State of California
AIR RESOURCES BOARD

STAFF REPORT: INITIAL STATEMENT OF REASONS FOR RULEMAKING

PROPOSED AMENDMENTS TO ALTERNATIVE FUEL CONVERSION CERTIFICATION PROCEDURES

Date of Release: **August 7, 2013**
Scheduled for Consideration: **September 26, 2013**

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EXECUTIVE SUMMARY

Due to the increased availability of affordable natural gas, the California Natural Gas Vehicle Coalition and other alternative fuel advocates have requested that the California Air Resources Board (ARB) update its current regulation governing alternative fuel conversion certification procedures for on-road motor vehicles and engines. Industry is requesting that ARB provide small volume conversion manufacturers a more streamlined process for obtaining retrofit certification, and to incorporate changes to make the approval process more similar to that of the United States Environmental Protection Agency (U.S. EPA).

Staff held three public workshops (August 2012, January 2013, and May 2013) and worked cooperatively with industry through workgroup meetings. At all workshops and meetings, staff solicited comments from stakeholders and affected industry to develop staff's current proposals. Staff believes that providing the additional flexibility for a limited period of time can be accomplished without significantly risking the emission performance of the converted motor vehicle or engine.

ARB is, therefore, proposing to amend the current alternative fuel conversion certification procedures for motor vehicles and engines. Staff's proposed changes allow small volume conversion manufacturers to reduce the upfront demonstration requirements and allow systems to be sold sooner with lower certification costs than with the current process.

In summary, the proposed amendments would allow small volume conversion manufacturers:

- to request waivers for certain testing and demonstration
- to add options in making required demonstrations
- to request a conditional Executive Orders when streamlined demonstrations cannot be used
- to permit conversion systems that are approved with new vehicle testing to be sold for used vehicle conversions

Staff is proposing to sunset many of the changes for the 2018 model year because such changes may not be appropriate when lower emission standards take effect for new vehicles and engines.

TABLE OF CONTENTS

I. INTRODUCTION AND BACKGROUND 1
A. Background and Legal Authority 2
II. STATEMENT OF REASONS 8
A. Description of Problem the Proposal Is Intended To Address 8
B. Proposed Solutions to the Problem 9
C. Rationale Supporting the Proposed Solutions 11
III. SUMMARY OF PROPOSED ACTION 13
IV. AIR QUALITY 17
V. ENVIRONMENTAL IMPACTS ANALYSIS 18
A. Introduction 18
B. Environmental Review Process 18
C. Prior Environmental Analysis 18
D. Proposed Regulation 19
E. Environmental Impacts 19
VI. ENVIRONMENTAL JUSTICE 22
VII. ECONOMIC IMPACTS 23
A. Proposed Amendments 23
B. Major Regulations 25
C. Reasonable Alternatives Considered 25
D. Impact on Small Business 27
E. Significant Adverse Economic Impact Directly Affecting Business 27
F. Justification for Adoption of Regulations Different from Federal Regulations Contained in the Code of Federal Regulations 27
G. Economic Impact Assessment 28
VIII. SUMMARY AND RATIONALE FOR EACH REGULATORY PROVISION 29
A. Alternative Fuel Retrofit Systems with Sealed Fuel Systems 32
B. Small Volume Conversion Manufacturer Provisions 32
C. Test Fuel 33
D. Assigned Deterioration Factors 34
E. NMOG Multiplier 34
F. Alternative Test Methods 34
G. OBD Monitoring System Requirements 35

H. Dual Fuel Waivers 38
I. Certifying to a More Stringent Emission Standard 38
J. Warranty Requirements 39
K. Sunset Provision 39
L. Expedited Approval Process 40
IX. PUBLIC PROCESS FOR DEVELOPMENT OF PROPOSED ACTION 41
A. Public Workshops 41
B. Workgroup Meetings and Other Outreach Efforts 42
X. REFERENCES 43

LIST OF TABLES

Table I-1: Standards and Test Procedures for New Vehicle and Engine Certification.... 4
Table I-2: Certification and Installation Procedures for Alternative Fuel Retrofit Systems for In-Use Vehicles and Engines 6
Table III-1: Summary of Proposed Changes to Emissions Test Procedures..... 14
Table III-2: Summary of Proposed Changes for OBD Requirements for Small Volume Conversion Manufacturers 15
Table VII-1: Typical Costs of One Alternative Fuel Certification for Small Volume Conversion Manufacturers..... 24
Table VII-2: Cost Savings for Each Alternative Considered 27

APPENDICES

A. Proposed Amendments to Regulation.....A-1

B. Proposed Amendments to the “California Certification and Installation Procedures for Alternative Fuel Retrofit Systems for Motor Vehicles Certified for 1994 and Subsequent Model Years and for all Model Year Motor Vehicle Retrofit Systems Certified for Emission Reduction Credit” B-1

C. Proposed Adoption of “California Certification and Installation Procedures For Alternative Fuel Retrofit Systems For On-Road Motor Vehicles and Engines”.... C-1

D. Economic Analysis D-1

E. Reference Letters.....E-1

F. Participants, Public Notices, and Workshop Presentations.....F-1

I. INTRODUCTION AND BACKGROUND

The increased market availability of low priced natural gas has resulted in more interest in converting light-, medium-, and heavy-duty vehicles and engines to operate on compressed natural gas (CNG) and liquefied petroleum gas (LPG). In addition, the U.S. Environmental Protection Agency (U.S. EPA) recently finalized regulations for certifying alternative fuel conversion systems for on-road motor vehicles and engines that provide conversion manufacturers streamlined certification process requirements and additionally provide small volume conversion manufacturers further testing flexibility[1]. For these reasons, the California Natural Gas Vehicle Coalition and other alternative fuel advocates have requested that the Air Resources Board (ARB or Board) update its current regulation governing alternative fuel conversion certification procedures for on- road motor vehicle retrofits for both new and used vehicles and engines.[2,3] Specific requests include: simplifying the application and approval process, providing additional time to sell conversions as "new"[4] vehicles or engines, adding flexibility to the alternative fuel certification requirements, and streamlining the testing and demonstration requirements to allow small volume alternative fuel conversion manufacturers to demonstrate compliance in less time and at a lower cost.

Staff believes that providing the additional flexibility requested by small volume alternative fuel conversion manufacturers can be accomplished without significantly risking the emission performance of the converted vehicles and engines, and is therefore proposing to amend the current alternative fuel conversion certification procedures. Staff is proposing changes to sections 2030 and 2031, title 13, of the California Code of Regulations (CCR), that apply to motor vehicle conversions to use fuels other than the original certification fuels and incorporating a new test procedure titled "California Certification and Installation Procedures for Alternative Fuel Retrofit Systems for On-Road Motor Vehicles and Engines" for 2004 and newer vehicles and engines. Staff believes that the original manufacturers of vehicles and engines have designed and demonstrated robust emissions control systems and adequately demonstrated compliance with applicable emissions standards and other certification requirements for the useful life of the vehicles and engines. The proposed amendments will allow the alternative fuel conversion manufacturers to "piggyback" on the original manufacturers' efforts and focus on only the emissions impacts of their retrofit systems. The proposed amendments would retain the OBD testing and demonstration of the

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[1] Clean Alternative Fuel Vehicle and Engine Conversions; Final Rule; 40CFR Parts 85 and 86; 76 Fed. Reg. 19830-19874 (April 8, 2011).

[2] Natural Gas Coalition Letter to ARB; March 8, 2013; Re: CARB's Alternative Fuel Vehicle Conversion Certification Program.

[3] Alternative Fuels Advocates, LLC Letter to ARB; August 2, 2012; Re: Streamlining of Certain Natural Gas / Propane Vehicle and Engine Certification Procedures.

[4] The proposed amendments are only applicable to alternative fuel conversion systems designed for and installed in in-use on-road motor vehicles and engines. This Staff Report utilizes the term "relatively new" to refer to motor vehicles and engines that are converted shortly after their legal or equitable title has already transferred to an ultimate purchaser, but staff wishes to expressly clarify that the term "relatively new" is not and should not be construed as equivalent to the terms "new motor vehicle" or "new motor vehicle engine" as defined in Health and Safety Code sections 39042 or 39042.5.

catalyst system, the fuel system at the rich and lean limits, and the exhaust gas sensors of the emissions control system. The proposed amendments would also waive many test requirements if no significant changes are made to the original vehicle and provide more flexibility in how the required demonstrations are made. Staff is proposing to sunset many of the changes for the 2018 model year because such changes may not be appropriate when lower emission standards take effect for new vehicles and engines.

Staff is also proposing an expedited approval provision so that an alternative fuel conversion manufacturer that obtains a new vehicle or engine certification from ARB may request certification of an alternative fuel retrofit system for in-use vehicles that is identical in configuration to the fuel system in the newly certified vehicle or engine.

Staff believes that these proposed changes will meet industry requests while also adequately ensuring that the emissions from converted vehicles and engines will not exceed the emissions standards applicable to the original vehicles and engines.

A. Background and Legal Authority

California law requires new motor vehicles and engines, as well as aftermarket parts and aftermarket alternate fuel conversion systems, to be certified by ARB for emission compliance before they are legal for sale, use, or registration in California. New vehicle and engine certification is granted annually for vehicle families and individual engine families and is valid for one model year. In contrast, aftermarket parts certification is valid indefinitely unless modifications are made to such part. California Health and Safety (H&S) Code section 39038 defines “model year” consistent with the federal Clean Air Act as “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.”

New Motor Vehicle Certification Requirements

New motor vehicles may not be imported, delivered, purchased, rented, leased, acquired, received, offered for sale, sold, or registered for use in California unless they have first been certified by ARB. Certification is a finding by ARB that a motor vehicle has satisfied criteria adopted by ARB for the control of specified air contaminants from vehicular sources, and such criteria are set forth in regulations and associated test procedures that ARB has promulgated pursuant to the statutory authority of H&S Code sections 43100 *et seq.*

The requirements associated with obtaining a new vehicle certification require a manufacturer to demonstrate that its new motor vehicle complies with applicable exhaust and evaporative emissions standards over its useful life, and to also comply with other requirements, such as labeling and emissions warranty requirements. Only after a manufacturer obtains a new vehicle certification from ARB can it legally place new vehicles that are covered by that certification into commerce in California.

California law distinguishes a new motor vehicle from a used motor vehicle based on whether the equitable or legal title to that vehicle has been transferred to an “ultimate purchaser” (H&S Code section 39042). An “ultimate purchaser” is the first person who in good faith purchases a new motor vehicle or new motor vehicle engine for purposes other than resale (H&S Code section 39055.5).

The statutory scheme described above requires that new motor vehicles and engines that are modified to operate on alternative fuels before their titles are transferred to ultimate purchasers must be certified by the modifying entity under California’s new motor vehicle certification regulations.

New vehicle and engine certification requirements include, but are not limited to, the following:

- Submit an application for certification
- Demonstrate the new vehicle/engines complies with applicable emission standards when tested in conformance with specified test procedures
- Demonstrate durability for the useful life
- Meet the applicable labeling requirements
- Provide emissions warranty to the ultimate purchaser
- Demonstrate compliance with on-board diagnostics (OBD) system requirements

When an applicant requests certification of a new vehicle/engine that has been converted to operate on an alternative fuel, an Executive Order is issued, upon approval, by ARB for the entire vehicle or engine and authorizes the sale of the converted engine or vehicle as new vehicle for the model year. The converter is treated the same as if they are the original manufacturer of the vehicle or engine.

The applicable standards and test procedures from the CCR for new vehicle and engine certification can be found in Table I-1.

Table I-1: Standards and Test Procedures for New Vehicle and Engine Certification

Code	Title
13 CCR § 1956.8	Exhaust Emission Standards and Test Procedures – 1985 and Subsequent Model Heavy-Duty Engines and Vehicles
13 CCR § 1961	Exhaust Emission Standards and Test Procedures – 2004 through 2019 Model Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles
13 CCR § 1961.1	Greenhouse Gas Exhaust Emission Standards and Test Procedures – 2009 through 2016 Model Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles
13 CCR § 1961.2	Exhaust Emission Standards and Test Procedures – 2015 and Subsequent Model Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles
13 CCR § 1961.3	Greenhouse Gas Exhaust Emission Standards and Test Procedures – 2017 and Subsequent Model Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles.
13 CCR § 1965	Emission Control and Smog Index Labels – 1979 and Subsequent Model-Year Motor Vehicles.
13 CCR § 1976	Standards and Test Procedures for Motor Vehicle Fuel Evaporative Emissions
13 CCR § 1968.2	Malfunction and Diagnostic System Requirements – 2004 and Subsequent Model-Year Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles and Engines
13 CCR § 1971	Engine Manufacturer Diagnostic System Requirements – 2007 and Subsequent Model-Year Heavy-Duty Engines
13 CCR § 1971.1	On-Board Diagnostic System Requirements – 2010 and Subsequent Model-Year Heavy-Duty Engines
13 CCR § 2035 through 2042	Motor Vehicle and Motor Vehicle Engine Emission Control System Warranty.
13 CCR § 2062	Assembly-Line Test Procedures – 1998 and Subsequent Model Years.
13 CCR § 2235	Specifications for Fill Pipes and Openings of Motor Vehicle Fuel Tanks.

Alternative Fuel Conversions of In-Use Vehicles

Once the equitable or legal title to a certified on-road motor vehicle has been transferred to an ultimate purchaser, the vehicle may only be operated if its certified emission control system is correctly installed and operating, and no one may install, sell, offer for sale, or advertise any device, apparatus, or mechanism that alters or modifies the original design or performance of that emission control system unless that device, apparatus or mechanism has been exempted by ARB. The conversion of motor vehicles/engines to operate on fuels other than the fuels for which the vehicles were originally certified constitutes modifications to required emission control systems. ARB is authorized to only exempt modifications to a certified configuration if it finds the modifications will not reduce the effectiveness of required motor vehicle pollution control devices or cause the emissions from the modified or altered vehicle to exceed applicable emissions standards for the model-year of the vehicle being modified or converted. As discussed in more detail below, ARB is specifically authorized to certify alternative fuel conversion systems, and has promulgated regulations applicable to such conversion systems in Title 13, CCR sections 2030 and 2031. However, these regulations were last substantively amended in 1995.

Alternative fuel conversions of in-use vehicles/engines are subject to the following requirements:

- Demonstrate compliance with applicable vehicle or engine certification emission standards or more stringent standards
- Certification based on engine family or test group and model year
- Demonstrate compliance with durability requirements
- Supplemental emission control information label
- Manufacturer's and installer's warranty
- Evaluation of impact on auxiliary emission control devices
- Demonstrate compliance with OBD system requirements
- Installation inspection
- In-use enforcement testing

When ARB approves a manufacturer's alternative fuel conversion system certification application, ARB issues an Executive Order that details the emissions standards the alternative fuel retrofit system was certified to, and the models that obtained certification within the test group or engine family. The Executive Order allows the approved alternate fuel conversion system to be legally sold and installed in vehicles within California.

The certification and installation procedures for alternative fuel retrofit systems for in-use vehicles and engines are set forth in Table I-2.

Table I-2: Certification and Installation Procedures for Alternative Fuel Retrofit Systems for In-Use Vehicles and Engines

Code/Procedure	Title
13 CCR § 2030	Liquefied Petroleum Gas or Natural Gas Retrofit Systems
13 CCR § 2031	Alcohol or Alcohol/Gasoline Fuels Retrofit Systems
Associated Test Procedures	California Certification and Installation Procedures for Alternative Fuel Retrofit Systems for Motor Vehicles Certified for 1994 and Subsequent Model Years and for All Model Year Motor Vehicle Retrofit Systems Certified for Emission Reduction Credit
	California Exhaust Emission Standards and Test Procedures for Systems Designed to Convert Motor Vehicles Certified for 1993 and Earlier Model Years to Use Liquefied Petroleum Gas or Natural Gas Fuels
	California Exhaust Emission Standards and Test Procedures for Systems Designed to Convert Motor Vehicles Certified for 1993 and Earlier Model Years to Use Alcohol or Alcohol/Gasoline Fuels

Statutory Authority

California law authorizes ARB to certify alternative fuel conversion systems for motor vehicles. H&S Code section 43018(a) directs the Board to endeavor to achieve the maximum degree of emission reduction possible from vehicular and other mobile sources in order to accomplish the attainment of state air quality standards at the earliest practicable date. H&S Code section 43018(c) provides that in carrying out section 43018(a), the Board is to adopt standards and regulations that will result in the most cost-effective combination of controls to achieve reductions in motor vehicle exhaust and evaporative emissions.

