test fuel, consistent with the fuel specifications as outlined in Title 40 Code of Federal Register, Part 1065, subpart H, the manufacturer shall demonstrate that the emission test results complies with these Test Procedures.
(3) During all engine tests, the engine shall employ a lubricating oil consistent with the engine manufacturer's specifications for that particular engine. These specifications shall be recorded and declared in the certification application.

(f) DELETE AND REPLACE WITH:
Small engines. Engines with total displacement at or below 1000 cc may comply with the requirements of Title 13, California Code of Regulations, Chapter 9, Article 1, Small Off-Road Engines and Chapter 15, Article 1, Evaporative Emission Requirements for Off-Road Equipment instead of complying with the requirements of this part, as described in §1048.615.

[The language was changed to reference appropriate California standards for Small Off-Road Engines, which are more stringent than the EPA standards.]

* * * * *

§1048.105 What evaporative emission standards and requirements apply?

§1048.110 How must my engines diagnose malfunctions?

§1048.115 What other requirements must my engines meet?
Engines subject to this part must meet the following requirements:
(a) DELETE AND REPLACE WITH:

Crankcase emissions. No crankcase emissions shall be discharged directly into the ambient atmosphere from any new 2001 or later engines subject to the provisions of this part.

[The EPA allows crankcase emissions to be added to the exhaust. This is inconsistent with the existing LSI regulation and ARB policy.]

* * * * *

§1048.120 What emission-related warranty requirements apply to me?
DELETE AND REPLACE WITH:

PART 1

(a) Applicability. This section applies to new 2010 and later model year off-road large spark-ignition engines with engine displacement greater than 1.0 liter that are certified to the applicable emission standards. The warranty period begins on the date the engine or equipment is delivered to an ultimate purchaser. The use of alternative fuels must not void the warranties on any engine certified to use such fuel.

(b) General Emissions Warranty Coverage. The manufacturer of each off-road large spark-ignition engine must warrant to the ultimate purchaser and each subsequent purchaser that the engine is:

(1) Designed, built, and equipped so as to conform with all applicable regulations adopted by the Air Resources Board pursuant to its authority in Chapters 1 and 2, Part 5, Division 26 of the Health and Safety Code; and

(2) Free from defects in materials and workmanship which cause the failure of a warranted part to be identical in all material respects to the part as described in the engine manufacturer's application for certification for a period of 3 years or 2,500 hours, whichever occurs first.

(3) Free from defects in materials and workmanship which cause the failure of a high-cost warranted part to be identical in all material respects to the part as described in the engine manufacturer's application for a period of five years or 3,500 hours of operation, whichever occurs first.

(A) Each manufacturer shall identify in its application for certification the "high-priced" warranted parts which (i) are included on the Board's "Emission Warranty Parts List" as last amended February 22, 1985, incorporated herein by reference, and (ii) have an individual replacement cost, at the time of certification, exceeding the cost limit defined in subsection (B). The replacement cost shall include the cost of the part, labor and standard diagnosis. The costs shall be those of the highest-cost metropolitan area of California.

(B) The dollar value of a high cost part shall be based on the following formula:

Cost Limitn = $300 * (CPI n-2 /118.3)

where,

Cost Limitn is the cost limit for the applicable model year of the engine rounded to the nearest ten dollars.

n is the model year of the new engines.

n-2 is the calendar year two years prior to the model year of the new engines.

CPI= is the annual average nationwide urban consumer price index published by the United States Bureau of Labor Statistics.

(C) The cost limit shall be reviewed annually by the Executive Officer. The highest-cost metropolitan area in California shall be identified by the Executive Officer for use in this subsection. If a manufacturer seeks certification of an engine before the applicable annual average CPI is available, the cost limit shall be calculated using the average of the monthly nationwide urban CPI figures for the most recent twelve month period for which figures have been published by the United States Bureau of Labor Statistics.

(D) Each manufacturer shall submit to the Executive Officer the documentation used to identify the "high-priced" warranted parts required in this subsection. The documentation shall include the estimated retail parts costs, labor rates in dollars per hour, and the labor hours necessary to diagnosis and replace the parts.

(4) In the absence of a device to measure hours of use, the engine must be warranted for a period of the years noted above in subsections (2) and (3). If a device to measure hours is used, the engine must be warranted for the number of hours or the number of years noted above in subsections (2) and (3), whichever occurs first.

(c) The warranty on emissions-related parts must be interpreted as follows:

(1) Any warranted part that is not scheduled for replacement as required maintenance in the written instructions required by Subsection (e) must be warranted for the warranty period defined in Subsection (b)(2) and (b)(3). If any such part fails during the period of warranty coverage, it must be repaired or replaced by the engine manufacturer according to Subsection (4) below. Any such part repaired or replaced under the warranty must be warranted for the remaining warranty period.

(2) Any warranted part that is scheduled only for regular inspection in the written instructions required by Subsection (e) must be warranted for the warranty period defined in Subsection (b)(2) and (b)(3). A statement in such written instructions to the effect of "repair or replace as necessary" must not reduce the period of warranty coverage. Any such part repaired or replaced under warranty must be warranted for the remaining warranty period.

(3) Any warranted part that is scheduled for replacement as required maintenance in the written instructions required by Subsection (e) must be warranted for the period of time prior to the first scheduled replacement point for that part. If the part fails prior to the first scheduled replacement, the part must be repaired or replaced by the engine manufacturer according to Subsection (4) below. Any such part repaired or replaced

under warranty must be warranted for the remainder of the period prior to the first scheduled replacement point for the part.

(4) Repair or replacement of any warranted part under the warranty provisions of this article must be performed at no charge to the owner at a warranty station.

(5) Notwithstanding the provisions of Subsection (4) above, warranty services or repairs must be provided at all manufacturer distribution centers that are franchised to service the subject engines.

(6) The owner must not be charged for diagnostic labor that leads to the determination that a warranted part is in fact defective, provided that such diagnostic work is performed at a warranty station.

(7) The engine manufacturer must be liable for damages to other engine components proximately caused by a failure under warranty of any warranted part.

(8) Throughout the engine's warranty period defined in Subsection (b)(2) and (b)(3), the engine manufacturer must maintain a supply of warranted parts sufficient to meet the expected demand for such parts.

(9) Any replacement part, as defined in Section 1900(b)(13), Title 13, may be used in the performance of any maintenance or repairs and must be provided without charge to the owner. It is not necessary for replacement parts to be the same brand or by the same manufacturer as the original part sold with the engine. Such use must not reduce the warranty obligations of the engine manufacturer.

(10) Add-on or modified parts, as defined in Section 1900(b)(1) and (b)(10), Title 13, that are not exempted by the Air Resources Board may not be used. The use of any non-exempted add-on or modified parts will, at the discretion of the engine manufacturer, be grounds for disallowing a warranty claim made in accordance with this article. The engine manufacturer must not be liable under this article to warrant failures of warranted parts caused by the use of a non-exempted add-on or modified part.

(11) The Executive Officer may request and, in such case, the engine manufacturer must provide, any documents that describe that manufacturer's warranty procedures or policies.

(d) Each manufacturer must include a copy of the following emission warranty parts list with each new engine, using those portions of the list applicable to the engine.

(1) Fuel Metering System

- (A) Fuel injection system.
- (B) Air/fuel ratio feedback and control system.
- (C) Carburetor system (internal parts and/or pressure regulator or fuel mixer or injection system).

(D) Cold start enrichment system.

(2) Air Induction System
(A) Intake manifold or air intake system.
(B) Air mass sensor assembly.
(C) Turbocharger/supercharger systems.

(3) Exhaust Gas Recirculation (EGR) System
(A) EGR valve body, and carburetor spacer if applicable.
(B) EGR rate feedback and control system.

(4) Air injection System
(A) Air pump or pulse valve.
(B) Valves affecting distribution of flow.
(C) Distribution manifold.

(5) Catalyst or Thermal Reactor System
(A) Catalytic converter.
(B) Thermal reactor.
(C) Exhaust manifold.

(6) Positive Crankcase Ventilation (PCV) System.
(A) PCV Valve.
(B) Oil Filler Cap.

(7) Ignition Control System
(A) Engine Control Module (ECM).
(B) Ignition module(s).

(8) Miscellaneous items Used in Above Systems
(A) Vacuum, temperature, and time sensitive valves and switches.
(B) Sensors used for electronic controls.
(C) Hoses, belts, connectors, assemblies, clamps, fittings, tubing, sealing gaskets or devices, and mounting hardware.
(D) Pulleys, belts and idlers.

(e) Each manufacturer must furnish with each new engine written instructions for the maintenance and use of the engine by the owner. The instructions must be consistent with this article and applicable regulations contained herein.

(f) Each manufacturer must submit the documents required by Subsections (d) and (e) with the manufacturer's preliminary application for engine certification for approval by the Executive Officer. Approval by the Executive Officer of the documents required by Subsections (d) and (e) must be a condition of certification. The Executive Officer must approve or disapprove the documents required by Subsections (d) and (e) within 90 days of the date such documents are received from the manufacturer. Any disapproval must be accompanied by a statement of the reasons therefor. In the event of disapproval, the manufacturer may file for an adjudicative hearing under Title 17, California Code of Regulation, Division 3, Chapter 1, Subchapter 1.25 to review the decision of the Executive Officer.

(g) In the application, each manufacturer must include a statement concerning proper maintenance of the engine to maximize emissions performance. The statement must include, but not be limited to, information on air filter care and replacement schedule, proper fueling and fuel mixing, engine maintenance, and a maintenance schedule to ensure that the owner returns to a servicing center to check for deposits, debris build- up, etc.

PART 2

(a) Each manufacturer must furnish a copy of the following statement with each new off-road large spark-ignition engine with engine displacement greater than 1.0 liter, that have been certified to the applicable emission standards pursuant to Section 2433(b), using those portions of the statement applicable to the engine. Each manufacturer must furnish a copy of the warranty statement as set forth in the California Code of Regulations, Title 13, Section 2406(a) with each new off-road large spark-ignition engine with engine displacement less than or equal to 1.0 liter, using those portions of the statement applicable to the engine.

CALIFORNIA EMISSION CONTROL WARRANTY STATEMENT

YOUR WARRANTY RIGHTS AND OBLIGATIONS

The California Air Resources Board (and manufacturer's name, optional) is pleased to explain the emission control system warranty on your (model year(s)) (equipment type or off-road large spark-ignition) engine. In California, new off-road large spark-ignition (LSI) engines must be designed, built and equipped to meet the State's stringent anti-smog standards. (Manufacturer's name) must warrant the emission control system on your engine for the periods of time listed below provided there has been no abuse, neglect or improper maintenance of your engine.

Your emission control system may include parts such as the carburetor, regulator or fuel-injection system, ignition system, engine computer unit (ECM), catalytic converter and air induction system. Also included may be sensors, hoses, belts, connectors and other emission-related assemblies.

Where a warrantable condition exists, (manufacturer's name) will repair your LSI engine at no cost to you including diagnosis, parts and labor. MANUFACTURER'S WARRANTY COVERAGE: The (model year(s)) off-road large spark-ignition engines are warranted for (warranty period). If any emission-related part on your engine is defective, the part will be repaired or replaced by (manufacturer's name). OWNER'S WARRANTY RESPONSIBILITIES: - As the off-road LSI engine owner, you are responsible for the performance of the required maintenance listed in your owner's manual. (Manufacturer's name) recommends that you retain all receipts covering maintenance on your off-road engine, but (manufacturer's name) cannot deny warranty solely for the lack of receipts or for your failure to ensure the performance of all scheduled maintenance. - As the off-road large spark-ignition engine owner, you should however be aware that (manufacturer's name) may deny you warranty coverage if your off-road large spark-ignition engine or a part has failed due to abuse, neglect, improper maintenance or unapproved modifications. - Your engine is designed to operate on (specific fuel(s)).Use of any other fuel may result in your engine no longer operating in compliance with California's emissions requirements. - You are responsible for initiating the warranty process. The ARB suggests that you present your off-road large spark-ignition engine to a (manufacturer's name) dealer as soon as a problem exists. The warranty repairs should be completed by the dealer as expeditiously as possible.

If you have any questions regarding your warranty rights and responsibilities, you should contact (Insert chosen manufacturer's contact) at 1-XXX-XXX-XXXX.

(b) Warranty statement furnishing requirements.

(1) Commencing with the 2001 model year for large off-road large spark-ignition engines with engine displacement greater than 1.0 liter, each manufacturer must furnish with each new engine a warranty statement that generally describes the obligations and rights of the engine manufacturer and owner under this article. Engine manufacturers must also include in the warranty statement a phone number the customer may use to obtain their nearest franchised service center.

(2) Commencing with the 2002 model year for large off-road large spark-ignition engines with engine displacement less than or equal to 1.0 liter, each manufacturer must furnish with each new engine a warranty statement as set forth in the California Code of Regulations, Title 13, Section 2406(b).

(c) Each manufacturer must submit the documents required by Subsections (a) and (b) with the manufacturer's preliminary application for new engine certification for approval by the Executive Officer. The Executive Officer may reject or require modification of the documents to the extent the submitted documents do not satisfy the requirements of Subsections (a) and (b). Approval by the Executive Officer of the documents required by Subsections (a) and (b) must be a condition of certification. The Executive Officer must approve or disapprove the documents required by Subsections (a) and (b) within 90 days of the date such documents are received from the manufacturer. Any disapproval must be accompanied by a statement of the reasons therefor. In the event of disapproval, the manufacturer may petition the Board to review the decision of the Executive Officer.

[The entire section has been replaced with existing ARB warranty provisions. The ARB warranty program is generally more prescriptive and provides greater protection to the buyer]

§1048.125 What maintenance instructions must I give to buyers?

§1048.130 What installation instructions must I give to equipment manufacturers?

§1048.135 How must I label and identify the engines I produce?

* * * * *

(c) The label must–

* * * * *

(9) DELETE AND REPLACE WITH:
Contain the maintenance specifications and adjustments recommended by the engine manufacturer, including, as applicable: spark plug gap width, valve lash, ignition timing, idle air/fuel mixture setting procedure and value (e.g., idle CO, idle speed drop), and high idle speed. These specifications must indicate the proper transmission position (if applicable) during tune-up and what accessories, if any, should be in operation, and what systems, if any (e.g., vacuum advance, air pump), should be disconnected during the tune-up. If the manufacturer does not recommend adjustment of the foregoing specifications, the manufacturer must include in lieu of the "specifications" the single statement "No other adjustments needed." For all engines, the instructions for tune-up adjustments must be sufficiently clear on the label to preclude the need for a mechanic or equipment owner to refer to another document in order to correctly perform the adjustments.

[Our warranty provisions are more prescriptive and provide greater protection to the buyer]

* * * * *

(17) DELETE AND REPLACE WITH:
If your engines are certified to the optional lower-emission standards in §1048.140, state: "OLES."

[The new language refers to the ARB's "Optional Low Emission Standards." See justification for this change in §1048.140]

* * * * *

(g) ADD:

Engine labels must also include evaporative warranty information as described in California Code of Regulations, Title 13, Chapter 15, Article 1, Section 2759

§1048.140 What are the provisions for certifying optional lower-emission engines?

DELETE AND REPLACE WITH:

This section defines optional lower-emission standards for engines equipped with superior emission control systems. These engines, designated as "OLES" engines, must meet all the requirements in this part that apply to 2010 model year engines and one of the standards in the following table. These engines must also meet all testing and reporting requirements:

Optional Exhaust Emission Standards for
Hydrocarbons plus Oxides of Nitrogen (HC+NOx) and Carbon Monoxide (CO)
in grams per brake horsepower-hour (grams per kilowatt-hour)

Model Year	Engine Displacement	Durability Period	Standard – g/bhp-hr (g/kW-hr)	
			HC+NOx	CO
2010 and subsequent	> 1.0 liter	5000 hours or 7 years	0.4 (0.5)	15.4 (20.6)
			0.2 (0.3)	
			0.1 (0.1)	

(a) DELETE

(b) DELETE

(c) DELETE

(d) If you certify an engine family under this section, it is subject to all the requirements of this part as if these voluntary standards were mandatory.

[We have replaced the Blue Sky standards in §1048.140 with our optional lower-emission standards that are based on a previously established manufacturer's advisory correspondence or MAC. While not identical, our optional lower-emission standards are generally consistent with the EPA's HC+NOx Blue Sky standards.]

§1048.145 Are there interim provisions that apply only for a limited time?

(a) DELETE

[§1048.145 allows for the generation of offset credits. This is inconsistent with current ARB policy and has been deleted.]

Subpart C—Certifying Engine Families

§1048.201 What are the general requirements for obtaining a certificate of conformity?

§1048.205 What must I include in my application?

* * * * *

(aa) DELETE AND REPLACE WITH:
Name an agent for service of process located in the United States. Service on this agent constitutes service on you or any of your officers or employees for any action by the California Air Resources Board.

[The revised language provides the ARB the ability to serve process]

§1048.210 May I get preliminary approval before I complete my application?

§1048.220 How do I amend the maintenance instructions in my application?

§1048.225 How do I amend my application for certification to include new or modified engines?

§1048.230 How do I select engine families?

* * * * *

(f) DELETE

[The language has been deleted as the current LSI program and ARB policy does not allow manufacturers to divide engine families into subfamilies with multiple standards.]

§1048.235 What emission testing must I perform for my application for a certificate of conformity?

§1048.240 How do I demonstrate that my engine family complies with exhaust emission standards?

* * * * *

(c) DELETE AND REPLACE WITH:
To compare emission levels from the emission-data engine with the applicable emission standards, apply deterioration factors to the measured emission levels for each pollutant. Specify the deterioration factors based on emission measurements using four significant figures, consistent with good engineering judgment. For example,

your deterioration factors must take into account any available data from in-use testing with similar engines (see subpart E of this part). Apply deterioration factors as follows:

* * * * *

(2) DELETE

[ARB policy is to use a more conservative multiplicative deterioration factor]

* * * * *

§1048.245 How do I demonstrate that my engine family complies with evaporative emission standards?

§1048.250 What records must I keep and make available to ARB?

* * * * *

(e) ADDED
Maintain certification engines for a period of two years

[ARB policy, as expressed in other motor vehicle regulations, requires engine manufacturers to maintain certification engines for a specified period.]

§1048.255 When may EPA deny, revoke, or void my certificate of conformity?

Subpart D—Testing Production-line Engines

§1048.301 When must I test my production-line engines?
DELETE AND REPLACE WITH:

(a) Compliance Test Procedures

(1) These procedures apply, commencing with the 2001 model year, to any large off-road spark-ignition engine family group (as defined in Sections 2 and 11 of the "California Exhaust Emission Standards and Test Procedures for New 2001 and Later Off-Road Large Spark-ignition Engines") or any subgroup within an engine family group selected for compliance testing pursuant to this section, with an engine displacement greater than 1.0 liter, that have been certified to the applicable emission standards pursuant to Section 2433(b). 2002 and later model year large off-road spark-ignition engines with engine displacement less than or equal to 1.0 liter must comply with the new engine compliance test procedures set forth in the California Code of Regulations, Title 13, Section 2407.

(2) The Executive Officer may, with respect to any new engine family group or subgroup being sold, offered for sale, or manufactured for sale in California, order an engine

manufacturer to make available for compliance testing and/or inspection a reasonable number of engines, and may direct that the engines be delivered to the state board at the Haagen- Smit Laboratory, 9528 Telstar Avenue, El Monte, California 91731 or where specified by the Executive Officer. The Executive Officer may also, with respect to any new engine family group or subgroup being sold, offered for sale, or manufactured for sale in California, have a manufacturer compliance test and/or inspect a reasonable number of engines at the manufacturer's facility under the supervision of an ARB Enforcement Officer. Engines must be representatively selected from sources specified by the Executive Officer according to a method approved by him/her, that insofar as practical must exclude engines that would result in an unreasonable disruption of the manufacturer's distribution system. To the extent practical, the Executive Officer must test a representative configuration (as defined in Section 3 of the "California Exhaust Emission Standards and Test Procedures for New 2001 and Later Off-Road Large Spark-ignition Engines") from the engine family group in order to minimize manufacturers' expense and inconvenience in testing different engine configurations.

A subgroup of an engine family group may be selected for compliance testing only if the Executive Officer has reason to believe that the emissions characteristics of that subgroup are substantially in excess of the emissions of the engine family group as a whole.

(3) For all 2001 and subsequent model year off-road large spark-ignition engines selected for compliance testing, the selection and testing of engines and the evaluation of data must be made in accordance with the procedures set forth herein.

(4) For manufacturers that have more than one engine family group, the Air Resources Board or its designated laboratory may procure and test at the manufacturer's expense no more than one engine family group per year, if compliance testing is required.

Notwithstanding the above, if a manufacturer fails to demonstrate compliance with the emission standards after one engine family group has been tested, the ARB or its designated laboratory may test additional engine family groups at the manufacturer's expense, until compliance is demonstrated on one engine family group or all of a manufacturer's engine family groups have been tested. However, the ARB may conduct engine enforcement testing pursuant to the engine test procedures specified in Section 2433, at its own expense. In such an instance, the Executive Officer must order testing only in those cases where evidence such as production line test data or in-use test data indicate that engines may not be in compliance.

(5) All testing must be conducted in accordance with the applicable model year certification emission test procedures. Break-in before testing may be performed on test engines to the same extent it is performed on production-line testing engines (See subsection (b)). No break-in or modifications, adjustments, or special preparation or maintenance will be allowed on engines chosen for compliance testing without the

written consent of the Executive Officer. Such consent must not be unreasonably withheld where such adjustment or alteration is required to render the engine testable and reasonably operative.

(6) If the manufacturer elects to specify a different break-in or adjustments, they will be performed by the manufacturer under the supervision of ARB personnel.

(7) Correction of damage or maladjustment that may reasonably be found to have resulted from shipment of the engine is permitted only after testing the engine, except where 100 percent of the manufacturer's production is given that inspection or maintenance by the manufacturer's own personnel. Exceptions are allowed in the cases where the damage results in the engine being unsafe to operate, inoperable, or unable to complete the emission test. Additionally, an exception is allowed if the damage results in engine performance deficiencies that would be obvious in customer service and that would cause the customer to seek repair of the engine. The manufacturer may request that the engine be repaired from shipping damage, and be retested. If the Executive Officer concurs, the engine may be retested, and the original test results may be replaced by the after-repair test results.

(8) Engines must be randomly chosen from the selected engine family group or subgroup. Prior to the start of testing, manufacturers must indicate that sampling plan (as described in paragraphs (9) and (10), below) they will use. Once testing has begun, manufacturers may not switch to the other sampling plan; the generated test results will be final. Each chosen engine must be tested according to the "California Exhaust Emission Standards and Test Procedures for New 2001 and Later Off-Road Large Spark-ignition Engines" ("Test Procedures") to determine its emissions. Unique specialty hardware and personnel normally necessary to prepare the engine for the performance of the test as set forth in the Test Procedures must be supplied by the manufacturer within seven days after request. Failure to supply this unique specialty hardware or personnel may not be used by the manufacturer as a cause for invalidation of the subsequent tests.

(9) Engines must be tested in groups of five until a "Pass" or Fail" decision is reached for each pollutant independently for the engine family or subgroup in accordance with the following table:

Number of Engines Tested	Decide “Fail” If “U” is greater than or equal to:	Decide “Pass” If “U” is less than or equal to:
5	2.18	-0.13
10	2.11	0.51
15	2.18	0.88
20	2.29	1.16

where:

$$U = \frac{\sum_{I=1}^{n} (x_i - \mu_o)}{(\sum_{I=1}^{n} (x_i - \mu_o)^2)^{0.5}}$$

x_i = the projected emissions of one pollutant for the ith engine tested.
μ_o = the applicable calendar year emission standard for that pollutant.
n = the number of engines tested.

(10) The Executive Officer will find that a group of engines has failed the compliance testing pursuant to the above table if the Executive Officer finds that the average emissions of the engines within the selected engine family or subgroup exceed the applicable calendar year new engine emission standard for at least one pollutant.

(11) If no decision for a pollutant or pollutants can be reached after 20 engines have been tested, the Executive Officer will not make a "Fail" decision for the selected engine family or subgroup on the basis of these 20 tests alone. Under these circumstances the Executive Officer will elect to test 10 additional engines. If the average emissions from the 30 engines tested exceed any one of the exhaust emission standards for which a "Pass" decision has not been previously made, the Executive Officer will render a "Fail" decision.

(12) If the Executive Officer determines, in accordance with the procedures set forth in Subsection (a) that an engine family, or any subgroup within an engine family, exceeds the emission standards for one or more pollutants, the Executive Officer will:

(A) Notify the engine manufacturer that the engine manufacturer may be subject to revocation or suspension of the Executive Order authorizing sales and distribution of the noncompliant engines in the State of California, or enjoined from any further sales or distribution, of the noncompliant engines in the State of California pursuant to Section 43017 of the Health and Safety Code. Prior to revoking or suspending the Executive Order, or seeking to enjoin an engine manufacturer, the Executive Officer will consider production line test results, if any, and any additional test data or other information provided by the engine manufacturer and other interested parties. In addition, the engine manufacturer may be subject to, on a per engine basis, any and all remedies available under Part 5, Division 26 of the Health and Safety Code, sections 43000 et seq.

(B) Notify the equipment manufacturer that the equipment manufacturer may be subject to revocation or suspension of the Executive Order authorizing sales and distribution of the noncompliant engines in the State of California, or being enjoined from any further sales, or distribution, of the equipment manufacturer's equipment product line(s) that are, or utilize engines that are, noncompliant with the applicable emission regulations pursuant to Section 43017 of the Health and Safety Code. Prior to revoking or suspending the Executive Order, or seeking to enjoin an equipment manufacturer, the Executive Officer will consider production line test results, if any, and any additional test data or other information provided by the equipment manufacturer and other interested parties. In addition, the equipment manufacturer may be subject to, on a per engine basis, any and all remedies available under Part 5, Division 26 of the Health and Safety Code, sections 43000 et seq.

(13) Engines selected for inspection must be checked to verify the presence of those emissions-related components specified in the engine manufacturer's application for certification, and for the accuracy of any adjustments, part numbers and labels specified in that application. If any engine selected for inspection fails to conform to any applicable law in Part 5 (commencing with Section 43000) of Division 26 of the Health and Safety Code, or any regulation adopted by the state board pursuant thereto, other than an emissions standard applied to new engines to determine "certification" as specified in Chapter 9, the Executive Officer will:

(A) Notify the engine manufacturer and may seek to revoke or suspend the Executive Order authorizing sales and distribution or enjoin the engine manufacturer from any further sales, or distribution, of the applicable noncompliant engine families or subgroups within the engine families in the State of California pursuant to Section 43017 of the Health and Safety Code. Before revoking or suspending the Executive Order authorizing sales and distribution of the applicable noncompliant engine families or subgroups within the State of California, or seeking to enjoin an engine manufacturer, the Executive Officer will consider any information provided by the engine manufacturer and other interested parties. In addition, the engine manufacturer may be subject to, on a per engine basis, any and all remedies available under Part 5, Division 26 of the Health and Safety Code, sections 43000 et seq.

(B) Notify the equipment manufacturer and may seek to revoke or suspend the Executive Order authorizing sales and distribution or enjoin the equipment manufacturer from any further sales, or distribution, in the State of California of the equipment manufacturer's equipment product line(s) that are, or utilize engines that are, noncompliant with the applicable emission regulations pursuant to Section 43017 of the Health and Safety Code. Prior to revoking or suspending the Executive Order authorizing sales and distribution of the applicable noncompliant equipment, or seeking to enjoin an equipment manufacturer, the Executive Officer will consider any information provided by the equipment manufacturer and other interested parties. In addition, the equipment manufacturer may be subject to, on a per engine basis, any and all remedies available under Part 5, Division 26 of the Health and Safety Code, sections 43000 et seq.

(b) 2001 and Subsequent Model Cumulative Sum Production Line Test Procedures

(1) The 2001 and subsequent model year off-road large spark-ignition engines with an engine displacement of greater than 1.0 liter, that have been certified to the applicable emission standards pursuant to Section 2433(b), are subject to production line testing performed according to the requirements specified in this section. The 2002 and subsequent model year off-road large spark-ignition engines with an engine displacement of less than or equal to 1.0 liter, that have been certified for sale in California, must comply with production line testing performed according to the requirements set forth in the California Code of Regulations, Title 13, Section 2407.

(A) Standards and Test Procedures. The emission standards, exhaust sampling and analytical procedures are those described in the Test Procedures, and are applicable to engines tested only for exhaust emissions. The production line test procedures are specified in conjunction with the Test Procedures. An engine is in compliance with these production line standards and test procedures only when all portions of these production line test procedures and specified requirements from the Test Procedures are fulfilled, except any adjustable engine parameters may be set to any value or position that is within the range available to the ultimate purchaser.

(B) Air Resources Board (ARB) personnel and mobile laboratories must have access to engine or equipment assembly plants, distribution facilities, and test facilities for the purpose of engine selection, testing, and observation. Scheduling of access must be arranged with the designated engine manufacturer's representative and must not unreasonably disturb normal operations (See Test Procedures).

(2) Engine Sample Selection.

(A) At the start of each quarter for the model year, the engine manufacturer will begin to randomly select engines from each engine family for production line testing, according to the criteria specified herein. The engines must be representative of the engine manufacturer's California sales. Each engine will be selected from the end of the assembly line. All engine models within the engine family must be included in the sample pool. Each selected engine for production line testing must pass the inspection test, by being equipped with the appropriate emission control systems certified by the ARB. The procedure for randomly selecting engines or units of equipment must be submitted to the Chief, Mobile Source Operations Division, 9528 Telstar Avenue, El Monte, CA, 91731, prior to the start of production for the first year of production.

(i) For newly certified engine families: After two engines are tested, the manufacturer will calculate the required sample size for the model year according to the Sample Size Equation in paragraph (4) of this subsection.

(ii) For carry-over engine families: After one engine is tested, the manufacturer will combine the test with the last test result from the previous model year and then calculate the required sample size for the model year according to the Sample Size Equation in paragraph (4) of this subsection.

(iii) Beginning with the 2006 model year, a manufacturer may annually request of the Executive Officer a reduction in production line testing for an engine family. In making such request, the manufacturer must demonstrate that the engine family's production line test data is consistent and in-use compliance data is consistent for the previous year(s) and in compliance with the emission standards in Section 2433. If the Executive Officer determines that a reduction is warranted, the manufacturer may test as few as one production engine during the subject model year.

(B) Engine manufacturers must provide actual California sales, or other information acceptable to the Executive Officer, including, but not limited to, an estimate based on market analysis and federal production or sales.

(3) Engine Preparation and Preconditioning

(A) No emissions tests may be performed on an engine prior to the first production line test.

(B) The engine or unit of equipment must be tested after the engine manufacturer's recommended break-in period. The engine manufacturer must submit to the Executive Officer the schedule for engine break-in and any changes to the schedule with each quarterly report. This schedule must be adhered to for all production line testing within an engine family and subgroup or engine family and assembly plant as appropriate.

(C) If an engine or unit of equipment is shipped to a remote facility for production line testing, and adjustment or repair is necessary because of such shipment, the engine manufacturer must perform the necessary adjustments or repairs only after the initial test of the engine or equipment. Engine manufacturers must report to the Executive Officer in the quarterly report, all adjustments or repairs performed on engines or equipment prior to each test. In the event a retest is performed, a request may be made to the Executive Officer, within ten days of the production quarter, for permission to substitute the after-repair test results for the original test results. The Executive Officer will either affirm or deny the request by the engine manufacturer within ten working days from receipt of the request.

(D) If an engine manufacturer determines that the emission test results of an engine or unit of equipment are invalid, the engine or equipment must be retested. Emission results from all tests must be reported. The engine manufacturer must include a detailed report on the reasons for each invalidated test in the quarterly report.

(4)(A) Manufacturers will calculate the required sample size for the model year for each engine family using the Sample Size Equation below. N is calculated from each test result. The number N indicates the number of tests required for the model year for an engine family. N is recalculated after each test. Test results used to calculate the variables in the Sample Size Equation must be final deteriorated test results as specified in (d)(3).

$$N = \left[\frac{(t_{95} \, x \, \sigma)}{(x - STD)}\right]^2 + 1$$

Where:

N	=	required sample size for the model year.
t_{95}	=	95% confidence coefficient. It is dependent on the number of tests completed, n, as specified in the table in paragraph (C) of this section. It defines one-tail, 95% confidence intervals.
σ	=	test sample standard deviation calculated from the following equation:

$$\sigma = \sqrt{\frac{\Sigma(X_i - x)^2}{n - 1}}$$

Where:

X_i	=	emission test result for an individual engine
x	=	mean of emission test results of the sample
STD	=	emission standard
n	=	The number of tests completed in an engine family

(B) Reserved

(C) Number of Tests (n) & 1-tail Confidence Coefficients (t 95)

n	t_{95}	n	t_{95}	n	t_{95}
2	6.31	12	1.80	22	1.72
3	2.92	13	1.78	23	1.72
4	2.35	14	1.77	24	1.71
5	2.13	15	1.76	25	1.71
6	2.02	16	1.75	26	1.71
7	1.94	17	1.75	27	1.71

n	t_{95}	n	t_{95}	n	t_{95}
8	1.90	18	1.74	28	1.70
9	1.86	19	1.73	29	1.70
10	1.83	20	1.73	30	1.70
11	1.81	21	1.72	∞	1.645

(D) A manufacturer must distribute the testing of the remaining number of engines needed to meet the required sample size N, evenly throughout the remainder of the model year.