In addition to the general directive to adopt emission standards for motor vehicles as specified in H&S Code section 43018(c), the Board is further directed to consider methods for reducing emissions specifically from heavy-duty diesel motor vehicles. H&S Code sections 43701(b) and (c) provide that ARB shall adopt emission standards and procedures for the qualification of equipment used to reduce emissions from existing heavy-duty diesel motor vehicles.

Vehicle Code section 27156 contains provisions to ensure that modifications to certified vehicles do not increase emissions, and provides that no device, apparatus, or mechanism that alters or modifies the original design or performance of a required motor vehicle emission control system can be advertised, sold, or installed unless that device, apparatus or mechanism has been exempted by ARB. ARB is authorized to only exempt modifications to a certified configuration if it finds the modifications will

either not reduce the effectiveness of any required motor vehicle pollution control device or device or will not cause emissions from the converted vehicle to exceed applicable standards.

H&S Code section 43004 provides that the exhaust emission standards applicable to gasoline-powered motor vehicles shall also apply to gasoline- or diesel-powered vehicles to use fuels other than the fuel for which the vehicle was originally certified. H&S Code section 43006 authorizes the Board to adopt test procedures for certifying alternative fuel conversion systems.

II. STATEMENT OF REASONS

A. Description of Problem the Proposal Is Intended To Address

The increased market availability of low priced natural gas has resulted in more interest in converting light-, medium-, and heavy-duty vehicles and engines to operate on CNG and LPG. In addition, the U.S. EPA recently finalized regulations for certifying alternative fuel conversion systems for on-road motor vehicles and engines that establish streamlined certification procedures and provide small volume conversion manufacturers additional testing flexibility. The current requirements for obtaining ARB certification of alternative fuel conversion systems for on-road motor vehicles and motor vehicle engines were last substantively amended in 1995, and consequently do not incorporate the more stringent low emission vehicle standards (LEV II and LEV III) adopted by the Board since 1995. Moreover, the California Natural Gas Vehicle Coalition and other alternative fuel advocates have requested that ARB modify the existing certification procedures for alternative fuel retrofit systems for on road motor vehicle vehicles to simplify and streamline the requirements needed to obtain approval for such systems, extend the life of the approval, and lower costs.

As previously discussed in Section I of this report, the current process for certifying a new vehicle or engine is distinct from the process for certifying an alternative fuel conversion system and currently requires additional testing and a second certification to sell the conversion system as a kit for in-use vehicles.

Either certification process can be time consuming and costly, especially for small volume conversion manufacturers with limited engineering resources and limited access to vehicle programming by original equipment manufacturers. The existing regulations require manufacturers to provide test data and demonstrate that emission levels will not exceed applicable certification standards over the useful life of the vehicle. This requires accelerated aging of the vehicle/engine and its emission control components. In addition, manufacturers must demonstrate that all OBD monitors have been properly recalibrated to function correctly with the alternative fuel. Demonstration of OBD compliance and durability of emission control requirements for certification of alternative fuel conversions can be costly, complex, and time consuming. Staff estimates that this process can take up to 6 months and cost up to $170,000 for a new vehicle certification (see table VII-1).

Additionally, the test fuel required under the current regulatory process must meet stringent standards in purity. The cost of obtaining certified test fuel can exceed $100 per gasoline gallon equivalent.

For many alternative fuel conversion manufacturers that seek certification for a new vehicle or engine, their design and development effort begins upon introduction of a new subject vehicle into the market place. Certain alternative conversion manufacturers have established relations with the original vehicle manufacturers allowing them access to critical engine and emission control information prior to vehicle or engine introduction.

These conversion manufacturers may have timing and cost advantages. When an applicant requests certification of a new vehicle/engine that has been converted to operate on an alternative fuel, an Executive Order is issued, upon approval, by ARB for that new vehicle or engine and authorizes the conversions of the new vehicles for no longer than one model year. This current process is constrained to the time available to complete the conversions for that given model year. These factors may present barriers to small volume conversion manufacturers who may consequently choose not to sell their products in California (U.S. EPA's less stringent procedures and more streamlined process applies outside of California which minimizes factors discussed here) because of the narrow window of opportunity (i.e., the model year) to acquire a new vehicle, engineer it for compliance on the alternative fuel and complete certification.

In addition, an alternative fuel conversion manufacturer that obtains a new vehicle or engine certification must reapply for an in-use vehicle or engine certification to obtain approval to sell the identical conversion system as an aftermarket retrofit kit. Therefore, upon receiving a new vehicle or engine alternative fuel conversion certification, in-use or aftermarket certification for the identical conversion system requires a separate application and may also include additional requirements. These separate processes exist because of different authority over new certification versus in-use certification.

B. Proposed Solutions to the Problem

Staff is proposing to update the current requirements for obtaining ARB certification of alternative fuel conversion systems for on-road motor vehicles and motor vehicle engines. Staff is proposing changes to title 13, CCR, sections 2030 and 2031 (see Appendix A) that apply to converting motor vehicles to use fuels other than the original certification and incorporating a new test procedure for 2004 and newer vehicles and engines. Staff chose the 2004 model year because this is the first applicable model year for the most recent OBD regulation found in title 13, CCR section1968.2. The proposed amendments would modify the existing test procedure to apply to 1994 through 2003 model year motor vehicles and engines (see Appendix B) and add a new test procedure to apply to 2004 and subsequent model year motor vehicles and engines (see Appendix C). The proposed amendments will allow alternative fuel conversion system manufacturers to obtain certifications for "relatively new" and used vehicles and engines by using the proposed new test procedures titled "California Certification and Installation Procedures for Alternative Fuel Retrofit Systems for On-Road Motor Vehicles and Engines." (Appendix C) This report utilizes the term "relatively new" to refer to motor vehicles and engines that are converted shortly after their legal or equitable title has already transferred to an ultimate purchaser, but staff wishes to expressly clarify that the term "relatively new" is not and should not be construed as equivalent to the terms "new motor vehicle" or "new motor vehicle engine" as defined in Health and Safety Code sections 39042 or 39042.5.

The proposed amendments would change the current approval process to allow an alternative fuel retrofit manufacturer to offer for sale an alternate fuel retrofit system that is designed to be installed on a "relatively new" vehicle once its title is transferred to an

ultimate purchaser. Therefore, a consumer who purchases a new vehicle could potentially also purchase an alternative fuel conversion system for that vehicle on the same purchase order or contract. This would enable retrofit system manufacturers to market their systems at local new vehicle dealerships and would allow the consumer to order a new vehicle or engine that is converted to operate on an alternative fuel, before taking possession of the vehicle, provided the vehicle's legal or equitable title has transferred to the consumer. The consumer would also be able to purchase the new vehicle or engine and then purchase the retrofit conversion system at a later date from another supplier. Additionally, the alternative fuel retrofit conversion system would not have an expiration date, so the alternative fuel retrofit manufacturer can continue to market the conversion system for in-use vehicle/engines.

Staff is proposing changes to streamline the emissions testing requirements and the OBD testing and demonstration requirements. Some of these changes will affect all conversion manufacturers but most will affect small volume conversion manufacturers.

The proposed changes to the emissions testing requirements would allow alternative fuel conversion manufacturers of retrofit systems with sealed fuel systems to obtain a waiver from the evaporative testing requirements. In response to industry's request, staff is proposing to adopt U.S. EPA's multiplier of 1.5 times the measured NMHC emissions to determine compliance with NMOG, instead of the current test requirements, for both CNG and LPG. The changes will also allow conversion manufacturers of a dual fuel system to apply for a test waiver to eliminate repeating the emissions testing on the original fuel if the original emissions control system is not compromised. Staff is also proposing to allow the small volume conversion manufacturers to use assigned deterioration factors (DF) provided by ARB or U.S. EPA to determine compliance with useful life emissions testing instead requiring high mileage emission tests.

For heavy-duty engines and vehicles that were originally certified under an engine-dynamometer test procedure, staff is proposing to allow applicants to request alternative test methods that do not require dynamometer testing for demonstrating the conversion system does not increase emissions compared to the original engine.

For OBD requirements, the proposed amendments would retain the OBD testing and demonstration of the catalyst system, the fuel system at the rich and lean limits, and the exhaust gas sensors of the emissions control system. The proposed amendments would allow small volume conversion manufacturers to waive test requirements if no significant changes are made to the original vehicle and would provide more flexibility in how the required demonstrations are made. For example, the proposed changes would allow small volume conversion manufacturers to align the emission testing requirements with the new vehicle certification by allowing use of assigned deterioration factors without the demonstration of full useful life testing – which would be a less costly process due to reduced testing requirements, to reduce OBD compliance demonstrations to only those that are needed to show that these systems will continue to function as designed by the original vehicle manufacturer, and to allow for an easier

certification process while retaining confidence that the performance of the OBD system will not be compromised in the converted vehicles.

Staff is proposing to allow small volume conversion manufacturers to use the less expensive commercial CNG fuel that meets the federal standards for testing in lieu of ARB CNG certification test fuel. Staff is also proposing to allow small volume conversion manufacturers to use LPG that meets ARB's motor vehicle fuel requirements, since there is no federally certified LPG, in lieu of ARB LPG certification test fuel because these fuels not only are less expensive, but they are also readily available.

Staff believes that some of the proposed test procedures will need to be updated to reflect the changes in emission control and OBD systems for the 2018 model year. By 2018, the declining LEV III exhaust emission fleet average will be driving a significant portion of the light duty vehicles to lower exhaust emission levels reducing the margin available to conversion manufacturers when adjusting monitors to work on a different fuel or emission standard than originally calibrated. In addition, the heavy duty OBD standards will also be in full effect for conventional and alternative fueled engines for the 2018 model year. Therefore, staff is proposing to add a sunset provision for many of the proposed amendments. The sunset provision would also serve as a safety net for limiting potential emission impacts should unforeseen issues arise as a result of the proposal. Prior to the sunset, staff will monitor impacts to emissions and changes to engine technology and will provide recommendations to the Board whether or not the sunset provisions needs to be extended.

The proposed changes will also create a new subsection (c) in sections 2030 and 2031, title 13, CCR, to provide an expedited approval provision allowing applicants to seek an in-use, aftermarket certification once a new vehicle/engine certification is issued for an identical conversion system. The proposed changes will allow a manufacturer to request approval to carry-over or carry-across data used to obtain California certification of a new vehicle or new engine to demonstrate compliance with the emission testing requirements specified under the in-use procedures for identical conversion systems. This process would substantially reduce the time and costs associated with re-certifying an identical alternative fuel conversion system for qualifying manufacturers by providing them the option to not conduct similar emissions testing for seeking certification of an aftermarket alternative fuel retrofit system.

C. Rationale Supporting the Proposed Solutions

Staff's proposed changes would simplify the application and approval process, update the in-use alternative fuel certification requirements to better align with recent changes adopted by the U.S. EPA, and would streamline new and in-use alternative fuel vehicle and engine certification requirements while preserving emission benefits. The aim of the modifications is to reduce costs and time required to bring the conversion systems to market and provide conversion manufacturers with a non-expiring Executive Order. Staff's proposal would also streamline the application process for manufacturers that

have obtained a new vehicle or new engine certification. Staff's proposed changes also allow small volume conversion manufacturers to reduce the upfront demonstration requirements and allow systems to be sold sooner with lower certification costs than with the current process. Staff believes this streamlined approach will remove many of the current market barriers for small volume conversion manufacturers and is unlikely to create excess emissions.

III. SUMMARY OF PROPOSED ACTION

Staff is proposing to amend sections 2030 and 2031 of title 13, CCR to modify the existing test procedure to apply to 1994 through 2003 model year vehicles (see Appendix B) and incorporate new certification procedures for alternative fuel retrofit systems in 2004 and subsequent model year on-road motor vehicles and motor vehicle engines. The new test procedure is titled "California Certification and Installation Procedures for Alternative Fuel Retrofit Systems for On-Road Motor Vehicles and Engines" and is found in Appendix C. Staff is also proposing to add subsection (c) to sections 2030 and 2031 of title 13, CCR to provide an expedited approval process that will allow manufacturers that obtain California certification of new, alternate-fueled motor vehicles and engines to utilize emissions data to also seek certification of an alternative fuel retrofit system. The proposed amendments to sections 2030 and 2031 of title 13, CCR can be found in Appendix A of this staff report and are indicated by strike-out (deletion) and underline (addition). A detailed discussion of each amendment follows.

New Test Procedures

To mitigate some of the testing related costs for small volume conversion manufacturers and to streamline the procedures associated with certifying fuel conversions, staff is proposing new certification and installation procedures for alternative fuel retrofit systems applicable to 2004 and subsequent in-use motor vehicles and engines. Staff choose the 2004 model year because this is the first applicable model year for the most recent OBD regulation found in title 13, CCR section1968.2. The new procedures include:

- Allowing the waiver of evaporative testing for sealed alternative fuel systems
- Defining a small volume conversion manufacturer
- Modifying test fuel requirements
- Allowing the use of assigned deterioration factors
- Adopting U.S. EPA's NMHC/NMOG correction factor
- Allowing the use of alternative test methods
- Streamlining OBD system monitoring system demonstration requirements
- Allowing for the use of dual fuel testing waivers
- Introducing a sunset provision
- Reducing time to market for certifying to a more stringent emissions standard
- Retaining the vehicle's emissions warranty

Staff is proposing to apply most of these changes to small volume conversion manufactures to reduce the testing and demonstration burden. Staff also is proposing to sunset many of the changes because they may not be appropriate when lower emission standards take effect for new vehicles and engines in 2018.

Table III-1 summarizes the proposed changes to emissions test procedures for all converters and for small volume conversion manufacturers and identifies which changes are affected by the sunset provision.

Table III-1: Summary of Proposed Changes to Emissions Test Procedures

Available to all Conversion Manufacturers	Available to all Conversion Manufacturers until Sunset	Available to Small Volume Conversion Manufacturers until Sunset
• Manufacturers may use multiplier of 1.5x NMHC for NMOG compliance • Manufacturers may submit engineering evaluation and data for exemption from evaporative emission testing for sealed fuel systems. All submitted material subject to review and approval by the Executive Officer	• Dual-fuel waivers for repeating required testing on original fuel	• For exhaust and evaporative emissions testing, may use NG test fuel that meets U.S. EPA specifications. May use commercially available NG fuel without analysis • For exhaust and evaporative emissions testing, may use LPG test fuel that meets ARB motor-vehicle LPG fuel specifications. May use commercially available LPG fuel without analysis. • Assigned Deterioration Factors (DF) may be used to determine compliance with applicable emission standards • May propose an alternate test procedure for testing of heavy-duty engines and vehicles originally certified under an engine-dynamometer test procedure

Table III-2 summarizes the proposed changes to OBD requirements for all small volume conversion manufacturers and identifies which changes are affected by the sunset provision.

Table III-2: Summary of Proposed Changes for OBD Requirements for Small Volume Conversion Manufacturers

Available to all Small Volume Conversion Manufacturers	Available to Small Volume Conversion Manufacturers until Sunset	Available to Small Volume Conversion Manufacturers after Sunset
• Manufacturers may request to waive pinpointing of air-fuel ratio cylinder imbalance malfunctions. • For conversions of gasoline vehicles to a more stringent standard, manufacturers are still required to perform all certification demonstration tests. However, conditional approval can be requested after performing only the catalyst, exhaust gas sensor, and fuel system tests and final approval received after submitting the remaining test results • Certification documentation is limited to modifications, deletions, and additions to the OBD system on the base vehicle/engine due to the addition of the conversion system..	• For conversions being certified to the same emission standard as the original vehicle, manufacturers have additional options for what they can use for the certification demonstration vehicle including using a lower mileage vehicle or a standardized rapid aging cycle. • For conversions of gasoline vehicles being certified to the same emission standard as the original vehicle, manufacturers could request waivers from all but three categories (catalyst, exhaust gas sensor, and fuel system) of the certification demonstration emission tests if there are no modifications that would affect other monitors that require demonstration.. • For conversions of diesel or heavy-duty engines, manufacturers may submit a plan subject to Executive Officer approval for specific certification demonstration emission test exemptions.	• For conversions of gasoline vehicles to the same standard, manufacturers are required to perform all certification demonstration tests after sunset. However, conditional approval can be requested after performing only the catalyst, exhaust gas sensor, and fuel system tests and final approval received after submitting the remaining test results.

As shown in tables III-1 and III-2, the majority of the proposed changes affect only small volume conversion manufacturers. These changes allow small volume conversion manufacturers the ability to use a commercially available test fuel, substitute deterioration factors for full useful life emissions testing, and waive many of the OBD demonstration requirements which transfer some of the risk for long term emissions increases to ARB. Based on staff's technical understanding and judgment, the proposed changes warrant a sunset provision after the 2017 model year. Staff believes that some of the test procedures will need to be updated to reflect the changes in emission control and OBD systems for the 2018 model year. By 2018 LEV III will be in full effect for light duty vehicles and the heavy duty OBD standards will also be in full

effect for conventional and alternative fueled engines. The sunset will also serve as a safety net for containing potential emission impacts should unforeseen issues arise as a result of the proposal. ARB will also increase their in use compliance and enforcement efforts in this area to both minimize the risk and investigate the actual impacts of introducing the flexibilities for this industry.

Staff believes that the proposed changes to the current procedures for certification of alternative fuel conversions would:

- Allow conversion manufacturers to market their products to relatively new vehicles and engines by allowing the installation to happen at time of new vehicle/engine sale
- Streamline ARB's alternative fuel vehicle and engine certification procedures
- Update and simplify the application and approval process
- Reduce market barriers for small volume conversion manufacturers without significantly risking emission performance

Addition of Section 2030(c) and 2031(c)

Staff is proposing to create a new subsection (c) in sections 2030 and 2031 to provide manufacturers that certify new vehicles and engines fueled by alternative fuels an expedited process to certify an alternative fuel conversion system. The proposed changes will allow a manufacturer to request approval to carry-over or carry-across data used to obtain California certification of a new vehicle or new engine to demonstrate compliance with the emission testing requirements specified under the in-use procedures for identical conversion systems. Applicants for carry-over and carry-across will be evaluated according to the criteria specified in U.S. EPA Advisory Circular 17F, dated November 16, 1982, updated on January 21, 1988, which is incorporated by reference in section 11.(b)(3) of the proposed new test procedures (Appendix C). This process would substantially reduce the time and costs associated with certifying alternative fuel conversion systems for qualifying manufacturers by providing them the option to not repeat emissions testing for certifying an identical aftermarket alternative fuel conversion system.

IV. AIR QUALITY

Alternative fuel conversion manufacturers must attest that no additional emissions are produced due to the conversion process. In addition, some of the small volume conversion manufacturers will opt to certify to a lower emission standard than the originally certified vehicles which would provide some emission benefits as their volumes increase in the inventory. The proposed changes allow small volume conversion manufacturers the ability to waive many of the OBD demonstration requirements which transfer some of the risk for long term emissions increases to ARB. Although the proposed flexibility provisions for small volume conversion manufacturers is unlikely to create excess emissions from converted vehicle and engines, staff believes that the proposed in-use enforcement testing and confirmatory in-use testing provisions will help ensure that such increased emissions will not occur. As a further safeguard, staff is proposing to sunset the flexibility provisions for small volume conversion manufacturers after the 2017 model year. This sunset provision will provide small volume conversion manufacturers enhanced flexibility over a four model year window to develop and to market mature alternative fuel retrofit systems while also providing a safety net to ensure increased emissions do not result because of the proposed small volume conversion manufacturers' flexibility provisions. Further air quality analysis is discussed in Chapter V.

V. ENVIRONMENTAL IMPACTS ANALYSIS

A. Introduction

This chapter provides an environmental analysis for the proposed regulation. Based on ARB's review, staff has determined that implementing the proposed amendments to the Alternative Fuel Conversion Certification Procedures would not result in any potentially significant adverse impacts on the environment. This analysis provides the basis for reaching this conclusion. This section of the Staff Report also discusses environmental benefits expected from implementing the proposed regulatory amendments.

B. Environmental Review Process

ARB is the lead agency for the proposed regulation and has prepared this environmental analysis pursuant to its regulatory program certified by the Secretary of the Natural Resources Agency (14 CCR 15251(d); 17 CCR 60005-60007). In accordance with Public Resources Code section 21080.5 of the California Environmental Quality Act (CEQA), public agencies with certified regulatory programs are exempt from certain CEQA requirements, including but not limited to preparing environmental impact reports, negative declarations, and initial studies (14 CCR 15250). ARB has prepared this environmental analysis (EA) to assess the potential for significant adverse and beneficial environmental impacts associated with the proposed regulation, as required by ARB's certified regulatory program (17 CCR 60005(b)). The resource areas from the CEQA Guidelines Environmental Checklist were used as a framework for assessing the potential for significant impacts (17 CCR 60005(b)).

If comments received during the public review period raise significant environmental issues, staff will summarize and respond to the comments in the Final Statement of Reasons prepared for the regulation. The final decision-maker will approve the written responses to comments prior to taking final action on the proposed regulation (17 CCR 60007(a)). If the regulation is adopted, a Notice of Decision will be posted on ARB's website and filed with the Secretary of the Natural Resources Agency for public inspection (17 CCR 60007(b)).

C. Prior Environmental Analysis

The current regulation was originally adopted by ARB on April 16, 1975 and was subsequently amended on April 18, 1981, September 14, 1984, March 11, 1993, April 26, 1995, and September 25, 1997. This regulation and its subsequent revisions ensure that continued air emission reduction benefits are realized by requiring manufacturers and installers of alternative fuel retrofit systems to demonstrate that such systems do not cause retrofitted vehicles and engines to exceed the emission standards applicable to the original, unmodified vehicles or engines. The environmental analyses performed for the regulation and its amendments did not identify any significant adverse impacts to the environment.

D. Proposed Regulation

California regulations currently specify separate certification requirements of alternative fuel conversion systems intended for in-use vehicles/engines and for new motor vehicles and new motor vehicle engines. The proposed amendments only address the requirements applicable to in-use vehicles/engines.

Staff recognizes that alternative fuel conversions may be performed on both "relatively new" motor vehicles and engines (i.e., vehicles and engines whose legal or equitable title have only recently transferred to an ultimate purchaser) and older motor vehicles and engines (i.e., vehicles and engines whose titles have transferred to ultimate purchasers for a longer period of time), but in both cases, alternative fuel conversions involve reconfiguring a previously certified gasoline- or diesel-fueled vehicle or engine to operate on natural gas, propane, alcohols, or a blend of conventional and alternative fuels. The conversion may include the addition of a fuel system, removal of emission controls, and recalibration of the vehicle's computer.

As described in Chapter VIII of this Staff Report, the proposed regulation would:

- Streamline ARB's alternative fuel vehicle/engine certification procedures that will, in part, better align with U.S. EPA's program
- Update and simplify the application and approval process
- Reduce certification burden for small volume conversion manufacturers by changing:
    - Requirements for demonstrating emission compliance to useful life
    - Test fuel specifications
    - Requirements for demonstrating OBD system compliance

The proposed amendments develop a process that would allow manufacturers that certify a new motor vehicle or new motor vehicle engine to request a certification for an alternative fuel conversion system under an expedited process as compared to the current process.

The proposed amendments would update the existing certification procedures by incorporating the emission standards and associated test procedures for 2004 and subsequent model year vehicles and engines, and would also streamline the existing certification procedures, including providing small volume conversion manufacturers the flexibility to waive many of the OBD demonstration requirements.

E. Environmental Impacts

While all certification procedures are designed to ensure that vehicles and engines sold in California meet California's air emissions standards, the certification procedures for alternative fuel conversion systems are established to ensure that converted vehicles or engines continue to meet the same emission standards as the original vehicle, or meet a lower emission standard.

The proposed amendments consist primarily of administrative and procedural changes to better align with existing federal requirements and to assist small volume conversion manufacturers in their future retrofit certification efforts. These changes would modify the stringency of the certification process by streamlining the existing process while continuing to ensure that expected emissions benefits are realized. The proposed amendments modify language and simplify procedural requirements in part to better align ARB's certification procedures with U.S. EPA's program, and would not involve or result in any additional requirements than what is already being required by existing federal and state requirements.

The changes associated with the initial emissions tests would not result in increased emissions; however, for conversions that are certified to the same emissions standard as the original vehicle, the flexibility for demonstration OBD compliance would be less rigorous than currently required. The OBD compliance requirements remain the same and staff expects most OBD systems to comply fully; however, there is a possibility that some systems that are not fully compliant could be approved. Any emissions impact would be mitigated through recalls and penalties for non-compliance. The sunset period will also limit the potential for excess emissions. For conversions to a lower emission standard than that of the original vehicle, the OBD test requirements would remain the same, but the amendments would allow the conversion kit to be sold several months sooner and staff anticipates that sales of these kits would increase. Staff believes that conversions to a lower standard would also result in additional emissions benefits if more vehicles are sold. Ultimately the impact on emissions will depend on sales of vehicle conversions of cleaner versus the same emission standards.

The concurrent implementation of the proposed in-use enforcement testing and confirmatory in-use testing provisions will help to ensure that any increase in emissions does not occur. Moreover, as a further safeguard, staff is proposing to sunset the flexibility provisions for small volume conversion manufacturers after the 2017 model year as they are not likely to be applicable for LEV III nor for heavy duty vehicle certification of 2018 or newer engines. This sunset provision also provides a safety net to ensure increased emissions do not result because of the proposed small volume conversion manufacturer flexibility provisions.

Staff has also determined that the proposed amendments will result in no impact to the following resource areas: aesthetics, agricultural and forestry resources, biological resources, cultural resources, geology and soils, greenhouse gases, hazardous material, hydrology and water quality, land use planning, mineral resources, noise, population and housing, public services, recreation, or traffic and transportation, and utilities and service systems. These areas would not be impacted because compliance with the proposed amendments would not require any action by regulated parties that could adversely affect these resources, either directly or indirectly. Based on staff's analysis, we have determined that implementing the proposed amendments would not result in a significant adverse impact on the environment.

No discussion of alternatives or mitigation measures is necessary because no significant adverse environmental impacts were identified.

VI. ENVIRONMENTAL JUSTICE

The objectives of ARB's statewide regulatory programs are better air quality and reduced health risk for all residents throughout California. The Board has a policy that community health and environmental justice (EJ) concerns be addressed in all of ARB's regulatory programs. State law defines EJ as the fair treatment of people of all races, cultures, and incomes with respect to the development, adoption, implementation, and enforcement of environmental laws, regulations, and policies. The Board has established a framework for incorporating EJ into ARB's programs consistent with the directives of State law.

The proposed modifications to the alternate fuel conversion procedures provide a streamlined process for small volume conversion manufacturers to reduce costs, promote competition, and drive technological innovation for smaller companies while assuring emissions from converted vehicles remain unchanged or in some cases are reduced. Although the proposed modifications are emission neutral, the increase in use of alternate fueled vehicles would reduce the use of traditional fueled vehicles, such as diesel fueled vehicles, proportionally resulting in the reduction of toxic air contaminants. This is consistent with ARB's EJ policy of reducing exposure to air pollutants and reducing the adverse impacts from toxic air contaminants in all communities, including low-income and minority communities.

While staff's proposed changes do not directly affect low-income and minority communities, they do provide a mechanism for smaller manufacturers of alternative fuel conversion systems that may be located in or near these communities to certify and install these systems locally.

VII. ECONOMIC IMPACTS

A. Proposed Amendments

ARB's proposed changes would significantly lower the time and cost for small volume conversion manufacturers to generate the data required for alternative fuel conversion system certification. These proposed amendments waive certain test requirements if no significant changes are made to the original vehicle, and provide more flexibility in how the required demonstrations are made. ARB will also provide options to the converter industry to show compliance without performing some of the certification tests. The following is a summary of the cost savings small volume conversion manufacturers may realize if the proposed changes are adopted.

Table VII-1 summarizes typical costs that are affected by staff's proposal for the following scenarios: the current ARB certification procedures for new and in-use vehicles, the proposed ARB certification procedures for retrofit systems to be installed on near new vehicles certified to the same standard as the original vehicle, and the recently revised procedures adopted by the U.S. EPA to be installed on near new vehicles. The costs are divided into subgroups of emission certification costs, OBD certification costs, and other certification costs. As discussed below, some of these costs are incurred per test group certified while others are incurred per model year. As shown in table VII-1, costs for exhaust emission tests will stay the same.

Similar to the recent regulation adopted by the U.S. EPA, these proposed changes would allow small volume conversion manufacturers to request the evaporative emissions tests be waived for sealed fuel systems. Therefore this cost model assumes the evaporative emissions test will be zero.

The cost for aging a vehicle to its full useful life to demonstrate durability of the emission control system is typically about $10,000 and represents the testing costs of a two year old aged vehicle for durability demonstration. The cost would be higher if the manufacturer was unable to use bench aging or actual mileage accumulation. This cost would not necessarily have to be duplicated under OBD test vehicle aging because the manufacturers can use certification emission durability vehicles as their OBD test vehicles.

Staff's proposal would allow small volume conversion manufacturers to use catalysts and exhaust gas sensors that are rapid aged per a specified aging procedure on the test vehicle as compared to a vehicle aged to full useful life for the OBD demonstration vehicle. Additionally the proposal has provisions for the converter to waive some of the OBD demonstration tests. Therefore costs for the OBD emissions test and demonstration parts will be reduced significantly. A more detailed cost analysis of the estimated OBD demonstration costs can be found in Appendix D.

Table VII-1: Typical Costs of One Alternative Fuel Certification for Small Volume Conversion Manufacturers

	ARB Current New Vehicle Certification	ARB Current In-Use Vehicle Certification[5]	ARB Proposed Retrofit System Certification	U.S. EPA Current Retrofit System Certification
Exhaust Emission Tests	$6,300	$6,300	$6,300	$6,300
Evaporative Emission Tests	$6,400	$6,400	$0	$0
Emission Durability Demonstration	$0[6]	$10,000[7]	$0	$0
OBD Test Vehicle Aging	$50,000	$50,000	$20,000	$0
OBD Emission Tests	$39,900	$39,900	$8,400	$9,500
OBD Demonstration Parts	$49,200	$49,200	$42,000	$13,000
Travel, Vehicle Shipments, and Application Preparation	$16,900	$16,900	$16,900	$16,900
Certification Fees	$1,300	$0	$0	$4,000
Totals	**$170,000**	**$178,700**	**$93,600**	**$49,700**

There will be no change in the travel, vehicle shipments, and application preparation so these costs will remain the same but certification fees will be reduced because the small volume conversion manufacturer is simply certifying the retrofit system and not a vehicle or engine.

While the costs shown in the table for ARB's proposal are higher than U.S.EPA, ARB costs for OBD demonstration are incurred once per model year while the U.S. EPA costs are per test group, which will yield further reductions relative to U.S. EPA when more than one test group is certified per model year.

As shown in Table VII-1, the proposed changes would provide a cost savings for a single certification for small volume conversion manufacturers. Small volume conversion manufacturers would expect to save $76,400 for a new vehicle conversion and $85,100 for an in-use conversion. The conversion manufacturer could also use ARB demonstration data for certification with U.S. EPA and avoid the OBD related costs with U.S. EPA certification. These cost reductions translate to larger savings across the industry. For example in 2012, ARB approved 12 new light duty alternative fuel vehicle

[5] There would be no costs for any test where manufacturers re-use emissions data generated for prior new vehicle certifications, such as carry-over or carry-across data.
[6] Although most alternative fuel converters use assigned deterioration factors thereby saving the cost of a durability demonstration, they have the option of running the demonstration to reflect the true deterioration of their system and the cost would be higher in this case.
[7] This estimate represents the testing costs of a two year old aged vehicle for durability demonstration. The cost estimate would be significantly higher if the manufacturer was unable to use bench aging or actual mileage accumulation.

and engine families to small volume conversion manufacturers. Therefore, the cost savings to the California small volume conversion manufacturers might be as much as $1,021,200 (($85,100)*12) per year. As with the increased numbers of certifications U.S. EPA experienced after streamlining their procedures, staff expects the number of annual certifications will substantially increase in the early years of the streamlined program and then continue to increase as the market for these retrofit systems matures. Consequently, staff anticipates that the certification workload for new and in-use vehicles and engines certifications will increase justifying the need to hire one additional staff to keep up with market demands. Staff estimates the cost for one certification engineer to be $175,000 annually.