(E) After each new test, the required sample size, N, is recalculated using updated sample means, sample standard deviations and the appropriate 95% confidence coefficient.

(F) A manufacturer must continue testing and updating each engine family's sample size calculations according to paragraphs (4)(A) through (4)(F) of this section until a decision is made to stop testing as described in paragraph (4)(G) of this section or a noncompliance decision is made pursuant to (c)(6).

(G) If, at any time throughout the model year, the calculated required sample size, N, for an engine family is less than or equal to the sample size, n, and the sample mean, x, for HC + NOx is less than or equal to the emission standard, the manufacturer may stop testing that engine family.

(H) If, at any time throughout the model year, the sample mean, x, for HC + NOx is greater than the emission standard, the manufacturer must continue testing that engine family at the appropriate maximum sampling rate.

(I) The maximum required sample size for an engine family (regardless of the required sample size, N, as calculated in paragraph (4)(A) of this section) is thirty tests per model year.

(J) Manufacturers may elect to test additional randomly chosen engines. All additional randomly chosen engines tested in accordance with the testing procedures specified in Emission Standards and Test Procedures must be included in the Sample Size and Cumulative Sum equation calculations as defined in section (b), respectively.

(K) Small volume manufacturers may limit the number of engines tested to one percent of their California production. Compliance would be determined based on the available test data.

(5) The manufacturer must produce and assemble the test engines using its normal production and assembly process for engines to be distributed into commerce.

(6) No quality control, testing, or assembly procedures will be used on any test engine or any portion thereof, including parts and subassemblies, that have not been or will not be used during the production and assembly of all other engines of that family, unless the Executive Officer approves the modification in production or assembly procedures.

(c) Calculation of Cumulative Sum (CumSum) Statistic. Each engine manufacturer must review the test results using the following procedure:

(1) Manufacturers must construct the following CumSum equation for each regulated pollutant for each engine family. Test results used to calculate the variables in the CumSum Equation must be final deteriorated test results as defined in (d)(3).

$$C_i = \max[0 \text{ OR } (C_{i-1} + X_i - (STD + F))]$$

Where:

C_i	=	The current CumSum statistic
C_{i-1}	=	The previous CumSum statistic. Prior to any testing, the CumSum statistic = 0 (i.e. $C_0 = 0$)
X_i	=	The current emission test result for an individual engine
STD	=	Emission standard
F	=	$0.25 \times \sigma$

(2) After each test, C_i is compared to the action limit, H, the quantity which the CumSum statistic must exceed, in two consecutive tests, before the engine family may be determined to be in noncompliance for purposes of paragraph (c).

H	=	The Action Limit. It is $5.0 \times \sigma$, and is a function of the standard deviation, σ.
σ	=	is the sample standard deviation and is recalculated after each test.

(3) After each engine is tested, the CumSum statistic shall be promptly updated according to the CumSum Equation in paragraph (1) of this subsection.

(4) If, at any time during the model year, a manufacturer amends the application for certification for an engine family as specified in Sections 17 and 18 of the Test

Procedures by performing an engine family modification (i.e. a change such as a running change involving a physical modification to an engine, a change in specification or setting, the addition of a new configuration, changes in calibration, or the use of a different deterioration factor), all previous sample size and CumSum statistic calculations for the model year will remain unchanged.

(5) A failed engine is one whose final deteriorated test result for a regulated pollutant exceeds the emission standard for that pollutant.

(6) An engine family may be determined to be in noncompliance, if at any time throughout the model year, the CUMSUM statistic, C i, for a regulated pollutant is greater than the action limit, H, for two consecutive tests.

(7) The engine manufacturer must perform a minimum of two (2) tests per engine family per quarter of production, regardless of whether the conditions of sample size have been met.

(8) All results from the previous quarters of the same model year must be included in the on-going Cumulative Sum analysis, provided that the engine family has not failed (e.g., if three engines of a family were tested in the first quarter, the first test of the second quarter would be considered as the fourth test).

(9) If the Cumulative Sum analysis indicates that an engine family has failed, the engine manufacturer must notify the Chief of the Mobile Source Operations Division in writing and by telephone, within ten (10) working days. Corrective action will be taken as noted in paragraphs (e) and (f) below.

(10) If a manufacturer performs corrective action on a failed engine family and then resumes production, all previous tests will be void, and Cumulative Sum analysis will begin again with the next test.

(11) At the end of the quarter, or when the Cumulative Sum analysis indicates that a decision has been made, the manufacturer must provide all the data accumulated during the quarter.

(d) Calculation and reporting of test results.

(1) Initial test results are calculated following the applicable test procedure. The manufacturer rounds these results, in accordance with ASTM E29- 93a, to the number of decimal places contained in the applicable emission standard expressed to one additional significant figure. (ASTM E29-93a has been incorporated by reference.)

(2) Final test results are calculated by summing the initial test results derived in paragraph (a) of this section for each test engine, dividing by the number of tests conducted on the engine, and rounding in accordance with ASTM E29-93a to the same

number of decimal places contained in the applicable standard expressed to one additional significant figure.

(3) The final deteriorated test results for each test engine are calculated by applying the appropriate deterioration factors, derived in the certification process for the engine family, to the final test results, and rounding in accordance with ASTM E29-93a to the same number of decimal places contained in the applicable standard expressed to one additional significant figure.

(4) If, at any time during the model year, the CumSum statistic exceeds the applicable action limit, H, in two consecutive tests, the engine family may be determined to be in noncompliance and the manufacturer must notify the Chief of Mobile Sources Operations Division and the Manager of the New Vehicle Audit Section, 9528 Telstar Ave., El Monte, CA 91731, within ten (10) working days of such exceedance by the Cum Sum statistic.

(5) Within 30 calendar days of the end of each quarter, each engine manufacturer must submit to the Executive Officer a report which includes the following information:

(A) The location and description of the manufacturer's or other's exhaust emission test facilities which were utilized to conduct testing reported pursuant to this section;

(B) Total production and sample sizes, N and n, for each engine family;

(C) The applicable emissions standards for each engine family.

(D) A description of the process to obtain engines on a random basis;

(E) A description of the test engines. (i.e., date of test, engine family, engine size, engine or equipment identification number, fuel system, dynamometer power absorber setting in horsepower, engine code or calibration number, and test location).

(F) The date of the end of the engine manufacturer's model year production for each engine family.

(G) For each test conducted,

(i) A description of the test engine, including:

(a) Configuration and engine family identification,

(b) Year, make, and build date,

(c) Engine identification number, and

(d) Number of hours of service accumulated on engine prior to testing;

(ii) Location where service accumulation was conducted and description of accumulation procedure and schedule;

(iii) Test number, date, test procedure used, initial test results before and after rounding, and final test results for all exhaust emission tests, whether valid or invalid, and the reason for invalidation, if applicable;

(iv) A complete description of any adjustment, modification, repair, preparation, maintenance, and/or testing which was performed on the test engine, was not reported pursuant to any other part of this article, and will not be performed on all other production engines;

(v) The exhaust emission data for HC+NOx (or NMHC+NOx, as applicable) and CO for each test engine or equipment. The data reported must provide two significant figures beyond the number of significant figures in applicable emission standards.

(vi) The retest emission data, as described in paragraph (d) above for any engine or unit of equipment failing the initial test, and description of the corrective actions and measures taken, including specific component replaced or adjusted.

(vii) A CumSum analysis, as required in paragraph (c), of the production line test results for each engine family;

(viii) Any other information the Executive Officer may request relevant to the determination whether the new engines being manufactured by the manufacturer do in fact conform with the regulations with respect to which the Executive Order was issued;

(ix) For each failed engine as defined in paragraph (c), a description of the remedy and test results for all retests.

(x) Every aborted test data and reason for the aborted test.

(xi) The start and stop dates of batch-produced engine family production.

(xii) The required information for all engine families in production during the quarter regardless of sample size; and

(xiii) The following signed statement and endorsement by an authorized representative of the manufacturer:

This report is submitted pursuant to this article. This production line testing program was conducted in complete conformance with all applicable regulations under the Test Procedures. No emission-related changes to production processes or quality control procedures for the engine family tested have been made during this production line testing program that affect engines from the production line. All data and information reported herein is, to the best of (Company Name) knowledge, true and accurate. I am aware of the penalties associated with violations of the California Code of Regulations and the regulations thereunder. (Authorized Company Representative.)

(H) Each manufacturer must submit a copy of the report that has been stored (e.g., computer disc), or may be transmitted, in an electronically digitized manner, and in a format that is specified by the Executive Officer. This electronically based submission is in addition to the written submission of the report.

(e) Manufacturer Notification of Failure.

(1) The Executive Officer will notify the engine manufacturer that the engine manufacturer may be subject to revocation or suspension of the Executive Order authorizing sales and distribution of the noncompliant engines in the State of California, or being enjoined from any further sales, or distribution, of the noncompliant engines in the State of California pursuant to Section 43017 of the Health and Safety Code. Prior to revoking or suspending, or seeking to enjoin an engine manufacturer, and other interested parties, including, but not limited to corrective actions applied to the noncompliant engine family. In addition, the engine manufacturer may be subject to, on a per engine basis, any and all remedies available under Part 5, Division 26 of the Health and Safety Code, sections 43000 et seq.

(2) The Executive Officer will notify the equipment manufacturer that the equipment manufacturer may be subject to revocation or suspension of the Executive Order authorizing sales and distribution of the noncompliant equipment in the State of California, or being enjoined from any further sales, or distribution, of the noncompliant equipment product line(s) that are, or utilize engines that are, noncompliant with the applicable emission regulations in the State of California pursuant to Section 43017 of the Health and Safety Code. Prior to revoking or suspending, or seeking to enjoin an equipment manufacturer, and other interested parties, including, but not limited to corrective actions applied to the noncompliant engine family. In addition, the equipment manufacturer may be subject to, on a per engine basis, any and all remedies available under Part 5, Division 26 of the Health and Safety Code, sections 43000 et seq.

(f) Suspension and revocation of Executive Order.

(1) The Executive Order is automatically suspended with respect to any engine failing pursuant to paragraph (c)(5) effective from the time that testing of that engine family is completed.

(2) The Executive Officer may suspend the Executive Order for an engine family which is determined to be in noncompliance pursuant to paragraph (c)(6). This suspension will not occur before fifteen days after the engine family is determined to be in noncompliance.

(3) If the results of testing pursuant to these regulations indicate that engines of a particular family produced at one plant of a manufacturer do not conform to the regulations with respect to which the Executive Order was issued, the Executive Officer may suspend the Executive Order with respect to that family for engines manufactured by the manufacturer at this and all other plants.

(4) Notwithstanding the fact that engines described in the application for certification may be covered by an Executive Order, the Executive Officer may suspend such certificate immediately in whole or in part if the Executive Officer finds any one of the following infractions to be substantial:

(A) The manufacturer refuses to comply with any of the requirements of this subpart.

(B) The manufacturer submits false or incomplete information in any report or information provided to the Executive Officer under this subpart.

(C) The manufacturer renders inaccurate any test data submitted under this subpart.

(D) An ARB enforcement officer is denied the opportunity to conduct activities authorized in this subpart and a warrant or court order is presented to the manufacturer or the party in charge of the facility in question.

(5) The Executive Officer may suspend such certificate immediately in whole or in part if the Executive Officer finds that an ARB enforcement officer is unable to conduct activities authorized in this Section and the Test Procedures because a manufacturer has located its facility in a foreign jurisdiction where local law prohibits those activities.

(6) The Executive Officer shall notify the manufacturer in writing of any suspension or revocation of an Executive Order in whole or in part. A suspension or revocation is effective upon receipt of the notification or fifteen days from the time an engine family is determined to be in noncompliance pursuant to paragraph (c)(5) or (c)(6), whichever is later, except that the certificate is immediately suspended with respect to any failed engines as provided for in paragraph (a) of this section.

(7) The Executive Officer may revoke an Executive Order for an engine family after the certificate has been suspended pursuant to paragraph (b) or (c) of this section if the proposed remedy for the nonconformity, as reported by the manufacturer to the Executive Officer, is one requiring a design change or changes to the engine or emission control system as described in the application for certification of the affected engine family.

(8) Once an Executive Order has been suspended for a failed engine, as provided for in paragraph (a) of this section, the manufacturer must take the following actions before the certificate is reinstated for that failed engine:

(A) Remedy the nonconformity;

(B) Demonstrate that the engine conforms to the emission standards by retesting the engine in accordance with these regulations; and

(C) Submit a written report to the Executive Officer, after successful completion of testing on the failed engine, which contains a description of the remedy and test results for each engine in addition to other information that may be required by this part.

(9) Once an Executive Order for a failed engine family has been suspended pursuant to paragraph (b), (c) or (d) of this section, the manufacturer must take the following actions before the Executive Officer will consider reinstating the certificate:

(A) Submit a written report to the Executive Officer which identifies the reason for the noncompliance of the engines, describes the proposed remedy, including a description of any proposed quality control or quality assurance measures to be taken by the manufacturer to prevent future occurrences of the problem, and states the date on which the remedies will be implemented.

(B) Demonstrate that the engine family for which the Executive Order has been suspended does in fact comply with the regulations of this part by testing as many engines as needed so that the CumSum statistic falls below the action limit. Such testing must comply with the provisions of this Part. If the manufacturer elects to continue testing individual engines after suspension of a certificate, the certificate is reinstated for any engine actually determined to be in conformance with the emission standards through testing in accordance with the applicable test procedures, provided that the Executive Officer has not revoked the certificate pursuant to paragraph (f) of this section.

(10) Once the Executive Order has been revoked for an engine family, if the manufacturer desires to continue introduction into commerce of a modified version of that family, the following actions must be taken before the Executive Officer may issue a certificate for that modified family:

(A) If the Executive Officer determines that the proposed change(s) in engine design may have an effect on emission performance deterioration, the Executive Officer shall notify the manufacturer, within five working days after receipt of the report in paragraph (9)(A) of this section, whether subsequent testing under this subpart will be sufficient to evaluate the proposed change or changes or whether additional testing will be required; and

(B) After implementing the change or changes intended to remedy the nonconformity, the manufacturer must demonstrate that the modified engine family does in fact conform with the regulations of this part by testing as many engines as needed from the modified engine family so that the CumSum statistic, as calculated per aforementioned method, falls below the action limit. When both of these requirements are met, the Executive Officer shall reissue the certificate or issue a new certificate, as the case may be, to include that family. As long as the CumSum statistic remains above the action limit, the revocation remains in effect.

(11) At any time subsequent to a suspension of an Executive Order for a test engine pursuant to paragraph (a) of this section, but not later than 15 days (or such other period as may be allowed by the Executive Officer) after notification of the Executive Officer's decision to suspend or revoke an Executive Order in whole or in part pursuant to paragraphs (b), (c), or (f) of this section, a manufacturer may request a hearing as to whether the tests have been properly conducted or any sampling methods have been properly applied.

(12) Any suspension of an Executive Order under paragraph (f)(4) of this section:

(A) must be made only after the manufacturer concerned has been offered an opportunity for a hearing conducted in accordance with all applicable requirements and;

(B) need not apply to engines no longer in the possession of the manufacturer.

(13) After the Executive Officer suspends or revokes an Executive Order pursuant to this section and prior to the commencement of a hearing, if the manufacturer demonstrates to the Executive Officer's satisfaction that the decision to suspend or revoke the Executive Order was based on erroneous information, the Executive Officer shall reinstate the Executive Order.

(14) To permit a manufacturer to avoid storing non-test engines while conducting subsequent testing of the noncomplying family, a manufacturer may request that the Executive Officer conditionally reinstate the Executive Order for that family. The Executive Officer may reinstate the Executive Order subject to the following condition: the manufacturer must commit to recall all engines of that family produced from the time the Executive Order is conditionally reinstated if the CumSum statistic does not fall below the action limit and must commit to remedy any nonconformity at no expense to the owner.

[The replacement language provides for Greater and more accurate testing, as proposed in the ARB production line testing, is necessary in order to ensure the emissions benefit prior to the equipment going in-use. The ARB has found that the proposed level of production line testing is necessary and provides an appropraite balance with the economic costs to ensure a robust control program.]

§1048.305 How must I prepare and test my production-line engines?
DELETE

[Replaced by 2437 language in §1048.301]

§1048.310 How must I select engines for production-line testing?
DELETE

[Replaced by 2437 language in §1048.301]

§1048.315 How do I know when my engine family fails the production-line testing requirements?
DELETE

[Replaced by 2437 language in §1048.301]

§1048.320 What happens if one of my production-line engines fails to meet emission standards?
DELETE

[Replaced by 2437 language in §1048.301]

§1048.325 What happens if an engine family fails the production-line requirements?
DELETE

[Replaced by 2437 language in §1048.301]

§1048.330 May I sell engines from an engine family with a suspended certificate of conformity?
DELETE

[Replaced by 2437 language in §1048.301]

§1048.335 How do I ask EPA to reinstate my suspended certificate?
DELETE

[Replaced by 2437 language in §1048.301]

§1048.340 When may EPA revoke my certificate under this subpart and how may I sell these engines again?
(a) We may revoke your certificate for an engine family in the following cases:

* * * * *

(2) DELETE AND REPLACE WITH:
Your engine family fails to comply with the requirements of this subpart and your proposed remedy to address a suspended certificate under §1048.301 is inadequate to solve the problem or requires you to change the engine's design or emission-control system.

(b) To sell engines from an engine family with a revoked certificate of conformity, you must modify the engine family and then show it complies with the requirements of this part.

(1) DELETE AND REPLACE WITH:

If we determine your proposed design change may not control emissions for the engine's full useful life, we will tell you within ten working days after receiving your report. In this case we will decide whether production-line testing will be enough for us to evaluate the change or whether you need to do more testing.

[Subsection (a)(2) is modified to correct the reference from §1048.325 to §1048.301]

* * * * *

§1048.345 What production-line testing records must I send to EPA?

DELETE

[Replaced by 2437 language in §1048.301]

§1048.350 What records must I keep?

DELETE

[Replaced by 2437 language in §1048.301]

[All sections referring to production line testing have been replaced with existing the ARB program. The ARB production line testing program provides greater assurance that engines will maintain their emissions during their useful life.]

Subpart E—Testing In-use Engines

§1048.401 What testing requirements apply to my engines that have gone into service?

* * * * *

(b) We may approve an alternate plan for showing that in-use engines comply with the requirements of this part if one of the following is true:

(1) DELETE AND REPLACE WITH:

You produce a total of less than 2000 large spark-ignition engines annually for sale in the United States of America.

[The language has been revised to make the definition for small volume manufacturer definition consistent with other ARB regulations.]

* * * * *

§1048.405 How does this program work?

§1048.410 How must I select, prepare, and test my in-use engines?
DELETE AND REPLACE WITH:

(a) This section applies to new 2010 and later model year off-road large spark-ignition engines with engine displacement greater than 1.0 liter.

(b) Manufacturer In-Use Testing Program.

Standards and Test Procedures. The emission standards, exhaust sampling and analytical procedures are those described in the Test Procedures, and are applicable to engines tested only for exhaust emissions. An engine is in compliance with these standards and test procedures only when all portions of these in-use test procedures and specified requirements from the Test Procedures are fulfilled, except that any adjustable engine parameters must be set to the nominal value or position as indicated on the engine label.

(1) Within a manufacturer's model-year engine production period, the ARB will identify those engine families, and the specific configurations within an engine family, that the manufacturer must subject to in-use testing as described below. For each model year, ARB may identify a number of engine families that is no greater than 25 percent of the number of engine families to which this article is applicable. For those manufacturers producing three or less engine families in a model year, ARB may designate a maximum of one engine family per model year for in-use testing.

(2) For each engine family identified by ARB, engine manufacturers must perform emission testing of an appropriate sample of in-use engines from each engine family. Manufacturers must submit data from this in-use testing to ARB.

(3) An engine manufacturer must test in-use engines from each engine family identified by ARB. All engines selected by the manufacturer for testing must be identified by the manufacturer, and a list of the selected engines must be submitted to the Executive Officer, prior to the onset of testing. Engines to be tested must have accumulated a minimum of 0.50 (50 percent) of the family's certified useful life period. The number of engines to be tested by a manufacturer will be determined by the following method:

(A) a minimum of four engines per family, provided that no engine fails any emission standard. For each exceedance, two additional engines must be tested until the total number of engines equals ten.

(B) For engine families of less than 500 engines (national production) for the identified model year or for engine manufacturers who make less than or equal to 2,000 engines nationally for that model year, a minimum of two (2) engines per family provided that no engine fails any emission standard. For each failing engine, two more engines shall be tested until the total number of engines equals ten (10).

(C) If an engine family was certified using carryover emission data and has been previously tested under paragraphs (b)(3)(A) or (b)(3)(B) of this section (and a recall for that family has not occurred), then only one engine for that family must be tested. If that one engine fails any emission standard, testing must be conducted as outlined in subsections (b)(3)(A) or (b)(3)(B), whichever is appropriate.

(4) The Executive Officer may approve an alternative to manufacturer in-use testing, where:

(A) Engine family production is less than or equal to 200 per year, nationally;

(B) Engines cannot be obtained for testing because they are used substantially in vehicles or equipment that are not conducive to engine removal such as large vehicles or equipment from which the engine cannot be removed without dismantling either the engine, vehicle, or equipment; or

(C) Other compelling circumstances associated with the structure of the industry and uniqueness of engine applications. Such alternatives shall be designed to determine whether the engine family is in compliance.

(5) The engine manufacturer shall procure in-use engines which have been operated between 0.50 and 1.0 times the certified engine's useful life period. The engine manufacturer may test engines from more than one model year in a given year. The manufacturer shall submit a plan for testing within twelve calendar months after receiving notice that ARB has identified a particular engine family for testing and shall complete testing of such engine family within 24 calendar months from the date of approval of the plan by ARB. Test engines may be procured from sources associated with the engine manufacturer (i.e., manufacturer-established fleet engines, etc.) or from sources not associated with the manufacturer (i.e., consumer-owned engines, independently owned fleet engines, etc.).

(c) Maintenance, procurement and testing of in-use engines.

(1) A test engine must have a maintenance and use history representative of in-use conditions.

(A) To comply with this requirement a manufacturer must obtain information from the end users regarding the accumulated usage, maintenance, repairs, operating conditions, and storage of the test engines.

(B) Documents used in the procurement process must be maintained as required.

(2) The manufacturer may perform minimal restorative maintenance on components of a test engine that are not subject to parameter adjustment. Maintenance may include only that which is listed in the owner's instructions for engines with the amount of

service and age of the acquired test engine. Repairs may be performed on a test engine with prior Executive Officer approval. Documentation of all maintenance, repairs, defects, and adjustments shall be maintained and retained as required.

(3) At least one valid emission test, according to the Test Procedure, is required for each in-use engine.

(4) The Executive Officer may waive portions or requirements of the test procedure, if any, that are not necessary to determine in-use compliance.

(5) If a selected in-use engine fails to comply with any applicable emission standards, the manufacturer shall determine the reason for noncompliance. The manufacturer must report within 72 hours after the completion of the test specifying the emission results and identifying the pollutant which failed to comply with the emission standard. The manufacturer must report all such reasons of noncompliance within fifteen business days of completion of testing. Additional time beyond the initial fifteen days may be granted providing that the manufacturer receives prior approval from the Executive Officer. The reports may be filed electronically or mailed to the following address: Chief of Mobile Source Operations Division, 9528 Telstar Avenue, El Monte, CA 91731.

(6) At the discretion of the Executive Officer, an engine manufacturer may test more engines than the minima described in paragraph (b)(3) of this section or may concede failure before testing a total of ten engines. Upon conceding failure the manufacturer shall proceed with a voluntary recall program as specified in Section 2439.

(7) The Executive Officer will consider failure rates, average emission levels and the existence of any defects, among other factors, in determining whether to pursue remedial action under this subpart. The Executive Officer may order a recall pursuant to Section 2439 before testing reaches the tenth engine whenever the Executive Officer has determined, based on production-line test results or in-use test results, enforcement testing results, or any other information, that a substantial number of a class or category of equipment or engines produced by that manufacturer, although properly maintained and used, contain a failure in an emission-related component which, if uncorrected, may result in the equipments' or engines' failure to meet applicable standards over their useful lives; or whenever a class or category of equipment or engines within their useful lives, on average, do not conform to the emission standards prescribed pursuant to Part 5 (commencing with Section 43000) of Division 26 of the Health and Safety Code, or any regulation adopted by the state board pursuant thereto, other than an emissions standard applied to new engines to determine "certification" as specified in Chapter 9, as applicable to the model year of such equipment or engines.

(8) Prior to an ARB-ordered recall, the manufacturer may perform a voluntary emissions recall pursuant to Article 4.5, Section 2439(b). Such manufacturer is subject to the reporting requirements in subsection (d) below.

(9) Once ARB determines that a substantial number of engines fail to conform with the requirements, the manufacturer will not have the option of a voluntary emissions recall.

(d) In-use test program reporting requirements.

(1) The manufacturer shall electronically submit to the Executive Officer within three months of completion of testing all emission testing results generated from the in-use testing program. The following information must be reported for each test engine:

(A) engine family,

(B) model,

(C) engine serial number or alternate identification, as applicable,

(D) date of manufacture,

(E) estimated hours of use,

(F) date and time of each test attempt,

(G) results (if any) of each test attempt,

(H) results of all emission testing,

(I) summary of all maintenance, repairs, and adjustments performed,

(J) summary (if any) of all ARB pre-approved modifications and repairs,

(K) determinations of noncompliance or compliance.

(2) The manufacturer must electronically submit the results of its in-use testing with a pre-approved information heading. The Executive Officer may exempt manufacturers from this requirement upon written request with supporting justification.

(3) All testing reports and requests for approvals made under this subpart shall be sent to the Executive Officer.

(4) The Executive Officer may require modifications to a manufacturer's in-use testing programs.

[All sections referring to in-use compliance have been replaced with existing the ARB program. The ARB in-use compliance program provides greater assurance that engines will maintain their emissions during their useful life.]

§1048.415 What happens if in-use engines do not meet requirements?
DELETE AND REPLACE WITH:

Procedures for In-Use Engine Recalls for Large Off-Road Spark-Ignition Engines with an Engine Displacement Greater Than 1.0 Liter.

(a) The recall procedures in this section apply as set forth in Title 13, California Code of Regulations, Sections 2433 and 2438.

(b) Voluntary Emissions Recall

(1) When any manufacturer initiates a voluntary emission recall, the manufacturer shall notify the Executive Officer of the recall at least 30 days before owner notification is to begin. The manufacturer shall also submit to the Executive Officer a voluntary recall plan for approval, as prescribed in the following:

(A)(i) a description of each class or category of engines to recall, including the number of engines to be recalled, the engine family or a sub-group thereof, the model year, and such other information as may be required to identify the engines:

(ii) a description of the specific modifications, alterations, repairs, corrections, adjustments, or other changes to be made to correct the engines affected by the nonconformity;

(iii) a description of the method by which the manufacturer will notify engine owners including copies of any letters of notification to be sent to engine owners;

(iv) a description of the proper maintenance or use, if any, upon which the manufacturer conditions eligibility for repair under the recall plan, and a description of the proof to be required of an engine owner to demonstrate compliance with any such conditions;

(v) a description of the procedure to be followed by engine owners to obtain correction of the nonconformity. This shall include designation of the date on or after which the owner can have the nonconformity remedied, the time reasonably necessary to perform the labor to remedy the nonconformity, and the designation of facilities at which the nonconformity can be remedied;

(vi) a description of the class of persons other than dealers and authorized warranty agents of the manufacturer who will remedy the nonconformity;

(vii) a description of the system by which the manufacturer will assure that an adequate supply of parts is available to perform the repair under the plan; or

(B)(i) a description of each class or category of engines subject to recall, including the number of engines subject to being recalled, the engine family or a sub-group thereof, the model year, and such other information as may be required to identify the engines;

(ii) a description of the method by which the manufacturer will use the in-use emissions credit, averaging, banking, and trading program, as described in Section 2438(e), to remedy the nonconformity.

(2) Voluntary Recall Progress Report. A manufacturer who initiates a voluntary emission recall campaign pursuant to paragraph (b)(1)(A) of this section must submit at least one report on the progress of the recall campaign. This report shall be submitted to the Executive Officer by the end of the fifth quarter, as defined in Section 2112(j), Chapter 2, Title 13 of the California Code of Regulations, following the quarter in which the notification of equipment or engine owners was initiated, and include the following information:

(A) Engine family involved and recall campaign number as designated by the manufacturer.

(B) Date owner notification was begun, and date completed.

(C) Number of equipment or engines involved in the recall campaign.

(D) Number of equipment or engines known or estimated to be affected by the nonconformity.

(E) Number of equipment or engines inspected pursuant to the recall plan and found to be affected by the nonconformity.

(F) Number of inspected equipment or engines.

(G) Number of equipment or engines receiving repair under the recall plan.

(H) Number of equipment or engines determined to be unavailable for inspection or repair under the recall plan due to exportation, theft, scrapping, or for other reasons (specify).

(I) Number of equipment or engines determined to be ineligible for recall action due to removed or altered components.

(J) A listing of the identification numbers of equipment or engines subject to recall but for whose repair the manufacturer has not been invoiced. This listing shall be supplied in a standardized computer data storage device to be specified by the Executive Officer.

(K) Any service bulletins transmitted to dealers which relate to the nonconformity and which have not previously been submitted.

(L) All communications transmitted to equipment or engine owners which relate to the nonconformity and which have not previously been submitted.

(3) The information gathered by the manufacturer to compile the reports must be retained for not less than seven years from the date of the manufacture of the engines and must be made available to the Executive Officer or designee of the Executive Officer upon request.

(4) A voluntary recall plan shall be deemed approved unless disapproved by the Executive Officer within 20 business days after receipt of the recall plan.

(5) Under a voluntary recall program, initiated and conducted by a manufacturer or its agent or representative as a result of in-use enforcement testing or other evidence of noncompliance provided or required by the Board to remedy any nonconformity, the capture rate shall be at a minimum 55 percent of the equipment or engine within the subject engine family or a sub-group thereof. The manufacturer shall comply with the capture rate by the end of the fifth quarter, as defined in Section 2112(j), Chapter 2, Title 13 of the California Code of Regulations, following the quarter in which the notification of equipment or engine owners was initiated. If the manufacturer cannot correct the percentage of equipment specified in the plan by the applicable deadlines, the manufacturer must use good faith efforts through other measures, subject to approval by the Executive Officer, to bring the engine family into compliance with the standards. If the Executive Officer does not approve the manufacturer's efforts, the manufacturer shall propose mitigation measures to offset the emissions of the unrepaired equipment within 45 days from the last report filed pursuant to paragraph (b)(2), above. The Executive Officer shall approve such measures provided that:

(A) The emission reductions from the recalled and repaired equipment or engines and the mitigation measures are equivalent to achieving the capture rate; and

(B) The emission reductions from the mitigation measures are real and verifiable; and

(C) The mitigation measures are implemented in a timely manner.

(c) Initiation and Notification of Ordered Emission-Related Recalls.

(1) A manufacturer shall be notified whenever the Executive Officer has determined, based on production-line test results or in-use test results, enforcement testing results, or any other information, that a substantial number of a class or category of equipment or engines produced by that manufacturer, although properly maintained and used, contain a failure in an emission-related component which, if uncorrected, may result in the equipments' or engines' failure to meet applicable standards over their useful lives; or whenever a class or category of equipment or engines within their useful lives, on average, do not conform to the emission standards prescribed pursuant to Part 5 (commencing with Section 43000) of Division 26 of the Health and Safety Code, or any regulation adopted by the state board pursuant thereto, other than an emissions standard applied to new engines to determine "certification" as specified in Chapter 9, as applicable to the model year of such equipment or engines.

(2) It shall be presumed for purposes of this section that an emission-related failure will result in the exceedance of emission standards unless the manufacturer presents evidence in accordance with the procedures set forth in subsections (A), (B), and (C) which demonstrates to the satisfaction of the Executive Officer that the failure will not result in exceedance of emission standards within the useful life of the equipment or engine.

(A) In order to overcome the presumption of noncompliance set forth in paragraph (c)(2) above, the average emissions of the equipment and engines with the failed emission-related component must comply with applicable emission standards. A manufacturer may demonstrate compliance with the emission standards by following the procedures set forth in either paragraphs (c)(2)(B) or (c)(2)(C) of this section.