B. Major Regulations

The proposed amendments to the alternative fuel conversion procedures are not a major regulation because the impact to the California business enterprises and individuals is less than $50,000,000.

C. Reasonable Alternatives Considered

This chapter discusses alternatives to the proposed amendments to the Alternative Fuel Conversion Procedures. Staff considered a number of alternatives instead of the proposed amendments. These included making no changes to the regulation, considering U.S. EPA new standards, or allowing self-certification by the small volume conversion manufacturers. Each of these alternatives was rejected in favor of staff's proposed amendments. 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 or less burdensome to affected private persons than the proposed regulation.

No Changes to the Current Procedures

Over the last several decades, ARB has implemented stringent procedures for the alternative fuel conversions to ensure the emission standards of the original vehicle are maintained. As vehicle emission standards have become increasingly more stringent, OBD systems have become more important to ensure the emissions control systems are functioning properly and emission levels do not increase throughout the vehicle's useful life. Currently, companies interested in converting a new vehicle must follow the same stringent certification procedures as the original manufacturer of the vehicle. The new vehicle certification procedures are identified in section I-A. of this report. Staff estimated cost for new vehicle certification is shown in Table VII -1. Due to industry request to reduce the alternative fuel conversion process burden for small volume conversion manufacturers, and ARB concurring that the proposed changes would accomplish that without significantly risking emission impacts, staff rejected keeping the status quo.

Adopt U.S. EPA Procedures

The U.S. EPA recently adopted changes to their procedures used to approve vehicles and engines that have been converted to operate on alternative fuels such as natural gas or propane. The U.S. EPA changes provide a mechanism by which alternate fuel conversion manufacturers can obtain an EPA exemption from the tampering prohibition in the federal Clean Air Act section 203; however, the proposed amendments will provide California an additional level of assurance that the emissions from converted vehicles and engines will not exceed the emissions of the original vehicles.

For example, the U.S. EPA's streamlined requirements for demonstrating compliance with OBD system requirements provides no assurance that the OBD system after the conversion is properly adjusted to account for the modifications and change in fuel. In practice, the U.S. EPA process does not require any changes to the original control system to account for the changes that are made, which means that emission-related component failures are unlikely to be detected until emissions are far in excess of the required standards, if they are detected at all. When emissions control systems fail, the emissions can be 5 to 10 times higher than a properly functioning vehicle and a robust OBD system is needed to assure that emissions of the converted vehicle aren't substantially higher than on the original fuel. Overall, the changes adopted by U.S. EPA are significantly less protective of emissions and public health.

California has more severe air quality problems than most other states and currently does not meet federal air quality standards. California also has lower emissions standards for light-duty vehicles and will need to ensure that conversions to alternative fuel still achieve the expected emissions reductions. The newly adopted federal regulations provide a mechanism by which an alternative fuel converter can obtain an EPA exemption from the tampering prohibition in the federal Clean Air Act section 203. The proposed amendments will provide California an additional level of assurance that that the emissions from converted vehicles and engines will not exceed the emissions of the original vehicles, commensurate with the greater assurance needed by California's motor vehicle emissions control programs.

Primarily, the federal program does not require small volume manufacturers to demonstrate durability or to demonstrate that once the conversion is conducted the OBD system meets the emission thresholds or malfunction criteria specified in the OBD regulations. For example, the federal program allows the use of a modified new catalyst for OBD demonstration testing whereas ARB requires a laboratory aged catalyst, which is representative of how catalysts deteriorate and malfunction in use.

Additionally, the federal program has less stringent requirements for conversions of older vehicles. For emissions compliance, an alternative conversion manufacturer needs to provide emissions test data for vehicles within their useful life and a technical description, supported by test data upon request, for vehicles outside their useful lives, that shows that the base vehicle emissions will be maintained. For in-use vehicles, the federal program only requires the manufacturer to attest that the onboard diagnostic system is fully functional and provide a report on the on-board diagnostics scanning tool

without demonstrating the system performs as stated. Accordingly, staff did not consider this option.

Costs for certifying a retrofit system for a near new vehicle are found in the "Clean Alternative Fuel Vehicle and Engine Conversions; Final Rule" 40CFR Parts 85 and 86, and shown in table VII-1.

Self-Certification

ARB also considered a suggestion to allow conversion manufacturers to self-certify that they comply with OBD requirements without submitting documentation. ARB would then verify compliance after two years. The proposal saves time upfront without any significant cost savings for the conversion manufacturers that perform adequate testing to verify their systems design and functionality to take their product to the market. However, staff rejected it due to risk option because the risk that poorly designed systems and errors in design would not be discovered for several years. And retroactive actions such as recalls or penalties would be more disruptive to the market than upfront review. Costs for this alternative were not analyzed nor shown in table VII-1.

D. Impact on Small Business

Staff has identified that adopting U.S. EPA's standard would provide more cost savings to the small volume conversion manufacturers as compared to staff's proposed changes, however, the changes adopted by U.S. EPA are less protective of emissions and public health. Table VII-2 outlines staff's estimated cost savings for small volume conversion manufacturers based on the various alternatives considered.

Table VII-2: Cost Savings for Each Alternative Considered

Alternatives	Cost Saving/Certification
No Change	No Saving
US EPA Procedures	$129,000
Proposed Amendments	$85,100

E. Significant Adverse Economic Impact Directly Affecting Business

There is no economic adverse effect to the businesses in California.

F. Justification for Adoption of Regulations Different from Federal Regulations Contained in the Code of Federal Regulations

ARB's program is more robust than the US EPA certification procedures and verifies that a converted vehicle still meets the base emissions of the original vehicle. ARB has been working cooperatively with industry to increase flexibility for alternative fuel conversion manufacturers while ensuring that converted vehicles do not have higher

emissions. Staff has held numerous public workshops and workgroup meetings to address industry concerns and has drafted a proposal that significantly reduces certification costs without sacrificing any significant emissions benefits. These changes were developed through the public process and better align ARB's certification procedures with U.S. EPA's program. Furthermore, the current ARB proposal largely reflects the recommendations proposed by conversion industry representatives, and strikes a balance in streamlining the approval process with assurances that converted vehicles will not become gross polluters that go undetected in use. Industry stakeholders are also concerned that it would be counterproductive for the alternative fueled vehicle conversions market to sell cars and trucks that are more polluting than the original vehicle.

G. Economic Impact Assessment

The following economic impact assessment has been prepared for this rulemaking action in accordance with the provisions of Government Code section 11346.3(b)(1)(A)-(D).

The proposed amendments would significantly reduce the time and costs for small volume conversion manufacturers to generate data required to certify alternative fuel conversions, which would likely result in the expansion of associated businesses. Staff anticipates that the proposed amendments would result in the increase in sales and installations of the conversion systems in California which may result in the expansion of existing California businesses and the creation of some new businesses and jobs within the State. Additionally, as more vehicles and engines are converted to operate on alternative fuels, staff anticipates an expansion of the fueling infrastructure which would also result in the expansion of existing California businesses and the creation of some new businesses and jobs within the State

To the extent that a small volume conversion manufacturer is located in California, that manufacturer would likely experience increased product sales which in turn would result in the expansion of manufacturing businesses and the creation of manufacturing jobs.

The proposed amendments will preserve the emissions benefits associated with California's motor vehicle emissions control program by ensuring that emissions from converted vehicles do not exceed those from the originally certified vehicles. The proposed amendments may also result in air emissions benefits to the extent that manufacturers elect to certify conversion systems to convert vehicles and engines to more stringent certification standards than the originally certified vehicles and engines and to the extent that such conversion systems are purchased and installed. As a result, there would be no adverse effect on the environment.

VIII. SUMMARY AND RATIONALE FOR EACH REGULATORY PROVISION

H&S Code section 43004 provides that the exhaust emission standards applicable to gasoline-powered motor vehicles shall also apply to gasoline- or diesel-powered vehicles to use fuels other than the fuel for which the vehicle was originally certified. H&S Code section 43006 authorizes the Board to adopt test procedures for certifying alternative fuel conversion systems.

Vehicle Code section 27156 contains provisions to ensure that modifications to certified vehicles do not increase emissions, and provides that no device, apparatus, or mechanism that alters or modifies the original design or performance of a required motor vehicle emission control system can be advertised, sold, or installed unless that device, apparatus or mechanism has been exempted by ARB. ARB is authorized to only exempt modifications to a certified configuration if it finds the modifications will either not reduce the effectiveness of any required motor vehicle pollution control device or device or will not cause emissions from the converted vehicle to exceed applicable standards.

To ensure that the emissions from vehicles that are retrofitted to operate on alternative fuels do not exceed the emissions from the original, or unmodified vehicles, ARB developed certification procedures that require conversion manufacturers to demonstrate a converted vehicle will not reduce the effectiveness of any required motor vehicle pollution control device or will not cause emissions from the converted vehicle to exceed applicable standards. These test procedures are found in the following sections of CCR Title 13, Division 3, Chapter 1, Article 5, "Approval of Systems Designed to Convert Motor Vehicles to Use Fuels Other Than the Original Certification Fuel or to Convert Motor Vehicles for Emission Reduction Credit or to Convert Hybrid Electric Vehicles to Off-Vehicle Charge Capable Hybrid Electric Vehicles:"

Section 2030 – Liquefied Petroleum Gas or Natural Gas Retrofit Systems
Section 2031 – Alcohol or Alcohol/Gasoline Fuels Retrofit Systems
Section 2032 – Off-Vehicle Charge Capable Hybrid Electric Vehicle Conversion Systems

Staff is only proposing changes to sections 2030 and 2031 that apply to conversions to a gaseous or alcohol based fuel. The proposed amendments to sections 2030 and 2031 can be found in Appendix A of this report and are indicated by strike-out (deletion) and underline (addition). Currently, each section points to a set of procedures for conversion by vehicle or engine model year.

ARB's current procedures specify requirements applicable to conversion systems designed for installation in 1993 and earlier model year motor vehicles, and 1994 and subsequent model year motor vehicles. Staff is proposing to change the title and make other minor changes to the current test procedures that affect 1994 and subsequent model year motor vehicles and motor vehicle engines. The modified test procedure can

be found in Appendix B of this report. The proposed amendments would limit the applicability of the current 1994 procedures to 1994 through 2003 model year motor vehicles. Staff is also proposing to incorporate a new test procedure, applicable to 2004 and subsequent model-year motor vehicles, titled "California Certification and Installation Procedures for Alternative Fuel Retrofit Systems for On-Road Motor Vehicles and Engines." The proposed new test procedure can be found in Appendix C of this report. This new test procedure contains several documents that would be incorporated by reference. The following is a list of those documents:

Code of Federal Regulations (40CFR), Part 86.1313-2007, dated July 01, 2011.

The following American Society for Testing and Materials (ASTM) test method listed in 40CFR, Part 86.1313-2007, dated July 01, 2011.

- ASTM Test Method Number D1945-03(2010)

California Code of Regulations, Title 13 CCR § 2292.6, as amended December 08, 1999.

The following ASTM test methods listed in Title 13, CCR, section 2292.6. as amended December 08, 1999.

- ASTM Test Method Number D2163-87
- ASTM Test Method Number D1267-89
- ASTM Test Method Number D2598-88
- ASTM Test Method Number D1837-86
- ASTM Test Method Number D2158-89
- ASTM Test Method Number D1838-89
- ASTM Test Method Number D2784-89
- ASTM Test Method Number D2713-86

U.S. Environmental Protection Agency (U.S.EPA) Advisory Circular 17F, dated November 16, 1982, updated January 21, 1988.

U.S. EPA National Vehicle and Fuel Emissions Laboratory guidance letter CD-12-07 (Revised) for Assigned Deterioration Factors, dated March 30, 2012.

ARB test procedure "California 2001 through 2014 Model Criteria Pollutant Exhaust Emission Standards and Test Procedures and 2009 through 2016 Model Greenhouse Gas Exhaust Emission Standards and Test Procedures for Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles," as amended December 6, 2012.

ARB test procedure "California Non-Methane Organic Gas Test Procedures," as amended December 6, 2012.

ARB test procedure "California Exhaust Emission Standards and Test Procedures for 2005 through 2008 Model Zero-Emission Vehicles, and 2001

through 2008 Model Hybrid Electric Vehicles, in the Passenger Car, Light-Duty Truck and Medium-Duty Vehicle Classes," as amended December 2, 2009 and is incorporated by reference in title 13, CCR section 1962.

ARB test procedure "California Exhaust Emission Standards and Test Procedures for 2009 through 2017 Model Zero-Emission Vehicles and Hybrid Electric Vehicles, in the Passenger Car, Light-Duty Truck and Medium-Duty Vehicle Classes," as amended December 6, 2012 and is incorporated by reference in title 13, CCR section 1962.1.

ARB test procedure "California Exhaust Emission Standards and Test Procedures for 2018 and Subsequent Model Zero-Emission Vehicles and Hybrid Electric Vehicles, in the Passenger Car, Light-Duty Truck and Medium-Duty Vehicle Classes," as amended December 6, 2012 and is incorporated by reference in title 13, CCR section 1962.2.

ARB test procedure "California 2001 through 2014 Model Criteria Pollutant Exhaust Emission Standards and Test Procedures and 2009 through 2016 Model Greenhouse Gas Exhaust Emission Standards and Test Procedures for Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles," as amended December 6, 2012 and is incorporated by reference in title 13, CCR section 1961(d).

ARB test procedure "California 2015 and Subsequent Model Criteria Pollutant Exhaust Emission Standards and Test Procedures and 2017 and Subsequent Model Greenhouse Gas Exhaust Emission Standards and Test Procedures for Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles," as amended December 6, 2012.

ARB test procedure "California Evaporative Emission Standards and Test Procedures for 2001 and Subsequent Model Motor Vehicles" as amended March 22, 2012 and is incorporated by reference in title 13, CCR section 1976(c).

ARB test procedure "California Refueling Emission Standards and Test Procedures for 2001 and Subsequent Model Motor Vehicles," as amended March 22, 2012, and is incorporated herein by reference in title 13, CCR section 1978(b).

ARB test procedure "California Exhaust Emission Standards and Test Procedures for 2004 and Subsequent Model Heavy-Duty Diesel-Engines and Vehicles," adopted December 12, 2002, as amended April 18, 2013.

ARB certification procedure "California Interim Certification Procedures for 2004 and Subsequent Model Hybrid-Electric Vehicles, in the Urban Bus and Heavy-Duty Vehicle Classes," adopted October 24, 2002.

ARB test procedure "California Exhaust Emission Standards and Test Procedures for 2004 and Subsequent Model Heavy-Duty Otto-Cycle Engines," as amended April 18, 2013.

The proposed amendments would allow conversion manufacturers to demonstrate that retrofitted motor vehicles or engines do not exceed the applicable emission standards of the original motor vehicle or engine or alternatively, do not exceed the emission standards of a more stringent emissions standard. The following is a summary of proposed changes that apply to the alternative fuel conversion test procedures found in sections 2030 and 2031.

A. Alternative Fuel Retrofit Systems with Sealed Fuel Systems

Section 4.(d)(1) of the proposed new test procedures would allow manufacturers of alternative fuel retrofit systems with sealed fuel systems to demonstrate compliance with the evaporative emission standards without performing evaporative emissions testing. Demonstrations may be based on an engineering evaluation of the alternative fuel retrofit system to show that it has no evaporative-related emissions under typical vehicle operation. All such demonstrations must be approved in advance by the Executive Officer. ARB may perform evaporative emissions testing using prescribed test procedures for confirmatory and other testing.

B. Small Volume Conversion Manufacturer Provisions

To sell an alternative fuel conversion system in California, a manufacturer must apply for certification and provide test results to demonstrate that the system meets applicable emission requirements. The application process requires retrofit system manufacturers to expend time and resources for designing, testing, and building emission compliant systems. Large manufacturers should be able to recoup such costs by the sheer volume of sales. For small volume conversion manufacturers, it is just the opposite and high certification costs and lengthy testing requirements may burden a converter's ability to certify and market conversion systems in a timely manner. To reduce costs and time for certifying alternative fuel conversions, staff is proposing amendments to reduce the testing requirements for small volume conversion manufacturers. Staff defines small volume conversion manufacturers as manufacturers with California annual sales of less than 1,500 alternative fuel retrofit systems in any given calendar year. The 1,500 sales threshold was selected because similar figures were used by other regulations. U.S. EPA's alternative fuel retrofit regulations include a small volume definition of 15,000 sales of converter systems nationally for all vehicle and engine classes. Staff's proposed definition is in line with the federal definition since California historically has represented about 10 percent of the national vehicle market. Furthermore, historic records show that the majority of manufacturers sold less than 1,500 conversion systems per year. The amendments clarify California sales include all retrofit systems produced by the manufacturer and delivered for sale in California. If a manufacturer has an arrangement allowing another entity to market its retrofit systems (e.g., a retailer or distributor), California sales includes retrofit systems produced by the

manufacturer and marketed by those authorized entities. The definition of a small volume conversion manufacturer can be found in section 2.(a)(18) of the proposed new test procedures (Appendix C).

C. Test Fuel

Staff is proposing to allow small volume conversion manufacturers to use the less expensive commercial CNG that meets the federal standards for testing in lieu of ARB CNG certification test fuel. The federal standard for CNG is found in the Code of Federal Regulations (40CFR), Part 86.1313-2007, July 01, 2011 edition and is incorporated by reference in section 5.(c)(3)(A) of the proposed new test procedures (Appendix C). This federal standard for CNG requires retrofit system manufacturers to provide a fuel analysis with their final emission results using American Society for Testing and Materials (ASTM) test method D1945-03(2010) which is incorporated by reference therein.

Staff is also proposing to allow small volume conversion manufacturers to use LPG that meets ARB's motor vehicle fuel requirements, since there is no federally certified LPG, in lieu of ARB LPG certification test fuel. ARBs motor fuel standard for LPG is found in title 133, CCR, section 2292.6 and is incorporated by reference in section 5.(c)(3)(B) of the proposed new test procedures (Appendix C). This California regulation requires retrofit system manufacturers to provide a fuel analysis with their final emission results using the following ASTM test methods which are incorporated by reference therein:

- D2163-87
- D1267-89
- D2598-88
- D1837-86
- D2163-87
- D2158-89
- D1838-89
- D2784-89
- D2713-86

The test results from using the proposed fuel standards may be slightly different than the results from tests conducted with certification test fuels due to less controlled fuel specifications. However, since the applicant is required to include an analysis of their certification test fuel with their test results for approval, this proposed change would have positive economic benefit with little impact expected on the certification process. Staff is not proposing any changes to the use of alcohol test fuel and the continued use of commercial fuels for any service accumulation testing (durability).

Staff is proposing the use of commercial fuel for the official certification testing through 2017 model year only as an interim cost savings for the industry. The concern with the use of such fuel is its quality and variability of properties, and the impacts on emissions. Data comparing emissions from vehicles and engines operated on both commercial and official certification fuels need to be generated to show no significant differences. Staff

is proposing to continue the use of commercial fuels past the sunset date if the industry provides test data showing no significant emissions differences. Industry may pool their resources over the next four years to generate the data.

D. Assigned Deterioration Factors

Staff is proposing to allow the small volume conversion manufacturers to use an assigned deterioration factors (DF) to determine compliance with useful life emission standards and remove the requirements for high mileage emission tests. A deterioration factor is a numeric factor applied to low mileage mass emissions to account for the potential increase in emissions due to deterioration of engines, emission control components, and retrofit systems as they age. It is defined as the estimate of the ratio of the true mean response at high mileage to the true mean response at low mileage. The results from using assigned DF would not be as accurate as the results from actual testing, but it is a good approximation and is sufficient for determining compliance. Assigned DFs tend to be higher, more severe, than the average DF for a similar class of vehicle or engine. This method is also approved by U.S. EPA. The assigned DF would be provided by ARB. If no ARB assigned DFs are available, manufacturers may use the assigned DF's, as published by the U.S. EPA National Vehicle and Fuel Emissions Laboratory guidance letter CD-12-07 (Revised) dated March 30, 2012 which is incorporated by reference in section 5.(c)(3)(C) of the proposed new test procedures (Appendix C). Providing this flexibility to small volume conversion manufacturers would save them time and costs. To further reduce costs if DFs are not available from U.S. EPA, staff also proposes to allow small volume conversion manufacturers to submit DFs for Executive Officer approval as long as the manufacturers would validate the factor.

E. NMOG Multiplier

In response to industry's request, staff is proposing to adopt U.S. EPA's multiplier of 1.5 times the measured NMHC emissions to determine compliance with NMOG instead of the current, more expensive test requirements for both NG and LPG. This would result in reduced testing costs as applicants would not be required to use chromatography to determine emission rates of aldehydes and alcohols and would move ARB's requirements closer towards harmonizing with federal standards. The specific language for using the 1.5 multiplier can be found in section 5.(c)(1) of the proposed new test procedures (Appendix C).

F. Alternative Test Methods

In an effort to update the in-use alternative fuel conversion certification procedures, staff is proposing the use of alternative test methods and procedures. Specifically, small volume retrofit system manufacturers certifying systems for heavy-duty engines and vehicles that were originally certified under an engine-dynamometer test procedure may propose an alternative test method. The use of alternative test methods could greatly accelerate the certification process and would provide flexibility for manufacturers,

provided that the manufacturers demonstrate that the alternative test method correlates with the emission tests and cycles used by the original vehicle or engine for certification. Manufacturers have requested the use of portable emission measurement systems (PEMS). Manufacturers may propose PEMS testing procedures by submitting their plan and data to support its correlation for review and approval by the Executive Officer. The specific language for using the alternative test method can be found in section 4.(a)(4) of the proposed new test procedures (Appendix C).

G. OBD Monitoring System Requirements

Industry has expressed concerns regarding the high relative costs and time associated with demonstrating OBD compliance. Staff is proposing to streamline OBD demonstration requirements and certification documentation requirements and add flexibility for the small volume conversion manufacturers while still affording a reasonable level of protection from high in-use emissions without proper fault detection. With the exception of provisions for certification to the same standard for reduced durability requirements on the OBD test vehicle and exceptions to demonstration requirements for monitors and/or emission controls that were not changed with the conversion, these provisions would continue to apply after the sunset date. And, to ensure applicants do not mistakenly interpret any reductions in testing or data required at the time of certification as an exemption from the underlying OBD system requirement to detect faults, all applicants will be required to submit a statement of compliance that they indeed meet the OBD requirements. The specific language for OBD testing requirements for retrofit certification can be found in section 6. of the proposed new test procedures (Appendix C).

With regards to conversions of light- and medium-duty gasoline original vehicles/engines that are seeking certification to the same emission standards as the original vehicle/engine, the proposed changes would revise certification requirements, reduce the number of demonstration tests required if no changes to monitoring strategies or original control strategies are made with the conversion, and allow the use of less expensive rapid aged parts or an in-use vehicle for demonstration testing. For conversion systems that are seeking certification to more stringent emission standards than that of the original vehicle/engine, the proposed changes would revise certification requirements and delay submission of demonstration test data for some monitors. These provisions are discussed in further detail below.

For small volume conversion manufacturers of light- and medium-duty diesel vehicles/engines or heavy-duty diesel or gasoline vehicles/engines, there have either never been applications for such conversions or the original engines have not yet been subject to full OBD requirements. As such, ARB staff has not had enough experience determining the appropriate streamlined requirements and flexibilities that would ensure that the OBD systems on these vehicles are not compromised by the conversion. Thus, for these conversion systems, manufacturers would be required to propose a plan analogous to the provisions mentioned above, where ARB approval would be based on

the appropriate application of these provisions to the respective requirements in the OBD regulations.

The objective of the certification is to ensure that emissions after the alternative fuel conversion would be no worse than before the conversion, and the OBD system would continue to be able to detect a system fault at the required emission levels. If the vehicle to be retrofitted was certified with an OBD system, the proper functionality of the OBD system must not be impaired as a result of the installation and operation of the alternative fuel retrofit system. Therefore, in developing the proposal, staff considered allowing the waiver of additional OBD demonstration tests if the OBD monitors and their underlying original emission controls have not been changed to maintain emission and OBD compliance.

For OBD demonstration testing, staff is proposing changes to the test vehicle requirements for small volume conversion manufacturers of gasoline original vehicles/engines. When conducting OBD demonstration testing per the current requirements, the manufacturer is required to use a certification emission durability test vehicle, a representative high mileage vehicle, or a vehicle aged to the end of the full useful life using an ARB approved alternative durability procedure. This is required to ensure that the calibration of the OBD system accounts for the aging effects of the emission control system and will properly detect malfunctions on high mileage vehicles and will continue to be required for conversion systems certifying to a more stringent standard. To lower the costs and reduce time involved for conversion systems certified to the same emission standard, the proposal would allow, until the sunset, the use of predefined aged components or limited vehicle aging to “create” a test vehicle in an appropriate condition of aging as long as the requirements specified in the proposed procedures are met. This proposed change would allow small volume conversion manufacturers to use a test vehicle with the original equipment manufacturer (OEM) catalysts and oxygen sensors aged per the bench aging cycle specified in in section 6.(b)(1)(B)1. of the proposed new test procedures (Appendix C). This aging cycle has been copied into the proposed new test procedures from the “California Evaluation Procedures for New Aftermarket Catalytic Converters.” Catalysts and oxygen sensors would be required to be aged for 100 hours using the bench aging cycle.

Staff is also proposing changes to the monitors that are required to be demonstrated for small volume conversion manufacturers of gasoline original vehicles/engines. Generally, the existing regulation requires a demonstration test to be conducted for each monitor that is calibrated to an emission threshold and includes demonstrations for the following gasoline monitors: exhaust gas sensors (e.g., oxygen sensors), exhaust gas recirculation (EGR), variable valve timing, fuel system, misfire, secondary air injection, and catalyst. For certification of the conversion system to the same standard as the gasoline original vehicle, staff is proposing until the sunset to require limited demonstration testing only for the exhaust gas sensor monitor, fuel system monitor, catalyst system monitor, and any other monitor where the monitor itself (e.g., the EGR low flow monitor) or the original emission control software (e.g., EGR valve duty cycle) or hardware was changed. For conversion systems certified to a more stringent

standard than the original vehicle, staff is proposing to continue to require demonstration testing for all monitors specified in the existing applicable regulation. However under the proposal, the manufacturer may request to be conditionally certified based on submission of the limited demonstration test data for the exhaust gas sensors, fuel system, and catalyst system monitors. The data for the remaining monitors would be required to be submitted within an appropriate time after conditional certification is granted and the conditional status would be removed upon review and approval of the subsequent data by ARB staff. After the sunset, these provisions for certification to a more stringent standard would also apply to certification to the same standard.

The staff is proposing further changes to the catalyst monitor demonstration requirements. If a catalyst monitor demonstration test illuminates the malfunction indicator light (MIL) after emissions exceed the applicable emission threshold, the regulation currently requires the manufacturer to retest the vehicle with a less deteriorated catalyst and to show that either the MIL illuminates with emissions below the threshold or the MIL illuminates within acceptable upper and lower limits of 25 percent of the applicable standard. Staff is proposing to expand the upper and lower limits by an additional 25 percent, with the limits now based on 50 percent of the applicable standard, to allow more margin for under and over shooting when developing threshold catalysts for the catalyst demonstration test. For example, for a catalyst monitor threshold of 1.75 times the standard, the manufacturer has to demonstrate the catalyst malfunction is detected between 1.5 and 2.0 times the standard under the existing regulation. Under the proposal for a catalyst monitor threshold of 1.75 times the standard, the manufacturer would have to demonstrate the catalyst malfunction is detected between 1.25 and 2.25 times the standard. This proposal would apply to conversion systems certified to either the same emission standard as, or a more stringent emission standard, than that of the original vehicle/engine.

Lastly, staff is also proposing changes to the certification documentation requirements that would apply to all converters (i.e., would not be limited to only small volume conversion manufacturers). Specifically, as an alternative to providing all the certification documentation information required by the OBD regulation, staff is proposing to allow manufacturers to provide only information about the modifications, additions, and deletions made to the OBD system on the original vehicle/engine. As mentioned above, these certification documentation changes would not be subject to the sunset date deadline.

While the staff is proposing changes to the required demonstration tests and certification documentation requirements, it is important to note that the OBD system performance and enforcement requirements remain unchanged. The proposed changes are intended to reduce the time and cost of preparing certification documentation and conducting testing to support OBD certification for small volume conversion manufacturers while maintaining the required performance of the OBD system and its ability to detect malfunctions on in-use vehicles.

H. Dual Fuel Waivers

Manufacturers seeking to convert a vehicle to use an alternative fuel or the conventional fuel the vehicle or engine was originally certified with must comply with the exhaust and evaporative emission standards for both fuels. Dual fuel refers to a retrofit system which utilizes both an alternative fuel and a conventional fuel, engineered and designed to be capable of operating on either fuel. The dual fuel system has separate fuel tanks for each fuel on-board the vehicle, but only one fuel is used at a time during operation. However, manufacturers applying for alternative fuel certification may provide an engineering justification for a test waiver to eliminate repeating the emissions testing of the vehicle on the original fuel.

The manufacturer would have to include an explanation of how the changes associated with the retrofit system do not affect the emissions and engine operation of the vehicle using its original fuel. This proposed waiver from repeating the required evaporative and exhaust and emission testing on the original fuel would provide economic benefit for the manufacturers due to reduction in the number of tests. Since the manufacturer still has to demonstrate compliance, based on engineering evaluation of the system and data submitted, and be approved by the Executive Officer before the waiver can be issued, staff believes there is minimal to no little risk of increasing emission or to the integrity of the certification process. The specific language for requesting a waiver for dual fuel systems can be found in section 5.(c)(2) of the proposed new test procedures (Appendix C).

I. Certifying to a More Stringent Emission Standard

Industry has requested a more streamlined process to certify a vehicle or engine to a more stringent emission standard than the original vehicle or engine's original certification standard. Applicants often wish to reduce certifications one level (e.g., converting an ultra low emission vehicle (ULEV) gasoline vehicle to a super ultra low emission vehicle (SULEV) or natural gas vehicle). Market drivers for such requests include funding opportunities and high occupancy vehicle lane access.

Section 6.(b)(2) of the proposed new test procedures would allow small volume conversion manufacturers to request certification to a more stringent standard after completing testing for only the exhaust gas sensor monitor, fuel system monitor, catalyst system monitor, and any other monitor where the monitor itself (e.g., the EGR low flow monitor) or the original emission control software (e.g., EGR valve duty cycle) or hardware was changed. The data for the remaining monitors would be required to be submitted within an appropriate time after conditional certification is granted and the conditional status would be removed upon review and approval of the subsequent data by ARB staff. If approved, the applicant will receive an Executive Order that allows it to sell the conversion systems. However, the EO will be expressly conditioned upon submission of the remaining OBD demonstration requirements within a specified length of time to complete the certification.

J. Warranty Requirements

ARB requires new vehicle and engine manufacturers to provide an emissions warranty to consumers for the emission control components for a period of time and mileage. Emissions warranty helps ensure manufacturers build components that are durable and function as designed and as certified. The current aftermarket conversion procedures include emissions warranty provisions similar to the new vehicle and engine requirements. The staff proposal is to continue the current aftermarket warranty provisions with minor changes. Manufacturers shall provide warranty for three years or 50,000 miles or the warranty period remaining from the original vehicle or engine. New vehicle warranties for advance control vehicles may reach 15 years or 150,000 miles. These Procedures will maintain that level of coverage. Similar requirements are proposed for high cost parts where warranty is extended to 7 years or 70,000 miles.

Manufacturers will also have to retain and review warranty claims for each conversion system on a production year basis for three years. The reports of the claims must be available to ARB upon request. If warranty claims are excessive, perhaps exceeding 25 claims or 1 percent for a specific part, ARB may use the information to initiate in-use enforcement testing or confirmatory testing. The specific language all warranty requirements can be found in section 9. of the proposed new test procedures (Appendix C).

K. Sunset Provision

Staff believes that some of the test procedures will need to be updated to reflect the changes in emission control and OBD systems for the 2018 model year. By 2018, the declining LEV III exhaust emission fleet average will be driving a significant portion of the light duty vehicles to lower exhaust emission levels. In addition, the heavy duty OBD standards will also be in full effect for conventional and alternative fueled engines for the 2018 model year.