(B) A manufacturer may test properly maintained in-use equipment with the failed emission-related component pursuant to the applicable certification emission tests specified in Section 2433, Title 13 of the California Code of Regulations. The emissions shall be projected to the end of the equipment's or engine's useful life using in-use deterioration factors. The in-use deterioration factors shall be chosen by the manufacturer from among the following:

(i) "Assigned" in-use deterioration factors provided by the ARB on a manufacturer's conditions; request and based on ARB in-use testing; or,

(ii) deterioration factors generated during certification, provided adjustments are made to account for equipment aging, customer hour usage-accumulation practices, type of failed component, component failure mode, effect of the failure on other emission-control components, commercial fuel and lubricant quality, and any other factor which may affect the equipment's or engine's operating or,

(iii) subject to approval by the Executive Officer, a manufacturer-generated deterioration factor. Such deterioration factor must based on in-use data generated from certification emission tests performed on properly maintained and used equipment in accordance with the procedures set forth in Section 2433 of Title 13 of the California Code of Regulations, and the equipment from which it was derived must be representative of the in-use fleet with regard to emissions performance and equipped with similar emission control technology as equipment with the failed component.

(C) In lieu of the equipment or engine emission testing described in subsection (B) above and subject to approval by the Executive Officer, a manufacturer may perform an engineering analysis, laboratory testing or bench testing, when appropriate, to demonstrate the effect of the failure.

(3) The notification shall include a description of each class or category of equipment or engines encompassed by the determination of nonconformity, shall set forth the factual basis for the determination and shall designate a date at least 45 business days from the date of receipt of such notification by which the manufacturer shall submit a plan to remedy the nonconformity.

(4) Availability of Public Hearing.

(A) The manufacturer may request a public hearing pursuant to the procedures set forth in Subchapter 1.25, Division 3, Chapter 1, Title 17, California Code of Regulations to contest the finding of nonconformity and the necessity for or the scope of any ordered corrective action.

(B) If a manufacturer requests a public hearing pursuant to subsection (A) above, and if the Executive Officer's determination of nonconformity is confirmed at the hearing, the manufacturer shall submit the recall plan required by Section 2439 within 30 days after receipt of the Board's decision.

(5) Ordered Recall Plan.

(A) Unless a public hearing is requested by the manufacturer, a recall plan shall be submitted to the Chief, Mobile Source Operations Division, 9528 Telstar Avenue, El Monte, CA 91731, within the time limit specified in the notification. The Executive Officer may grant the manufacturer an extension upon good cause shown.

(B) The recall plan shall contain the following:

(i) A description of each class or category of equipment or engine to be recalled, including the engine family or sub-group thereof, the model-year, the make, the model, and such other information as may be required to identify the equipment or engines to be recalled.

(ii) A description of the nonconformity and the specific modifications, alterations, repairs, corrections, adjustments or other changes to be made to bring the equipment or engines into conformity including a brief summary of the data and technical studies which support the manufacturer's decision regarding the specific corrections to be made.

(iii) A description of the method by which the manufacturer will determine the names and addresses of equipment or engine owners and the method by which they will be notified.

(iv) A description of the procedure to be followed by equipment or engine owners to obtain correction of the nonconformity including the date on or after which the owner can have the nonconformity remedied, the time reasonably necessary to perform the labor required to correct the nonconformity, and the designation of facilities at which the nonconformity can be remedied. The repair shall be completed within a reasonable time designated by the Executive Officer from the date the owner delivers the equipment or engine for repair. This requirement becomes applicable on the date designated by the manufacturer as the date on or after which the owner can have the nonconformity remedied.

(v) If some or all of the nonconforming equipment or engines are to be remedied by persons other than dealers or authorized warranty agents of the manufacturer, a description of such class of persons and a statement indicating that the participating members of the class will be properly equipped to perform such remedial action.

(vi) The capture rate required for each class or category of equipment or engine to be recalled. Under recalls based on exceedance of emission standards, the capture rate shall be at a minimum 80 percent of the equipment or engine within the subject engine family.

(vii) The plan may specify the maximum incentives (such as a free tune-up or specified quantity of free fuel), if any, the manufacturer will offer to induce equipment or engine owners to present their equipment for repair, as evidence that the manufacturer has made a good faith effort to repair the percentage of equipment or engines specified in the plan. The plan shall include a schedule for implementing actions to be taken including identified increments of progress towards implementation and deadlines for completing each such increment.

(viii) A copy of the letter of notification to be sent to equipment or engine owners.

(ix) A description of the system by which the manufacturer will assure that an adequate supply of parts will be available to perform the repair under the recall plan including the date by which an adequate supply of parts will be available to initiate the repair campaign, and the method to be used to assure the supply remains both adequate and responsive to owner demand.

(x) A copy of all necessary instructions to be sent to those persons who are to perform the repair under the recall plan.

(xi) A description of the impact of the proposed changes on fuel economy, operation, performance and safety of each class or category of equipment or engines to be recalled and a brief summary of the data, technical studies, or engineering evaluations which support these descriptions.

(xii) A description of the impact of the proposed changes on the average emissions of the equipment or engines to be recalled based on noncompliance described in subsection (c)(1), above. The description shall contain the following:

(1.) Average noncompliance emission levels.

(2.) Average emission reduction or increase per pollutant resulting from the recall repair. These averages shall be verified by the manufacturer by applying the proposed recall repairs to two or more in-use equipment or engines representing the average noncompliance emission levels. Only those equipment or engines with baseline emission levels within 25 percent of the average emission levels of noncomplying pollutant(s) established under the in-use enforcement test program may be used by manufacturers to verify proposed recall repairs. The Executive Officer may allow the use of equipment or engines exceeding these upper averaging noncompliance limits if none which meet the limits can be reasonably procured.

(3.) An estimate of the average emission level per pollutant for a class or category of equipment or engines after repair as corrected by the required capture rate. The estimated average emission level shall comply with the applicable emission standards. If the average emissions levels achieved by applying the average emission reduction per equipment or engine after repair and the estimated capture rate, do not achieve compliance with the emissions standards, a manufacturer shall propose other measures to achieve average emissions compliance.

(xiii) Any other information, reports, or data which the Executive Officer may reasonably determine to be necessary to evaluate the recall plan.

(6) Approval and Implementation of Recall Plan.

(A) If the Executive Officer finds that the recall plan is designed effectively to correct the nonconformity and complies with the provisions of this Section, he or she will so notify the manufacturer in writing. Upon receipt of the approval notice from the Executive Officer, the manufacturer shall commence implementation of the approved plan. Notification of equipment or engine owners and the implementation of recall repairs shall commence within 45 days of the receipt of notice unless the manufacturer can show good cause for the Executive Officer to extend the deadline.

(B) If the Executive Officer does not approve the recall plan or the mitigation measures provided in this Section as submitted, the Executive Officer shall order modification of the plan or mitigation measures with such changes and additions as he or she determines to be necessary. The Executive Officer shall notify the manufacturer in writing of the disapproval and the reasons for the disapproval.

(C) The manufacturer may contest the Executive Officer's disapproval by requesting a public hearing pursuant to the procedures set forth in Subchapter 1.25, Division 3, Chapter 1, Title 17, California Code of Regulations. As a result of the hearing, the Board may affirm, overturn or modify the Executive Officer's action. In its decision, affirming or modifying, the Board shall specify the date by which the manufacturer shall commence notifying equipment or engine owners and implementing the required recall repairs.

(D) If no public hearing is requested in accordance with (C) above, the manufacturer shall incorporate the changes and additions required by the Executive Officer and shall commence notifying equipment or engine owners and implementing the required recall repairs within 60 days of the manufacturer's receipt of the Executive Officer's disapproval.

(7) Notification of Owners.

(A) Notification to equipment or engine owners shall be made by first class mail or by such other means as approved by the Executive Officer provided, that for good cause, the Executive Officer may require the use of certified mail to ensure an effective notification.

(B) The manufacturer shall use all reasonable means necessary to locate equipment or engine owners provided, that for good cause, the Executive Officer may require the manufacturer to use motor equipment registration lists, as applicable, available from State or commercial sources to obtain the names and addresses of equipment or engine owners to ensure effective notification.

(C) The Executive Officer may require subsequent notification by the manufacturer to equipment or engine owners by first class mail or other reasonable means provided, that for good cause, the Executive Officer may require the use of certified mail to ensure effective notification.

(D) The notification of equipment or engine owners shall contain the following:

(i) The statement: "The California Air Resources Board has determined that your (equipment or engine) (is or may be) releasing air pollutants which exceed (California or California and Federal) standards. These standards were established to protect your health and welfare from the dangers of air pollution."

(ii) A statement that the nonconformity of any such equipment or engines will be remedied at the expense of the manufacturer.

(iii) A statement that eligibility may not be denied solely on the basis that the equipment or engine owner used parts not manufactured by the original equipment manufacturer, or had repairs performed by outlets other than the equipment or engine manufacturer's franchised dealers.

(iv) A clear description of the components which will be affected by the recall action and a general statement of the measures to be taken to correct the nonconformity.

(v) [Reserved]

(vi) A description of the adverse effects, if any, that an uncorrected nonconformity would have on the performance, fuel economy, or driveability of the equipment or engine or to the function of other engine components.

(vii) A description of the procedure which the equipment or engine owner should follow to obtain correction of the nonconformity including the date on or after which the owner can have the nonconformity remedied, the time reasonably necessary to correct the nonconformity, and a designation of the facilities located in California at which the nonconformity can be remedied.

(viii) After the effective date of the recall enforcement program referred to above, a statement that a certificate showing that the equipment has been repaired under the recall program shall be issued by the service facilities and that such a certificate may be required as a condition of equipment registration or operation, as applicable.

(ix) A card to be used by a equipment or engine owner in the event the equipment or engine to be recalled has been sold. Such card should be addressed to the manufacturer, have postage paid, and shall provide a space in which the owner may indicate the name and address of the person to whom the equipment or engine was sold.

(x) The statement: "In order to ensure your full protection under the emission warranty made applicable to your (equipment or engine) by State or Federal law, and your right to participate in future recalls, it is recommended that you have your (equipment or engine) serviced as soon as possible. Failure to do so could be determined to be a lack of proper maintenance of your (equipment or engine)".

(xi) A telephone number provided by the manufacturer, which may be used to report difficulty in obtaining recall repairs.

(xii) The manufacturer shall not condition eligibility for repair on the proper maintenance or use of the equipment except for strong or compelling reasons and with approval of the Executive Officer; however, the manufacturer shall not be obligated to repair a component which has been removed or altered so that the recall action cannot be performed without additional cost.

(xiii) No notice sent pursuant to Section (D), nor any other communication sent to equipment or engine owners or dealers shall contain any statement, express or implied, that the nonconformity does not exist or will not degrade air quality.

(xiv) The manufacturer shall be informed of any other requirements pertaining to the notification under this section which the Executive Officer has determined are reasonable and necessary to ensure the effectiveness of the recall campaign.

(8) Repair Label.

(A) The manufacturer shall require those who perform the repair under the recall plan to affix a label to each equipment or engine repaired or, when required, inspected under the recall plan.

(B) The label shall be placed in a location as approved by the Executive Officer and shall be fabricated of a material suitable for such location and which is not readily removable.

(C) The label shall contain the recall campaign number and a code designating the facility at which the repair, inspection for repair, was performed.

(9) Proof of Correction Certificate. The manufacturer shall require those who perform the recall repair to provide the owner of each equipment or engine repaired with a certificate, through a protocol and in a format prescribed by the Executive Officer, which indicates that the noncomplying equipment or engine has been corrected under the recall program. This requirement shall become effective and applicable upon the effective date of the recall enforcement program referred to in this section, above.

(10) Capture Rates and Alternative Measures.

The manufacturer shall comply with the capture rate specified in the recall plan as determined pursuant to this Section, above, by the end of the fifth quarter, as defined in Section 2112(j), Chapter 2, Title 13 of the California Code of Regulations, following the quarter in which the notification of equipment or engine owners was initiated. If, after good faith efforts, the manufacturer cannot correct the percentage of equipment specified in the plan by the applicable deadlines and cannot take other measures to bring the engine family into compliance with the standards, the manufacturer shall propose mitigation measures to offset the emissions of the unrepaired equipment within 45 days from the last report filed pursuant to Section 2439(c)(13), below. The Executive Officer shall approve such measures provided that:

(A) The emission reductions from the recalled and repaired equipment or engines and the mitigation measures are equivalent to achieving the capture rate; and

(B) The emission reductions from the mitigation measures are real and verifiable; and

(C) The mitigation measures are implemented in a timely manner.

(11) Preliminary Tests. The Executive Officer may require the manufacturer to conduct tests on components and equipment or engines incorporating a proposed correction, repair, or modification reasonably designed and necessary to demonstrate the effectiveness of the correction, repair, or modification.

(12) Communication with Repair Personnel. The manufacturer shall provide to the Executive Officer a copy of all communications which relate to the recall plan directed to dealers and other persons who are to perform the repair. Such copies shall be mailed to the Executive Officer contemporaneously with their transmission to dealers and other persons who are to perform the repair under the recall plan.

(13) Recordkeeping and Reporting Requirements.

(A) The manufacturer shall maintain sufficient records to enable the Executive Officer to conduct an analysis of the adequacy of the recall campaign. For each class or category of equipment or engine, the records shall include, but need not be limited to, the following:

(i) Engine family involved and recall campaign number as designated by the manufacturer.

(ii) Date owner notification was begun, and date completed.

(iii) Number of equipment or engines involved in the recall campaign.

(iv) Number of equipment or engines known or estimated to be affected by the nonconformity.

(v) Number of equipment or engines inspected pursuant to the recall plan and found to be affected by the nonconformity.

(vi) Number of inspected equipment or engines.

(vii) Number of equipment or engines receiving repair under the recall plan.

(viii) Number of equipment or engines determined to be unavailable for inspection or repair under the recall plan due to exportation, theft, scrapping, or for other reasons (specify).

(ix) Number of equipment or engines determined to be ineligible for recall action due to removed or altered components.

(x) A listing of the identification numbers of equipment or engines subject to recall but for whose repair the manufacturer has not been invoiced. This listing shall be supplied in a standardized computer data storage device to be specified by the Executive Officer. The frequency of this submittal, as specified in subsection (C) below, may be changed by the Executive Officer depending on the needs of recall enforcement.

(xi) Any service bulletins transmitted to dealers which relate to the nonconformity and which have not previously been submitted.

(xii) All communications transmitted to equipment or engine owners which relate to the nonconformity and which have not previously been submitted.

(B) If the manufacturer determines that the original responses to subsections (A)(iii) and (iv) of these procedures are incorrect, revised figures and an explanatory note shall be submitted. Responses to subsections (A)(v), (vi), (vii), (viii), and (ix) shall be cumulative totals.

(C) Unless otherwise directed by the Executive Officer, the information specified in subsection (A) of these procedures shall be included in six quarterly reports or two annual reports, beginning with the quarter in which the notification of owners was initiated, or until all nonconforming equipment or engines involved in the campaign have been remedied, whichever occurs sooner. Such reports shall be submitted no later than 25 days after the close of each calendar quarter.

(D) The manufacturer shall maintain in a form suitable for inspection, such as computer information storage devices or card files, and shall make available to the Executive Officer or his or her authorized representative upon request, lists of the names and addresses of equipment or engine owners:

(i) To whom notification was given;

(ii) Who received remedial repair or inspection under the recall plan; and

(iii) Who were denied eligibility for repair due to removed or altered components.

(E) The records and reports required by these procedures shall be retained for not less than one year beyond the useful life of the equipment or engines involved, or one year beyond the reporting time frame specified in subsection (C) above, whichever is later.

(14) Penalties.

Failure by a manufacturer to carry out all recall actions ordered by the Executive Officer pursuant to Sections 2439(c) of these procedures is a violation of Health and Safety Code Section 43013 and 43105 and shall subject the manufacturer, on a per engine basis, to any and all remedies available under Part 5, Division 26 of the Health and Safety Code, sections 43000 et seq.

(d) Extension of Time. The Executive Officer may extend any deadline in the plan if he or she finds in writing that a manufacturer has shown good cause for such extension.

(e) The Executive Officer may waive any or all of the requirements of these procedures if he or she determines that the requirement constitutes an unwarranted burden on the manufacturer without a corresponding emission reduction.

[All sections referring to in-use compliance have been replaced with existing the ARB program. The ARB in-use compliance program provides greater assurance that engines will maintain their emissions during their useful life.]

§1048.420 What in-use testing information must I report to EPA?
DELETE

[Replaced by 2438-9 language in §1048.410-415]

[The language is not necessary as information regarding the reporting of in-use testing is already contained in §1048.415.]

§1048.425 What records must I keep?
DELETE

[Replaced by 2438-9 language in §1048.410-415;The provisions contained in §1048.415 include submittal of an electronic report to ARB; as such, there is no need to retain records.]

Subpart F—Test Procedures

§1048.501 How do I run a valid emission test?

§1048.505 How do I test engines using steady-state duty cycles, including ramped-modal testing?

§1048.510 Which duty cycles do I use for transient testing?

§1048.515 What are the field-testing procedures?

Subpart G—Compliance Provisions

§1048.601 What compliance provisions apply to these engines?

§1048.605 What provisions apply to engines certified under the motor-vehicle program?

§1048.610 What provisions apply to vehicles certified under the motor-vehicle program?

§1048.615 What are the provisions for exempting engines designed for lawn and garden applications?

* * * * *

(a)

(3) DELETE AND REPLACE WITH:

The engine must be in an engine family that has a valid executive order showing that it meets emission standards for Class II engines under Title 13, California Code of

Regulations, Chapter 9, Article 1, Small Off-Road Engines and Chapter 15, Article 1, Evaporative Emission Requirements for Off-Road Equipment.

* * * * *

(d) DELETE AND REPLACE WITH:
Engines exempted under this section are subject to all the requirements affecting engines under Title 13, California Code of Regulations, Chapter 9, Article 1, Small Off-Road Engines and Chapter 15, Article 1, Evaporative Emission Requirements for Off-Road Equipment. The requirements and restrictions of Title 13, California Code of Regulations, Chapter 9, Article 1, Small Off-Road Engines and Chapter 15, Article 1, Evaporative Emission Requirements for Off-Road Equipment apply to anyone manufacturing these engines, anyone manufacturing equipment that uses these engines, and all other persons in the same manner as if these engines had a total maximum engine power at or below 19 kW.

§1048.620 What are the provisions for exempting large engines fueled by natural gas?

§1048.625 What special provisions apply to engines using noncommercial fuels?

§1048.630 What are the provisions for exempting engines used solely for competition?

§1048.635 What special provisions apply to branded engines?

Subpart H—[Reserved]

Subpart I—Definitions and Other Reference Information

§1048.801 What definitions apply to this part?
The following definitions apply to this part. The definitions apply to all subparts unless we note otherwise. All undefined terms have the meaning the Act gives to them. The definitions follow:

* * * * *

All-terrain vehicle has the meaning given in 40 CFR 1051.801
DELETE AND REPLACE WITH: All-terrain vehicle has the meaning given in Title 13, California Code of Regulations, Chapter 9, Article 3, Off-Highway Recreational Vehicles and Engines.

[EPA's definition is inconsistent with the existing California definition for Off-Highway Recreational Vehicles and Engines]

* * * * *

<u>Blue Sky Series engine</u>
DELETE

[The ARB is proposing to replace the Blue Sky standards with their own optional lower emission standards; see §1048.140].

* * * * *

<u>Designated Compliance Officer</u> means the Manager, Engine Programs Group (6405-J), U.S. Environmental Protection Agency, 1200 Pennsylvania Ave., NW., Washington, DC 20460.
DELETE AND REPLACE WITH:
<u>Designated Compliance Officer</u> means the Executive Officer of the California Air Resources Board or a designee of the Executive Officer.

<u>Designated Enforcement Officer</u> means the Director, Air Enforcement Division (2242A), U.S. Environmental Protection Agency, 1200 Pennsylvania Ave., NW.,Washington, DC 20460.
DELETE AND REPLACE WITH:
<u>Designated Enforcement Officer</u> means any officer or employee of the California Air Resources Board so designated in writing by the Executive Officer or by the Executive Officer's designee.

* * * * *

<u>High-cost warranted part</u> means a component covered by the emission-related warranty with a replacement cost (at the time of certification) exceeding $400 (in 1998 dollars). Adjust this value using the most recent annual average consumer price index information published by the U.S. Bureau of Labor Statistics. For this definition, replacement cost includes the retail cost of the part plus labor and standard diagnosis.
DELETE AND REPLACE WITH:
<u>High-cost warranted part</u> means a component covered by the emission-related warranty with a replacement cost derived by the formula in section §1048.120(b)(3)(B).

[The definition has been replaced to reflect existing ARB warranty provisions. The ARB warranty program is generally more prescriptive and provides greater protection to the buyer.]

* * * * *

<u>Low-hour</u> means relating to an engine with stabilized emissions and represents the undeteriorated emission level. This would generally involve less than 300 hours of operation.
DELETE

[ARB certification is based on zero-hour emission testing]

* * * * *

Small-volume engine manufacturer means a company with fewer than 200 employees. This includes any employees working for parent or subsidiary companies.
DELETE AND REPLACE WITH:
Small-volume manufacturer means an engine manufacturer that produces a total of less than 2000 large spark-ignition engines annually for sale in the United States of America.

* * * * *

§1048.805 What symbols, acronyms, and abbreviations does this part use?

§1048.810 What materials does this part reference?

§1048.815 What provisions apply to confidential information?
(a) Clearly show what you consider confidential by marking, circling, bracketing, stamping, or some other method.
(b) We will store your confidential information as described in 40 CFR part 2. Also, we will disclose it only as specified in 40 CFR part 2. This applies both to any information you send us and to any information we collect from inspections, audits, or other site visits.
(c) If you send us a second copy without the confidential information, we will assume it contains nothing confidential whenever we need to release information from it.
(d) If you send us information without claiming it is confidential, we may make it available to the public without further notice to you, as described in 40 CFR 2.204.

§1048.820 How do I request a hearing from the executive officer of the ARB?
(a) You may request a hearing under certain circumstances, as described elsewhere in this part. To do this, you must file a written request, including a description of your objection and any supporting data, within 30 days after we make a decision.
(b) For a hearing you request under the provisions of this part, we will approve your request if we find that your request raises a substantial factual issue.
(c) If we agree to hold a hearing, we will use the procedures specified in §1048.15(b)(7).

Appendix I to Part 1048—Large Spark-ignition (SI) Transient Cycle for Constant-Speed Engines
Appendix II to Part 1048—Large Spark-ignition (SI) Composite Transient Cycle

APPENDIX A: MANUFACTURER STANDARDS AND TEST PROCEDURES
Part 6

Proposed Regulation Order Part 6: Adoption of incorporated "California Exhaust and Standards and Test Procedures for New 2007 and Later Off-Road Large Spark-Ignition Engines" (40 CFR, Part 1065) and Adoption of incorporated "California Exhaust and Standards and Test Procedures for New 2007 and Later Off-Road Large Spark-Ignition Engines" (40 CFR, Part 1068)

State of California
AIR RESOURCES BOARD

PROPOSED CALIFORNIA EXHAUST AND EVAPORATIVE EMISSION STANDARDS AND TEST PROCEDURES FOR NEW 2007 AND LATER OFF-ROAD LARGE SPARK-IGNITION ENGINES

(PART III: TEST PROCEDURES 1065 AND 1068)

Adopted: [insert date of adoption]

NOTE: This document incorporates by reference 40 Code of Federal Regulations (CFR) Part 1065 – Engine-Testing Procedures, Subparts A, B, C, D, E, F, G, H, I, J, and K, as amended July 13, 2005, 40 CFR Part 1068, Subparts A, B, C, D, E, F, and G, including Appendix A to Subpart E and Appendix I and II to part 1068, as amended July 13, 2005, and the internally referenced subparts of 40 CFR Part 85, 40 CFR Part 86, and 40 CFR Part 1048. Sections that have been included in their entirety are set forth with the section number and title. California provisions that replace specific federal language provisions are denoted by the words "DELETE" for the federal language and "REPLACE WITH" or "ADD" for the California language. The symbols "* * * * *" and "..." mean that the remainder of the CFR text for a specific section is not shown in these procedures but has been incorporated by reference, with only the printed text changed. CFR sections that are not listed are not part of the test procedures. If there is any conflict between the provisions of this document and the California Health and Safety Code, Division 26, or Title 13 of the California Code of Regulations (CCR), the Health and Safety Code and Title 13 apply.

This document is all newly adopted text.

Table of Contents

CALIFORNIA EXHAUST EMISSION STANDARDS AND TEST PROCEDURES FOR NEW 2007 AND LATER OFF-ROAD LARGE SPARK-IGNITION ENGINES

The following provisions of Part 1065, and Part 1068, Title 40, Code of Federal Regulations, as proposed by the United States Environmental Protection Agency on the date listed, are adopted and incorporated herein by this reference for 2007 model year and later off-road large spark-ignition engines as the California Exhaust Emission Standards and Test Procedures for New 2007 and Later Off-Road Large Spark-Ignition Engines, except as altered or replaced by the provisions set forth below.

PART 1065 – ENGINE-TESTING PROCEDURES

SOURCE: 70 FR 40516, July 13, 2005, unless otherwise noted.

Subpart A – Applicability and General Provisions

§ 1065.1 Applicability.

* * * * *

(a)(3) DELETE,
REPLACE WITH:
Off-road large spark-ignition engines regulated under Title 13, CCR, Chapter 9, Article 4.5, and subject to the emission standards in § 2433(b)(1) of that Article.

* * * * *

(g) DELETE.

§ 1065.2 Submitting information to ARB under this part.

* * * * *

§ 1065.5 Overview of this part 1065 and its relationship to the standard-setting part.

* * * * *

§ 1065.10 Other procedures.

* * * * *

§ 1065.12 Approval of alternate procedures.

* * * * *

§ 1065.15 Overview of procedures for laboratory and field testing.

* * * * *

§ 1065.20 Units of measure and overview of calculations.

* * * * *

§ 1065.25 Recordkeeping.

* * * * *

Subpart B – Equipment Specifications

§ 1065.101 Overview.

* * * * *

§ 1065.110 Work inputs and outputs, accessory work, and operator demand.

* * * * *

§ 1065.120 Fuel properties and fuel temperature and pressure.

* * * * *

§ 1065.122 Engine cooling and lubrication.

* * * * *

§ 1065.125 Engine intake air.

* * * * *

§ 1065.127 Exhaust gas recirculation.

* * * * *

§ 1065.130 Engine exhaust.

* * * * *

§ 1065.140 Dilution for gaseous and PM constituents.

* * * * *

§ 1065.145 Gaseous and PM probes, transfer lines, and sampling system components.

* * * * *

§ 1065.150 Continuous sampling.

* * * * *

§ 1065.170 Batch sampling for gaseous and PM constituents.

* * * * *

§ 1065.190 PM-stabilization and weighing environments for gravimetric analysis.

* * * * *

§ 1065.195 PM-stabilization environment for in-situ analyzers.

* * * * *

Subpart C – Measurement Instruments

§ 1065.201 Overview and general provisions.

* * * * *

§ 1065.202 Data updating, recording, and control.

* * * * *

§ 1065.205 Performance specifications for measurement instruments.

* * * * *

Measurement of Engine Parameters and Ambient Conditions

§ 1065.210 Work input and output sensors.

* * * * *

§ 1065.215 Pressure transducers, temperature sensors, and dewpoint sensors.

* * * * *

Flow-Related Measurements

§ 1065.220 Fuel flow meter.

* * * * *

§ 1065.225 Intake-air flow meter.

* * * * *

§ 1065.230 Raw exhaust flow meter.

* * * * *

§ 1065.240 Dilution air and diluted exhaust flow meters.

* * * * *

§ 1065.245 Sample flow meter for batch sampling.

* * * * *

§ 1065.248 Gas divider.

* * * * *

CO and CO_2 Measurements

§ 1065.250 Nondispersive infra-red analyzer.

* * * * *

Hydrocarbon Measurements

§ 1065.260 Flame-ionization detector.

* * * * *

§ 1065.265 Nonmethane cutter.

* * * * *

§ 1065.267 Gas chromatograph.

* * * * *

NO_x Measurements

§ 1065.270 Chemiluminescent detector.

* * * * *

§ 1065.272 Nondispersive ultraviolet analyzer.

* * * * *

O_2 Measurements

§ 1065.280 Paramagnetic and magnetopneumatic O_2 detection analyzers.

* * * * *

Air-to-Fuel Ratio Measurements

§ 1065.284 Zirconia (ZrO_2) analyzer.

* * * * *

PM Measurements

§ 1065.290 PM gravimetric balance.

* * * * *

§ 1065.295 PM inertial balance for field testing analysis.

* * * * *

Subpart D --Calibrations and Verifications

§ 1065.301 Overview and general provisions.

* * * * *

§ 1065.303 Summary of required calibration and verifications.

* * * * *

§ 1065.305 Verifications for accuracy, repeatability, and noise.

* * * * *

§ 1065.307 Linearity verification.

* * * * *

§ 1065.308 Continuous gas analyzer system-response and updating-recording verification.

* * * * *

§ 1065.309 Continuous gas analyzer uniform response verification.

* * * * *

Measurement of Engine Parameters and Ambient Conditions

§ 1065.310 Torque calibration.

* * * * *

§ 1065.315 Pressure, temperature, and dewpoint calibration.

* * * * *

Flow-Related Measurements

§ 1065.320 Fuel-flow calibration.

* * * * *

§ 1065.325 Intake-flow calibration.

* * * * *

§ 1065.330 Exhaust-flow calibration.

* * * * *

§ 1065.340 Diluted exhaust flow (CVS) calibration.

* * * * *

§ 1065.341 CVS and batch sampler verification (propane check).

* * * * *

§ 1065.345 Vacuum-side leak verification.

* * * * *

CO and CO_2 Measurements

§ 1065.350 H_2O interference verification for CO_2 NDIR analyzers.

* * * * *

§ 1065.355 H_2O and CO_2 interference verification for CO NDIR analyzers.

* * * * *

Hydrocarbon Measurements

§ 1065.360 FID optimization and verification.

* * * * *

§ 1065.362 Non-stoichiometric raw exhaust FID O_2 interference verification.

* * * * *

§ 1065.365 Nonmethane cutter penetration fractions.

* * * * *

NO$_x$ Measurements

§ 1065.370 CLD CO_2 and H_2O quench verification.

* * * * *

§ 1065.372 NDUV analyzer HC and H_2O interference verification.

* * * * *

§ 1065.376 Chiller NO_2 penetration.

* * * * *

§ 1065.378 NO_2-to-NO converter conversion verification.

* * * * *

PM Measurements

§ 1065.390 PM balance verifications and weighing process verification.

* * * * *

§ 1065.395 Inertial PM balance verifications.

* * * * *

Subpart E – Engine Selection, Preparation, and Maintenance

§ 1065.401 Test engine selection.

* * * * *

ADD:
(c) Emission-data engines.
(1) Engines will be chosen to be run for emission data based upon engine family groups. Within each engine family group, the requirements of this paragraph must be met.
(2) Engines of each engine family group will be divided into groups based upon their exhaust emission control systems. One engine of each system combination shall be run for gaseous emission data. The complete gaseous emission test must be conducted. Within each combination, the engine that features the highest horsepower,

primarily at or near the rated speed, will usually be selected. The engine manufacturer may elect to test the worst-case emissions engine within each combination with prior approval from the Executive Officer. The engine with the highest horsepower will usually be selected. For engine families that contain multiple fuel systems, the engine manufacturer shall conduct separate individual gaseous emission test based on the worst-case emissions configuration for each different fuel system within the engine family's engine configuration.
(3) The Executive Officer may select a maximum of one additional engine within each engine-system combination based upon features indicating that it may have the highest emission levels of the engines of that combination. In selecting this engine, the Executive Officer will consider such features as the injection system, fuel system, engine control system, rated speed, rated horsepower, peak torque speed, and peak torque.
(4) Within an engine family control system combination, the manufacturer may alter any emission-data engine (or other engine including current or previous model year emission-data engines and development engines provided they meet the emission-data engines' protocol) to represent more than one selection under paragraph (c)(2) and (3) of this section.
(d) In lieu of testing an emission-data engine selected under paragraph (c) of this section, and submitting data therefore, a manufacturer may, with the prior written approval of the Executive Officer, submit exhaust emission data as applicable on a similar engine, for which certification has previously been obtained or for which all applicable data required under certification application has previously been submitted.
(e) Durability-data Engine
(1) The engine manufacturer shall select the engine configuration that best represents the entire engine family or groups of engine families to demonstrate engine and emission durability. The duration of the engine durability demonstration for the purpose of generating deterioration factors for the emission calculation shall be equivalent to the emissions durability period as defined in these Test Procedures.