Currently, staff believes that certifying compliance to the lower LEV III standards can only be accomplished through actual testing and demonstration of the emission control and OBD systems. Waiving these tests through an engineering evaluation is not possible because technologies that will be used to comply with the new LEV III standards will need to be more sophisticated and durable. Additionally, the proposed deterioration factors used for complying with today's standards are unlikely to be representative of the deterioration factors for the lower LEV III standards.
Likewise, heavy duty diesel engines currently use Selective Catalytic Reduction (SCR) exhaust aftertreatment technology to reduce emissions. Conversions of heavy duty diesel engine to gaseous fuels may also result in the use of a different aftertreatment technology (e.g., a three way catalyst).. This type of significant change is essentially a new engine and will need to complete full certification. Therefore most of the proposed flexibility will likely not be appropriate at that time. Further, full OBD will be required on new alternative fueled heavy duty engines beginning in the 2018 model year. It is

appropriate to require full OBD demonstrations to ensure compliance at this new level of capability on both new and converted engines.

For these reasons, staff is proposing to sunset provisions that are not appropriate after the 2017 model year when the new lower emissions standards take effect. Staff will monitor impacts to emissions and changes to engine technology and will provide future recommendations to the Board whether the sunset provision needs to be extended.

The proposed changes also allow small volume conversion manufacturers the ability to waive many of the OBD demonstration requirements which transfer some of the risk for long term emissions increases to ARB. Based on staff's technical understanding and judgment, the sunset provision would also serve as a safety net for containing potential emission impacts should unforeseen issues arise as a result of the proposal.

Staff developed this proposal through the public process. A number of the participating stakeholders have experience certifying conversion systems to existing ARB requirements. Their input based on their experience was taken into consideration when making changes to the demonstration requirements. The requirements change the least for systems certified to more stringent standards so there is reduced risk with respect to such systems. Likewise if the volumes grow for systems certified to more stringent standards, the cumulative potential emission impact is minimized. However, with respect to the systems certified to the same standard, there may be more growth in this market because the time and cost to certify is greatly reduced. The sunset provision will create a firm opportunity to revisit the requirements and conservatively puts the sunset in place in the event the benefits of these producers do not manifest themselves as expected or in the event there are problems that need to be addressed. Further, the additional volumes will support the time and cost of doing a more rigorous certification. The definition of sunset can be found in section 2.(a)(19) of the proposed new test procedures (Appendix C).

L. Expedited Approval Process

Staff is proposing to create a new subsection (c) in sections 2030 and 2031 of title 13, CCR to provide manufacturers that certify new vehicles and engines fueled by alternative fuels an expedited process to certify an identical alternative fuel conversion system. The proposed changes will allow a manufacturer to request approval to carry-over or carry-across data used to obtain California certification of a new vehicle or new engine to demonstrate compliance with the emission testing requirements specified under the in-use procedures for identical conversion systems. Applicants for carry-over and carry-across will be evaluated according to the criteria specified in U.S. EPA Advisory Circular 17F, dated November 16, 1982, updated on January 21, 1988, which is incorporated by reference in section 11.(b)(3) of the proposed new test procedures (Appendix C). This would substantially reduce the time and costs for certifying alternative fuel conversion systems for qualifying manufacturers.

IX. PUBLIC PROCESS FOR DEVELOPMENT OF PROPOSED ACTION

Air Resources Board staff developed the proposed amendments through an extensive public process in less than a year. This included public workshops, workgroup meetings, and teleconference calls with stakeholders. At all workshops and meetings, staff solicited comments from stakeholders and affected industry to develop staff's current proposals. Appendix F lists organizations, companies, and agencies that were represented at these meetings.

A. Public Workshops

On August 14, 2012, ARB staff held an informational workshop in El Monte, California, to discuss ARB's current alternative fuel conversion requirements for new and used vehicles and engines. Based on comments received at the workshop and recent changes adopted by the U.S. EPA to their procedures for certifying alternative fuel conversions, staff began investigating the need for updates to ARB's procedures. See Appendix F for a list of participants, workshop notice, and staff's presentation.

On January 22, 2013, staff held a second public workshop in El Monte, California to discuss the proposed amendments to the alternative fuel conversion certification procedures for new and in-use vehicles and engines. The workshop was also available via teleconference to attendees who could not travel. Attendees at the January 22, 2013 workshop included representatives of natural gas and propane alternative fuel conversion system manufacturers, alternative fuel suppliers, and hybrid-electric retrofit system manufacturers. See Appendix F for a list of participants, workshop notice, and staff's presentation. At the workshop, staff discussed proposals to amend the current procedures. These included changes designed to streamline the application process for in-use certifications, changes to the certification test requirements, changes to the OBD test procedures, and changes to the in-use testing and installation inspection requirements. Staff also discussed the viability of alternative test methods and a request from stakeholder input regarding current market demand for new and in-use hybrid conversions. Attendees commented on expanding the use of alternative fuels (mainly natural gas and propane) in the transportation sector. They also stated that ARB's current certification requirements are overly prescriptive and create market barriers in California, especially for small businesses. Much of the discussion centered on recently adopted changes by U.S. EPA to their alternative fuel conversion certification procedures. Attendees also stated the cost disparity between a U.S. EPA certification versus an ARB certification and that much of the costs concerns are associated with the OBD requirements. The attendees also expressed concern that ARB's alternative fuel certification procedures currently do not allow the use of waivers. U.S. EPA allows alternative fuel manufacturers to request waivers from repeating specific tests already performed during a vehicle or engine's original certification testing.

ARB staff held a third public workshop on May 1, 2013 in El Monte, California. The workshop was also available to attendees to participate via teleconference. Approximately 70 individuals participated in the workshop both in-person and via

teleconference. See Appendix F for list of participants, workshop notice, and staff's presentation. At the workshop, staff's proposals included creating a single process for new and in-use conversions by focusing on certifying retrofit systems rather than vehicles/engines, providing additional flexibilities for small volume conversion manufacturers, and streamlining the application and approval process. Staff also proposed reducing emission testing and OBD demonstration requirements, expanding applicable test fuels and deterioration factors, incorporating waiver language, changes to in-use testing and installation control changes, and a four year window for added flexibilities.

B. Workgroup Meetings and Other Outreach Efforts

ARB staff also held four workgroup meetings to discussed proposed amendments with industry representatives. Workgroup participants included representatives from companies that develop technology to modify conventional fueled vehicles to alternative fueled vehicles. Representatives at the workgroup meetings also included representatives from the alternative fuel industry. These meetings were held on January 15, March 1, April 8, and May 30, 2013. The meetings were designed to work with industry representatives on more detailed and technical issues in developing the proposed amendments including costs, alternative fuel conversions, and streamlining certification application process. ARB also held numerous teleconference calls with individual stakeholders and representatives of the natural gas industry to discuss technical information further on the proposed amendments.

X. REFERENCES

1. Clean Alternative Fuel Vehicle and Engine Conversions; Final Rule; 40CFR Parts 85 and 86. (April 8, 2011) http://www.gpo.gov/fdsys/pkg/FR-2011-04-08/pdf/2011-7910.pdf

2. Natural Gas Coalition Letter to ARB; March 8, 2013; Re: CARB's Alternative Fuel Vehicle Conversion Certification Program. (Available in the Appendix E)

3. Alternative Fuels Advocates, LLC Letter to ARB; August 2, 2012; Re: Streamlining of certain Natural Gas / Propane vehicle and engine certification procedures. (Available in the Appendix E)

APPENDIX A

A. Proposed Amendments to Regulation

AMENDMENTS
TO ARTICLE 5, CHAPTER 1, DIVISION 3, TITLE 13
OF THE CALIFORNIA CODE OF REGULATIONS AND
TO SECTIONS 2030 AND 2031 OF ARTICLE 5

Note: Amendments are shown in <u>underline</u> to indicate additions and ~~strikeout~~ to indicate deletions from the existing regulatory text.

Article 5. Approval of Systems Designed To Convert Motor Vehicles to Use Fuels Other Than the Original Certification Fuel or to Convert Motor Vehicles for Emission Reduction Credit or to Convert Hybrid Electric Vehicles to Off-Vehicle Charge Capable Hybrid Electric Vehicles

Amend title 13, California Code of Regulations, sections 2030 and 2031 to read as follows:

§ 2030. Liquefied Petroleum Gas or Natural Gas Retrofit Systems.

(a) Applicable Standards and Test Procedures.
The standards and test procedures for approval of systems designed to convert 1993 and earlier model year motor vehicles to use liquefied petroleum gas or natural gas fuels are contained in "California Exhaust Emission Standards and Test Procedures for Systems Designed to Convert Motor Vehicles Certified for 1993 and Earlier Model Years to Use Liquefied Petroleum Gas or Natural Gas Fuels" adopted by the State Board on April 16, 1975, as amended November 21, 1995. The standards and test procedures for approval of systems designed to convert 1994 ~~and subsequent~~ through 2003 model year motor vehicles to use liquefied petroleum gas or natural gas fuels are contained in "California Certification and Installation Procedures for Alternative Fuel Retrofit Systems for Motor Vehicles Certified for 1994 through 2003 Model Years ~~and Subsequent Model Years~~ and for 1994 through 2003 ~~all~~ Model Year Motor Vehicle Retrofit Systems Certified for Emission Reduction Credit," adopted by the State Board March 11, 1993, as last amended ~~September 25, 1997~~ [DATE OF AMENDMENT]. At the option of the retrofit system manufacturer, the standards and test procedures for approval of systems designed to convert 1994 through 2003 ~~and subsequent~~ model year vehicles to use liquefied petroleum gas or natural gas fuels may be used for approval of systems designed to convert 1993 and earlier model year motor vehicles to use liquefied petroleum gas or natural gas fuels in lieu of the "California Exhaust Emission Standards and Test Procedures for Systems Designed to Convert Motor Vehicles Certified for 1993 and Earlier Model Years to Use Liquefied Petroleum Gas or Natural Gas Fuels." The standards and test procedures for approval of systems designed to convert 2004 and subsequent model year motor vehicles to use liquefied petroleum gas or natural gas fuels are contained in the “California Certification and Installation Procedures for Alternative Fuel Retrofit Systems for On-Road Motor Vehicles and Engines,” adopted by the State board on [*DATE OF ADOPTION*], which are incorporated herein by reference.

(b) Implementation Phase-In Schedule.
Notwithstanding sub section (a), a retrofit system manufacturer may apply "California Exhaust Emission Standards and Test Procedures for Systems Designed to Convert Motor Vehicles Certified for 1993 and Earlier Model Years to Use Liquefied Petroleum Gas or Natural Gas Fuels" to certify retrofit systems for 1994 and 1995 model-year vehicles in accordance with the following implementation phase-in schedule. Each manufacturer may certify a maximum of 85 percent of its total 1994 model-year engine

family retrofit systems, 45 percent of its total 1995 model-year systems, and 45 percent of its total 1996 model-year systems, according to the requirements of these test procedures and "California Exhaust Emission Standards and Test Procedures for Systems Designed to Convert Motor Vehicles Certified for 1993 and Earlier Model Years to Use Alcohol or Alcohol/Gasoline Fuels", adopted by the State Board on April 28, 1983, as amended November 21, 1995. The remaining percentage of each manufacturer's certified 1994, 1995, and 1996 model-year engine family retrofit systems and all ~~of~~ 1997 ~~and subsequent~~ through 2003 model-year engine family retrofit systems shall be certified according to "California Certification and Installation Procedures for Alternative Fuel Retrofit Systems For Motor Vehicles Certified For 1994 ~~and Subsequent~~ through 2003 Model Years and for 1994 through 2003 ~~all~~ Model Year Motor Vehicle Retrofit Systems Certified for Emission Reduction Credit." The percentages shall be determined from the total number of retrofit systems certified and shall be met prior to the end of the next respective calendar year. "California Exhaust Emission Standards and Test Procedures for Systems Designed to Convert Motor Vehicles Certified for 1993 and Earlier Model Years to Use Liquefied Petroleum Gas or Natural Gas Fuels" shall not be applied to certify a retrofit system for installation on a transitional low-emission vehicle (TLEV), low-emission vehicle (LEV), or ultra-low-emission vehicle (ULEV) or to certify a retrofit system designed to convert a vehicle to TLEV, LEV, or ULEV emission standards (as defined in Section 1960.1, Title 13, California Code of Regulations), or to certify a retrofit system for emission reduction credits.

(c) Expedited Approval Provisions.
A manufacturer of new 2004 or subsequent model year passenger cars, light-duty trucks, medium-duty vehicles or heavy-duty engines or vehicles that are fueled by alternative fuels, as defined in title 13, California Code of Regulations, Chapter 5, Standards for Motor Vehicle Fuels, sections 2290– 2293.5 that obtains a new vehicle or engine certification from ARB may request certification of an alternative fuel retrofit system that is identical in configuration to the fuel system in the California certified vehicle or engine under the “California Certification and Installation Procedures for Alternative Fuel Retrofit Systems for On-Road Motor Vehicles and Engines,” adopted by the State board on [*DATE OF ADOPTION*], which are incorporated herein by reference. The manufacturer may request approval to carry-over or carry-across data used to obtain California certification of a new vehicle or new engine to demonstrate compliance with the emission testing requirements specified under the “California Certification and Installation Procedures for Alternative Fuel Retrofit Systems for On-Road Motor Vehicles and Engines,” adopted by the State board on [*DATE OF ADOPTION*], which are incorporated herein by reference. For purposes of this provision, the term “identical” means that all engine parts on the alternative fuel retrofit system that affect emissions must be of the same design, specifications, tolerances as those of the fueling system as disclosed in the manufacturer’s certification application for the new vehicle or new vehicle engine.

NOTE: Authority cited: Sections 39515, 39600, 39601 and 43006, Health and Safety Code. Reference: Sections 43000, 43004, 43006, 43008.6, 43013 and 43108, Health and Safety Code; and Sections 27156, 38391 and 38395, Vehicle Code.

§ 2031. Alcohol or Alcohol/Gasoline Fuels Retrofit Systems.

(a) Applicable Standards and Test Procedures.
The standards and test procedures for approval of systems designed to convert 1993 and earlier model year motor vehicles to use alcohol or alcohol/gasoline fuels in lieu of the original certification fuel system are contained in "California Exhaust Emission Standards and Test Procedures for Systems Designed to Convert Motor Vehicles Certified for 1993 and Earlier Model Years to Use Alcohol or Alcohol/Gasoline Fuels," adopted by the State Board April 28, 1983, as amended November 21, 1995. The standards and test procedures for approval of systems designed to convert 1994 ~~and subsequent~~ through 2003 model year motor vehicles to use alcohol or alcohol/gasoline fuels are contained in "California Certification and Installation Procedures for Alternative Fuel Retrofit Systems for Motor Vehicles Certified for 1994 through 2003 ~~and Subsequent~~ Model Years and for 1994 through 2003 ~~all~~ Model Year Motor Vehicle Retrofit Systems Certified for Emission Reduction Credit," adopted by the State Board March 11, 1993, as last amended ~~September 25, 1997~~ [DATE OF AMENDMENT]. At the option of the retrofit system manufacturer, the standards and test procedures for approval of systems designed to convert 1994 ~~and subsequent~~ through 2003 model year motor vehicles to use alcohol or alcohol/gasoline fuels may be used for approval of systems designed to convert 1993 and earlier model year motor vehicles to use alcohol or alcohol/gasoline fuels in lieu of the "California Exhaust Emission Standards and Test Procedures for Systems Designed to Convert Motor Vehicles Certified for 1993 and Earlier Model Years to Use Alcohol or Alcohol/Gasoline Fuels." The standards and test procedures for approval of systems designed to convert 2004 and subsequent model year motor vehicles to use alcohol or alcohol/gasoline fuels in lieu of the original certification fuel system are contained in the "California Certification and Installation Procedures for Alternative Fuel Retrofit Systems for On-Road Motor Vehicles and Engines," adopted by the State board on [*DATE OF ADOPTION*], which are incorporated herein by reference.

(b) Implementation Phase-In Schedule.
Notwithstanding subsection (a), a retrofit system manufacturer may apply "California Exhaust Emission Standards and Test Procedures for Systems Designed to Convert Motor Vehicles Certified for 1993 and Earlier Model Years to Use Alcohol or Alcohol/Gasoline Fuels" to certify retrofit systems for 1994 and 1995 model-year vehicles in accordance with the following implementation phase-in schedule. Each manufacturer may certify a maximum of 85 percent of its total 1994 model-year engine family retrofit systems, 45 percent of its total 1995 model-year systems, and 45 percent of its total 1996 model-year systems, according to the requirements of these test procedures and the "California Exhaust Emission Standards and Test Procedures for Systems Designed to Convert Motor Vehicles Certified for 1993 and Earlier Model

Years to Use Liquefied Petroleum Gas or Natural Gas Fuels," adopted by the State Board on April 16, 1975, as amended November 21, 1995. The remaining percentage of each manufacturer's certified 1994, 1995, and 1996 model-year engine family retrofit systems and all ~~of~~ 1997 ~~and subsequent~~ through 2003 model-year engine family retrofit systems shall be certified according to "California Certification and Installation Procedures for Alternative Fuel Retrofit Systems For Motor Vehicles Certified For 1994 ~~and Subsequent~~ through 2003 Model Years and for 1994 through 2003 ~~all~~ Model Year Motor Vehicle Retrofit Systems Certified for Emission Reduction Credit." The percentages shall be determined from the total number of retrofit systems certified and shall be met prior to the end of the next respective calendar year. "California Exhaust Emission Standards and Test Procedures for Systems Designed to Convert Motor Vehicles Certified for 1993 and Earlier Model Years to Use Alcohol or Alcohol/Gasoline Fuels" shall not be applied to certify a retrofit system for installation on a transitional low-emission vehicle (TLEV), low-emission vehicle (LEV), or ultra-low-emission vehicle (ULEV) or to certify a retrofit system designed to convert a vehicle to TLEV, LEV, or ULEV emission standards (as defined in Section 1960.1, Title 13, California Code of Regulations), or to certify a retrofit system for emission reduction credits.

(c) Expedited Approval Provisions.
A manufacturer of new 2004 or subsequent model year passenger cars, light-duty trucks, medium-duty vehicles or heavy-duty engines or vehicles that are fueled by alternative fuels, as defined in title 13, California Code of Regulations, Chapter 5, Standards for Motor Vehicle Fuels, sections 2290– 2293.5 that obtains a new vehicle or engine certification from ARB may request certification of an alternative fuel retrofit system that is identical in configuration to the fuel system in the California certified vehicle or engine under the “California Certification and Installation Procedures for Alternative Fuel Retrofit Systems for On-Road Motor Vehicles and Engines,” adopted by the State board on [*DATE OF ADOPTION*], which are incorporated herein by reference. The manufacturer may request approval to carry-over or carry-across data used to obtain California certification of a new vehicle or new engine to demonstrate compliance with the emission testing requirements specified under the “California Certification and Installation Procedures for Alternative Fuel Retrofit Systems for On-Road Motor Vehicles and Engines,” adopted by the State board on [*DATE OF ADOPTION*], which are incorporated herein by reference. For purposes of this provision, the term “identical” means that all engine parts on the alternative fuel retrofit system that affect emissions must be of the same design, specifications, tolerances as those of the fueling system as disclosed in the manufacturer’s certification application for the new vehicle or new vehicle engine.

NOTE: Authority cited: Sections 39515, 39600, 39601 and 43006, Health and Safety Code. Reference: Sections 43000, 43004, 43006, 43008.6, 43013 and 43108, Health and Safety Code; and Sections 27156, 38391 and 38395, Vehicle Code.

APPENDIX B

B. Proposed Amendments to the "California Certification and Installation Procedures for Alternative Fuel Retrofit Systems for Motor Vehicles Certified for 1994 and Subsequent Model Years and for all Model Year Motor Vehicle Retrofit Systems Certified for Emission Reduction Credit"

NOTE: The proposed amendments to this document are shown in underline to indicate additions and ~~strikeout~~ to indicate deletions compared to the test procedures as last amended November 21, 1995.

State of California
AIR RESOURCES BOARD

California Certification and Installation Procedures for Alternative Fuel Retrofit Systems for Motor Vehicles Certified for 1994 through 2003 Model Years ~~and Subsequent Model Years~~ and for 1994 through 2003 ~~all~~ Model Year Motor Vehicle Retrofit Systems Certified for Emission Reduction Credit

Adopted: March 11, 1993
Amended: April 26, 1995
Amended: November 21, 1995
Amended: [INSERT DATE OF AMENDMENT]

TABLE OF CONTENTS

Page

1. APPLICABILITY..... ~~A-1~~B-4

2. DEFINITIONS..... ~~A-2~~B-5

3. GENERAL REQUIREMENTS..... ~~A-3~~B-6
(a) Product Specifications..... ~~A-3~~B-6
(b) Emission Control Labels..... ~~A-5~~B-7
(c) Owner's Manuals..... ~~A-6~~B-8
(d) Manufacturer Recordkeeping Requirement..... ~~A-6~~B-9
(e) Installer Recordkeeping Requirement..... ~~A-6~~F-9

4. REQUEST FOR CERTIFICATION..... ~~A-7~~B-9

5. TEST PROCEDURES..... ~~A-8~~B-11
(a) Description of Vehicle Categories..... ~~A-8~~B-11
(b) Test Procedures for Vehicles in Category I..... ~~A-9~~B-11
(c) Test Procedures for Vehicles in Category II, Not Being Certified for Credit-Generation Purposes..... ~~A-12~~B-14
(d) Test Procedures for Vehicles in Category III Not Being Certified for Credit-Generation Purposes..... ~~A-13~~B-15
(e) Test Procedures for Vehicles in Category II Certified for Emission Reduction Credit..... ~~A-14~~B-16
(f) Test Procedures for Vehicles in Category III Certified for Emission Reduction Credit..... ~~A-16~~B-17
(g) Alternate Test Procedure for vehicles in Category I, or for Vehicles in Categories II or III Not Being Certified for Credit Generation Purposes..... ~~A-16~~B-17
(h) Alternate Test Procedure for Vehicles in Category II or Category III Certified for Credit Generation Purposes..... ~~A-17~~B-18

6. APPROVAL..... ~~A-17~~B-19
(a) Issuance of Executive Orders..... ~~A-17~~B-19
(b) Carry-Over and Carry-Across..... ~~A-18~~B-19

7. INSTALLATION REQUIREMENTS..... ~~A-18~~B-20

8. IN-USE ENFORCEMENT TEST REQUIREMENTS..... ~~A-20~~B-21

9. WARRANTY REQUIREMENTS..... ~~A-23~~B-24
(a) Requirements of Manufacturers..... ~~A-23~~B-24
(b) Extended Warranty Requirements..... ~~A-23~~B-24
(c) Requirements of Installers..... ~~A-24~~B-25

California Certification and Installation Procedures for Alternative Fuel Retrofit Systems for Motor Vehicles Certified for 1994 through 2003 Model Years ~~and Subsequent Model Years~~ and for 1994 through 2003 ~~all~~ Model Year Motor Vehicle Retrofit Systems Certified for Emission Reduction Credit

1. APPLICABILITY

(a) "Certification and Installation Procedures for Alternative Fuel Retrofit Systems for Motor Vehicles Certified for 1994 through 2003 Model Years ~~and Subsequent Model Years~~ and Retrofit Procedures for Emission Reduction Credit for 1994 through 2003 ~~all~~ Model Years ("these Procedures") apply to alternative fuel retrofit systems designed for installation on gasoline- or diesel-fueled light-, medium-, and heavy-duty motor vehicles for 1994 through 2003 ~~and subsequent~~ model years, and alternative fuel and conventional fuel retrofit systems for emission reduction credits for 1994 through 2003 ~~all~~ model years.

(b) Only these procedures shall be used to certify a retrofit system for the purpose of generating emission reduction credits. Each retrofit system manufacturer shall certify all engine family systems to be used for generating emission reduction credits regardless of model year (MY) or fuel used.

(c) Only these Procedures shall be used to certify a retrofit system for installation on a transitional low-emission vehicle ("TLEV"), low-emission vehicle ("LEV"), or ultra-low-emission vehicle ("ULEV") or to certify a retrofit system designed to convert a vehicle to TLEV, LEV, or ULEV emission standards (as defined in Section 1960.1, Title 13, CCR).

(d) Each manufacturer shall certify a minimum of 15 percent of 1994, 55 percent of 1995, 55 percent of 1996, and 100 percent of 1997 through 2003 ~~and subsequent~~ model year engine family retrofit systems according to the requirements of these Procedures except as provided in paragraph 1. (b). "California Exhaust Emission Standards and Test Procedures for Systems Designed to Convert Motor Vehicles Certified for 1993 and Earlier Model Years to Use Liquefied Petroleum Gas or Natural Gas Fuels," (for certifying liquefied petroleum gas or natural gas retrofit systems) and "California Exhaust Emission Standards and Test Procedures for Systems Designed to Convert Motor Vehicles Certified for 1993 and Earlier Model Years to Use Alcohol or Alcohol/Gasoline Fuels" (for certifying alcohol and alcohol/gasoline retrofit systems) shall be used to certify the remaining percentage of 1994, 1995, and 1996 model year engine family systems and 1993 and prior model year engine family systems, except as provided in paragraph 1. (b) and 1. (e). The percentages shall be determined from the total number of retrofit systems certified and shall be met prior to the end of the next respective calendar year.

(e) A retrofit system manufacturer may as an option use these Procedures to certify non-credit generating alternative fuel retrofit systems designed for installation on pre-1994 model year gasoline- or diesel-fueled light-, medium-, and heavy-duty motor vehicles, with the following addition: the Executive Officer may order 25,000 mile durability vehicle testing for alternative fuel retrofit systems designed for installation on pre-1994 model year vehicles which include hardware or components other than the fuel conversion system as part of the overall retrofit system.

(f) A certification for an alternative fuel retrofit system issued pursuant to these Procedures shall have the effect of a certification of an alternative fuel retrofit system pursuant to Health and Safety Code Section·43006. A certification for retrofit equipment utilizing any fuel, issued pursuant to these regulations, shall have the effect of an exemption issued pursuant to Vehicle Code Sections #27156 and 38395.

2. DEFINITIONS

"Alternative fuel" refers to liquefied petroleum gas, natural gas, alcohol and alcohol/gasoline fuels.

An "alternative fuel retrofit system" is a package of fuel, ignition, emission control, and engine components that are modified, removed, or added during the process of modifying a motor vehicle to operate on an alternative fuel. Such systems can be optionally certified to generate credits.

"Conventional fuel" means gasoline or diesel fuel.

"Credit-generating conventional fuel retrofit system" is a retrofit system that is certified to generate credits and that operates exclusively on the fuel for which the engine family was originally certified.

"Credits" refers to mobile source emission reduction credits.

"Drivability" of a vehicle refers to the smooth delivery of power, as demanded by the driver. Typical causes of drivability degradation are rough idling, misfiring, surging, hesitation, or insufficient power. Conversion from gasoline to gaseous fuels usually entails a loss of volumetric efficiency, resulting in some power loss. Normal power loss shall not be considered to be drivability degradation.

"Dual fuel" refers to a retrofit system which utilizes both an alternative fuel and a conventional fuel without further hardware changeover required.

"Installer" refers to a person who installs alternative fuel or credit-generating conventional fuel retrofit systems on motor vehicles.

“Retrofit system” is a package of fuel, ignition, emission control and engine components that are modified, removed, or added during the process of modifying an engine to operate at an emission rate lower than the rate to which the engine family was originally certified.

"Retrofit system manufacturer" or "manufacturer" refers to a person who manufactures or assembles an alternative fuel or credit-generating conventional fuel retrofit system for sale in California and requests or is granted the Executive Order certifying the alternative fuel or credit generating conventional fuel retrofits system.

‘‘Tier 1” refers to the emission standards applicable to 1995 and subsequent model year light-duty vehicles not considered as TLEV’s, ULEV'S or LEV'S, and as described in Section 1960.1, Title 13, California Code of Regulations.

For purposes of these Procedures “useful life" is the duration, expressed in miles, of the longest durability period for the new vehicle or engine emission standards to which the vehicle or engine family was certified. (This is typically 50,000 miles for light-duty vehicles. However, as of the 1993 model year, a phase-in of new, more stringent, light-duty standards with 100,000 mile useful life requirements will begin.)

3. GENERAL REQUIREMENTS

(a) Product Specifications:

In addition to all other standards or requirements imposed, the following general requirements shall apply to all alternative fuel or credit-generating conventional fuel retrofit systems to be certified for installation on California-certified gasoline or diesel-fueled motor vehicles:

(i) Alternative fuel retrofit systems for gaseous fuels shall be equipped with a lock off valve, actuated by an electrical or vacuum signal, preventing delivery of fuel to the carburetor, or fuel injection system, while the engine is shut down.

(ii) The drivability of a vehicle equipped with a retrofit system shall not be degraded in such a way as to encourage consumer tampering. To verify that the drivability of a retrofitted vehicle is acceptable, the Executive Officer may require that an independent laboratory evaluate drivability. The Executive Officer's determination that drivability must be evaluated shall be based on an engineering evaluation of the retrofit system described in the application for certification or on reports or

observations that retrofit systems similar in design to the system for which certification is sought have caused drivability degradation. The cost of this evaluation shall be borne by the applicant.

(iii) If the vehicle to be retrofitted was certified with an on-board diagnostic (OBD) system, pursuant to Section 1968 or 1968.1, Title 13, California Code of Regulations (CCR), the proper function of the on-board diagnostic system shall not be impaired as a result of the installation and operation of the alternative fuel or credit-generating conventional fuel retrofit system. This requirement may necessitate modification of the OBD system to prevent it from storing erroneous trouble codes (e.g., storing a code signifying faulty operation of the evaporative canister purge valve because the evaporative emission control system has been removed). All modifications to OBD components, programming or wiring, must be fully specified as parts of the retrofit system. If the retrofit system includes modifications to the OBD system, the applicant must submit an analysis showing that these modifications will not adversely affect OBD performance. Notwithstanding, for 2004 and previous model year vehicles, retrofit system manufacturers may request Executive Officer approval to disable specific on-board diagnostic monitoring strategies for which monitoring may not be reliable with respect to the use of alternative fuels (e.g., oxygen sensor response rate checks). The manufacturer shall submit data and/or an engineering evaluation to justify the request.

(iv) With the exception of idle speed control and throttle position control, no component or calibration of the fuel system that could affect emission performance shall be adjustable by the system installer or the vehicle's user.

(b) Emission Control Labels:

"California Motor Vehicle Emission Control Label Specifications," incorporated by reference in Title 13, CCR, Section 1965, shall apply to installations of alternative fuel or credit-generating conventional fuel retrofit systems, with the following additions:

(i) The retrofit system manufacturer shall provide a supplemental Emission Control Information label, which shall be affixed in a permanent manner to each retrofitted vehicle, in a location adjacent to the original Emission Control Information Label. If the supplemental label cannot be placed adjacent to the original label, it shall be placed in a location where it can be seen by a person viewing the original label.

(ii) The supplemental label shall show the vehicle model year; the Executive Order number certifying the retrofit system; the retrofit system manufacturer's name, address, and telephone number; and shall state that the retrofitted vehicle complies with California emission requirements. If the retrofit system has been certified as being capable of converting the vehicle into a Tier 1, TLEV, LEV, or ULEV, the label shall prominently display the title, "Tier 1 Vehicle," "Transitional Low-Emission Vehicle," "Low-Emission Vehicle," or "Ultra-Low-Emission Vehicle," as appropriate. If the retrofit system has been certified for credit-generation use on a heavy-duty vehicle, the label will state the applicable credit and standards, defined in Section 1956.9~~.~~, Title 13, California Code of Regulations. The label shall also list any original parts that were removed during installation of the retrofit system, as well as any changes in tune-up specifications required for the retrofit system. In addition, the label shall show the installer's name, address, and telephone number; the date on which the retrofit system was installed; and the mileage (retrofitted vehicle odometer reading) and date at which the retrofit system warranties expires. It is not necessary for emission control labels installed with retrofit systems to be machine readable. The supplemental label for an alternate fuel retrofit vehicle shall clearly state that the vehicle bas been equipped with an alternative fuel retrofit system designed to allow it to operate on a fuel other than gasoline or diesel and shall identify the fuel(s) that the vehicle is designed to use.