§ 1065.405 Test engine preparation and maintenance.

* * * * *

§ 1065.410 Maintenance limits for stabilized test engines.

* * * * *

§ 1065.415 Durability demonstration.

* * * * *

ADD:
(c) (1) The engine manufacturer shall use good engineering practice to determine

engine and emission durability.

(2) The engine manufacturer shall provide the Executive Officer with a written plan of the method used to determine engine and emission durability. The Executive Officer shall approve the plan if it demonstrates, according to good engineering judgement, the development of reasonable deterioration factors. The engine manufacturer shall not proceed with testing until the Executive Officer has approved the plan.

(3) In the absence of a manufacturer's specific service accumulation cycle, engine durability demonstration shall be conducted using multiple runs of the applicable duty cycles described in Sections 1048.505 and 1048.510 of Part 1048. The engine manufacturer may request, with the advanced approval of the Executive Officer, to reduce the total amount of service accumulation hours for any durability / service accumulation engine. The engine manufacturer may make such request only after an engine has accumulated at a minimum one half of the engine's defined useful life period. The Executive Officer shall base such approval on engine's durableness, maintenance events, emission test results, and the stability of engine out emissions.

(d) Regardless of which service accumulation cycle is used for generating the deterioration factors for emissions certification, the Executive Officer shall accept the manufacturer's deterioration factors for certification the first year; but, may deny the use of the manufacturer's deterioration factors for subsequent certification based on incorrect or inaccurate representativeness of actual in-use emissions test results.

Subpart F –Performing an Emission Test in the Laboratory

§ 1065.501 Overview.

* * * * *

§ 1065.510 Engine mapping.

* * * * *

§ 1065.512 Duty cycle generation.

* * * * *

§ 1065.514 Cycle-validation criteria.

* * * * *

§ 1065.520 Pre-test verification procedures and pre-test data collection.

* * * * *

§ 1065.525 Engine starting, restarting, and shutdown.

* * * * *

§ 1065.530 Emission test sequence.

* * * * *

§ 1065.545 Validation of proportional flow control for batch sampling.

* * * * *

§ 1065.550 Gas analyzer range validation, drift validation, and drift correction.

* * * * *

§ 1065.590 PM sample preconditioning and tare weighing.

* * * * *

§ 1065.595 PM sample post-conditioning and total weighing.

* * * * *

Subpart G –Calculations and Data Requirements

§ 1065.601 Overview.

* * * * *

§ 1065.602 Statistics.

* * * * *

§ 1065.610 Duty cycle generation.

* * * * *

§ 1065.630 1980 international gravity formula.

* * * * *

§ 1065.640 Flow meter calibration calculations.

* * * * *

§ 1065.642 SSV, CFV, and PDP molar flow rate calculations.

* * * * *

§ 1065.645 Amount of water in an ideal gas.

* * * * *

§ 1065.650 Emission calculations.

* * * * *

§ 1065.655 Chemical balances of fuel, intake air, and exhaust.

* * * * *

§ 1065.659 Removed water correction.

* * * * *

§ 1065.660 THC and NMHC determination.

* * * * *

§ 1065.665 THCE and NMHCE determination.

* * * * *

§ 1065.667 Dilution air background emission correction.

* * * * *

§ 1065.670 NO_x intake-air humidity and temperature corrections.

* * * * *

§ 1065.672 Drift correction.

* * * * *

§ 1065.675 CLD quench verification calculations.

* * * * *

§ 1065.690 Buoyancy correction for PM sample media.

* * * * *

§ 1065.695 Data requirements.

* * * * *

Subpart H –Engine Fluids, Test Fuels, Analytical Gases and Other Calibration Standards

§ 1065.701 General requirements for test fuels.

(a) DELETE,
REPLACE WITH:
(a) (1) If the engine is a gasoline-fueled large spark-ignition engine, then the test fuel used shall be consistent with the fuel specifications as outlined in the "California Exhaust Emission Standards and Test Procedures for 2001 and Subsequent Model Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles," as adopted August 5, 1999, and last amended August 4, 2005, and incorporated by reference herein. The California fuel specifications are contained in the California Code of Regulations, Title 13, Chapter 5, Article 1, Sections 2260-2272. If the engine is tested using the U.S. EPA test fuel, consistent with the fuel specifications as outlined in Title 40 Code of Federal Register, Part 1065, subpart H, the manufacturer shall demonstrate that the emission test results complies with these Test Procedures.
(2) If the engine is not a gasoline-fueled large spark-ignition engine, then the test fuel used shall be consistent with the fuel specifications as outlined in the "California Exhaust Emission Standards and Test Procedures for 2001 and Subsequent Model Passenger Cars, Light-Duty Trucks, and Medium- Duty Vehicles," as adopted August 5, 1999, and last amended August 4, 2005, and incorporated by reference herein. The California fuel specifications are contained in the California Code of Regulations, Title 13, Chapter 5, Article 3, Sections 2290-2293.5. If the engine is tested using the U.S. EPA test fuel, consistent with the fuel specifications as outlined in Title 40 Code of Federal Register, Part 1065, subpart H, the manufacturer shall demonstrate that the emission test results complies with these Test Procedures.

(b) DELETE,
REPLACE WITH:
With Executive Officer approval, the certifying entity may use other test fuels so long as

they do not affect the demonstration of compliance.

* * * * *

§ 1065.703 Distillate diesel fuel.

* * * * *

§ 1065.705 Residual fuel [Reserved].

* * * * *

§ 1065.710 Gasoline.

* * * * *

§ 1065.715 Natural gas.

* * * * *

§ 1065.720 Liquefied petroleum gas.

* * * * *

§ 1065.740 Lubricants.

* * * * *

ADD:
(c) During all engine tests, the engine shall employ a lubricating oil consistent with the engine manufacturer's specifications for that particular engine. These specifications shall be recorded and declared in the certification application.

§ 1065.745 Coolants.

* * * * *

§ 1065.750 Analytical gases.

* * * * *

§ 1065.790 Mass standards.

* * * * *

Subpart I – Testing with Oxygenated Fuels

§ 1065.801 Applicability.

* * * * *

§ 1065.805 Sampling system.

* * * * *

§ 1065.845 Response factor determination.

* * * * *

§ 1065.850 Calculations.

* * * * *

Subpart J – Field Testing and Portable Emission Measurement Systems

* * * * *

Subpart K – Definitions and Other Reference Information

§ 1065.1001 Definitions.

ADD:
The definitions in 40 CFR 1048.801 and 1068.30, as modified, apply with the following revisions.

ADD:
40 CFR part 1048 means Part 1048 and applicable subparts contained in these 2007 and Later Test procedures when referenced in unrevised sections.

ADD:
40 CFR part 1065 means Part 1065 and applicable subparts contained in these 2007 and Later Test procedures when referenced in unrevised sections.

40 CFR part 1068 means Part 1068 and applicable subparts contained in these 2007 and Later Test procedures when referenced in unrevised sections.

* * * * *

Act DELETE.

* * * * *

ADD:
Certificate of Conformity means an Executive Order issued in accordance with the California Health and Safety Code, Division 26, Part 5.

Certification DELETE,
REPLACE WITH:
Certification means, with respect to new off-road large spark-ignition engines, obtaining an executive order for an engine family complying with the off-road spark-ignition engine emission standards and requirements specified in the California Code of Regulations, Title 13, Chapter 9, Sections 2430-2439.

* * * * *

ADD:
Clean Air Act or the *Act* means California Health and Safety Code, Division 26, and corresponding regulations, except where the context indicates otherwise.

* * * * *

Designated Compliance Officer DELETE,
REPLACE WITH:
Designated Compliance Officer means the Executive Officer of the Air Resources Board, or a designee of the Executive Officer.

* * * * *

ADD:
EPA means Air Resources Board.

ADD:
Executive Order means an order issued by the Executive Officer of the Air Resources Board certifying engines for sale in California.

* * * * *

Nonroad engine DELETE,
REPLACE WITH:

Nonroad engine means an off-road engine as defined in this section.

* * * * *

ADD:
Off-road engine means:
(1) Except as discussed in paragraph (2) of this definition, any internal combustion engine:
(i) In or on a piece of equipment that is self-propelled or serves a dual purpose by both propelling itself and performing another function (such as garden tractors, off-highway mobile cranes, and bulldozers); or
(ii) In or on a piece of equipment that is intended to be propelled while performing its function (such as lawnmowers and string trimmers); or
(iii) That, by itself or in or on a piece of equipment, is portable or transportable, meaning designed to be and capable of being carried or moved from one location to another. Indicia of transportability include, but are not limited to, wheels, skids, carrying handles, dolly, trailer, or platform.
(2) An internal combustion engine is not an off-road engine if:
(i) The engine is used to propel a vehicle subject to the emissions standards contained in Title 13, California Code of Regulations, Sections 1950-1978, or a vehicle used solely for competition, or is subject to standards promulgated under section 202 of the federal Clean Air Act (42 U.S.C; or
(ii) The engine is regulated by a federal New Source Performance Standard promulgated under section 111 of the 1990 Clean Air Act (42 U.S.C. 7511); or
(iii) The engine otherwise included in paragraph (1)(iii) of this definition remains or will remain at a location for more than 12 consecutive months or a shorter period of time for an engine located at a seasonal source. A location is any site at a building, structure, facility, or installation. Any engine (or engines) that replaces an engine at a location and that is intended to perform the same or similar function as the engine replaced will be included in calculating the consecutive time period. An engine located at a seasonal source is an engine that remains at a seasonal source during the full annual operating period of the seasonal source. A seasonal source is a stationary source that remains in a single location on a permanent basis (i.e., at least two years) and that operates at that single location approximately three months (or more) each year. This paragraph does not apply to an engine after the engine is removed from the location.

* * * * *

We (us, our) DELETE,
REPLACE WITH:
We (us, our) means the Executive Officer of the Air Resources Board or a designee of the Executive Officer.

* * * * *

§ 1065.1005 Symbols, abbreviations, acronyms, and units of measure.

* * * * *

§ 1065.1010 Reference materials.

* * * * *

PART 1068 – GENERAL COMPLIANCE PROVISIONS FOR NONROAD PROGRAMS

SOURCE: 67 FR 68427, November 8, 2002, amended July 13, 2005, unless otherwise noted.

Subpart A – Applicability and Miscellaneous Provisions

§ 1068.1 Does this part apply to me?

* * * * *

(a)(1) DELETE,
REPLACE WITH:
Off-road large spark-ignition engines regulated under Title 13, California Code of Regulations, Chapter 9, Article 4.5, and subject to the emission standards in § 2433(b)(1) of that Article.

* * * * *

§ 1068.5 How must manufacturers apply good engineering judgment?

* * * * *

§ 1068.10 What provisions apply to confidential information?

DELETE,
REPLACE WITH:
Any manufacturer may assert that some or all of the information submitted pursuant to Title 13, California Code of Regulations, Chapter 9, Article 4.5 (Off-Road Large Spark-Ignition Engines) is entitled to confidential treatment as provided by Title 17, CCR, §§ 91000-91022.

§ 1068.15 Who is authorized to represent the Air Resources Board?

* * * * *

§ 1068.20 May ARB enter my facilities for inspections?

DELETE,
REPLACE WITH:
(a) Any engine manufacturer affected by these regulations, upon receipt of prior notice must admit or cause to be admitted during operating hours any ARB Enforcement Officer that has presented proper credentials to any of the following:

(1) Any facility where tests or procedures or activities connected with such tests or procedures are or were performed.

(2) Any facility where any new off-road large spark-ignition engine is present and is being, has been, or will be tested.

(3) Any facility where a manufacturer constructs, assembles, modifies, or builds-up an engine into a certification engine that will be tested for certification.

(4) Any facility where any record or other document relating to any of the above is located.

(b) Upon admission to any facility referred to in paragraph (c)(1) of this Section, any ARB Enforcement Officer must be allowed:

(1) To inspect and monitor any part or aspect of such procedures, activities, and testing facilities, including, but not limited to, monitoring engine preconditioning, emissions tests and break-in, maintenance, and engine storage procedures.

(2) To verify correlation or calibration of test equipment; and,

(3) To inspect and make copies of any such records, designs, or other documents; and,

(4) To inspect and/or photograph any part or aspect of any such certification engine and any components to be used in the construction thereof.

(c) To permit an ARB determination whether production off-road large spark-ignition engines conform in all material respects to the design specifications that apply to those engines described in the Executive Order certifying such engines and to standards prescribed herein. Engine manufacturers must, upon receipt of prior notice, admit any ARB Enforcement Officer, upon presentation of credentials, to:

(1) Any facility where any document design, or procedure relating to the translation of the design and construction of engines and emission related components described in the application for certification or used for certification testing into production engines is located or carried on; and,

(2) Any facility where any off-road large spark-ignition engines to be introduced into commerce are manufactured or assembled.

(3) Any California retail outlet where any off-road large spark-ignition engine is sold.

(d) On admission to any such facility referred to in this Section, any ARB Enforcement Officer must be allowed:

(1) To inspect and monitor any aspects of such manufacture or assembly and other procedures;

(2) To inspect and make copies of any such records, documents or designs; and,

(3) To inspect and photograph any part or aspect of any such new off-road large spark-ignition engines and any component used in the assembly thereof that are reasonably related to the purpose of the Enforcement Officer's entry.

(e) Any ARB Enforcement Officer must be furnished by those in charge of a facility being inspected with such reasonable assistance as may be necessary to discharge any function listed in this paragraph. Each applicant for or recipient of certification is required to cause those in charge of a facility operated for its benefit to furnish such reasonable assistance without charge to the ARB irrespective of whether or not the applicant controls the facility.

(f) The duty to admit or cause to be admitted any ARB Enforcement Officer applies whether or not the applicant owns or controls the facility in question and applies both to domestic and foreign engine manufacturers and facilities. The ARB will not attempt to make any inspections that it has been informed that local law forbids. However, if local law makes it impossible to insure the accuracy of data generated at a facility, no informed judgment that an engine is certifiable or is covered by an Executive Order can properly be based on the data. It is the responsibility of the engine manufacturer to locate its testing and manufacturing facilities in jurisdictions where this situation will not arise.

(g) For purposes of this Section:

(1) "Presentation of credentials" means a display of a document designating a person to be an ARB Enforcement Officer.

(2) Where engine, component, or engine storage areas or facilities are concerned, "operating hours" means all times during which personnel are at work in the vicinity of the area or facility and have access to it.

(3) Where facilities or areas other than those covered by paragraph (g)(2) of this Section are concerned, "operating hours" means all times during which an assembly line is in operation or during which testing, maintenance, break-in procedure, production or compilation of records, or any other procedure or activity is being conducted related to certification testing, translation of designs from the test stage to the production stage, or engine manufacture or assembly.

(4) "Reasonable assistance" includes, but is not limited to, providing clerical, copying, interpretation and translation services; making personnel available upon request to inform the ARB Enforcement Officer of how the facility operates and to answer questions; and performing requested emissions tests on any engine that is being, has been, or will be used for certification testing. Such tests must be nondestructive, but may require appropriate break-in. The engine manufacturer must be compelled to cause the personal appearance of any employee at such a facility before an ARB Enforcement Officer, upon written request from the Executive Officer for the appearance of any employee of a facility, and service of such request upon the engine manufacturer. Any such employee who has been instructed by the engine manufacturer to appear will be entitled to be accompanied, represented, and advised by counsel.

§ 1068.25 What information must I give to ARB?

* * * * *

(b) DELETE,
REPLACE WITH:
Manufacturers subject to the requirements of this part must establish and maintain records, perform tests, make reports and provide additional information that the Executive Officer may reasonably require under the California Health and Safety Code, Division 26, and corresponding regulations. This also applies to engines that are exempt from emission standards.

ADD:
(c) (1) Upon request of the Executive Officer, the manufacturer of any off-road large spark-ignition engine covered by an Executive Order shall, within 30 days, identify by engine identification number or alternative tracking method, the engine(s) covered by the Executive Order.

(2) The manufacturer of any off-road large spark-ignition engine covered by an Executive Order shall provide to the Executive Officer, within 60 days of the issuance of an Executive Order, an explanation of the elements in any engine identification coding system in sufficient detail to enable the Executive Officer to identify those engines that are covered by an Executive Order.

(d) Any off-road LSI engine manufacturer obtaining certification under this part shall notify the E.O., on a yearly basis, of the number of engines of such engine family-engine displacement-exhaust emission control system-fuel system combination produced for sale in California during the preceding year.

§ 1068.27 May ARB conduct testing with my production engines?

* * * * *

§ 1068.30 What definitions apply to this part?

ADD:
The definitions in 40 CFR 1048.801 and 1065.1001, as modified, apply with the following revisions:

ADD:
40 CFR part 1048 means Part 1048 and applicable subparts contained in these 2007 and Later Test procedures when referenced in unrevised sections.

ADD:
40 CFR part 1065 means Part 1065 and applicable subparts contained in these 2007 and Later Test procedures when referenced in unrevised sections.

ADD:
40 CFR part 1068 means Part 1068 and applicable subparts contained in these 2007 and Later Test procedures when referenced in unrevised sections.

* * * * *

Act DELETE.

ADD:
Administrator means the Executive Officer of the Air Resources Board, or a designee of the Executive Officer.

* * * * *

Certificate holder DELETE,
REPLACE WITH:
Certificate holder means a manufacturer (including importers) with a valid Executive Order for at least one engine family in a given model year.

ADD:
Clean Air Act or the *Act* means California Health and Safety Code, Division 26, and corresponding regulations, except where the context indicates otherwise.

Designated Officer DELETE,
REPLACE WITH:
Designated Compliance Officer means the Executive Officer of the Air Resources Board, or a designee of the Executive Officer.

* * * * *

Nonroad engine DELETE,
REPLACE WITH:
Nonroad engine means an off-road engine as defined in this section.

ADD:
Off-road engine means:
(1) Except as discussed in paragraph (2) of this definition, any internal combustion engine:
(i) In or on a piece of equipment that is self-propelled or serves a dual purpose by both propelling itself and performing another function (such as garden tractors, off-highway mobile cranes, and bulldozers); or
(ii) In or on a piece of equipment that is intended to be propelled while performing its function (such as lawnmowers and string trimmers); or
(iii) That, by itself or in or on a piece of equipment, is portable or transportable,

meaning designed to be and capable of being carried or moved from one location to another. Indicia of transportability include, but are not limited to, wheels, skids, carrying handles, dolly, trailer, or platform.

(2) An internal combustion engine is not an off-road engine if:

(i) The engine is used to propel a vehicle subject to the emissions standards contained in Title 13, California Code of Regulations, Sections 1950-1978, or a vehicle used solely for competition, or is subject to standards promulgated under section 202 of the federal Clean Air Act (42 U.S.C; or

(ii) The engine is regulated by a federal New Source Performance Standard promulgated under section 111 of the 1990 Clean Air Act (42 U.S.C. 7511); or

(iii) The engine otherwise included in paragraph (1)(iii) of this definition remains or will remain at a location for more than 12 consecutive months or a shorter period of time for an engine located at a seasonal source. A location is any site at a building, structure, facility, or installation. Any engine (or engines) that replaces an engine at a location and that is intended to perform the same or similar function as the engine replaced will be included in calculating the consecutive time period. An engine located at a seasonal source is an engine that remains at a seasonal source during the full annual operating period of the seasonal source. A seasonal source is a stationary source that remains in a single location on a permanent basis (i.e., at least two years) and that operates at that single location approximately three months (or more) each year. This paragraph does not apply to an engine after the engine is removed from the location.

* * * * *

Standard-setting part DELETE,
REPLACE WITH:
Standard-setting part means the articles of the California Code of Regulations that define emission standards for a particular engine.

* * * * *

We (us, our) DELETE,
REPLACE WITH:
We (us, our) means the Executive Officer of the Air Resources Board or a designee of the Executive Officer.

* * * * *

§ 1068.35 What symbols, acronyms, and abbreviations does this part use?

* * * * *

Subpart B – Prohibited Actions and Related Requirements

§ 1068.101 What general actions does this regulation prohibit?

* * * * *

(a) DELETE,
REPLACE WITH:
The following prohibitions and requirements apply to manufacturers of new engines and manufacturers of equipment containing these engines, except as described in subparts C and D of this part:
(1) *Introduction into commerce.* New engines and equipment may not be sold, offered for sale, or introduced or delivered into commerce in California or imported into California unless it has a valid Executive Order for its model year and the required label or tag. The actions listed in the previous sentence may not be taken with respect to any equipment containing an engine subject to this part's provisions, unless the engine has a valid and appropriate Executive Order and the required engine label or tag. For purposes of this paragraph (a)(1), an appropriate Executive Order is one that applies for the same model year as the model year of the equipment (except as allowed by § 1068.105(a)), covers the appropriate category of engines, and conforms to all requirements specified for the equipment in the standard-setting part. The requirements of this paragraph (a)(1) also cover new engines that are produced solely to replace an older engine in a piece of equipment, unless the engine qualifies for the replacement-engine exemption in § 1068.240. Civil penalties my be assessed for each engine in violation under the requirements of the California Health and Safety Code, Division 26, and corresponding regulations.
(2) *Reporting and recordkeeping.* Manufacturers are required to record certain types of information to show that their engines are meeting California's standards. Manufacturers must comply with these requirements to make and maintain required records (including those described in § 1068.501), and may not deny ARB access to these records or the ability to copy these records for which ARB has the authority to examine upon request. The required reports and information must be provided to the ARB upon request without delay. Failure to comply with the requirements of this paragraph is prohibited. A violation of the requirements of this subpart is a violation of the applicable provisions of the California Health and Safety Code, Division 26, and corresponding regulations, and is subject to the penalty provisions thereunder.
(3) *Testing and access to facilities.* Manufacturers may not prevent ARB or its delegated agents from entering the manufacturer's facility to inspect and/or perform authorized testing. Manufacturers must perform the tests we require (or have the tests performed by an outside source). Failure to perform this testing is prohibited. Civil penalties my be assessed for each engine in violation under the requirements of the California Health and Safety Code, Division 26, and corresponding regulations.

(b) DELETE,

REPLACE WITH:
The following prohibitions apply to all entities with respect to the engines to which this part applies:
(1) *Tampering.* No one may remove or disable a device or element of design that may affect an engine's emission levels. This restriction applies before and after the engine is placed in service. Section 1068.120 describes how this applies to rebuilding engines. A person or a manufacturer or dealer who violates this part is subject to a civil penalty as specified in the California Health and Safety Code, Division 26, and corresponding regulations This prohibition does not apply in any of the following situations:

(i) You need to repair an engine and you restore it to proper functioning when the repair is complete.

(ii) You need to modify an engine to respond to a temporary emergency and you restore it to proper functioning as soon as possible.

(iii) You modify a new engine that another manufacturer has already certified to meet emission standards and recertify it under your own engine family. In this case you must tell the original manufacturer not to include the modified engines in the original engine family.

(2) *Defeat devices.* A manufacturer may not knowingly manufacture, sell, offer to sell, or install, an engine part if it bypasses, impairs, defeats, or disables the engine's control the emissions of any pollutant. A violation of the requirements of this subpart is a violation of the applicable provisions of the California Health and Safety Code, Division 26, and corresponding regulations, and is subject to the penalty provisions thereunder.
(3) *Stationary engines.* An engine that is excluded from any requirements of this chapter because it is a stationary engine may not be moved or installed in any mobile equipment except as allowed by the provisions of this chapter. The residence time requirements of paragraph (2)(iii) of the nonroad engine definition in § 1068.30 may not be intentionally circumvented. A violation of the requirements of this subpart is a violation of the applicable provisions of the California Health and Safety Code, Division 26, and corresponding regulations, and is subject to the penalty provisions thereunder for each day you are in violation.
(4) *Competition engines.* An uncertified engine or piece of equipment that is excluded or exempted from any requirements of this chapter because it is to be used solely for competition may not be used in a manner that is inconsistent with use solely for competition. A violation of the requirements of this subpart is a violation of the applicable provisions of the California Health and Safety Code, Division 26, and corresponding regulations, and is subject to the penalty provisions thereunder.
(5) *Importation.* An uncertified engine or piece of equipment may not be imported if it is defined to be new in the standard-setting part and it is built after emission standards start to apply in California. A violation of the requirements of this subpart is a violation of the applicable provisions of the California Health and Safety Code, Division 26, and corresponding regulations, and is subject to the penalty provisions thereunder. Note the following:

(i) The definition of new is broad for imported engines; uncertified engines and equipment (including used engines and equipment) are generally considered to be new when imported.
(ii) Engines that were originally manufactured before applicable ARB standards became effective are generally not subject to emission standards.
(6) *Warranty.* Manufacturers must honor the emission-related warranty requirements under § 1068.115 and fulfill any applicable responsibilities to recall engines under § 1068.505. Failure to meet these obligations is prohibited. A violation of the requirements of this subpart is a violation of the applicable provisions of the California Health and Safety Code, Division 26, and corresponding regulations, and is subject to the penalty provisions thereunder.

* * * * *

(e) DELETE,
REPLACE WITH:
Maximum penalty limits may be adjusted based on the applicable provisions of the California Health and Safety Code, Division 26, and corresponding regulations.

ADD:
(f) Under § 43017 of the California Health and Safety Code, the Air Resources Board may enjoin any violation of any provision of Subpart B of this part 1068.

§ 1068.105 What other provisions apply to me specifically if I manufacture equipment needing certified engines?

* * * * *

(d) DELETE,
REPLACE WITH:
Producing off-road equipment certified to highway emission standards. A manufacturer may produce off-road equipment from complete or incomplete motor vehicles with the motor vehicle engine under the following conditions:
(1) The engine or vehicle is certified to California on-road requirements.
(2) The engine is not adjusted outside the manufacturer's specifications.
(3) The engine or vehicle is not modified in any way that may affect its emission control. This applies to evaporative emission controls, but not refueling emission controls.
(4) Additional restrictions may be imposed by the Executive Officer as determined necessary to ensure emission performance equity.

§ 1068.110 What other provisions apply to engines in service?

* * * * *

(b) DELETE,
REPLACE WITH:
Certifying aftermarket parts. The manufacturer or rebuilder of an aftermarket engine part shall be required to certify according to the requirements of Title 13, CCR, Chapter 4, Article 2. The aftermarket part rebuilder or manufacturer must keep all records showing how the part affects emissions, and shall provide this information to the Executive Officer within 30 calendar days upon request.

* * * * *

§ 1068.115 When must manufacturers honor emission-related warranty claims?

Introductory text DELETE,
REPLACE WITH:
Title 13, CCR, Chapter 9, Article 4.5, § 2435, requires certifying manufacturers of off-road spark-ignition engines to warrant to purchasers that their engines are designed, built, and equipped to conform at the time of sale to the applicable regulations for their full useful life, including a warranty that the engines are free from defects in materials and workmanship that would cause an engine to fail to conform to the applicable regulations during the specified warranty period. This section codifies the warranty requirements without intending to limit them.

* * * * *

§ 1068.120 What requirements must I follow to rebuild engines?

* * * * *

§ 1068.125 What happens if I violate the regulations?

DELETE,
REPLACE WITH:
A violation of the requirements of this subpart is a violation of the applicable provisions of the California Health and Safety Code, Division 26, and corresponding regulations, and is subject to the penalty provisions thereunder.

Subpart C – Exemptions and Exclusions

§ 1068.201 Does ARB exempt or exclude any engines from the prohibited acts?

* * * * *

§ 1068.210 What are the provisions for exempting test engines?

* * * * *

§ 1068.215 What are the provisions for exempting manufacturer-owned engines?

* * * * *

(b) DELETE,
REPLACE WITH:
By provision of the California Health and Safety Code, Division 24, Part 5, Chapter 1, § 43014, a manufacturer may request the Executive Officer to issue an experimental permit for a nonconforming engine under the ownership and control of the manufacturer for the purposes of developing products, assessing production methods, or promoting engines in the marketplace. The engine shall not be loaned, leased, or sold to generate revenue, either by itself or in a piece of equipment.

* * * * *

(c)(3)(iv) DELETE,
REPLACE WITH:
The statement "THIS ENGINE IS COVERED BY AN EXPERIMENTAL PERMIT AND IS EXEMPT FROM MEETING CALIFORNIA EMISSION REQUIREMENTS." The referencing of similar federal requirements in combination with California references under this provision is permitted.

§ 1068.220 What are the provisions for exempting display engines?

* * * * *

§ 1068.225 What are the provisions for exempting engines for national security?

* * * * *

§ 1068.230 What are the provisions for exempting engines for export?

* * * * *

§ 1068.235 What are the provisions for exempting engines used solely for competition?

* * * * *

§ 1068.240 What are the provisions for exempting new replacement engines?

DELETE,
REPLACE WITH:
Off-road large spark-ignition engines subject to provisions of Subpart C are subject to replacement engines regulations specified in Title 13, California Code of Regulations, Chapter 9, Articles 4.5, Section 2433(e).

§ 1068.245 What temporary provisions address hardship due to unusual circumstances?

* * * * *

§ 1068.250 What are the provisions for extending compliance deadlines for small-volume manufacturers under hardship?

* * * * *

§ 1068.255 What are the provisions for exempting engines for hardship for equipment manufacturers and secondary engine manufacturers?

* * * * *

(b)(4)(i) DELETE,
REPLACE WITH:
If the engine does not meet any emission standards: "THIS ENGINE IS EXEMPT UNDER 13 CCR 2433(e) FROM EMISSION STANDARDS AND RELATED REQUIREMENTS." The referencing of similar federal requirements in combination with California references under this provision is permitted.

* * * * *

§ 1068.260 What are the provisions for temporarily exempting engines for delegated final assembly?

* * * * *

§ 1068.265 What provisions apply to engines that are conditionally exempted from certification?

* * * * *

Subpart D – Imports

§ 1068.301 Does this subpart apply to me?

* * * * *

§ 1068.305 How do I get an exemption or exclusion for imported engines?

* * * * *

ADD:
(f) For any engine whose destination is California, send the completed form to the Executive Officer of the Air Resources Board.

§ 1068.310 What are the exclusions for imported engines?

* * * * *

§ 1068.315 What are the permanent exemptions for imported engines?

* * * * *

§ 1068.320 How must I label an imported engine with a permanent exemption?

* * * * *

(b)(4) DELETE,
REPLACE WITH:
State: "THIS IMPORT ENGINE IS GRANTED A PERMANENT EXEMPTION FROM MEETING CURRENT YEAR CALIFORNIA OFF-ROAD LARGE SPARK-IGNITION ENGINES EMISSION REQUIREMENTS BY ALLOWANCE FOR [identify the permanent exemption category authorizing the exemption (for example, "NATIONAL SECURITY")]. INSTALLING THIS ENGINE IN ANY DIFFERENT APPLICATION IS A VIOLATION OF CALIFORNIA LAW SUBJECT TO CIVIL PENALTY." The referencing of similar federal requirements in combination with California references under this provision is permitted.

§ 1068.325 What are the temporary exemptions for imported engines?

* * * * *

§ 1068.330 How do I import engines requiring further assembly?

* * * * *

§ 1068.335 What are the penalties for violations?

* * * * *

ADD:
(c) Under § 43017 of the California Health and Safety Code, the Air Resources Board may enjoin any violation of any provision of Subpart D of this part 1068.

Subpart E – Selective Enforcement Auditing

DELETE,

Appendix A to Subpart E of Part 1068-Plans for Selective Enforcement Auditing

DELETE,

Subpart F – Reporting Defects and Recalling Engines

DELETE,
REPLACE WITH:
Off-road large spark-ignition engines subject to provisions of Subpart F are subject to recall regulations specified in Title 13, California Code of Regulations, Chapter 9, Articles 4.5, Section 2439, Procedures for In-Use Engine Recalls for Large Off-Road Spark-Ignition Engines with an Engine Displacement Greater Than 1.0 Liter.

Subpart G – Hearings

§ 1068.601 What are the procedures for hearings?

DELETE,
REPLACE WITH:
A manufacturer may request a hearing on an Executive Officer's decision regarding certification, as specified in Title 17, California Code of Regulations, Division 3, Chapter 1, Subchapter 1.25, Articles 1 and 2.

Appendix I to Part 1068 – Emission-Related Components

* * * * *

Appendix II to Part 1068 – Emission-Related Parameters and Specifications

* * * * *

APPENDIX B: FLEET AVERAGE EMISSION LEVEL REQUIREMENTS
Part 1

Proposed Regulation Order Part 7: Adopt California Code of Regulations, Title 13, Sections 2775, 2775.1, and 2775.2 for Large Spark-Ignition (LSI) Engine Fleet Requirements.

PROPOSED REGULATION ORDER, PART 7

NOTE: The entire text is new language proposed for addition to the California Code of Regulations.

Adopt Article 2, Large Sparks Ignition (LSI) Engine Fleet Requirements, within Chapter 15, Division 3, Title 13, California Code of Regulations, and new sections 2775, 2775.1, and 2775.2 to read as follows:

Article 2. Large Spark-Ignition (LSI) Engine Fleet Requirements

Section 2775. Applicability.

(a) General Applicability. This article applies to operators of off-road large spark-ignition (LSI) engine forklifts, sweepers/scrubbers, industrial tow tractors or airport ground support equipment operated within the State of California in the conduct of business with:

(1) 25 horsepower or more (greater than 19 kilowatts for 2005 and later model year engines), and

(2) greater than 1.0 liter displacement.

(b) Exemptions.

(1) Small Fleets as defined in subsection (d).

(2) Rental or lease equipment operated in California no more than 30 aggregated calendar days per year shall be exempt from the requirements of this article.

(3) Off-road military tactical vehicles or equipment exempt from regulation under the federal national security exemption, 40 CFR, subpart J, section 90.908, are exempt from the requirements of this article. Vehicles and equipment covered by the definition of military tactical vehicle that are commercially available and for which a federal certificate of conformity has been issued under 40 CFR Part 90, subpart B, shall also be exempt from the requirements of this article.

(c) Each part of this article is severable, and in the event that any part of this chapter or article is held to be invalid, the remainder of the article shall remain in full force and effect.

(d) Definitions. The definitions in Section 1900 (b), Chapter 1, and Section 2431 (a), Chapter 9 of Title 13 of the California Code of Regulations apply to this article. In addition, the following definitions apply to this article:

"Aggregated Operations" means all of an operator's California facilities for which equipment purchasing decisions are centrally made. Facilities that budget and make equipment purchasing decisions independent of a government or corporate headquarters are assumed to be independent and therefore are not required to be aggregated for the purpose of determining fleet size.

"Agricultural Crop Preparation Services" means packinghouses, cotton gins, nut hullers and processors, dehydrators, feed and grain mills, and other related activities.

"Airport Ground Support Equipment," "Ground Service Equipment," or "GSE" means any large spark-ignition engine or electric-powered equipment contained in the 24 categories of equipment included in section B.3. of Appendix 2 of the South Coast Ground Support Equipment Memorandum of Understanding, dated November 27, 2002.

"Baseline Inventory" means an inventory of equipment as defined in this subdivision that reflects all equipment owned at the time of the inventory.

"Certification Standard" means the level to which an LSI engine is certified, in grams per kilowatt-hour of hydrocarbon and oxides of nitrogen, combined, as identified in an Executive Order (EO) issued by the Executive Officer of the California Air Resources Board.

"Emission Control System" means any device or system employed with a new or in-use off-road LSI-engine vehicle or piece of equipment that is intended to reduce emissions. Examples of LSI emission control systems include, but are not limited to, closed-loop fuel control systems, fuel injection systems, three-way catalysts, and combinations of the above.

"Equipment" or "Pieces of Equipment" means one or more forklifts, industrial tow tractors, sweeper/scrubbers, or pieces of airport ground support equipment as defined in this section.

"Executive Officer" means the Executive Officer of the California Air Resources Board, or his or her delegate.

"Executive Order" means a document signed by the Executive Officer that specifies the standard to which a new LSI engine is certified or the level to which an LSI retrofit emission control system is verified.

"Facility" means any structure, appurtenance, installation, and improvement on land that operates and/or garages one or more pieces of equipment.

"Facility Sample" means the selection of one or more individual facilities from an operator's California facilities for comparison to the operator's aggregate fleet inventory for fleet average calculation.

"Fleet Average Emission Level" means the arithmetic mean of the combined hydrocarbon plus oxides of nitrogen emissions certification standard for each piece of applicable equipment comprising an operator's fleet. For the purposes of calculating the fleet average, electric-powered equipment shall be considered to have combined hydrocarbon plus oxides of nitrogen emissions level of zero (0). Electric-powered equipment of less than 19 kilowatts shall be allowed to be included in the fleet average calculation provided that the operator can demonstrate that the equipment performs the work equivalent of an LSI engine-powered piece of equipment.

"Forklift" means an electric Class 1 or 2 rider truck or a large spark-ignition engine-powered Class 4 or 5 rider truck as defined by the Industrial Truck Association. Electric Class 3 trucks are not forklifts for the purposes of this regulation.

"Industrial Tow Tractor" means an electric or large spark-ignition engine-powered Class 6 truck as defined by the Industrial Truck Association. Industrial tow tractors are designed primarily to push or pull non-powered trucks, trailers, or other mobile loads on roadways or improved surfaces. Industrial tow tractors are commonly referred to as tow motors or tugs. Industrial tow tractors are distinct from airport ground support equipment tugs for the purposes of this regulation.

"Label" means a permanent material that is welded, riveted or otherwise permanently attached to the engine block or other major component in such a way that it will be readily visible after installation of the engine in the equipment. If the equipment obscures the label on the engine, the equipment manufacturer must attach a supplemental label such that it is readily visible. The label will state the standard to which the engine or equipment was certified.

"Large Fleet" means an operator's aggregated operations in California of 26 or more pieces of equipment.

"LSI Retrofit Emission Control System" means an emission control system employed exclusively with an in-use off-road LSI-engine vehicle or piece of equipment.

"Manufacturer" means the manufacturer granted new engine certification or retrofit emission control system verification.

"Medium Fleet" means an operator's aggregated operations in California of 4 to 25 pieces of equipment.

"Memorandum of Understanding Signatories" or "MOU Signatories" means any of the airlines that entered into the South Coast Ground Support Equipment Memorandum of Understanding, dated November 27, 2002.

"Military tactical vehicles or equipment means vehicles or equipment 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.

["Model Year" means the manufacturer's annual production period, which includes January 1 of a calendar year or, if the manufacturer has no annual production period, the calendar year.][1]

["New Engine" means an engine's ownership has not been transferred to the ultimate consumer.]

"Non-forklift fleet" means an operator's aggregated operations in California of four (4) or more sweeper/scrubbers, industrial tow tractors, or pieces of airport ground support equipment, alone or in combination.

["Off-Road Large Spark-ignition Engines" or "LSI Engines" means any engine that produces a gross horsepower of 25 horsepower or greater (greater than 19 kilowatts for 2005 and later model years) or is designed (e.g., through fueling, engine calibrations, valve timing, engine speed modifications, etc.) to produce 25 horsepower or greater (greater than 19 kilowatts for 2005 and later model years). If an engine family has models at or above 25 horsepower (greater than 19 kilowatts) and models below 25 horsepower (at or below 19 kilowatts), only the models at or above 25 horsepower (above 19 kilowatts) would be considered LSI engines. The engine's operating characteristics are significantly similar to the theoretical Otto combustion cycle with the engine's primary means of controlling power output being to limit the amount of air that is throttled into the combustion chamber of the engine. LSI engines or alternate fuel-powered LSI internal combustion engines are designed for powering, but not limited to powering, forklift trucks, sweepers, generators, and industrial equipment and other miscellaneous applications. All engines and equipment that fall within the scope of the preemption of Section 209(e)(1)(A) of the Federal Clean Air Act, as amended, and as defined by regulation of the Environmental Protection Agency, are specifically excluded from this category. Specifically excluded from this category are: 1) engines operated on or in any device used exclusively upon stationary rails or tracks; 2) engines used to propel marine vessels; 3) internal combustion engines attached to a foundation at a location for at least 12 months; 4) off-road recreational vehicles and snowmobiles; and 5) stationary or transportable gas turbines for power generation.]

"Operator" means a person with legal right of possession and use of LSI engine equipment other than a person whose usual and customary business is the rental or leasing of LSI engine equipment. Operator includes a person whose usual and customary business is the rental or leasing of LSI engine equipment for any LSI engine equipment not solely possessed or used for rental or leasing.

---

[1] Bracketed definitions are replicated for ease of use and presentation clarity from Section 1900 (b), Chapter 1, or Section 2431 (a), Chapter 9, of Title 13 of the California Code of Regulations.

"Repower" means a new or remanufactured engine and parts offered by the OEM or by a non-OEM rebuilder that has been demonstrated to the ARB to be functionally equivalent from a durability standpoint to the OEM engine and components being replaced.

"Retrofit" means the application of an emission control system to a non-new LSI engine.

"Serial Number" means an engine serial number and date of engine manufacture (month and year) that are stamped on the engine block or stamped on a metal label riveted or permanently attached to the engine block. Engine manufacturers must keep records such that the engine serial number can easily be used to determine if an engine was certified for the applicable model year, and beginning January 1, 2007, the standard to which the engine was certified.

"Small Fleet" means an operator's aggregated operations in California of 1 to 3 forklifts and/or 1 to 3 pieces of non-forklift equipment.

"South Coast Air Basin Airports," or "Basin Airports" means one or more of the following airports: Burbank-Glendale-Pasadena Airport, the John Wayne Airport, the Los Angeles International Airport, the Long Beach Municipal Airport, and the Ontario International Airport.

"Sweeper/scrubber" means an electric or large spark-ignition engine-powered piece of industrial floor cleaning equipment designed to brush and vacuum up small debris and litter or scrub and squeegee the floor, or both.

"Specialty Equipment" means a piece of equipment with unique or specialized performance capabilities that allow it to perform prescribed tasks and as approved by the Executive Officer.

["Ultimate Purchaser" means the first person who in good faith purchases a new LSI engine or equipment using such engine for purposes other than resale.]

"Uncontrolled LSI Engine" means pre-2001 uncertified engines and 2001-2003 certified uncontrolled LSI engines. The default emission rate for an uncontrolled LSI engine is 16.0 grams per kilowatt-hour of hydrocarbon plus oxides of nitrogen.

"Verification" means a determination by the Executive Officer that the LSI emission control system meets the requirements of this Procedure. This determination is based on both data submitted or otherwise known to the Executive Officer and engineering judgement.

"Verification Level" means one of four emission reduction classifications that apply to the performance capability of retrofit emission control systems as described in Title 13, California Code of Regulations, Section 2782(f), Table 1, as set forth in Table 1:

Table 1. LSI Engine Retrofit System Verification Levels

Classification	*Percentage Reduction (HC+NOx)*	*Absolute Emissions (HC+NOx)*
LSI Level 1 (1)	> 25% (2)	Not Applicable
LSI Level 2 (1)	> 75%(3)	3.0 g/bhp-hr (3)
LSI Level 3a (1)	> 85% (4)	0.5, 1.0, 1.5, 2.0, 2.5 g/bhp-hr
LSI Level 3b (5)	Not Applicable	0.5, 1.0, 1.5, 2.0 g/bhp-hr

Notes:

(1) Applicable to uncontrolled engines only
(2) The allowed verified emissions reduction is capped at 25% regardless of actual emission test values
(3) The allowed verified reduction for LSI Level 2 is capped at 75% or 3.0 g/bhp-hr regardless of actual emission test values
(4) Verified in 5% increments, applicable to LSI Level 3a classifications only
(5) Applicable to emission-controlled engines only

"Zero Emission Vehicle" or "ZEV" means any vehicle that could meet the zero-emission standards set forth in the California Exhaust Emission Standards and Test Procedures for 2003 and Subsequent Model Zero-Emission Vehicles, and 2001 and Subsequent Model Hybrid Electric Vehicles, in the Passenger Car, Light-Duty Truck and Medium-Duty Vehicle Classes (Aug. 5, 1999), or is certified to meet applicable ZEV standards in Title 13 of the California Code of Regulations

NOTE: Authority cited: Sections 39600, 39601, 43013, and 43018, Health and Safety Code. Reference: Sections 43013, 43017, and 43018, Health and Safety Code.

Section 2775.1. Standards.

(a) Except as provided in subdivisions (c), (d), (e), and (f), operators of medium and large forklift fleets and operators of non-forklift fleets with more than three pieces of equipment shall comply with the fleet average emission level standards in Table 2 by the specified compliance dates.

Table 2: Fleet Average Emission Level Standards in grams per kilowatt-hour (brake-horsepower-hour) of hydrocarbons plus oxides of nitrogen

	Initial Compliance Date		
Fleet Type	**1/1/2009**	**1/1/2011**	**1/1/2013**
Large Forklift Fleet	**3.2 (2.4)**	**2.3 (1.7)**	**1.5 (1.1)**
Medium Forklift Fleet	**3.5 (2.6)**	**2.7 (2.0)**	**1.9 (1.4)**
Non-forklift Fleet	**4.0 (3.0)**	**3.6 (2.7)**	**3.4 (2.5)**

(1) Fleet operators subject to the fleet average provisions shall include in their fleet average calculations any piece of equipment that the operator has rented or leased or reasonably expects to rent or lease for a period of one year or more.

(2) Fleet operators may exclude from the fleet average calculation rental or leased equipment if:

(A) the rental or lease is for a period of less than one year, and

(B) the rental or lease component comprises no more than 20 percent of the operator's equipment at any time, and

(C) the equipment rented or leased during the period from January 1, 2009 through December 31, 2010 is controlled to a 4.0 g/kW-hr (3.0 g/bhp-hr) standard or better and equipment rented or leased on or after January 1, 2011 is controlled to a 2.7 g/kW-hr (2.0 g/bhp-hr) standard or better.

(3) Fleet operators shall comply with the applicable fleet average standard in Table 2 with the following exceptions:

(A) if through business expansion, a fleet meets the definition of a larger size category, the fleet may continue to comply with the applicable fleet standard for the initial size category until the subsequent compliance date, at which time the fleet must meet the applicable fleet standard for the new fleet size category, or

(B) if through retirement or other fleet size reduction mechanism the fleet would otherwise be required to comply with a less stringent fleet standard, then the less stringent fleet standard becomes effective immediately.

(b) In addition to the fleet average emission level standards prescribed in subsection (a), each MOU Signatory shall ensure that 30 percent of their total new and in-use Basin airport GSE fleet meets the ZEV definition by December 31, 2010.

(1) Aggregation. The MOU Signatories may aggregate their Basin Airport fleets for the purpose of calculating the ZEV component of the fleet.

(2) Inter-carrier Averaging. At their election, two or more Basin Airport operators may also voluntarily agree to average or trade, at any time, their respective fleet conversions, or portions thereof, for purposes of complying with the ZEV requirement in subsection (b). Basin Airport operators that agree to inter-carrier averaging must submit signed agreements to ARB and other information as necessary to demonstrate that emission reductions available for inter-carrier averaging or trading are not otherwise required or relied upon for compliance under subsection (b).

(3) Exemptions. Air starts, cargo loaders, cargo tractors, and ground power units are exempt from the ZEV requirements of this subsection, but count toward the total fleet population.

(c) Operators of mixed fleets comprised of forklifts and non-forklift equipment shall determine fleet size individually for forklift fleets and non-forklift fleets; a mixed fleet with three or fewer forklifts and three or fewer non-forklift pieces of equipment shall be considered to be a small fleet.

(d) Except as provided in subdivisions (e), (f) and (g), each operator of a forklift fleet used in agricultural crop preparation services shall address emissions from their owned uncontrolled forklifts engines as follows:

(1) by January 1, 2009, identify that portion of the 1990 and newer LSI forklift fleet for which retrofit emission control systems have been verified and control 20 percent of that portion as prescribed in subdivision (e)(1)(D)(i) below; and

(2) by January 1, 2012, control 100 percent of the 1990 and newer LSI forklift fleet for which retrofit emission control systems have been verified as prescribed in subdivision (e)(1)(D)(i) below.

(3) Operators of fleets used in agricultural crop preparation services may exclude from their 1990 and newer LSI forklift fleet any rental or leased equipment. Equipment rented or leased on or after January 1, 2009 shall be controlled to a 4.0 g/kW-hr (3.0 g/bhp-hr) standard or better.

(e) Limited Hours of Use Provisions.

(1) Forklift and non-forklift equipment in medium and large fleets shall be exempted from the provisions of subdivision (a) of this section provided that:

(A) the equipment is used, on average over any three year period, less than 251 hours per year, and

(B) the equipment is equipped with an operational hours of use meter, and

(C) the operator maintains hours of use records for the piece of equipment at a facility, and

(D) the operator addresses the emissions by January 1, 2011, through option (i) or (ii) below:

(i) retrofit or repower the equipment to a Level 2 or Level 3 verification level as described in Title 13, California Code of Regulations, Section 2782 (f), or

(ii) retire the equipment or replace the equipment with a new or used piece of equipment certified to a 4.0 g/kW-hr (3.0 g/bhp-hr) hydrocarbon plus oxides of nitrogen standard.

(2) Forklifts used in agricultural crop preparation services fleets shall be exempted from the provisions of subdivision (d) of this section provided that they meet the requirements of subdivisions (e)(1)(A) through (e)(1)(C).

(f) Specialty Equipment Exemption.

(1) Forklift and non-forklift specialty equipment shall be exempt from the requirements of subdivisions (a) through (d) of this section provided that:

(A) the replacement cost exceeds the replacement cost of a "typical" piece of equipment from that category by 50 percent or the retrofit cost exceeds the "typical" retrofit cost of a piece of equipment from that category by 100 percent, and

(B) they meet the requirements of subdivisions (e)(1)(A) through (e)(1)(C), and

(C) the Executive Officer approves the listing of the piece of equipment as specialty equipment.

(g) Alternate Compliance Option for Operators of Fleets used in Agricultural Crop Preparation Services.

(1) Operators of forklift fleets used in agricultural crop preparation services shall be exempted from the provisions of subdivision (d) of this section provided that the forklift fleet complies with a 4.0 g/kW-hr (3.0 g/bhp-hr) fleet average emission level.

(h) Use of Experimental Emission Control Strategies.

(1) An operator may use an experimental emission control strategy provided by or operated by the manufacturer in no more than ten percent of his total fleet for testing and evaluation purposes. The operator shall keep documentation of this use in records as specified in Section 2775.2(b).

(i) Severability. If any provision of this section or the application thereof to any person or circumstance is held invalid, such invalidity shall not affect other provisions or applications of the section that can be given effect without the invalid provision or application, and to this end the provisions of this section are severable.

NOTE: Authority cited: Sections 39600, 39601, 43013, and 43018, Health and Safety Code. Reference: Sections 43013, 43017, and 43018, Health and Safety Code.

Section 2775.2. Compliance Requirements for Fleet Operators.

(a) Fleet operators shall conduct a baseline inventory of their fleet within six months of [insert operative date of regulations after filing with Secretary of State] and shall maintain records at their facilities of their baseline inventory and subsequent inventories indicating accessions and retirements until June 30, 2016.

(b) At a minimum, fleet operators shall record and maintain on file at their facilities, information on the equipment type, make, model, serial number, and emission certification standard or retrofit verification level. Fleet operators shall also maintain on file, for a period of three years, information on the quality of propane fuel they purchased for their fleet that includes a written statement from the fuel supplier that the fuel supplied to the operator meets all applicable state and federal laws for use in their engines. Operators that maintain multiple facilities may aggregate the records at a centralized facility or headquarters. Records for all equipment at all facilities shall be made available to the Air Resources Board within 30 calendar days upon request. Compliance staff may then select a facility sample for inspection purposes.

(c) Medium and large fleets shall be required to demonstrate at any time between January 1, 2009 and December 31, 2015, based on actual inventory, and reconciled against inventory records, that they meet the applicable fleet average emission level standard in Section 2775.1(a).

(d) Agricultural crop preparation services fleets shall be required to demonstrate at any time on or after June 1, 2007, based on actual inventory and reconciled against inventory records, that they have addressed their 1990 and newer uncontrolled LSI engines as prescribed in Section 2775.1(d).

(e) Compliance Extensions. An operator may be granted an extension to a compliance deadline specified in Section 2775.1 for one of the following reasons:

(1) Compliance Extension based on No Verified Retrofit Emission Control System

(A) If the Executive Officer has not verified a retrofit emission control system, or if one is not commercially available for a particular engine and equipment combination, the Executive Officer may grant a one-year extension in compliance if prior to each compliance deadline specified in subsections (a), (c), and (d), the Executive Officer finds that insufficient numbers of retrofit emission control systems are projected to be available.

(2) Compliance Extensions for GSE

(A) Compliance Extension based on no Verified or Commercially Available Retrofit Emission Control Systems for GSE. GSE of model year 1990 or newer with an uncontrolled LSI engine for which there is no verified retrofit as of January 1, 2007, or for which such verified retrofits are not commercially available by that date, shall be excluded from the GSE fleet average emission level standards contained in section 2775.1(a) until January 1, 2011. GSE of model year 1990 or newer with an uncontrolled LSI engine for which there is still no verified retrofit as of January 1, 2009, or for which such verified retrofits are not commercially available by that date, shall be excluded from the GSE fleet average emission level standards contained in section 2775.1(a) until January 1, 2013.

(B) Other Compliance Extensions for GSE. Operators may apply to the Executive Officer for an initial compliance extension of up to two years and one or more compliance extension renewals of up to one year in circumstances other than those addressed in subsection 2(A) above. The Executive Officer shall grant such applications if the applicant has made a good faith effort to comply with the fleet average emission level standards contained in section 2775.1(a) in advance of the compliance dates contained in the same section and documents either that it meets one of the following criteria independently, or that, when considering any combination of the criteria, the documentation justifies granting the application:

(i) due to conditions beyond the reasonable control of the applicant, sufficient numbers of tested and reliable emission-controlled GSE are not projected to be available at a commercially reasonable cost;

(ii) due to conditions beyond the reasonable control of the applicant, use of available emission-controlled GSE would result in significant operational or safety issues;

(iii) any other criterion that reasonably relates to whether the application should be granted.

(C) Compliance extensions granted under subsections (e)(2)(A) and (e)(2)(B) shall not extend beyond January 1, 2013. After January 1, 2013, all uncontrolled GSE shall be included in calculations for determining compliance with the GSE fleet average emission level standards contained in section 2775.1(a).

(3) If an extension to the compliance deadline is granted by the Executive Officer, the operator shall be deemed to be in compliance as specified by the Executive Officer's authorization.

(f) Continuous Compliance. An operator is required to keep his equipment in compliance with this regulation, once it is in compliance, so long as the operator is operating the equipment in California.

(g) Severability. If any provision of this section or the application thereof to any person or circumstance is held invalid, such invalidity shall not affect other provisions or applications of the section that can be given effect without the invalid provision or application, and to this end the provisions of this section are severable.

NOTE: Authority cited: Sections 39600, 39601, 43013, and 43018, Health and Safety Code. Reference: Sections 43013, 43017, and 43018, Health and Safety Code.

APPENDIX B: FLEET AVERAGE EMISSION LEVEL REQUIREMENTS
Part 2

Fleet Average Compliance Scenarios

APPENDIX B, Part 2: COMPLYING WITH THE FLEET AVERAGE REQUIREMENTS

This section describes the fleet average concept, provides compliance strategies, and presents example compliance scenarios.

Staff is proposing fleet average emission requirements for large and mid-size fleets. The most common setting for a large fleet is a distribution facility/warehouse or a large manufacturing facility. Operators that have multiple facilities statewide will likely fall into the large fleet category as well (for example, a home improvement warehouse may only have three or four forklifts per site, but could have dozens of sites statewide). A mid-size manufacturing facility or agricultural packing warehouse is a typical example of a mid-size fleet operator.

Staff proposes that large fleets meet more stringent fleet average emission levels than the mid-size fleets because large fleets have greater flexibility and financial ability when incorporating combinations of emission-reduction strategies to achieve a prescribed level. The strategies would include zero-emission technologies (such as electric forklifts), lower-emission standards (such as new equipment certified to optional lower-emission standards), and in-use reductions (such as retrofit systems).

The fleet average emission level would be more stringent for the forklift portion of the fleet than for the non-forklift portion of the fleet. This reflects two observations. First, electric-powered forklifts are readily available for use in many applications and already comprise a major market share of California sales. The availability of electric equipment is not as prevalent in the other applications in which LSI engines are used. Second, because forklifts are the most prevalent equipment type in the LSI category, retrofit kits and new equipment certified to optional lower-emission standards is more likely to be available as fleets seek to comply with their fleet average. Non-forklift equipment covered under the fleet average includes sweepers and scrubbers, industrial tugs, and airport ground support equipment. Under the staff proposal, LSI equipment outside of these four equipment types would not be included in the fleet average due to their relatively small emissions contributions.

The fleet average would be determined for the four types LSI equipment, both forklift and non-forklift using the certification levels of 2001 and newer LSI engines and the retrofit verification levels of engines with retrofit kits. Low usage equipment, defined as equipment that is used 250 hours per year or less, would be exempted from large and mid-size fleets for the purposes of the fleet average calculation. However, the emissions from this equipment would need to be addressed through retrofit, repower, replacement, or retirement by January 1, 2011.

Small fleets are defined as those fleets with one to three pieces of equipment. A small independent lumberyard is a good example of such a fleet. Small fleets would be exempt from the fleet average requirement.

1. Fleet Average Compliance Options

Equipment users can employ a variety of techniques to achieve prescribed fleet average emission levels. New procurements can be zero- or lower-emission LSI equipment. Existing or in-use equipment can be retrofitted with one or more of the same control technologies that have been incorporated into new lower-emission LSI engines. Fleet owners may also repower older equipment with new or lower-emission used certified engines or purchase used equipment with lower-emission certified engines. Details of each of these options follow.

1.1 Zero-Emission Equipment

The simplest and most effective way to reduce a fleet's average emission level is through procurement of zero-emission equipment, especially forklifts. Electric forklifts are most typically used in indoor materials handling applications that do not require large lift capacities (i.e., warehouse/retail operations). Applications where electric forklifts are used extensively include confined spaces, cold storage and food retail (primarily grocery stores).

Although electric forklifts are primarily designed for indoor operations, a number of manufacturers are also including equipment features that enable electric models to be used in a wider variety of environments. These features include pneumatic (air filled) tires that allow the forklift to be used on unimproved surfaces, waterproof trucks and sealed electronics compartments to make them water resistant for outdoor conditions, and alternating current motors that provide greater lift and travel speeds. Electric forklifts compete directly with LSI forklifts for many of the same work applications.

Electric forklifts have no exhaust emissions and extremely low upstream (power plant) emissions. Thus, electric forklifts can provide significant air quality benefits. The Electric Power Research Institute (EPRI) has prepared several reports on electric forklifts that identify other benefits in addition to improved air quality. Electric forklifts can have lower life-cycle costs when compared with LSI models. This is due to lower maintenance costs, lower fueling costs, and a longer useful life. Although the initial capital cost of an electric forklift is higher than that of a comparable LSI forklift, the incremental cost can be recovered during the useful life. Because of the financial benefits to the end user, electric forklifts are already prevalent in some markets.

Electric forklifts include electric motor trucks with cushion or pneumatic tires (referred to as Class 1 forklifts); electric motor narrow aisle trucks (Class 2); and electric hand trucks or hand/rider trucks (Class 3) (ITA, 2005). Class 1 electric forklifts are available in a wide variety of lift capacities from 3,000 pounds to 20,000 or more pounds. According to market data evaluated by the ARB, most Class 1 forklifts sold today in the U.S. are in the 3,000-6,000 pound lift capacity range. Class 1 forklifts typically perform duties similar to LPG-powered Class 4 and 5 forklifts. The use of Class 2 forklifts has the added benefit of allowing warehouses to more easily convert to cost-saving narrow aisle operation. For the purposes of calculating the fleet average, fleet owners would be able to assign an emission level of zero (0.0) to Class 1 and Class 2 forklifts. Fleet operators would not be allowed to count Class 3 trucks toward their fleet average, because Class 3 trucks do not traditionally replace Class 4 or 5 forklifts.

In general, an electric forklift can operate from one to two shifts before needing to be recharged. Some multi-shift operations employ battery swapping or fast charging to support the use of a 100 percent electric fleet. However, staff recognizes that facility or duty-cycle constraints may preclude some users from moving toward a 100 percent battery electric fleet.

In the future, another zero-emission option, the fuel-cell forklift, is expected to be commercially available. Numerous fuel-cell, battery, and traditional industrial truck manufacturers are now partnering to integrate fuel cells into industrial truck operations. Several of these partnerships are expecting to commercialize their technologies in the next several years. Benefits of fuel-cell and opportunity fast charging technologies include time-savings from the elimination of battery changes, no loss in lift capacity or drop in power as the shift progresses, and, in the case of fast charging, longer battery life. Also, with fuel-cell forklifts, dedicated battery-charging areas can be eliminated, freeing up valuable floor space.

1.2 New Equipment Certified to Optional Lower-emission Standards

The zero-emission options discussed above will not meet the needs of all operators. However, fleet operators can still achieve the fleet average standards through procurement of new lower-emission equipment that is cleaner than both the current and future standards. Based on current certification data as well as discussions with manufacturers, ARB staff believes that LSI manufacturers will be able to offer forklifts at emission levels significantly below these current standards. A discussion of the technologies expected to achieve even lower levels is contained in section 4 of the staff report.

Under the proposal, model year 2007 and subsequent engines could be certified to optional tiered new engine standards of 0.1, 0.2, 0.4, 0.6, 1.0, and 1.5 g/bhp-hr. A January 20, 2005, Manufacturers Advisory Correspondence already provides that manufacturers can voluntarily certify their 2005 and 2006 model year engines to these interim lower-emission standards up to 2.0 g/bhp-hr, and one major manufacturer has already submitted two engine applications to the ARB for early certification to the 2.0 g/bhp-hr level. These engines will provide equipment users with greater flexibility in meeting the proposed fleet average emission levels.

1.3 In-Use Controls

One of the most expedient ways to reduce LSI fleet emissions is to retrofit in-use engines. This entails modifying or upgrading components on the engine and/or fuel system with ARB verified retrofit emission control systems. An example of a retrofit emission control system is a closed-loop fuel control system coupled with a three-way catalytic converter, which could be added at the time of scheduled engine maintenance. Such systems have demonstrated an ability to reduce emissions by 75 percent or more.

As an alternative to retrofits, LSI equipment users may repower or replace existing engines or equipment with new engines or used equipment that are certified to lower-mission standards. By using this strategy the users would have the option to either replace their in-use uncontrolled engine with an engine that is certified to a 3.0 g/bhp-hr HC+NOx or lower-emissions standard, or purchase a used piece of certified equipment. Both of these are cost-effective strategies for lowering emissions from in-use equipment.

2 Fleet Average Compliance Scenarios

The main advantage of the proposed fleet average requirement is that it allows individual fleet users the flexibility to tailor their compliance strategy to the specific needs of their fleet. Some fleets may decide to purchase additional electric forklifts, others may prefer to modernize their fleet, and still others may pursue lower-emission equipment. Some fleets, primarily those with a substantial percentage of electric equipment, may not need to take any additional steps. Given this flexibility, it is impossible to precisely determine how fleets will comply. However, the staff has developed a few scenarios for illustrative purposes.

One factor that will significantly impact a fleet average value is the number of uncontrolled LSI engines. Uncontrolled forklifts have emissions of approximately 12 g/bhp-hr HC+NOx, while controlled LSI equipment meets a level of 3.0 g/bhp-hr. Uncontrolled engines were phased out by 2004, but some 2004 equipment was equipped with uncontrolled engines from the 2003 model year. The scenarios discussed below assume that by 2009, fleets have no uncontrolled equipment, i.e., all uncontrolled equipment has been retrofitted, repowered, replaced, or retired. The scenarios also assume an average fleet turnover of seven years. According to ARB's inventory, over 88 percent of the forklifts within California are seven years old or newer. Operators of fleets with a shorter fleet turnover rate (more modern fleets) will likely find it easier to comply with the requirements, while those with fleets with a longer turnover rate (older fleets) will likely have to take additional measures to comply.

By January 1, 2009, without being subject to fleet standards, a typical baseline fleet with a uniform seven-year turnover rate that has converted its uncontrolled equipment and has no electric equipment would have a fleet average of 2.7 g/bhp-hr HC+NOx. As proposed in Table 3.0, a large fleet would be required to meet a standard of 2.4 g/bhp-hr and a mid-sized fleet would be required to meet a standard of 2.6 g/bhp-hr.

2.1 <u>Large Fleets</u>

Under the staff proposal, large fleets would need to meet a fleet-average emission requirement of 2.4 g/bhp-hr by January 2009. The simplest and most effective way to meet the requirement would be to establish a modest electric equipment component. A fleet could achieve the 2.4 g/bhp-hr requirement by ensuring that approximately 11 percent of the equipment procured annually since 2002 is electric.

Fleets would not have to rely on electric equipment to meet the fleet average requirement - they can also comply by procuring lower-emission equipment. Newer fleets (those that more routinely replace older equipment) would have the easiest time complying with the requirements. Older fleets with longer turnover rates would have to be more aggressive in their procurement of lower-emission equipment to comply with the requirements. A fleet with a seven-year procurement cycle (and no electric equipment) could meet the proposed January 2009 fleet average standard of 2.4 g/bhp-hr standard by procuring 2.0 g/bhp-hr equipment in 2006 (one year early) and cleaner 1.0 g/bhp-hr equipment in 2008.

To meet the proposed 2011 fleet average requirement of 1.7 g/bhp-hr, a fleet would have to reduce their fleet average by 23 percent over the 2011 baseline. Again, the easiest way for a fleet to achieve the requirement is to incorporate electric equipment. A fleet with uniform turnover and a 23 percent electric component beginning in 2004 would meet the requirement. A fleet choosing not to incorporate any electric equipment would need to be more aggressive in their purchasing of lower-emission equipment. In addition to what they had done to meet the 2009 fleet average requirement, a fleet with a typical seven-year turnover rate would have to procure 1.0 g/bhp-hr equipment in 2009.

Finally, to meet the proposed 2013 fleet average requirement of 1.1 g/bhp-hr, a fleet would have to reduce their fleet average emission level by 27 percent over the 2013 baseline. As such, a fleet that incorporated a 27 percent electric component into their normal procurement cycle beginning in 2006 could meet the requirement. A fleet choosing not to incorporate any electric equipment would need to continue being more aggressive in their procurement of lower-emission equipment. In addition to what they had done to meet the 2009 and 2011 fleet average requirements, the fleet with a seven-year procurement cycle would have to additionally procure 0.4 g/bhp-hr equipment in 2012.

2.2 Mid-Size Fleets

Under the proposal, mid-size fleets would need to meet a fleet average emission level requirement of 2.6 g/bhp-hr. As with large fleets, mid-size fleets may meet the requirement through procurement of electric or lower-emission equipment. Since mid-size fleets may have less flexibility than large fleets have, their requirements are less stringent. Thus, they can comply with a smaller electric component or longer procurement cycle.

A typical mid-size fleet may achieve the 2.6 g/bhp-hr requirement with a uniform seven-year turnover rate by procuring four percent electric equipment each year beginning in 2002. The same fleet may also meet the standard without incorporating any electric equipment as long as they are on a typical seven-year procurement cycle and procure 2.0 g/bhp-hr equipment in 2006 (one year early). A fleet choosing to be on a longer eight-year procurement cycle would have to be more aggressive, procuring 2.0 g/bhp-hr equipment in 2006 and 1.5 g/bhp-hr equipment in 2008.

To meet the proposed 2011 fleet average requirement of 2.0 g/bhp-hr, a fleet would have to reduce their fleet average by nine percent over the 2011 baseline. A fleet with uniform turnover and a nine percent electric component purchase beginning in 2004 would meet the requirement. A fleet choosing not to incorporate any electric equipment might need to be more aggressive in purchasing lower-emission equipment. In addition to actions taken to meet the 2009 fleet average requirement, the fleet with a seven-year turnover rate would need to continue to procure complying equipment. The fleet with an eight-year turnover rate would have to procure 1.0 g/bhp-hr equipment in 2009 (in addition to what they had done to meet the 2009 fleet average requirement).

Finally, to meet the proposed 2013 fleet average requirement of 1.4 g/bhp-hr, a fleet would have to reduce their fleet average emission level by 7 percent over the 2013 baseline. As such, a fleet that incorporated a 7 percent electric component purchase into their normal procurement cycle beginning in 2006 could meet the requirement. A fleet on a six-, seven-, or eight-year procurement cycle could still comply with the requirement without incorporating any electric equipment and without procuring lower-emission equipment after 2009 as long as they had procured appropriate lower-emission equipment to meet the 2009 and 2011 requirements.

2.3 Non-Forklift Fleets

The fleet standards for non-forklifts are set to be conservative while still requiring the fleet to retrofit, repower, or retire uncontrolled equipment. This allows compliance with the fleet average through a steady turnover of the fleet with an eight-year life. It also allows for some non-availability of retrofit systems in the early years. Any availability of equipment meeting optional lower-emission standards in this category will make compliance with the proposed standards easier.

APPENDIX C: VERIFICATION PROCEDURE
Part 1

Proposed Regulation Order Part 9: Adopt California Code of Regulations, Title 13, Sections 2780, 2781, 2782, 2783, 2784, 2785, 2786, 2787, 2788, and 2789 for Verification Procedures for Retrofit Systems Verification Procedure, Warranty, and In-Use Compliance Requirements for Retrofits to Control Emissions from Off-Road Large Spark-Ignition Engines.

PROPOSED REGULATION ORDER, PART 9

NOTE: The entire text is new language proposed to be added to the California Code of Regulations.

Adopt Article 3, Verification Procedure, Warranty, and In-Use Compliance Requirements for Retrofits to Control Emissions from Off-Road Large Spark-Ignition Engines, Chapter 15, Division 3, Title 13, California Code of Regulations, and new sections 2780 through 2789, to read as follows:

Article 3. Verification Procedure, Warranty, and In-Use Compliance Requirements for Retrofits to Control Emissions from Off-Road Large Spark-Ignition Engines.

§ 2780. Applicability and Purpose.

These procedures apply to LSI retrofit emission control systems, which, through the use of sound principles of science and engineering, control emissions of hydrocarbons (HC) and oxides of nitrogen (NOx) from off-road large spark-ignition (LSI) engines. These systems may include but are not limited to, closed-loop fuel control systems, fuel injection systems, and three-way catalysts. These procedures are not applicable to retrofit strategies that employ or make use of fuel additives.

The use of LSI retrofit emission control systems verified in accordance with this article may be a means of complying with other state board regulations applicable to the use of LSI engines, to the extent provided for in those regulations.

NOTE: Authority cited: Sections 39002, 39003, 39500, 39600, 39601, 39650-39675, 40000, 43000, 43000.5, 43011, 43013, 43018 and 43105, 43600, 43700, Health and Safety Code. Reference: Sections 39650-39675, 43000, 43009.5, 43013, 43018, 43101, 43104, 43105, 43106, 43107, and 43204-43205.5 Health and Safety Code; Title 17 California Code of Regulations Section 93000.

§ 2781. Definitions.

(a) The definitions in Section 1900(b), Chapter 1, Title 13 of the California Code of Regulations are incorporated by reference herein. The following definitions shall govern the provisions of this chapter:

(1) "Applicant" means the entity that has applied for or has been granted verification under this Procedure
(2) "Average" means the arithmetic mean.
(3) "Baseline" means: (i) for uncontrolled engines, the emission levels from the engine as tested without the LSI retrofit emission control system implemented using the test cycle specified in this verification procedure; and (ii) for certified engines, the emission standards to which the engine was certified.

(4) "Certified engine" means an engine manufactured in compliance with ARB or EPA emission standards.

(5) "Durability" means the ability of the applicant's LSI retrofit emission control system to maintain a level of emissions at or below its verification emission level and maintain its physical integrity over the durability periods specified in these regulations. The minimum durability demonstration periods contained herein are not necessarily meant to represent the entire useful life of the LSI retrofit emission control system in actual service.

(6) "Emergency Engine Repair" means repair conducted outside of normal scheduled maintenance that is required for the safe operation of the equipment.

(7) "Emission Control Group" means a set of LSI engines and applications determined by parameters that affect the performance of a particular LSI retrofit emission control system. The exact parameters depend on the nature of the LSI retrofit emission control system and may include, but are not limited to, baseline or certification levels of engine emissions, combustion cycle, displacement, aspiration, horsepower rating, duty cycle, exhaust temperature profile, and fuel composition. An applicant could specify an emission control group to be comprised of engines from several different engine families, applications and equipment manufacturers. Verification of an LSI retrofit emission control system and the extension of existing verifications is done on the basis of emission control groups.

(8) "Executive Officer" means the Executive Officer of the Air Resources Board or the Executive Officer's designee.

(9) "Executive Order" means the document signed by the Executive Officer that specifies the verification level or percentage reduction of an LSI retrofit emission control system for an emission control group and includes any enforceable conditions and requirements necessary to support the designated verification.

(10) "Hot Start" means the start of an engine within four hours after the engine is last turned off.

(11) "LSI retrofit emission control system" means any device or system employed with an in-use off-road LSI-engine vehicle or piece of equipment that is intended to reduce emissions. Examples of LSI retrofit emission control systems include, but are not limited to, closed-loop fuel control system, fuel injection system, three-way catalysts, and combinations of the above.

(12) "LSI Retrofit Emission Control Group Name." See Section 2786(c)(2).

(13) "Off-Road Large Spark-Ignition Engine" or "LSI Engine" means any spark ignition engine that produces a gross power of greater than 19 kilowatts (25 horsepower) or is designed (e.g., through fueling, engine calibrations, valve timing, engine speed modifications, etc.) to produce greater than 19 kW (>25 hp), and is used in an off-road vehicle or equipment that is not excluded below. If an engine family has models at or below 19 kW (25 hp) and models above 19 kW (25 hp), only the models above 19 kW (25 hp) would be considered LSI engines. A spark ignition engine's operating

characteristics are significantly similar to the theoretical Otto combustion cycle with the engine's primary means of controlling power output being to limit the amount of air and fuel that is throttled into the combustion chamber of the engine. LSI engines are designed for powering equipment applications including, but not limited to, forklift trucks, sweepers, generators, and industrial equipment and other miscellaneous applications. Specifically excluded from this category are: i) engines operated on or in any device used exclusively upon stationary rails or tracks; ii) engines used to propel marine vessels; iii) internal combustion engines attached to a foundation at a location for at least 12 months; iv) off-road recreational vehicles and snowmobiles; and v) stationary or transportable gas turbines for power generation.

(14) "Off-Road Vehicle" or "Off-Road Equipment" means any non-stationary device, powered by an internal combustion engine or motor, used primarily off the highways to propel, move, or draw persons or property including any device propelled, moved, or drawn exclusively by human power. Examples include, but are not limited to, marine vessels, construction/farm equipment, industrial equipment, locomotives, small off-road engines, off-road motorcycles, and off-highway recreational vehicles.

(15) "Otto Cycle Engine" means a type of engine with operating characteristics significantly similar to the theoretical Otto combustion cycle. The primary means of 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. As an example, gasoline-fueled and LPG engines are Otto cycle engines.

(16) "Revoke" means to cancel the verification status of an LSI retrofit emission control system. If an LSI retrofit emission control system's verification status is revoked by the Executive Officer, the applicant must immediately cease and desist selling the LSI retrofit emission control system to end-users.

(17) "Verification" means that after the data submitted has been thoroughly evaluated and an engineering judgment has determined that an LSI Retrofit Emission Control System for installation on in-use equipment will meet the requirements of this procedure, an Executive Order is issued. This ensures the emissions reductions achieved by the control strategy are real and durable and production units in the field achieve reductions consistent with the verification procedure.

NOTE: Authority cited: Sections 39002, 39003, 39500, 39600, 39601, 39650-39675, 40000, 43000, 43000.5, 43011, 43013, 43018 and 43105, 43600, 43700, Health and Safety Code. Reference: Sections 43000, 43009.5, 43013, 43018, 43101, 43104, 43105, 43106, 43107, 43204, 43205, and 43205.5; Health and Safety Code.

§ 2782. Application Process.

(a) *Overview.* Before submitting a formal application for the verification of an LSI retrofit emission control system for use with an emission control group, the applicant must submit a letter of intent with a proposed verification plan to ARB (pursuant to Section 2782(b)). To obtain verification, the applicant must conduct emissions reduction testing (pursuant to Section 2783), a durability demonstration with testing (pursuant to Section 2784), and a field demonstration (pursuant to Section 2785), and must submit the results along with comments and other information (pursuant to Sections 2786 and 2787) in an application to the Executive Officer, in the format shown in Section 2782(d). If the Executive Officer grants a verification of an LSI retrofit emission control system, he or she will issue an Executive Order to the applicant identifying the verified emission reduction and any conditions that must be met for the LSI retrofit emission control system to function properly. After the Executive Officer grants verification of an LSI retrofit emission control system, the applicant must provide a warranty, conduct in-use compliance testing of the system after having sold or leased a specified number of units, and report the results to the Executive Officer (pursuant to Section 2789). An LSI retrofit emission control system that employs two or more individual sub-systems or components must be tested and submitted for evaluation as one system.

(b) *Proposed Verification Plan.* Before formally submitting an application for the verification of an LSI retrofit emission control system, the applicant must submit a proposed verification plan to ARB. The proposed verification plan should outline the applicant's plans for meeting the testing and other requirements. The Executive Officer shall use the information in the proposed plan to help determine the need for additional analyses and the appropriateness of allowing alternatives to the prescribed requirements and in determining whether the control strategy relies on sound principles of science and engineering. The proposed plan should include the following information:

(1) Identification of the contact persons, phone numbers, names and addresses of the responsible party proposing to submit an application.

(2) Description of the LSI retrofit emission control system and principles of operation. A schematic depicting operation should be included as appropriate. It is the responsibility of the applicant to demonstrate that the product relies on sound principles of science and engineering to achieve emission reductions. The description of the LSI retrofit emission control system must include, at a minimum, the information described in section 2782(d), items 2 and 3.

(A) If, after reviewing the description of the LSI retrofit emission control system, the Executive Officer determines that the applicant has not made a satisfactory demonstration that its product relies on sound principles of science and engineering to achieve emissions reductions, the Executive Officer shall notify the applicant of the determination in writing. The applicant may choose to withdraw from the verification process or submit additional materials and clarifications. The additional submittal must be received by the Executive Officer no later than 60 days from the date of the notification letter or the Executive Officer may suspend reviewing the proposed verification plan.

(B) If, after reviewing the additional submittal, the Executive Officer determines that the applicant has not yet made a satisfactory demonstration that its product relies on sound principles of science and engineering to achieve emission reductions, the review shall be suspended. If the Executive Officer has suspended reviewing the proposed verification plan, it may only be reactivated at the discretion of the Executive Officer.

(C) If at any time, the Executive Officer has reason to doubt the scientific or engineering soundness of a product, the Executive Officer may require the applicant to submit additional supporting materials and clarifications no later than 60 days from the date of the notification letter. If the additional submittal is not received by the Executive Officer by the deadline established in the notification letter, the review of the proposed verification plan may be suspended. In deciding whether to suspend reviewing the proposed verification plan the Executive Officer will review submittals as provided in subsection (B) above.

(3) Preliminary parameters for defining emission control groups that are appropriate for the LSI retrofit emission control system. The Executive Officer will work with the applicant to determine appropriate emission control group parameters.

(4) The applicant's plan for meeting the requirements of Sections 2783-2786. Existing test data may be submitted for the Executive Officer's consideration. The proposed verification plan must focus on verification of the LSI retrofit emission control system for use with a single emission control group.

(5) A brief statement that the applicant agrees to provide a warranty pursuant to the requirements of Section 2787.

(c) *Executive Officer Review.* After an applicant submits a proposed verification plan, the Executive Officer shall determine whether the applicant has identified an appropriate testing procedure to support an application for verification and notify the applicant in writing that it may submit an application for verification. The Executive Officer may suggest modifications to the proposed verification plan to facilitate verification of the LSI retrofit emission control system. All applications, correspondence, and reports must be submitted to:

Air Resources Board
9528 Telstar Avenue
El Monte, CA 91731

(d) *Application Format.* The application for verification of an LSI retrofit emission control system must follow the format shown below. If a section asks for information that is not applicable to the LSI retrofit emission control system, the applicant must indicate "not applicable." If the Executive Officer concurs with the applicant's judgment that a section is not applicable, the Executive Officer may waive the requirement to provide the information requested in that section.

1. Identification
   - 1.1 Identification of applicant, manufacturer, and product
   - 1.2 Identification of contact names for engineering or technical information of product or system
   - 1.3 Identification and description of the emission control group (see 2781 (a) (7) and 2783 (a)
   - 1.4 Identification of level of verification being sought
     - 1.4.1 Emissions reduction claim

2. LSI Retrofit Emission Control System Information
   - 2.1 General description of the LSI retrofit emission control system
     - 2.1.1 Discussion of principles of operation and system design
     - 2.1.2 Schematics depicting operation (as appropriate)
   - 2.2 Favorable operating conditions
   - 2.3 Unfavorable operating conditions (e.g., inappropriate duty cycle or application, geographical limitations, etc.) and associated reductions in performance
   - 2.4 Fuel and lubrication oil requirements (e.g., fuel specifications) and misfueling considerations (see 2783(d)(2), 2784(c2), 2786 (a) and (e).
   - 2.5 Identification of failure modes and associated consequences
   - 2.6 Discussion of potential safety issues *(e.g., lack of proper maintenance, unfavorable operating conditions, etc.)*
   - 2.7 Installation requirements
   - 2.8 Maintenance requirements

3. LSI Retrofit Emission Control System and Emission Control Group Compatibility
   - 3.1 Compatibility with the engine
     - 3.1.1 Discussion on calibrations and design features that may vary from engine to engine
     - 3.1.2 Effect on overall engine performance
     - 3.1.3 Effect on fuel consumption
     - 3.1.4 Engine oil consumption considerations
   - 3.2 Compatibility with the equipment/application
     - 3.2.1 Dependence of calibration and other design features on application characteristics
     - 3.2.2 Comparison of field data with operating conditions of equipment applications suitable for the LSI retrofit emission control group.

4. Testing Information
    4.1 Emission testing requirements
        4.1.1 Test facility identification
        4.1.2 Description of engine and equipment *(make, model year, engine family name, etc.)*
        4.1.3 Test procedure description *(-pre-conditioning period, test cycle, etc.)*
        4.1.4 Test fuel and lubrication oil (see 2783 (d)
        4.1.5 Test results and comments electronically submitted in comma-delimited columns in spreadsheet or text files
    4.2 Durability Demonstration requirements
        4.2.1 Test facility identification
        4.2.2 Description of field application (where applicable)
        4.2.3 Description of engine and equipment *(make, model year, engine family name, etc.)*
        4.2.4 Test procedure description *(field or bench, test cycle, etc.)*
        4.2.5 Test fuel and lubrication oil (see 2784 (c)
        4.2.6 Test results and comments electronically submitted in comma-delimited columns in spreadsheet or text files
        4.2.7 Summary of evaluative comments from third-party for in-field durability demonstration *(e.g., driver or fleet operator)*
    4.3 Field Demonstration requirements (where applicable)
        4.3.1 Field application identification
        4.3.2 Description of engine and equipment *(make, model year, engine family name, etc.)*
        4.3.3 Summary of evaluative comments on retrofit compatibility of the LSI retrofit emission control system with the equipment from third-party *(e.g., driver or fleet operator)*
    4.4 Alternative In-Use Compliance Test Procedure (where applicable)
        4.4.1 Description of the proposed alternative in-use test procedure
        4.4.2 Description of test equipment, including measurement accuracy and precision
        4.4.3 Description of advantages and limitations of the proposed alternative in-use test procedure
        4.4.4 Description of the emission correlation of the proposed alternative in-use test procedure with emission results from engine dynamometer test conducted for verification of the LSI retrofit emission control system
        4.4.5 Test results and comments

5. References

6. Appendices
    6.1 Laboratory test report information *(for all tests)*
        6.1.1 Actual laboratory test data
        6.1.2 Quality assurance and quality control information

6.2 Third-party letters or questionnaires describing in-field performance
6.3 LSI retrofit emission control system label
6.4 Owner's manual (as described in Section 2786 (e))
6.5 Other supporting documentation

(e) Within 30 days of receipt of the application, the Executive Officer shall notify the applicant whether the application is complete.

(f) Within 60 days after an application has been deemed complete, the Executive Officer shall determine whether the LSI retrofit emission control system merits verification and shall classify it as shown in Table 1. The applicant and the Executive Officer may mutually agree to a longer time period for reaching a decision, and the applicant may submit additional supporting documentation before a decision has been reached. The Executive Officer shall notify the applicant of the decision in writing and specify the classification level and the percentage reduction or absolute emissions and identify any terms and conditions that are necessary to support the verification.

Table 1. LSI Engine Retrofit System Verification Levels

Classification	*Percentage Reduction (HC+NOx)*	*Absolute Emissions (HC+NOx)*
LSI Level 1 (1)	$\geq$ 25% (2)	Not Applicable
LSI Level 2 (1)	$\geq$ 75%(3)	3.0 g/bhp-hr (3)
LSI Level 3a (1)	$\geq$ 85% (4)	0.5, 1.0, 1.5, 2.0, 2.5 g/bhp-hr
LSI Level 3b (5)	Not Applicable	0.5, 1.0, 1.5, 2.0 g/bhp-hr

Notes:

(1) Applicable to uncontrolled engines only

(2) The allowed verified emissions reduction is capped at 25% regardless of actual emission test values

(3) The allowed verified reduction for LSI Level 2 is capped at 75% or 3.0 g/bhp-hr regardless of actual emission test values

(4) Verified in 5% increments, applicable to LSI Level 3a classifications only

(5) Applicable to emission-controlled engines only

(g) Extensions of an Existing Verification. If the applicant has verified an LSI retrofit emission control system with one emission control group and wishes to extend the verification to include additional engines or equipment into the existing emission control group, or it wishes to include additional emission control groups, it may apply to do so using the original test data, additional test data, engineering justification and analysis, and any other information deemed necessary by the Executive Officer to address the differences between the emission control group already verified and the additional emission control group(s). Processing time periods follow sections (e) and (f) above.

(h) *Design Modifications*. If an applicant modifies the design of an LSI retrofit emission control system that has already been verified or is under consideration for verification by the Executive Officer, the modified version must be evaluated under this Procedure. The applicant must provide a detailed description of the design modification along with an explanation of how the modification will change the operation and performance of the LSI retrofit emission control system. To support its claims, the applicant must submit additional test data, engineering justification and analysis, and any other information deemed necessary by the Executive Officer to address the differences between the modified and original designs. An applicant must have written approval from the Executive Officer prior to making any design modifications to an LSI retrofit emission control system that has already been verified or is under consideration for verification by the Executive Officer. Processing time periods follow sections (e) and (f) above.

(i) *Treatment of Confidential Information*. Information submitted to the Executive Officer by an applicant may be claimed as confidential, and such information shall be handled in accordance with the procedures specified in Title 17, California Code of Regulations, Sections 91000-91022. The Executive Officer may consider such confidential information in reaching a decision on a verification application.

(j) The Executive Officer may lower the verification level or revoke the verification status of a verified LSI retrofit emission control system later if there are serious errors, omissions or inaccurate information in the application for verification or supporting information which, if known at the time of verification, would have justified lowering the verification level or denying the application.

NOTE: Authority cited: Sections 39002, 39003, 39500, 39600, 39601, 39650-39675, 40000, 43000, 43000.5, 43011, 43013, 43018 and 43105, 43600, 43700, Health and Safety Code. Reference: Sections 43000, 43009.5, 43013, 43018, 43101, 43104, 43105, 43106, 43107, 43204, 43205, and 43205.5; Health and Safety Code.

§ 2783. Emissions Reduction Testing Requirements.

(a) *Emission Control Group.* The applicant must identify the emission control group and test the LSI retrofit emission control system on representative engines from that emission control group. The applicant must identify the test engines, and equipment if applicable, by providing the engine family name, if available, make, model, and model year. The applicant must also describe equipment applications on which the LSI retrofit emission control system is intended to be used, by giving examples of in-use equipment, characterizing typical duty cycles, indicating any fuel requirements, and/or providing other application-related information.

(b) *Engine Pre-conditioning.* All testing should be performed with the test engine in a proper state of maintenance. The applicant may tune-up or rebuild the test engine prior to, but not after, baseline testing, unless rebuilding the engine is a part of the requirements for installation of the LSI retrofit emission control system.

(c) *LSI Retrofit System Pre-conditioning.* The engine or equipment installed with an LSI retrofit emission control system must be operated for a break-in period of between 25 and 100 hours before emission testing.

(d) *Test Fuel.*

(1) The test fuel used shall be consistent with the fuel specifications as outlined in the "California Exhaust Emission Standards and Test Procedures for 2001 and Subsequent Model Passenger Cars, Light-Duty Trucks, and Medium- Duty Vehicles," as incorporated by reference in section 1961(d) If the engine is tested using the U.S. EPA test fuel, as outlined in 40 CFR Part 1065, the manufacturer shall demonstrate that the emission results are consistent with these Test Procedures.

(2) During all engine tests, the engine shall employ lubricating oil consistent with the engine manufacturer's specifications for that particular engine. These specifications shall be recorded and declared in the verification application.

(e) *Test Cycle.*

(1) *Systems verified prior to 2007.* Any LSI retrofit emission control system verified before January 1, 2007,must be tested using the steady-state test procedure (C2) set forth in the, "California Exhaust Emission Standards and Test Procedures for New 2001 and Later Off-Road Large Spark-Ignition Engines" as incorporated by reference in section 2433(d), or the U.S. EPA transient test procedure as set forth in 40 CFR Part 1048, Subpart F, as adopted November 8, 2002. For off-road engines used in constant-speed operation, the applicant must use the steady-state test procedure (D2) set forth in the "California Exhaust Emission Standards and Test Procedures for New 2001 and Later Off-Road Large

Spark-Ignition Engines" as incorporated by reference in section 2433(d), or the U.S. EPA transient test cycle as outlined in 40 CFR Part 1048, Subpart F, as adopted November 8, 2002. The required test cycles are summarized in Table 2, below.

Table 2. Test Cycles for Emissions Reduction Testing

Test Type	***LSI Retrofit System Verification Date***	***Off-Road (including portable engines)***	***Off-Road (constant-speed operation)***
Engine	Pre-2007	Steady-state test cycle (C2) from ARB off-road regulations or U.S. EPA transient test cycle	Steady-state test cycle (D2) from ARB off-road Regulations or U.S. EPA transient test cycle
Engine	2007 and later	U.S. EPA transient test cycle	U.S. EPA transient test cycle

(2) *Systems verified in 2007 or later.* Any LSI retrofit emission control system verified on or after January 1, 2007, must be tested using the U.S. EPA transient test procedure as set forth in 40 CFR Part 1048, Subpart F, as adopted November 8, 2002.

(f) *Alternative Test Cycles and Methods.* The applicant may request the Executive Officer to approve an alternative test cycle or method in place of a required test cycle or method. In reviewing this request, the Executive Officer may consider all relevant information including, but not limited to, the following:
(1) Similarity of characteristics to the specified test cycle or method and in-use duty cycle.
(2) Body of existing test data generated using the alternative test cycle or method.
(3) Technological necessity.
(4) Technical ability to conduct the required test.

(g) Test runs to *Verify HC, NOx, and CO Emissions Reductions.* A minimum of three hot-start tests for the test cycle selected from Table 2, or an Executive Officer-approved alternative test cycle, must be run for baseline and control configurations.

(h) *Results.* For all valid emission tests used to support emissions reduction claims, the applicant must report emissions of total hydrocarbons, oxides of nitrogen, and carbon monoxide in grams/brake horsepower-hour (g/bhp-hr).

(i) *Incomplete and Aborted Tests.* The applicant must identify all incomplete and aborted tests and explain why those tests were incomplete or aborted.

(j) *Additional Analyses.* The Executive Officer may require the applicant to perform additional analyses if there is reason to believe that the use of an LSI retrofit emission control system may result in the increase of toxic air contaminants, or other harmful compounds.

(1) In its determination, the Executive Officer may consider all relevant data, including but not limited to the following:

(A) The addition of any substance to the fuel, intake air, or exhaust stream.

(B) Whether a catalytic reaction is known or reasonably suspected to increase toxic air contaminants or ozone precursors.

(C) Results from scientific literature.

(D) Field experience.

(E) Any additional data.

(2) The Executive Officer will determine appropriate test methods for additional analyses in consultation with the applicant.

(k) *Quality Control of Test Data.* The applicant must provide information on the test facility, test procedure, and equipment used in the emission testing, including evidence establishing that the test equipment used meets the specifications and calibrations given in 40 CFR Part 86, subpart N.

(l) *Testing or inspection.* The Executive Officer may, with respect to any verified LSI retrofit emission control system sold, leased, offered for sale, or manufactured for sale in California, order the applicant to make available for testing and/or inspection a reasonable number of LSI retrofit emission control systems, and may direct that they be delivered at the applicant's expense to the state board at the Haagen-Smit Laboratory, 9528 Telstar Avenue, El Monte, California or where specified by the Executive Officer. The Executive Officer may also, with respect to any verified LSI retrofit emission control system being sold, leased, offered for sale, or manufactured for sale in California, have an applicant test and/or inspect a reasonable number of units at the applicant or manufacturer's facility or at any test laboratory under the supervision of the Executive Officer.

NOTE: Authority cited: Sections 39002, 39003, 39500, 39600, 39601, 39650-39675, 40000, 43000, 43000.5, 43011, 43013, 43018 and 43105, 43600, 43700, Health and Safety Code. Reference: Sections 43000, 43009.5, 43013, 43018, 43101, 43104, 43105, 43106, 43107, 43204, 43205, and 43205.5; Health and Safety Code.

§ 2784. Durability Demonstration Requirements.

(a) The applicant must demonstrate, to the satisfaction of the Executive Officer, the durability of the applicant's LSI retrofit emission control system through an actual field or laboratory-based demonstration test. If the applicant chooses a laboratory-based durability demonstration, an additional field demonstration will be required to demonstrate in-field compatibility (pursuant to Section 2785). If the applicant has demonstrated the durability of the identical system in a prior verification or OEM certification, or has demonstrated durability through field experience, the applicant may request that the Executive Officer accept the previous demonstration in fulfillment of this requirement. In evaluating such a request, the Executive Officer may consider all relevant information including, but not limited to, the similarity of baseline emissions and application duty cycles, the relationship between the emission control group or engine family(ies) used in previous testing and the current emission control group, the number of engines tested, evidence of successful operation and user acceptance, and published reports.

(b) *Engine Selection*. Subject to the approval of the Executive Officer, the applicant may choose the engine to be used in the durability demonstration. The engine must be representative of the engines in the emission control group for which verification is sought. The selected engine need not be the same as the engine used for the emission testing (pursuant to Section 2783), but if the applicant does use the same engine, the emission testing results may also be used for the zero-hour durability tests.

(c) *Test Fuel*.

(1) The test fuel used shall be consistent with the fuel specifications as outlined in the "California Exhaust Emission Standards and Test Procedures for 2001 and Subsequent Model Passenger Cars, Light-Duty Trucks, and Medium- Duty Vehicles," as incorporated by reference in section 1961(d). If the engine is tested using the U.S. EPA test fuel, as outlined in 40 CFR Part 1065, the manufacturer shall demonstrate that the emission results are consistent with ARB Test Procedures. Manufacturers can use "commercially available fuels" to accumulate service hours but emission testing must be conducted using test fuel as specified in this section.

(2) During all engine tests, the engine shall employ lubricating oil consistent with the engine manufacturer's specifications for that particular engine. These specifications shall be recorded and declared in the verification application.

(d) *Service Accumulation*. The durability demonstration consists of an extended service accumulation period in which the LSI retrofit emission control system is used in the field or in a laboratory, with emissions reduction testing before and after the service accumulation. Service accumulation begins after the first emission test and concludes before the final emission test. The pre-conditioning period required in Section 2783 (c) cannot be used to meet the service accumulation requirements.

(1) Minimum Durability Demonstration Periods. The minimum durability demonstration period is 1,000 hours if it can be correlated or

demonstrated to be equivalent to 2,500 hours in-use. The applicant must provide to the Executive Officer sufficient written documentation to justify the request for the minimum durability demonstration period. The applicant may propose a sampling scheme that could be used to support an accelerated durability schedule for approval by the Executive Officer. The sampling scheme may include, but is not limited to, logging only significant changes in a parameter, averages, or changes above some threshold value. Data must be submitted electronically in columns as a text file or another format approved by the Executive Officer.

(2) Fuel for Durability Demonstrations. The fuel used during durability demonstrations should be equivalent to the test fuel, or a fuel with properties less favorable to the durability of the retrofit emission control system. Durability demonstrations may, at the applicant's option and with the Executive Officer's approval, include intentional use of out-of-specification fuels so that data on the effects of using out-of-specification fuels may be obtained.

(e) *Test Cycle*. Testing requirements are summarized in Table 3. Note that the same cycle(s) must be used for both the initial (zero hour) and final (2,500 hour) tests as defined in Section 2783 (e).

Table 3. Emission Tests Required for Durability Demonstrations

Application	***LSI Retrofit System Verification Date***	***Test Type***	***Zero-Hour Test (prior durability demonstration) 2,500-Hour Test (after completion of 100% of the durability demonstration or the minimum durability demonstration)***
Off-Road and portable engines	Pre-2007	Engine	Steady-state test cycle from ARB off-road regulations or U.S. EPA transient test cycle or an alternative cycle
Off-Road and portable engines	2007 and later	Engine	U.S. EPA transient test cycle or an alternative cycle

(f) *Test Run*. The number of tests to be conducted in accordance with the required test cycle shown in Table 3 is described below.

(1) The LSI retrofit emission control system must undergo one set of emission tests: (3 hot starts each for baseline and with the retrofit emission control system) at the beginning (zero hour) and one set of emission tests (3 hot starts for baseline and with the emission control system) after completion of the durability demonstration (2,500 hours) or the minimum durability demonstration period (1,000 hours). If there are substantial test data from

previous field studies or field demonstrations, applicants may request that the Executive Officer consider these in place of the initial emission tests.

(2) As an alternative to testing a single unit before and after the service accumulation period, the applicant may request that the Executive Officer consider the testing of two identical units, one that has been pre-conditioned and another that has completed the service accumulation period. In reviewing the request, the Executive Officer may consider all relevant information, including, but not limited to, the following:

(A) The effect of the LSI retrofit emission control system on engine operation over time. Strategies that cause changes in engine operation are likely not to qualify for this testing option.

(B) The quality of the evidence the applicant can provide to support that the two units are identical.

(C) Previous experience with similar or related technologies.

(g) *Maintenance During Durability Demonstration.* Except for emergency engine repair, only scheduled maintenance on the engine and LSI retrofit emission control system may be performed during the durability demonstration. If normal maintenance includes replacement of any component of the engine emission control system, the time (years or hours) between component change must be reported with the results of the demonstration. If emergency repair was conducted on an engine equipped with the LSI retrofit emission control system within the durability demonstration period, the applicant must, within 30 days of the repair, report to the Executive Officer on what repair was performed and what components were involved, and provide an explanation on the possible cause(s) for the engine's and/or LSI retrofit emission control system's malfunction. Based on the information provided by the applicant, the Executive Officer will decide whether to allow that engine to continue to be used in the durability demonstration program, or to start anew the durability demonstration period.

(h) *Performance Requirements.* The LSI retrofit emission control system must meet the following requirements throughout the durability demonstration period:

(1) If the applicant claims a percent emissions reduction, the percent emissions reduction must meet or exceed the minimum percent emissions reduction associated with the LSI Level for which the applicant is seeking verification.

(2) If the applicant claims a reduced emission level, the reduced emission level must not exceed the emission level associated with the LSI Level for which the applicant is seeking verification.

(3) The LSI retrofit emission control system must maintain its physical integrity. Its physical structure and all of its components not specified for regular replacement during the durability demonstration period must remain intact and fully functional.

(4) The LSI retrofit emission control system must not cause any damage to the engine, vehicle, or equipment.
(5) Except for emergency engine repair, no maintenance of the LSI retrofit emission control system beyond that specified in its owner's manual will be allowed without prior Executive Officer approval.

(i) *Failure During the Durability Demonstration Period.* If the LSI retrofit emission control system fails to maintain its initial verified percent emissions reduction or absolute emissions for any reason, the Executive Officer may downgrade the system to the verification level that corresponds to the lowest degraded performance observed in the durability demonstration period. If the LSI retrofit emission control system fails to maintain the emissions reduction performance pursuant to Sections 2784(h)(1) and 2784(h)(2), as demonstrated during the emission test pursuant to Section 2783, during the durability period, the LSI retrofit emission control system will not be verified. If the LSI retrofit emission control system fails in the course of the durability demonstration period, the applicant must submit a report explaining the circumstances of the failure within 90 days of the failure. The Executive Officer may then, as appropriate, determine whether to deny verification or allow the applicant to correct the failed LSI retrofit emission control system and either continue the durability demonstration or begin a new durability demonstration.

NOTE: Authority cited: Sections 39002, 39003, 39500, 39600, 39601, 39650-39675, 40000, 43000, 43000.5, 43011, 43013, 43018 and 43105, 43600, 43700, Health and Safety Code. Reference: Sections 43000, 43009.5, 43013, 43018, 43101, 43104, 43105, 43106, 43107, 43204, 43205, and 43205.5; Health and Safety Code.

§ 2785. Field Demonstration Requirements.

(a) *Compatibility.* The applicant must demonstrate compatibility of its LSI retrofit emission control system in the field with at least one piece of equipment belonging to the emission control group for which it seeks verification. Note that if the durability demonstration selected by the applicant is in-field, it may be used to satisfy the field demonstration requirement for that emission control group. An applicant that elected to demonstrate durability in-field must still comply with the reporting requirements as specified in 2785(c).
(1) Compatibility is determined by the Executive Officer based on the third-party statement (see section 2785 (c)) and any other data submitted. An LSI retrofit emission control system is compatible with the chosen application if it:
(A) Does not cause damage to the engine or engine malfunction;
(B) Does not hinder or detract from the vehicle or equipment's ability to perform its normal functions; and
(C) Is physically intact and well mounted with no signs of leakage or other visibly detectable problems.

(2) To determine whether separate field demonstrations are required when applying to extend additional engine or equipment in an existing emission control group or when applying to verify additional emission control groups, the Executive Officer may consider all relevant information, including, but not limited to existing field experience and engineering justification and analysis.

(b) *Test Period.* A piece of equipment must be operated with the LSI retrofit emission control system installed for a minimum period of 200 hours.

(c) *Reporting Requirements.* The applicant must provide a written statement from a third party approved by the Executive Officer, such as the owner or operator of the equipment used in the field demonstration. The written statement must be provided at the end of the test period and must describe the following aspects of the field demonstration: overall performance of the test application and the LSI retrofit emission control system, maintenance performed, problems encountered, and any other relevant information. The results of a visual inspection conducted by the third party at the end of the demonstration period must also be described. The description should comment on whether the LSI retrofit emission control system is physically intact, securely mounted, or leaking any fluids, and should include any other evaluative observations.

(d) *Failure During the Field Demonstration.* The LSI retrofit emission control system will be deemed to fail the field demonstration requirements if it could not comply with the criteria specified in Section 2785 (a)(1) during the test period. If the LSI retrofit emission control system fails in the course of the field demonstration, the applicant must notify ARB within 15 days of the failure, and submit a report explaining the circumstances of the failure within 90 days of the failure. The Executive Officer may then determine whether to deny verification or allow the applicant to correct the failed LSI retrofit emission control system and either continue the field demonstration or begin a new field demonstration.

NOTE: Authority cited: Sections 39002, 39003, 39500, 39600, 39601, 39650-39675, 40000, 43000, 43000.5, 43011, 43013, 43018 and 43105, 43600, 43700, Health and Safety Code. Reference: Sections 43000, 43009.5, 43013, 43018, 43101, 43104, 43105, 43106, 43107, 43204, 43205, and 43205.5; Health and Safety Code.

§ 2786. Other Requirements.

(a) *Fuel and Oil Requirements.* The applicant must specify the fuel and lubricating oil requirements necessary for proper functioning of the LSI retrofit emission control system. The applicant must also specify any consequences that will result from failure to comply with these requirements, as well as methods for reversing any negative consequences.

(b) *Maintenance Requirements*. The applicant must identify all normal maintenance requirements for the LSI retrofit emission control system and specify the recommended intervals for cleaning and/or replacing components. Components to be replaced within the defects warranty period must be included with the original LSI retrofit emission control system package or provided free of charge to the customer at the appropriate maintenance intervals. Any normal maintenance items that the applicant does not intend to provide free of charge must be approved by the Executive Officer (the applicant is not required to submit cost information for these.)

(c) *System Labeling.*

(1) The applicant must either affix legible and durable labels, or provide such labels to the installer along with instructions on how to affix them, on both the retrofit emission control system and the engine on which the retrofit emission control system is installed, except as noted in (3) below. The required labels must identify the name, address, and phone number of the manufacturer, the LSI retrofit emission control group name (defined in (2) below), a unique serial number for the LSI retrofit emission control system and the month and year of manufacture. The month and year of manufacture are not required on the label if this information can be readily obtained from the applicant by reference to the serial number. A scale drawing of a sample label must be submitted with the verification application. Unless an alternative is approved by the Executive Officer, the label information must be in the following format:

Name, Address, and Phone Number of Manufacturer
LSI Retrofit Emission Control Group Name
Product Serial Number
ZZ-ZZ (Month and Year of manufacture, e.g., 11-05)

(2) LSI Retrofit Emission Control Group Name. Each LSI retrofit emission control system shall be assigned a name defined as below:

CA/V/MMM/LL##/NHP## or NHL##/APP/XXXXX

Where:

CA: Designates an LSI retrofit emission control system verified in California
IV: Year of verification
MMM: Manufacturer code (assigned by the Executive Officer)
LL##: Verified LSI Level (e.g., LL2 means the retrofit system was verified to the "LSI Level 2", LL3a means the retrofit system was verified to "LSI Level 3a).
NHP##: Verified HC + NOx reduction percent (e.g., NH75 means HC + NOx reduction of 75 percent).
NHL##: Verified HC + NOx absolute emissions in units of g/bhp-hr, (e.g., NH3.0 means verified HC + NOx emission level of 3.0 g/bhp-hr).
APP: Verified application includes a combination of Off-road (OF),or Stationary (ST)
XXXXX: Five alphanumeric character code issued by the Executive Officer

(3) The applicant may request that the Executive Officer approve an alternative label. In reviewing this request, the Executive Officer may consider all relevant information including, but not limited to, the informational content of an alternative label as proposed by the applicant.

(d) *Additional Information.* The Executive Officer may require the applicant to provide additional information about the LSI retrofit emission control system or its implementation when such information is needed to assess environmental impacts associated with its use.

(e) *Owner's Manual.* The applicant must provide a copy of the LSI retrofit emission control system owner's manual, which must clearly specify at least the following information:
(1) Warranty statement including the warranty period over which the applicant is liable for any defects.
(2) Installation procedure and maintenance requirements for the LSI retrofit emission control system.
(3) Fuel consumption improvement or penalty, if any.
(4) Fuel requirements, if any.
(5) Requirements for lubrication oil quality and maximum lubrication oil consumption rate
(6) Contact information for replacement components and cleaning agents.
(7) Maintenance Requirements

(f) *Noise Level Control.* Applicants must ensure that the LSI retrofit emission control system complies with all applicable local government requirements for noise control.

(g) *Limit on CO.* In order for an LSI retrofit emission control system to be verified, it must comply with one of the following two limits on CO:
(1) For an LSI retrofit emission control system designed to be installed in a certified engine, the system must not increase the emissions of CO greater than the CO emission standards for new, emission-certified, off-road LSI engines adopted by the Air Resources Board and in effect for the model year in which the engine certification was issued;
(2) For an LSI retrofit system designed to be installed in an engine that is not emission-certified, the system must not cause the CO emission level to exceed the greater of 37 g/bhp-hr or ten percent above the engine's baseline CO emission level as determined in accordance with sections 2783 and 2784.

(h) *Emission Sampling Ports.* To facilitate in-field and normal maintenance diagnostic emission measurements, the applicant may choose to design the LSI retrofit emission control system to have a minimum of two sampling ports where emissions measurements could be made. Guideline suggestions for the sampling port criteria are presented here:

(1) The sampling ports are to be designed to allow for measurements of uncontrolled, engine-out emissions and controlled, tailpipe emissions;
(2) The sampling ports are to be ¼ inch NPT half couplings, either welded to the exhaust system, or manufactured into the retrofit emission control device where possible;
(3) The sampling port to be used for measuring uncontrolled, engine-out emissions is to be located in a straight section of the exhaust pipe upstream from the retrofit emission control device, after the turbocharger, if so equipped, with a minimum of one to two pipe diameters from any elbows upstream of the sampling port. It is acceptable to locate the sampling port adjacent to the oxygen sensor threaded port, if so equipped;
(4) The sampling port to be used for measuring controlled, tailpipe emissions is to be placed on the muffler body, after the catalyst, if so equipped, or if in the exhaust pipe, should be located a minimum distance of 10 inches from the tailpipe opening, if feasible, otherwise, it should be located as far as possible from the tailpipe opening;
(5) The locations of the sampling ports are to be designed to be accessible to test personnel without removing major engine or equipment components, such as the forklift counterweight, for example;
(6) The sampling ports are to be equipped with threaded plugs.
(7) If the sampling ports are designed to be installed by the retrofit system installer, the applicant must provide all necessary parts and complete instructions for proper installation;

NOTE: Authority cited: Sections 39002, 39003, 39500, 39600, 39601, 39650-39675, 40000, 43000, 43000.5, 43011, 43013, 43018 and 43105, 43600, 43700, Health and Safety Code. Reference: Sections 43000, 43009.5, 43013, 43018, 43101, 43104, 43105, 43106, 43107, 43204, 43205, and 43205.5; Health and Safety Code.

§ 2787. Warranty Requirements.

(a) (1) *Product Warranty.*

(A) The applicant must provide a warranty to all owners, for ownership within the warranty period, and lessees, for lease contract within the warranty period, that its verified LSI retrofit emission control system is free from defects in design, materials, workmanship, or operation of the LSI retrofit emission control system which cause the LSI retrofit emission control system to fail to conform to at least 90 percent of the its verified level for the minimum warranty period of 3 years or 2,500 hours, whichever occurs first, provided the operation of and conditions of use for the equipment, engine, and LSI retrofit emission control system conform with the operation and conditions specified in the ARB's Executive Order and that the engine or equipment belongs to the emission control group as specified in the ARB's Executive Order for that LSI retrofit emission control system.

(B) In the absence of a device to measure hours of use, the LSI retrofit emission control system must be warranted for a period of three years.

If a device to measure hours is used, the engine must be warranted for 3 years or 2,500 hours, whichever occurs first. The warranty must cover the full repair or replacement cost of the LSI retrofit emission control system, including parts and labor.

(C) The warranty must also cover the full repair or replacement cost of returning the engine components to the condition they were in prior to the failure, including parts and labor, for damage to the engine proximately caused by the verified LSI retrofit emission control system. Repair or replacement of any warranted part, including the engine, must be performed at no charge to the equipment or engine owner. This includes only those relevant diagnostic expenses if a warranty claim is valid. The applicant may, at its option, instead pay the fair market value of the engine prior to the time the failure occurs.

(D) The repair or replacement of any warranted part, otherwise eligible for warranty coverage, may be excluded from such warranty if the LSI retrofit emission control system or engine has been abused, neglected, or improperly maintained, and such abuse, neglect, or improper maintenance was the direct cause of the need for the repair or replacement of the part.

(E) Failure of the equipment or engine owner to ensure scheduled maintenance or to keep maintenance records for the equipment, engine, or LSI retrofit emission control system may, but shall not per se, be grounds for disallowing a warranty claim.

(2) *Installation Warranty*

(A) A person or company that installs a verified LSI retrofit emission control system must warrant that the installation is free from defects in workmanship or materials which cause the LSI retrofit emission control system to fail to conform to at least 90 percent of its verified level for the minimum warranty period of 3 years or 2,500 hours, whichever occurs first, except as noted in 2787(a)(1)(B), or the other requirements as specified in sections 2786(c) and (e).

(B) The extent of the warranty coverage provided by installers must be the same as the warranty provided by the applicant as established in subsection (a)(1) and the same exclusions must apply.

(b) (1) *Product Warranty Statement.* The applicant must furnish a copy of the following statement in the owner's manual. The applicant may include descriptions of circumstances that may result in a denial of warranty coverage, but these descriptions shall not otherwise limit warranty coverage in any way.

YOUR PRODUCT WARRANTY RIGHTS AND OBLIGATIONS

(Applicant's name) must warrant the LSI retrofit emission control system in the equipment for which it is sold or leased to be free from defects in design, materials, workmanship, or operation of the LSI retrofit emission control system which cause the LSI retrofit emission control system to fail to conform to the emission control performance level it was verified to, or to the requirements in the California Code of Regulations, Title 13, Chapter 9, Article 8, Sections 2780 to 2786, and 2789, for 3 years or 2,500 hours, whichever occurs first, pursuant to Section 2787(a)(1), provided there has been no abuse, neglect, or improper maintenance of your LSI retrofit emission control system, engine or equipment, as specified in the owner's manuals. Where a warrantable condition exists, this warranty also covers the engine from damage caused by the LSI retrofit emission control system, subject to the same exclusions for abuse, neglect or improper maintenance. Please review your owner's manual for other warranty information. Your LSI retrofit emission control system may include a core part (e.g., three-way catalyst, carburetor, mixer or regulator) as well as hoses, connectors, and other emission-related assemblies. Where a warrantable condition exists, (applicant's name) will repair or replace your LSI retrofit emission control system at no cost to you including diagnosis, parts, and labor.

WARRANTY COVERAGE:

For a (engine size) engine used in a(n) (type of application) application, the warranty period will be 3 years or 2,500 hours of operation, whichever occurs first. If any emission-related part of your LSI retrofit emission control system is defective in design, materials, workmanship, or operation of the LSI retrofit emission control system thus causing the LSI retrofit emission control system to fail to conform to the emission control performance level it was verified to, or to the requirements in the California Code of Regulations, Title 13, Chapter 9, Article 8, Sections 2780 to 2786, and 2789, within the warranty period, as defined above. (Applicant's name) will repair or replace the LSI retrofit emission control system, including parts and labor.

In addition, (applicant's name) will replace or repair the engine components to the condition they were in prior to the failure, including parts and labor, for damage to the engine proximately caused by the verified LSI retrofit emission control system. This also includes those relevant diagnostic expenses in the case in which a warranty claim is valid. (Applicant 's name) may, at its option, instead pay the fair market value of the engine prior to the time the failure occurs.

OWNER'S WARRANTY RESPONSIBILITY

As the (engine, equipment) owner, you are responsible for performing the required maintenance described in your owner's manual. (Applicant's name) recommends that you retain all maintenance records and receipts for maintenance expenses for your engine or equipment, and LSI retrofit emission control system. If you do not keep your receipts or fail to perform all scheduled maintenance, (applicant's name) may have grounds to deny warranty coverage. You are responsible for presenting your equipment or engine, and LSI retrofit emission control system to (applicant's name) or a (applicant's name) dealer as soon as a problem is detected. The warranty repair or replacement should be completed in a reasonable amount of time, not to exceed 30 days. If a replacement is needed, this may be extended to 90 days should a replacement not be available, but must be performed as soon as a replacement becomes available.

If you have questions regarding your warranty rights and responsibilities, you should contact (Insert chosen applicant's contact) at 1-800-xxx-xxxx or the California Air Resources Board at 9528 Telstar Avenue, El Monte, CA 91731, or (800) 363-7664, or electronic mail: helpline@arb.ca.gov.

(b)(2) *Installation Warranty Statement.* The installer must furnish the owner with a copy of the following statement.

YOUR INSTALLATION WARRANTY RIGHTS AND OBLIGATIONS

(Installer's name) must warrant that the installation of an LSI retrofit emission control system is free from defects in workmanship or materials which cause the LSI retrofit emission control system to fail to conform to the emission control performance level it was verified to, or to the requirements in the California Code of Regulations, Title 13, Sections 2781 to 2786 and 2789. The warranty period and the extent of the warranty coverage provided by (installer's name) must be the same as the warranty provided by the product manufacturer, and the same exclusions must apply.

OWNER'S WARRANTY RESPONSIBILITY

As the engine or equipment owner, you are responsible for presenting your engine or equipment and LSI retrofit emission control system to (installer's name) as soon as a problem with the installation is detected.

If you have questions regarding your warranty rights and responsibilities, you should contact (Insert chosen installer's contact) at 1-800-xxx-xxxx or the California Air Resources Board at 9528 Telstar Avenue, El Monte, CA 91731, or (800) 363-7664, or electronic mail: helpline@arb.ca.gov.

(c) (1) *Annual Warranty Report.* The applicant must submit a warranty report to the Executive Officer by February 1 of each calendar year. The warranty report must include the following information:

(A) Annual and cumulative sales, and annual and cumulative leases of equipment installed with LSI retrofit emission control systems—(California only).

(B) Annual and cumulative production of LSI retrofit emission control systems (California only).

(C) Annual summary of warranty claims (California only). The summary must include:

i. A description of the nature of the claims and of the warranty replacements or repairs. The applicant must categorize warranty claims for each LSI retrofit emission control system group by the component(s) part number(s) replaced or repaired.

ii. The number and percentage of LSI retrofit emission control systems of each model for which a warranty replacement or repair was identified.

iii. A short description of the LSI retrofit emission control system component that was replaced or repaired under warranty and the most likely reason for its failure.

(E) (D) Date the warranty claims were filed and the engine family and application the LSI retrofit emission control systems were used with. The reason(s) for any instances in which warranty service is not provided to end-users that file warranty claims. The applicant may also want to report instances where the applicant chose to honor warranty claims even though the applicant has determined that those warranty claims were invalid or that they were not required per Section 2787 of this regulation.

(c) (2) *Periodic Warranty Reports.*

(A) The applicant must submit a warranty report within 30 calendar days if there are three or more warranty claims for the same component or same part number repaired or replaced; or, if there are four or more total warranty claims, or four percent of the cumulative number of LSI retrofit systems subject to these warranty provisions, whichever is greater. The warranty report must include the following information:

i. A description of the nature of the claims and of the warranty replacements or repairs. The applicant must categorize warranty claims for each LSI retrofit emission control group by the component(s) part number(s) replaced or repaired.

ii. The number and percentage of LSI retrofit emission control systems of each model for which a warranty replacement or repair was identified.

iii. A short description of the LSI retrofit emission control system component that was replaced or repaired under warranty and the most likely reason for its failure.

iv. Date the warranty claims were filed and the engine family and application the LSI retrofit emission control systems were used with.

v. The reason(s) for any instances in which warranty service is not provided to end-users that file warranty claims. The applicant may also want to report instances where the applicant chose to honor warranty claims even though the applicant has determined that those warranty claims were invalid or that they were not required per Section 2787 of this regulation.

(B) The applicant must comply with the requirements specified pursuant to Section 2787(c)(2)(A), above, for warranty claims submitted to the applicant after the reporting dates of the periodic warranty report.

NOTE: Authority cited: Sections 39002, 39003, 39500, 39600, 39601, 39650-39675, 40000, 43000, 43000.5, 43011, 43013, 43018 and 43105, 43600, 43700, Health and

Safety Code. Reference: Sections 43000, 43009.5, 43013, 43018, 43101, 43104, 43105, 43106, 43107, 43204, 43205, and 43205.5; Health and Safety Code.

§ 2788. Determination of Emissions Reduction.

(a) *Calculation of Emissions Reduction.* The emissions reduction verified for an LSI retrofit emission control system is based on the average of all valid test results, as specified in Sections 2783(g) and 2784(f), before (baseline) and after (control) implementation of the LSI retrofit emission control system. Test results from both the emission testing and durability testing are to be included. If the applicant chooses to perform either the zero hour or the 2500-hour durability baseline test, but not both, those results must be used to calculate the reductions obtained in both the zero hour and 2500-hour control tests.

(1) Percentage Reduction. The percentage reduction for a given pair of baseline and control test sets (where a "set" consists of all test cycle repetitions) is the difference between the average baseline and average control emissions divided by the average baseline emissions, multiplied by 100 percent. The average of all such reductions, as shown in the equation below, is used in the verification of an LSI retrofit emission control system.

$$\text{Percentage Reduction} = 100 \times \frac{\Sigma\left[(\text{baseline}_{AVG} - \text{control}_{AVG})/\text{baseline}_{AVG}\right]}{\text{Number of control test sets}}$$

Where:

Σ = sum over all control test sets

baseline_{AVG} or control_{AVG} = average of emissions from all baseline or control test repetitions within a given set

(2) Absolute Emission Level. The absolute emission level is the average control emission level, as defined in the following equation:

$$\text{Absolute Emission Level} = \frac{\Sigma\,(\text{control}_{AVG})}{\text{Number of control test sets}}$$

(b) *Categorization of the LSI Retrofit Emission Control System.* The Executive Officer shall categorize an LSI retrofit emission control system to reduce HC and NOx emissions based on its verified emissions reductions. An LSI retrofit emission control system that reduces HC and NOx will be assigned its verified percentage reduction or verified emissions reduction level, pursuant to section 2782(f).

The Executive Officer may lower the verification level or revoke the verification status of a verified LSI retrofit emission control group if the applicant fails to observe the requirements of Sections 2786 or 2787. The

Executive Officer must allow the applicant an opportunity to address the possible lowering or revocation of the verification level in a corrective report to the Executive Officer and the Executive Officer may make this determination based on all relevant information.

NOTE: Authority cited: Sections 39002, 39003, 39500, 39600, 39601, 39650-39675, 40000, 43000, 43000.5, 43011, 43013, 43018 and 43105, 43600, 43700, Health and Safety Code. Reference: Sections 39650-39675, 43000, 43009.5, 43013, 43018, 43101, 43104, 43105, 43106, 43107, and 43204-43205.5 Health and Safety Code; Title 17 California Code of Regulations Section 93000.

§ 2789. In-Use Compliance Requirements.

(a) *Applicability.* These in-use compliance requirements apply to all LSI retrofit emission control systems for off-road applications. It is the responsibility of the applicant to perform in-use compliance testing for each verified LSI retrofit emission control group. Testing is required when 50 units within a given LSI retrofit emission group have been sold or leased in the California market.

(b) *Test Period.* Applicants must obtain access to and test LSI retrofit emission control systems, as described below in (c), (d), and (e), once they have been operated between 1,500 and 2,000 hours or between 22 and 29 months, whichever comes first.

(c) *Selection of LSI Retrofit Emission Control Systems for Testing.* For each LSI retrofit emission control group, the Executive Officer will identify a representative sample of engines or equipment equipped with LSI retrofit emission control systems for in-use compliance testing. The engines or equipment with the selected LSI retrofit emission control systems installed must have good maintenance records and may receive a tune-up or normal maintenance prior to testing. The applicant must obtain information from the end users regarding the accumulated hours of usage, maintenance records (to the extent practicable), operating conditions and a description of any unscheduled maintenance that may affect the emission results. If the specified information is not available for the engine or equipment selected, the Executive Officer may select a different engine or equipment for testing. Upon notification that an engine or equipment has been selected, an applicant would have 6 months to provide an in-use compliance testing proposal for approval by the Executive Officer. Testing would begin when the engines had accumulated sufficient hours of service; testing must be completed within one year of notification.

(d) *Number of LSI Retrofit Emission Control Systems to be Tested.* The number of LSI retrofit emission control systems an applicant must test will be determined as follows:

(1) A minimum of four LSI retrofit emission control systems in each LSI retrofit emission control group must be tested. For every system tested that does

not reduce emissions by at least 90 percent of the lower bound of its initial verification level, two more LSI retrofit emission control systems from the same group must be obtained and tested. The total number of systems tested shall not exceed ten per LSI retrofit emission control group.

(2) At the discretion of the Executive Officer, applicants may begin by testing more than the minimum of four LSI retrofit emission control systems. Applicants may concede failure of an emission control system before testing a total of ten LSI retrofit emission control systems.

(e) *In-use Compliance Emission Testing.* Applicant must measure emissions using one of the following test procedures for in-use compliance emission testing:

(1) *Laboratory Testing.* Remove the selected engines or the retrofit emission control systems for testing in a laboratory. Applicants must follow the testing procedure used for initial emissions reduction verification as described in Section 2783. For engines originally verified to a percentage reduction, both baseline and control tests are required; for engines originally verified to an absolute emission, only control tests are required. In addition, applicants must use the same test cycle(s) that they used to verify the LSI retrofit emission control system originally.

(2) *Testing Installed Engines.* Test the selected engines while they remain installed in the equipment. Applicants must follow the U.S. EPA field-testing procedures as specified in 40 CFR part 1065, subpart J, as adopted November 8, 2002. The accuracy and precision of the measurement system used for in-use testing must be at least +/-5 percent or better. For engines originally verified to a percentage reduction, both baseline and control tests are required; for engines originally verified to an emission level, only control tests are required.

(3) *Alternative In-Use Testing.* The Executive Officer may approve an alternative to the in-use testing described above, on a case-by-case basis. The proposed alternative must use scientifically sound methodology and be designed to accurately determine whether the LSI retrofit emission control system is in compliance with the requirements that are specified in the verification Executive Order. If the applicant wants to use an alternative in-use test procedure, the applicant should submit the proposed alternative in-use test procedure at the same time the applicant submits the proposed verification testing procedure (pursuant to Section 2782(b) for LSI retrofit control system verification. If the applicant proposes an alternative test to determine in- use emissions of the LSI retrofit system, the applicant must provide data to show that the emission test results from the proposed alternative test are consistent with the emission test results derived from engine dynamometer test for the test cycle(s) that was used in the initial verification of the LSI retrofit system.

(f) If an LSI retrofit emission control system fails catastrophically during the in-use compliance testing, the applicant must provide an investigative report detailing the causes of the failure to the Executive Officer within 90 days of the failure.

(g) The Executive Officer may, with respect to any LSI retrofit emission control system sold, leased, offered for sale, or manufactured for sale in California, order the applicant to make available for compliance testing and/or inspection a reasonable number of LSI retrofit emission control systems, and may direct that the retrofit emission control systems be delivered at the applicant's expense to the state board at the Haagen-Smit Laboratory, 9528 Telstar Avenue, El Monte, California or where specified by the Executive Officer. The Executive Officer may also, with respect to any LSI retrofit emission control system being sold, leased, offered for sale, or manufactured for sale in California, have an applicant compliance test and/or inspect a reasonable number of units at the applicant or manufacturer's facility or at any test laboratory under the supervision of the ARB Executive Officer.

(h) *In-Use Compliance Report*. The applicant must submit an in-use compliance report to the Executive Officer within three months of completing testing. The following information must be reported for each of the minimum of four LSI retrofit emission control systems tested:

(1) Parties involved in conducting the in-use compliance tests.
(2) Quality control and quality assurance information for the test equipment.
(3) LSI retrofit emission control group name and manufacture date.
(4) Equipment and type of engine (engine family name, make, model year, model, displacement, etc.) the LSI retrofit emission control system was applied to.
(5) Estimated hours the LSI retrofit emission control system was in use.
(6) Results of all emission testing.
(7) Summary of all maintenance, adjustments, modifications, and repairs performed on the LSI retrofit emission control system.

(i) The Executive Officer may request the applicant to perform additional in-use testing if the warranty claims exceed the thresholds specified in section 2787(c)(2)(A) or based on other relevant information. As noted in section 2787(c)(2)(A), if warranty claims exceed the specified thresholds, the applicant must notify the Executive Officer and submit a warranty report within 30 calendar days of that time.

(j) Conditions *for Passing In-Use Compliance Testing*. For an LSI retrofit emission control system to pass in-use compliance testing, emission test results must indicate that the retrofit system reduced emissions by at least 90 percent of the lower bound of the emissions reduction level to which the Executive Officer originally verified it to. If the first four LSI retrofit emission control systems tested within an LSI retrofit emission control group meet this standard, the LSI retrofit emission control group passes in-use compliance testing. If any of the first four LSI retrofit emission control systems tested within an LSI retrofit emission control group fail to reduce emissions by at least 90 percent of the lower bound of the emissions reduction level to which the Executive Officer originally verified it to, and if more than four units are tested, at least 70 percent of all units tested must pass the 90 percent standard for the LSI retrofit emission control group to pass in-use compliance testing. For each failed test, for which the cause of failure can be attributed to the product and not to maintenance or other engine-related problems, two additional units must be tested, up to a total of ten units per LSI retrofit emission control group.

(k) *Failure of In-use Compliance Testing – Remedial Action*. If the LSI retrofit system from an emission control group does not meet the minimum requirements for in-use compliance testing, the applicant must submit a remedial report within 90 days after the in-use compliance report is submitted. The remedial report must include:

(1) Summary of the in-use compliance report.

(2) Detailed analysis of the failed LSI retrofit emission control systems and possible reasons for failure.

(3) Remedial measures to correct or replace failed LSI retrofit emission control systems as well as the rest of the in-use LSI retrofit emission control systems.

(l) The Executive Officer may evaluate the remedial report, annual warranty report, and all other relevant information to determine if the LSI retrofit emission control group passes in-use compliance testing. The Executive Officer may request more information from the applicant. Based on this review, the Executive Officer may lower the verification level or revoke the verification status of a verified LSI retrofit emission control group. The Executive Officer may also lower the verification level or revoke the verification status of a verified LSI retrofit emission control group, if the applicant does not conduct in-use compliance testing in accordance with this section, or if the Executive Officer conducts in-use compliance testing in accordance with this section (including alternative testing) and the LSI retrofit emission control group does not pass the standards in this section. The Executive Officer must allow the applicant an opportunity to address the possible lowering or revocation of the verification level in a remedial report to the Executive Officer prior to taking action lowering or revoking the verification level, and shall consider all relevant information.

NOTE: Authority cited: Sections 39002, 39003, 39500, 39600, 39601, 39650-39675, 40000, 43000, 43000.5, 43011, 43013, 43018 and 43105, 43600, 43700, Health and Safety Code. Reference: Sections 43000, 43009.5, 43013, 43018, 43101, 43104, 43105, 43106, 43107, 43204, 43205, and 43205.5; Health and Safety Code.

APPENDIX C: VERIFICATION PROCEDURE
Part 2

Proposed Verification Procedures for Retrofit Emission Control Systems for Off-Road Industrial Engines

APPENDIX C, PART 2:
VERIFICATION PROCEDURE DISCUSSION

The Air Resources Board (ARB or Board) and equipment manufacturers share the responsibility to ensure that emission control systems for retrofit use on existing engines and equipment are functional and durable. This responsibility is greater yet when ARB's regulations directly require the systems end users to achieve emission reductions from the equipment and engines they own and operate as with the proposed LSI fleet requirements. ARB staff, based on significant input from industry and related trade groups, has developed a procedure to verify and ensure that control equipment is durable and effective in reducing emissions.

This document describes the verification procedure that the ARB will use to evaluate retrofit technologies and the claimed emission reductions of oxides of nitrogen (NOx) and hydrocarbons (HC) from off-road large spark-ignition LSI engines. The proposed Verification Procedure (Procedure) establishes a way for manufacturers to demonstrate to the ARB that their retrofit emission control system provides real and durable emission reductions while not increasing carbon monoxide (CO) above existing established levels. Resulting emissions benefits when using these retrofit systems will be used to meet SIP requirements or for calculating cost effectiveness for applicants to incentive programs.

The ARB's role is to ensure that the reduction claims for a given retrofit emissions control system are real, quantifiable, and durable. The ARB must also establish the emission reduction level, as well as verify that the equipment has passed rigorous field tests and investigate any secondary emissions of concern.

While developing the Procedure staff addressed important issues such as verifying the reduction claims, including durability, warranty, and in-use emissions. The durability and warranty requirements ensure that manufacturers are building retrofit emission control systems (RECS) with sufficient durability to meet the verified emission levels as the systems age. In-use compliance testing is a way to show ARB staff that the unit produced remains consistent with verified designs and continues to function as designed after it has left the manufacturing plant.

1. PROPOSED REGULATION

Participation in the verification process is voluntary. The proposed Procedure outlines the requirements to which an applicant must fully comply: conduct emission tests, conduct durability and field demonstrations and submit the results to the ARB along with other information in the prescribed application format.

When the ARB completes the evaluation of a RECS, and is satisfied that the RECS reduces emissions, the Executive Officer will notify the applicant in writing and issue an Executive Order. The Executive Order states the verified emission reduction level and any conditions that are necessary to support or sustain that verification. The verification also requires that the applicant provide a detailed warranty, conduct in-use compliance testing of the system after having sold or leased a specified number of units and report the results to the Executive Officer.

2. Applicability and Purpose

The Verification Procedures apply to retrofit control systems, which through the use of sound, proven science and engineering will control emissions HC, NOx and CO from off-road LSI engines. The use of control systems verified in accordance with the proposed verification procedure may be a means of complying with other state board regulations applicable to LSI engines, to the extent provided for in those regulations.

3. APPLICATION PROCESS

3.1 Letter of Intent – Proposed Verification Plan

Prior to submitting a formal application for verification, the applicant must submit a letter of intent to apply for verification of their retrofit system. This will ensure that the applicant includes all information necessary for the ARB staff to conduct an initial evaluation. Providing such information will also ensure that the applicant understands the requirements and thus not spend extra time and resources conducting unnecessary testing. The letter should include:

- Identification of the contact persons, phone numbers, names and addresses of the responsible party proposing to submit an application
- A general description of the technical principles of the retrofit operation
- Plans for meeting the testing and other verification requirements or existing test data
- A percent emission reduction and/or brake-specific emission limit that the system is expected to achieve throughout the emission durability period
- Proposed emission control group and parameters
- Plans for meeting the testing and other verification requirements – including any existing test data
- Previous test data
- A brief statement that the applicant agrees to provide a warranty

3.2 Plan Review Timeframe

During the initial review, ARB staff may be requesting more information and understanding of how the RECS functions on the target equipment. If the Executive Officer determines that the applicant has not made a satisfactory demonstration that the product designed to achieve the claimed emission reductions is based on sound principles of science and engineering, the Executive Officer shall notify the applicant in writing. The applicant has 60 days from the date of the notification letter to decide whether to submit additional materials and clarifications or discontinue their participation in the verification process.

If the ARB staff determines that the retrofit system appears to be technologically sound and appropriate for the identified emission control group, the applicant will be notified of this finding. The applicant may then proceed with satisfying the remaining requirements for full verification of their RECS. Once the applicant and staff agree on the proposed verification plan any modifications to the prescribed test equipment and/or test procedures must be approved in advance by the Executive Officer and described later in the formal verification application.

3.3 Formal Application

When all prescribed verification testing is complete, the applicant may then submit a formal application. The test results along with other information should be submitted in the approved application format included in the proposed verification procedure. The ARB has 30 days to review this application for completeness and to determine whether additional information is required. Within 60 days after an application has been deemed complete, the staff will determine whether the RECS merits verification.

The Executive Officer shall notify the applicant of the decision in writing and issue an Executive Order specifying the Verification level and state absolute emissions or percentage reduction.

If the retrofit system passes the verification process, a performance classification level will be assigned by the Executive Officer. The level will be either the percentage reduction or the absolute emissions as shown in Table 1 below.

3.4 Data Submission

Any data submission must be in an electronic file that is column-delimited format or an alternative format approved by the Executive Officer. The appropriateness of allowing alternatives to the prescribed requirements will be taken into consideration at this time.

Emission tests used to support emission reduction claims must be reported in total hydrocarbons, oxides of nitrogen, and carbon monoxide. Emission test units must be reported in grams/brake horsepower-hour (g/bhp-hr.)

4. Classification of Retrofit Emission Control Levels

Achieving large reductions in emissions with retrofit emissions control systems may not be a pragmatic proposal for all LSI engines and equipment. In recognition of this, and to facilitate the implementation of current emission control strategies, the ARB has proposed a procedure that would allow multiple levels of system verifications rather than a single level. The proposed levels are based on the performance of current LSI retrofit emission control system technology and input from industry. A multi-level approach gives a hierarchy for emission reduction technologies.

The multi-level verification classification consists of four HC + NOx reduction levels as shown in Table 1. The proposed levels should broaden both the spectrum of control technologies available and the number of applications that can be controlled. It should be noted that while staff is recommending a multi-level approach to verification, ARB is not deviating from the goal to realize the maximum reductions in HC + NOx emissions from LSI equipment that is economically and technologically feasible.

Table 1. LSI Engine Retrofit System Verification Levels

Classification	*Percentage Reduction (HC+NOx)*	*Absolute Emissions (HC+NOx)*
LSI Level 1 (1)	≥ 25% (2)	Not Applicable
LSI Level 2 (1)	≥ 75% (3)	3.0 g/bhp-hr (3)
LSI Level 3a (1)	≥ 85% (4)	0.5, 1.0, 1.5, 2.0, 2.5 g/bhp-hr
LSI Level 3b (5)	Not Applicable	0.5, 1.0, 1.5, 2.0 g/bhp-hr

(1) Applicable to uncontrolled engines only
(2) The allowed verified emission reduction is capped at 25% regardless of actual emission test values
(3) The allowed verified reduction for LSI Level 2 is capped at 75% or 3.0 g/bhp-hr regardless of actual emission test values
(4) Verified in 5% increments, applicable to LSI Level 3a classifications only
(5) Applicable to emission-controlled engines only

4.1 Emission Control Groups

An emission control group is a set of LSI engines or applications that is determined by a group of common parameters that affect the performance of particular RECS. An after-market system would likely be flexible enough for use on a diverse group of engine models and equipment, including different engine makes, years, and fuel types. Categorizing the engine "universe" in this way is an effective method for reducing the amount of testing needed and allows ARB to evaluate diverse technologies with a single verification Procedure.

Significant parameters for the RECS of both the engine and application are considered in creating "emission control groups." The exact parameters depend on the nature of the RECS and may include, but are not limited to, baseline or certification levels of engine emissions, displacement, horsepower rating, duty cycle, fuel delivery systems and fuel. The emission control group may be comprised of several engine families, applications and engine manufacturers.

Staff expects that the procedure will be used for a wide range of technologies, each with its own nature, strengths and weaknesses. Because the applicant is most acquainted with the engines and equipment the RECS will work on, ARB staff recognizes the importance of applicant input in the early stages of the application process when the emission control group is identified for verification.

The applicant should submit its proposed emission control group and parameters for the RECS with their proposed verification plan. A RECS system that employs two or more individual sub-systems or components would be tested and submitted for evaluation as one system. This coordination with staff will also help identify appropriate use of any existing data and potentially reduce the amount of testing that would be required under an emission control group system.

Emission control groups are fully integrated into the procedure for both initial verifications and extensions of existing verifications. For the initial verification of a RECS, the applicant must restrict its application to a single emission control group. By restricting the scope of the first application, staff is better able to conduct a thorough review of the retrofit emission control system.

4.2 Extensions of a Verification

After the RECS has been successfully verified for one emission control group, the applicant may extend the verification by submitting data showing that the retrofit emission control system would be effective on other engines or equipment. Any information deemed necessary by the Executive Officer to address differences between the emission control group already verified and the additional emission control group(s) or engines could be required for the extension.

If the applicant has design modifications of the RECS in the original verification, an extension of the original Executive Order or issuance of an additional Executive Order can be made through this same verification procedure. The applicant may use additional test data, engineering analysis or justification, and any other information deemed essential by staff. Processing time periods are consistent with initial verification.

5. Verification Requirements

5.1 Emissions Reductions Testing

The applicant's proposed plan and the formal application must focus on testing the retrofit emission control system on engines representing a single identified emission control group. Some manufacturers of RECS have been conducting testing and evaluation of their emissions control systems for a number of years. That test information has mainly been used to assist their customers in controlling exposure of individuals to CO emissions while operating power equipment in confined space environments. ARB staff anticipates that some applicants may request to use the existing test data for verification purposes. The applicant is encouraged to submit with their verification plan any existing test data or their plans for meeting the emission testing, durability testing, field compatibility and the later in-use compliance testing requirements of the procedure. Based on this information and discussions, staff will determine whether testing requirements are already partially or fully satisfied.

The primary aim of emission testing is to ensure that retrofit emission control systems give real emission reductions while minimizing any generation of harmful secondary emissions by presenting test results for representative engines/equipment from the chosen emissions control group. Engine family name when available, make, model designation (e.g. name or number) and model year should be used for the test engine identification.

Baseline emission test data must be collected for HC and NOx as well as the emission test data after the RECS is installed. If this verification is for a retrofit to be used on a certified engine, the certification emission standards can be used as the baseline emission test data. Baseline emissions data for CO is required to insure that the RECS does not cause the CO emissions to exceed the allowed limits.

The appropriate test cycles to use in the testing are shown in Table 2 below.

Table 2. Test Cycles for Emission Reduction Testing

Test Type	LSI Retrofit System Verification Date	Off-Road (including portable engines)	Off-Road (constant-speed operation)
Engine	Pre-2007	Steady-state test cycle from ARB off-road regulations or U.S. EPA transient test	Steady-state test cycle from ARB off-road regulations or U.S. EPA transient test
Engine	2007 and later	U.S. EPA transient test	U.S. EPA transient test

5.2 Test Engine Selection

The applicant will identify the engine/s that best represent the chosen emission control group for testing. Appropriate identification of test engines would be the make, model, model year, HC, NOx, and CO baseline emission test levels for uncontrolled equipment, or HC, NOx, and CO certification standards and engine family name for engines subject to emission regulations.

The applicant must also describe the equipment applications on which the RECS is intended to be used, by giving examples of in-use equipment, characterizing typical duty cycles, indicating any fuel requirements, and/or providing other application-related information.

5.3 Test Fuel

The testing fuel used shall be consistent with the fuel specifications as outlined in the "California Exhaust Emission Standards and Test Procedures for 2001 and Subsequent Model Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles," as referenced in Title 13, California Code of Regulations, section 1961 (d). If testing will be done using U.S. EPA fuel, as outlined in title 40, Code of Federal Regulations (CFR), part 1065, the manufacturer shall demonstrate that the emission results are consistent with the above ARB test procedures. Manufacturers may, however use "commercially available fuels" to accumulate service hours.

During all engine tests, the engine shall employ lubricating oil consistent with the engine manufacturer's specifications for that particular engine. These specifications shall be recorded and declared in the verification application.

5.4 Test Cycle

The test used for the verification should follow the test cycles specified in the Table 2 or with an alternative cycle(s) approved by the Executive Officer. For off-road engines used in constant-speed operation, the applicant must use the D-2 steady state test cycle or another appropriate off-road test cycle representing the operating conditions of the application, with approval from the Executive officer, or the U.S. EPA transient test.

The applicant may request the Executive Officer approve an alternative test cycle or method in place of a required test cycle or method if the need arises. Some of the criteria staff will use in evaluating a proposed alternative are:

- Similarity of characteristics to the specified test cycle or method and in-use duty cycle
- Existing test data generated using the alternative test cycle or method
- Technological necessity
- Technical ability to conduct the required test

5.5 Testing and Emissions Analysis

A minimum of three hot start tests for the test cycle selected must be run for both the baseline configuration without emissions controls and with the implemented RECS configuration. For all test runs used to support emission reduction claims, the applicant must report emissions of total HC, NOx, and CO in grams per brake horsepower-hour.

Test data must be submitted in electronic file in comma-delimited columns or another format approved by the Executive Officer.

The Executive Officer may require the applicant to perform additional analyses if there is reason to believe that the use of the RECS may result in the increase of toxic air contaminants, or other harmful compounds. In the determination, the Executive Officer may consider all relevant data, including but not limited to the following:

- The nature of any substance added to the fuel, intake air, or exhaust stream
- Whether a catalytic reaction is known or reasonably suspected to increase toxic air contaminants or ozone precursors
- Results from scientific literature
- Field experience

5.6 Durability Demonstration

The previous section on emission testing described the process ARB would use to evaluate the emission reductions for the RECS and to determine if the reductions are real. This section focuses on the process for verifying that the RECS emission reductions are durable. Testing conducted in the durability demonstration provides a picture of how the performance of the RECS may change over time. Testing gives further certainty that the emissions control system is durable and physically functional.

The durability demonstration consists of operating the system in the field or in a laboratory for 2,500 hours. Emissions testing must be performed both at the beginning and end of the demonstration period. If the applicant chooses to conduct all the durability accumulation services in the laboratory, an in-field compatibility demonstration report would be required.

If the applicant has demonstrated durability for an identical system in a prior verification or has demonstrated durability through field experience, the applicant may request ARB to accept the previous demonstration. In evaluating such a request, staff will consider relevant information including, but not limited to:

- Similarity of baseline emissions and application duty cycles
- The relationship between the emission control group used in previous testing and the current emission control group
- Number of engines tested
- Evidence of successful operation and user acceptance
- Published reports

If the RECS fails to maintain the initial verified percent emission reduction or absolute emission level during the durability demonstration period, ARB will either deny the verification or downgrade the system to the verification level corresponding to the appropriate lower performance level.

If the RECS fails to maintain at least a 25% reduction, it cannot be verified. The applicant must submit a report explaining the circumstances of the failure. ARB will then determine if the applicant should continue the durability demonstration after fixing the failed system or begin a new durability demonstration.

5.7 Test Engine Selection

The applicant may choose the engine and application to be used in the durability demonstration subject to ARB approval. The selected engine need not be the same engine used for emission reduction testing, but if the applicant does use the same engine, the emission reduction testing results can also be used for the zero hour durability test requirement.

5.8 Service Accumulation

Durability demonstration consists of an extended service accumulation period in combination with emission reduction testing before and after the service accumulation. Service accumulation begins at the zero hour and concludes at 2,500 hours. The applicant could choose to satisfy the durability demonstration by complying with the requirements for a shorter durability period. The minimum durability demonstration period would be 1,000 hours if it can be correlated with or demonstrated to be equivalent to 2,500-hour in-use.

The applicant must provide sufficient documentation to justify the request for a shorter durability demonstration period. The applicant may propose a sampling scheme for approval by the Executive Officer. The sampling scheme may include, but is not limited to, logging only significant changes in a parameter, averages or changes above some threshold value. Data must be submitted in an electronic file in comma-delimited columns or another format that is approved by the Executive Officer.

5.9 Required Emission Testing for Durability Demonstration

The ARB staff proposes that emissions testing be conducted as part of the durability demonstration. The tests are intended to provide a picture of any change in performance of RECS over time.

The RECS must be tested for baseline and control emissions once at the beginning and once at the end of the durability demonstration period. The applicant may elect to test for baseline emissions only once, either at the beginning of the durability demonstration period or at the end of the durability demonstration period. However, if this is the case, the applicant must use the same baseline test result for calculating emissions reductions for both the beginning and the end of the demonstration period. As an alternative to testing a single unit before and after the service accumulation period, the applicant may request that the Executive Officer consider the testing of two identical units, one that has been preconditioned and another that has completed the service accumulation period.

For service accumulation in the laboratory the duty cycle must be the same test cycle(s) as for the initial emissions reductions testing and a minimum of three hot-start tests is required. The applicant may request ARB to accept existing field demonstration data or waive the initial emission tests if there is substantial test data from previous demonstrations.

5.10 Maintenance

Except for emergency engine repairs, only scheduled maintenance on the engine and RECS may be performed during the durability demonstration. If normal maintenance includes replacement of any component of the engine emission control system, the time (years, or hours) between component change must be included with the results of the demonstration.

If emergency repair was conducted on an engine equipped with the RECS within the durability demonstration period, the applicant must report to the Executive Officer, within 30 days of the repair, on what repair was performed and what components were involved, and provide an explanation on the possible cause(s) for the engines and/or the RECS malfunction. Based on the information provided by the applicant, the Executive Officer will decide whether to allow that engine to continue to be used in the durability demonstration program, or to start a new durability demonstration period.

5.11 Performance Requirements

Throughout the durability demonstration period, the RECS must meet the following requirements:

(1) If the applicant claims a percent emission reduction, the percent emission reduction must exceed the minimum percent emission reduction associated with the LSI Level for which the applicant was seeking verification.
(2) If the applicant claims a lower emission level, the emission level test results must not exceed the emission level associated with the LSI Level for which the applicant was seeking verification.
(3) The RECS must maintain physical integrity. Its physical structure and all of its components not specified for regular replacement during the durability demonstration period must remain intact and fully functional.
(4) The RECS must not cause any damage to the engine, vehicle, or equipment.
(5) No maintenance of the RECS beyond that specified in its owner's manual will be allowed without prior ARB approval.

5.12 Performance Failures in Durability Demonstration Period

If the retrofit emission control system does not maintain its initial emission reduction percent or emission reduction level over the durability period for any reason, the Executive Officer may downgrade the system to the verification level corresponding to the lowest degraded performance observed in the durability demonstration period. If the RECS fails to maintain the emission reduction performance pursuant to the performance requirements described above during the demonstration period, the RECS will not be verified. If the system fails, and the applicant desires to proceed with the verification, the applicant must submit a report explaining the circumstances of the failure within 90 days of the event. ARB will then determine if the applicant should continue the current durability demonstration after fixing the failed system or begin a new durability demonstration.

5.13 Field Demonstration Requirements

The applicant must demonstrate successful operation and compatibility of the retrofit emission control system in the field with at least one vehicle or engine belonging to the emission control group chosen for verification. The field demonstration test period is a minimum of 200 hours. ARB will consider existing field experience and engineering justification to determine whether additional emission control groups require separate field demonstrations.

Field demonstrations are not required for the purpose of determining in-field emission reductions and have no emission-testing component. Instead, the purpose is to see if the RECS is compatible with the emission control group selected and how it withstands real-world conditions. Compatibility here incorporates many aspects. It is important to determine, for instance, if the operator notes any unusual effects, how the system handles real-world vibrations, jolts, and variable exhaust flows, and what maintenance issues may turn up. The field demonstration, therefore, would verify that the applicant's system is technologically mature and ready for real-world application.

Compatibility is determined by the Executive Officer based on a third-party statement (described below) and any other data submitted. A control system will be considered compatible with the chosen application if it does not:

- cause engine damage or engine malfunction or
- hinder or detract from the vehicle or equipment's ability to perform its normal functions.

The RECS would be deemed to fail the field demonstration requirements if it could not comply with the above-specified criteria during the demonstration period.

Field demonstration is required if all durability was conducted in the laboratory.
If the durability demonstration selected is an in-field test, it may be used to satisfy the field demonstration requirement for that emission control group. In this case the field demonstration requirements need only be a written statement from an ARB-approved third party such as the owner or operator of the vehicle or equipment.

The statement must describe overall performance, maintenance required, problems encountered, the results of a visual inspection and any other relevant comments. The results of a visual inspection conducted by the third party at the end of the demonstration period must also be described. This should comment on whether the RECS is physically intact, securely mounted, or leaking any fluids and should include any other evaluative observations. If the RECS fails in the course of the field demonstration, the applicant must notify ARB within 15 days of the failure and then submit a report explaining the circumstances of the failure within 90 days of the failure. ARB may then determine whether to deny verification or allow the applicant to correct the failed RECS and either continue the field demonstration or begin a new field demonstration.

5.14 Other Requirements

In addition to the emission testing, durability testing and field demonstration, the applicant must meet a number of other requirements and provide additional information, much of which depends on the nature of the retrofit emission control system. This type of information would be explored with ARB staff and the applicant in the proposed verification plan.

5.15 Fuel and Oil Requirements

The applicant must specify the fuel and lubricating oil requirements necessary for proper functioning of the RECS in the owner's manual. The applicant must also specify any consequences that will be caused by failure to comply with these requirements, as well as methods for reversing any negative consequences.

5.16 Maintenance Requirements

The applicant must identify all normal maintenance requirements for the RECS. The applicant must specify the recommended intervals for cleaning and/or replacing components. Any components to be replaced within the defects warranty period must be included with the original RECS package or provided free of charge including freight and handling fees, to the customer at the appropriate maintenance intervals.

Any normal maintenance items that the applicant does not intend to provide free of charge must be approved by the Executive Officer (the applicant is not required to submit cost information for these items). In addition, if applicable, the applicant must specify procedures for proper handling of spent components and/or materials removed from the RECS. If any materials are hazardous, the applicant must identify them as such in the owner's manual.

5.17 System Labeling

Certain emissions-critical or emissions-related parts and/or engines must be properly identified for the end users. This will enable users to determine their compliance with any regulations. Also, the label will assist the applicants to identify a representative sample of retrofit emission control systems for in-use compliance testing. By using LSI emission control group names, ARB will be able to clearly identify given RECS and distinguish significant differences in design from superficial changes that are, for instance, employed by the applicant for marketing purposes.

The applicant must provide legible and durable labels to be affixed on both the RECS and the engine on which the RECS is installed except as noted in below. The required labels must identify the verification level as well as the percent reduction or absolute emission level. The label must also include name, address, and phone number of the manufacturer, the LSI retrofit emission control group name. A unique identification comprising the serial number for the RECS and the month and year of manufacture are also required for this label. The month and year of manufacture are not required on the label if this information can be readily obtained from the applicant by reference to the serial number. A scale drawing of a sample label must be submitted with the verification application. Unless an alternative is approved by the Executive Officer, the label information must be in the following format:

Name, Address, and Phone Number of Manufacturer
LSI Retrofit Emission Control Group Name
Product Serial Number
ZZ-ZZ (Month and Year of manufacture, e.g., 11-05)

(2) LSI Retrofit Emission Control Group Name. Each RECS shall be assigned a name defined as below:

CA/V/MMM/LL##/NHP## or NHL##/APP/XXXXX

Where:

CA: Designates a RECS verified in California
V: Year of verification
LL##: Verified LSI Level (e.g., LL2 means the retrofit system was verified to the "LSI Level 2", LL3a means the retrofit system was verified to "LSI Level 3a).
NHP##: Verified HC + NOx reduction percent (e.g., NH75 means HC + NOx reduction of 75 percent).
NHL##: Verified HC + NOx absolute emissions in units of g/bhp-hr, (e.g., NH3.0 means verified HC + NOx emission level of 3.0 g/bhp-hr).
APP: Verified application includes a combination of Off-road (OF),or Stationary (ST)
XXXXX: Five alphanumeric character code issued by the Executive Officer

The applicant may request that the Executive Officer approve an alternative label format to the RECS or engine as described in this section. In reviewing this request, the Executive Officer may consider all relevant information including, but not limited to, the informational content of an alternative label as proposed by the applicant.

5.18 Noise Level Control

Applicants must ensure that the RECS is in compliance with all applicable noise limits for which the RECS is intended. All RECS must be in compliance with applicable local government requirements for noise control.

5.19 Limits on CO

In order for the RECS to be verified, it must comply with the following limits on CO:

(1) If installed on engines not emission-certified, the system must not cause the CO emissions to exceed the greater of:
   (a) 37 g/bhp-hr or
   (b) ten percent above the engine's baseline CO emission level.

(2) If installed on an emission-certified engine, the system must not cause the CO emission to exceed the CO emission standard applicable to the engine at the time of the engine's certification

5.20 Emission Sampling Ports

To facilitate in-field emission measurements, the applicant may design the RECS to have two sampling ports where emissions measurements can be made.

5.21 Owner's Manual

The applicant must provide a copy of the owner's manual for the retrofit emission control system. At a minimum, the following information must be clearly specified.

- Warranty statement including the warranty period over which the applicant is liable for any defects
- Installation procedure and maintenance requirements for the RECS
- Any fuel consumption improvement or penalty
- Any fuel requirements
- Requirements for lubrication oil quality and maximum consumption rate
- Contact information for replacement components and cleaning agents

5.22 Determination of Emissions Reduction

The ARB verification of the emission reductions from the RECS will be based on the average of the entire valid baseline and control emission and durability test results (i.e., before and after the installation of the RECS). For applicants that are verifying to absolute emission levels, an average of the control test results will be used.

For durability testing: if the applicant chooses to perform either the zero hour or the 2500 hour baseline test, but not both, then those results must be used in the calculation of the reductions for the zero hour and the 2500 hour control tests.

6. Post-Verification Responsibilities

After a control system has been verified for use with an emission control group, it may be sold in California as such, participate in incentive programs in which verification is required, or be used to satisfy the requirements of ARB in-use control regulations. After verification, applicants have the responsibility to perform in-use compliance testing and to honor the warranty.

7. Warranty Requirements

The applicant must provide a minimum defects and emissions performance and product warranty with a minimum coverage of 2,500 hours or three years, whichever comes first. Because the emissions benefits must be real and durable for a specified length of time, an installation warranty will also be required, ensuring that nothing has been compromised by an incorrect installation. The applicant must also include a copy of this warranty statement in the owner's manual.

7.1 Product Warranty

The applicant must provide a transferable warranty to all owners, for ownership within the warranty period, and lessees, within the lease contract warranty period. The warranty should state that the verified RECS is free from defects in design, materials, workmanship, or operation of the RECS which would cause the RECS to fail to conform to at least 90 percent of the lower bound of all the test values used to determine percentage verification levels or 90 percent of the upper bound of all test values used to determine absolute verification levels.

The minimum warranty period should be three years or 2,500 hours, provided the operation of and conditions of use for the equipment, engine, and RECS conform with the operation and conditions specified in the ARB's Executive Order and stated in the owner's manual.

The warranty must cover the full repair or full replacement costs of the RECS, including parts and labor. The warranty must also cover the full repair or replacement cost of returning the engine components to the condition they were in prior to the failure, including parts and labor, for damage to the engine proximately caused by the verified RECS. Repair or replacement of any warranted part, including the engine, must be performed at no charge to the equipment or engine owner. This includes only those relevant diagnostic expenses in the case in which a warranty claim is valid. The applicant may, at its option, instead pay the fair market value of the engine prior to the time the failure occurs.

The repair or replacement of any warranted part otherwise eligible for warranty coverage may be excluded from the warranty if the RECS or engine has been abused, neglected, or improperly maintained. If such abuse, neglect, or improper maintenance was the direct cause of the need for the repair or replacement of the part it's repair or replacement would be excluded from the warranty. Failure of the equipment or engine owner to ensure scheduled maintenance or to keep maintenance records for the equipment, engine, or RECS may, but shall not, per se, be grounds for disallowing a warranty claim.

7.2 Installation Warranty

A person or company who installs a verified RECS must warrant that the installation is free from defects in workmanship or any materials which cause the RECS to fail to conform to the emission control performance level it was verified to for three years or 2,500 hours, whichever occurs first.

The extent of the warranty coverage provided by installers must be the same as the warranty provided by the applicant as established by the Product Warranty section (discussed above) and the same exclusions must apply.

7.3 Product Warranty Statement

The applicant must furnish a copy of the warranty statement in the owner's manual. The applicant may include descriptions of circumstances that may result in a denial of warranty coverage, but these descriptions shall not limit warranty coverage in any way.

7.4 Retrofit Emission Control System Warranty Reports

7.4.1 Annual Warranty Claims Reports

The applicant must submit an annual warranty report to the Executive Officer by February 1 of each calendar year including the following information:

- Annual and cumulative sales, and annual and cumulative leases of equipment installed with RECS in California.
- Annual and cumulative production of RECS is required for California only.
- Annual summary of warranty claims in California only must include:
  - A description of the nature of the claims and of the warranty replacements or repairs. The applicant must categorize warranty claims for each LSI retrofit emission control group by the component(s) part number(s) replaced or repaired.
  - The number and percentage of RECS of each model for which a warranty replacement or repair was identified.
  - A short description of the RECS component that was replaced or repaired under warranty and the most likely reason for its failure.
- Date the warranty claims were filed and the engine family and application in which the RECS were used.
- Delineate the reason(s) for any instances in which warranty service is not provided to end-users that file warranty claims. The applicant may also report instances where the applicant chose to make repairs for the user even though the applicant

has determined that those warranty claims were unsubstantiated or that they were not required under Section 2757 of the Verification Procedure.

7.4.2 Periodic Warranty Claims Reports

The applicant is required to submit a periodic warranty report within 30 calendar days if there are three or more warranty claims for the same component or same part number that is repaired or replaced; or, if there are four or more total warranty claims, or four percent of the cumulative number of RECS subject to these warranty provisions, whichever is greater. Throughout the year the applicant must continue to comply with the periodic warranty reporting as more warranty claims were made. The periodic warranty report must include the following information:

- Description of the nature of the claims and of the warranty replacements or repairs. The applicant must categorize warranty claims for each LSI retrofit emission control group by the component(s) part number(s) replaced or repaired.
- The number and percentage of RECS of each model for which a warranty replacement or repair was identified.
- A short description of the RECS component that was replaced or repaired under warranty and the most likely reason for the component failure.
- Date the warranty claims were filed and the engine family and application that were installed with the RECS.
- The reason(s) for any instances in which warranty service is not provided to end-users that file warranty claims. The applicant may also want to report instances where the applicant chose to make repairs for the user even though it determined that those warranty claims were unsubstantiated or that they were not required.

7.5 In-Use Compliance

An in-use compliance test requirement was included to ensure that RECS sold to end-users are as effective during normal operation as those tested for the initial verification. The in-use compliance testing is required when at least 50 units of a specific RECS group have been sold in the California market.

For each RECS control group, the Executive Officer will identify a representative sample of engines or equipment fitted with RECS for the in-use compliance testing from each emission control group. As with any in-use emission testing, all properly maintained engines would be expected to sustain the verified emission levels. Good maintenance records for the engines or equipment with the selected RECS installed will be an important part of the compliance information. Accumulated hours of usage, maintenance records (to the extent practicable), operating conditions and a description of any unscheduled maintenance that may affect the emission results would be important to present.

Applicants must obtain and test a minimum of four RECS that have operated between 1,500 and 2,000 hours or between 22 and 29 months. This testing would allow ARB to identify and assist in resolving any problems associated with the RECS before having widespread application of those systems in the market. A tune-up or regular maintenance prior to testing is allowed.

An applicant is required to follow the same testing procedure as used for initial emission testing, including the same test cycle(s). Doing so would eliminate any variations in emission reduction performance that occur with different test cycles. ARB could then make a more meaningful comparison of the emission reductions between the in-use RECS and those that were originally verified. After all testing is completed, the applicant must submit an in-use compliance report that summarizes the results of in-use testing.

7.5.1 In-Use Compliance Report

The applicant must submit an in-use compliance report to the Executive Officer within three months of completing each phase of testing. These reports are important so that ARB may be brought in early if there are problems that would need to be addressed that affect the verification of the RECS. The following information must be reported for each of the minimum of four RECS tested:

- Parties involved in conducting the in-use compliance tests.
- Quality control and quality assurance information for the test equipment.
- RECS group name and manufacture date.
- Equipment and type of engine the RECS was applied (engine family name, make, model year, model, displacement, etc.)
- Estimated hours that the RECS were used.
- Results of all emission testing.
- Summary of maintenance, modifications, and repairs performed on the RECS.

REFERENCES

ARB, 2002. "Staff Report: Initial Statement of Reasons, Proposed Regulation for the Verification Procedure for In-use Strategies to Control Emission From Diesel Engines," California Air Resources Board, March 29, 2002.

ARB, 1998a. "Public Hearing to Consider Adoption of Emission Standards and Test Procedures for New 2001 and Later Off-Road Large Spark-Ignition Engines," California Air Resources Board, September 4, 1998.

EPA, 2001. "Evaluation of Emissions Durability of Off-road LPG Engines Equipped With Three-way Catalyst," United States Environmental Protection Agency, September, 1998.

EPA, 2005. "Test Procedures for Highway and Nonroad Engines and Omnibus Technical Amendments," United States Environmental Protection Agency, June, 2005.