(iii) The retrofit system manufacturer shall provide a vacuum hose routing diagram for each alternate fuel retrofit system sold, and for any other retrofit that includes changes to the vacuum hose routing. The vacuum hose routing diagram shall be placed underhood in a permanent manner at a visible and accessible location and shall show modifications to the original vacuum system.

(c) Owner's Manuals:

Each retrofit system installed shall include an owner's manual containing at least the following information:

(i) a brief description of the retrofit system, including major components and their theory of operation;

(ii) the correct refueling procedure for alternate fuel retrofits;

(iii) a listing of necessary service and service intervals, as well as tune-up data, which differ from the service requirements specified by the vehicle's or engine's original manufacturer;

(iv) the name, address, and phone number of the installer, as well as a list of the names, addresses, and phone numbers of the major dealers in California who supply parts for, or service, the retrofit system; and

(v) warranty information.

(d) Manufacturer Recordkeeping Requirement:

Manufacturers of retrofit systems shall maintain a record of the vehicle identification numbers and California license plate numbers of those vehicles on which their product has been installed. As part of this record, manufacturers shall identify the installation date and the certification number of those systems installed on each vehicle and shall identify the vehicles' owners at the time of installation, including the owners' current addresses and phone numbers at the time of installation. The retrofit system manufacturer shall supply a copy of all installation information to the Executive Officer upon request.

(e) Installer Recordkeeping Requirement:

Installers of retrofit systems shall maintain a record as specified in paragraph 3(d) and shall provide this information to retrofit system manufacturers upon request.

4. REQUEST FOR CERTIFICATION

(a) A request for certification of an alternative fuel or credit- generating conventional fuel retrofit system may be submitted by an authorized representative of the retrofit system manufacturer intending to offer the retrofit system for sale or installation in the State of California.

(b) A separate request shall be required for each model year, even though the emission standards for certifying new vehicles may be the same for consecutive model years. The request shall include all test data and other information required pursuant to these Procedures, except where other provisions of these Procedures allow carry-over or carry-across of test data from an engine family to the engine family (ies) for which certification is sought. Procedures governing carry-over and carry-across are discussed under paragraph 6, "Approval."

(c) The request for certification shall be submitted in writing, signed by an authorized representative of the retrofit system manufacturer, and shall include the following:

(i) Identification and description of the engine families for which the retrofit system to be certified is designed; the emission standards applicable

to those engine families; and if applicable, a statement that the retrofit system is designed [A] to convert conventional vehicles into either TLEVs, LEVs or ULEVs, [B] to convert a TLEV into either an LEV or ULEV, [C] to convert an LEV into a ULEV, [D] to convert 1994 or earlier model year vehicles into Tier 1 Vehicles, or [E] to convert heavy-duty vehicles for emission reduction credit. For [E] include the credit standard(s) proposed for certification from the "Optional Exhaust Emission Standards for Retrofitted Heavy-Duty Engines", as contained in Section 1956.9, Title13, California Code of Regulations.

(ii) A complete description of the alternative fuel retrofit system, including details of the carburetor, mixer, regulator, vaporizer, or fuel injection system; the feedback mixture control system (if applicable), part number(s), calibration data, hose routing, specifications for the fuel tank, and pressure regulator; a sample of the emission control label as specified in 3.(b); a sample of the warranty statement as specified in 9(a) and (b); and all necessary modifications to the engine, emission control system, or other parts of the vehicle.

(iii) Procedures for installing and maintaining the retrofit system, including tune-up specifications and discussion of any special tools or techniques required for proper installation, maintenance, or operation.

(iv) An agreement to supply the Air Resources Board, within 45 calendar days of the Executive Officer's request, with any one or more of the vehicles used for certification testing, or to provide Air Resources Board personnel with equipment to inspect and test such vehicles at the applicant's facility, if requested by the Executive Officer.

(v) For retrofit systems being certified for credit-generation, the manufacturer shall provide in writing the name(s) and address-(es) of the fabrication, assembly line(s), and test facility (ies) where the retrofit kit is manufactured and tested.

(vi) For retrofit systems being certified for credit-generation, the manufacturer shall provide an engineering analysis upon request from the Executive Officer. Such analysis shall describe the detailed operating theory of the retrofit system based on accepted scientific and engineering principles. Final certification will require ARB acceptance and approval of the analysis.

(vii) For conventional fuel retrofits for credit-generation the manufacturer shall provide a complete description of the major components of the retrofit system and part number(s).

5. TEST PROCEDURES

(a) Description of Vehicle Categories:

For the purposes of these certification Procedures, the motor vehicle fleet is divided into three major categories:

I. Passenger cars, light-duty trucks, and medium-duty vehicles as defined in "California Exhaust Emission Standards and Test Procedures for 1988 and Subsequent Model Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles" (as incorporated by reference in Section 1960.1, Title 13, CCR), which were certified to an exhaust emission standard based on a chassis-dynamometer test procedure;

II. Vehicles with gross vehicle weight ratings less than or equal to 14,000 lbs. and not originally certified to a chassis dynamometer-based exhaust emission standard; and

III. Vehicles with gross vehicle weight ratings greater than 14,000lbs.

(b) Test Procedures for Vehicles in Category I:

Vehicles in Category I may certify under these provisions, or under the alternate test procedures given in 5(g).

For vehicles in Category I, the emission standards end test procedures set forth in the "California Exhaust Emission Standards and Test Procedures for 1988 end Subsequent Model Passenger Cars, light-Duty Trucks, and Medium-Duty Vehicles" also apply to the certification of alternative fuel or credit-generating conventional fuel retrofit systems, with the following exceptions:

(i) The applicable emission standards shall be at least as stringent as the emission standards applicable to the engine families for which the retrofit systems to be certified are designed. For credit-generation, the applicable emission standards shall be the Tier 1 and LEY program standards. Dual--fuel vehicles must be certified on each of the two fuels. For dual-fuel vehicles certified for credit, the certification standards for the two fuels shall be no more than one tier apart. In addition, vehicles retrofitted to operate on a given alternative fuel shall also be subject to any additional emission standards applicable to new motor vehicles that are designed to operate on the alternative fuel, and that are of the model year and vehicle class for which certification is sought. A maximum of one emission-data vehicle per engine family for which certification is sought shall be required. Where durability testing

is required, a bench-test vehicle may be substituted for a durability vehicle end may also be considered an emission-data vehicle. Prior to the commencement of testing, the choice of-durability vehicle or bench-test vehicle, emission-data vehicle(s) and engine(s) must be approved by the Executive Officer as being representative of the range of engine families for which certification is sought.

(ii) For the purpose of applying the provisions of the "California Exhaust Emission Standards and Test Procedures for 1988 and Subsequent Model Passenger Cars, Light-Duty Trucks, and Medium- Duty Vehicles" to certification testing of alternative fuel or credit-generating conventional fuel retrofit systems, test vehicles equipped with an alternative fuel or credit-generating conventional fuel retrofit system shall be assumed to have zero miles of mileage accumulation at the time that the retrofit system is installed. Mileage may be subsequently accumulated by driving the vehicle on the road, following a typical suburban route, or on a chassis dynamometer using the Automobile Manufacturer's Association mileage accumulation cycle (40 C.F.R., Part 86, Appendix IV, as adopted January 28, 1977).

(iii) Vehicle mileage accumulation on a durability vehicle or bench aging of retrofit system components shall be conducted to determine deterioration factors. Prior to the commencement of any emission or bench aging, the applicant's test plan must be approved by the Executive Officer. Approval of the test plan shall be contingent upon a demonstration by the applicant that bench aging produces deterioration factors at least as great as durability vehicle testing.

(iv) Bench aging conducted in lieu of vehicle mileage accumulation shall be conducted for a period of time such that the resulting deterioration of the retrofit system is equivalent to that which would occur during durability vehicle mileage accumulation over a mileage equal to the useful life of the vehicle.

(v) Vehicle mileage accumulation on a durability vehicle shall be performed in conjunction with emission testing. Before beginning vehicle mileage accumulation of the retrofit system, the system shall be installed on the durability vehicle; the vehicle shall be driven 4,000 ± 100 miles and then tested an alternative fuel retrofit the vehicle shall be tested using the alternative fuel. A dual-fuel retrofit system shall be emission tested using each fuel that it is capable of operating on. At the conclusion of vehicle mileage accumulation, a second emission test or series of tests shall be performed.

Alternatively, if bench aging is used to determine deterioration factors, then bench aging shall be performed in conjunction with emission

testing of a bench-test vehicle. Before beginning bench aging of the retrofit system, it shall be installed on the bench-test vehicle, the vehicle shall be driven for 4,000 ± 100 miles, and the vehicle shall then be emission tested. Alternate fuel retrofit shall be tested using the alternative fuel. A dual-fuel retrofit system shall be emission tested using each fuel that it is capable of operating on. After the emission tests are completed, the retrofit system shall be removed from the vehicle and subjected to bench aging. At the conclusion of bench aging, the retrofit system shall be reinstalled on the bench-test vehicle, and a second emission test or series of tests shall be performed.

(vi) For exhaust emissions of each regulated pollutant measured during the vehicle mileage accumulation or bench-test procedure, a deterioration factor shall be calculated by dividing the emission rate obtained during the second emission test by that obtained during the first. If the resulting quotient is less than one, the deterioration factor shall be assigned a value of one. The deterioration constant for evaporative emissions shall be calculated by subtracting the evaporative emissions found during the first emission test from those found during the second test. If the resulting difference is less than zero, the deterioration constant shall be assigned a value of zero.

(vii) Choices of vehicle models, engines, and transmissions for use in emission-data vehicles shall be approved by the Executive Officer as being representative of the engine families for which certification is sought, prior to the commencement of testing. Following installation of the retrofit system, the emission-data vehicle shall be driven 4,000 ± 100 miles to stabilize emission rates. After the specified mileage has been accumulated, the emission-data vehicles' exhaust and evaporative emissions, where applicable, shall be tested, using the appropriate procedure as set forth in "California Exhaust Emission Standards and Test Procedures for 1988 and Subsequent Model Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles. Dual fuel vehicles shall be emission tested using each fuel that the vehicle is capable of operating on.

(viii) The deteriorated emissions of emission-data vehicles shall be calculated using the deterioration factors and constants found during vehicle mileage accumulation or bench testing. The useful life exhaust emission values are defined as the product of each emission value at 4,000 miles times the corresponding deterioration factor. For evaporative emissions, the certification emission value is; equal to the sum of the emissions measured at, or extrapolated to 4,000 miles, plus the deterioration constant. The durability vehicle, bench-test vehicle, and all emission-data vehicles shall meet the applicable new vehicle useful life emission standards, as well as all applicable emission

standards for intermediate mileage levels, for the vehicles' model year- and fuel type(s).

(c) Test Procedures for Vehicles in Category II, Not Being Certified for Credit-Generation Purposes:

Vehicles in Category II not being certified for credit may certify under these provisions; or under the alternate test procedures given in 5(g).

For durability, bench-test and emission-data vehicles in Category II, test vehicles shall have accumulated a total mileage greater than 4,000 miles and less than 10,000 miles with the original fuel system, prior to emission testing. If the manufacturer chooses to use the option as described in 1(e) for pre-1994 model year vehicles, then the 10,000 mile limit shall not be applicable. A test vehicle's engine and emission control system shall be equipped and calibrated as certified. The vehicle shall then be tested for exhaust and, if applicable, evaporative emissions using the test procedures set forth in the "California Exhaust Emission Standards and Test Procedures for 1988 and Subsequent Model Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles". The inertia weight setting shall be equal to the average of the vehicle's curb weight and gross vehicle weight rating and road load horsepower based on the frontal area of the vehicle without modifications, as determined in "California Exhaust Emission Standards and Test Procedures for 1988 and Subsequent Model Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles," Section 9.b. The test results shall be defined as the baseline emission rates. After the baseline emission rates have been measured, the retrofit system shall be installed.

(i) The procedures outlined in paragraphs 5(b)(iii) through 5(b)(vi) shall be used with the following modifications: "useful life" shall equal 120,000 miles for vehicles in Category II; the durability or bench-test vehicle's emission rates of regulated pollutants measured at 4,000 ± 100 miles after the installation of the retrofit system shall not exceed 1.10 times the baseline rates; the deteriorated exhaust emissions of regulated pollutants projected to 120,000 miles shall not exceed 1.3 times the baseline emissions; and the deteriorate evaporative emissions of regulated pollutants projected to 120,000 miles shall not exceed the baseline emissions plus 0.5 grams.

(ii) When the Executive Officer determines that deterioration factors determined in paragraph 5(c) (i) may be carried across or carried over to other engine families in Category II, the representative emission-date vehicles shall be tested as specified in paragraph 5(b) (vii). Emission rates measured at 4,000 ± 100 miles after installation of the retrofit system shall not exceed 1.10 times the vehicles baseline rates.

(d) Test Procedures for Vehicles in Category III Not Being Certified for Credit-Generation Purposes:

Vehicles in Category III not being certified for credit may certify under these provisions or under the alternate test procedures given in 5(g).

Applicants requesting certification for retrofit systems for use in Category III vehicles shall submit a test plan, subject to the Executive Officer's approval, to verify that the retrofit system will not cause excess emissions from engine families for which certification is sought. Test vehicles shall have accumulated a total mileage greater than 4,000 miles with the original fuel system prior to emission testing. A test vehicle's engine and emission control system shall be equipped and calibrated as certified. The vehicle shall then be tested for exhaust emissions as specified in the test plan. The test result shall be defined as the baseline emission rate. After the baseline emission rate has been measured, the retrofit system shall be installed. Emission rates shall then be measured at 4,000 ± 100 miles after installation of the retrofit system using the test specified in the test plan.

(i) Emission testing shall be conducted to determine exhaust emission rates of carbon monoxide and the sum of non-methane hydrocarbons plus nitrogen oxides. Emissions shall not exceed 1.10 times the baseline rates.

(ii) The procedures outlined in paragraphs 5(b) (iii) through 5(b) (vi) shall be used with the following modifications: "useful life" shall equal 180,000 miles for vehicles in Category III; the durability or bench-test vehicle's emission rates of CO, and the sum of non-methane hydrocarbons plus NOx measured at 4,000 ± 100 miles shall not exceed 1.10 times the baseline rates; the deteriorated exhaust emissions projected to 180,000 miles shall not exceed 1.3 times the baseline emissions; and, the deteriorated evaporative emissions projected to 180,000 miles shall not exceed baseline emissions plus 0.5 grams. For the purposes of this section, the evaporative baseline emissions shall be estimated by the manufacturer based on good engineering principles and judgment. The manufacturer's test plan shall specify the evaporative baseline emissions estimate and describe how this estimate was derived.

(iii) The Executive Officer may allow carry-across of durability data from certification bench testing of retrofit systems designed for vehicles in Categories I or II to. Category III retrofits system applications, if the Executive Officer determines that the carry-across durability data will adequately represent the durability performance of the retrofit-it system to be certified.

(iv) Applicants requesting certification for retrofit systems designed to allow Category III vehicles to operate on an alternative fuel in addition to diesel fuel shall conduct smoke opacity testing on the emission-data vehicle(s) utilizing the peak smoke opacity standards and procedures set forth in "Heavy-Duty Diesel Vehicle Smoke Opacity Test Procedure," as incorporated by reference in Title 13, CCR, Section 2182. Smoke opacity testing shall be conducted using each fuel that the retrofitted vehicle is designed to operate on. The applicable peak smoke opacity standard shall be that set for the model year for which certification is sought.

(v) The selection of duty cycle(s) and all other aspects of the test procedure shall be subject to approval by the Executive Officer and emission testing shall commence only after the Executive Officer has approved the test plan. The Executive Order shall be issued following review of the test data and determination that they meet the criteria specified in the test plan.

(e) Test Procedures for Vehicles in Category II Certified for Emission Reduction Credit:

Vehicles in Category II certified for emission reduction credit may use these provisions, or the alternate test plan as given in 5(h).

The procedures outlined in paragraphs 5(e) (i) and (ii) shall be used with the following modifications:

(i) Certification for credit-generation purposes shall be conducted on the retrofitted engine system. Utilizing an engine dynamometer and not on the engine and vehicle combination. The test procedure used shall be the same procedure used to certify the engine family when new.

(ii) Emissions for any pollutant shall not use the baseline rate by more than a factor of 1.10. Baseline emissions for pre- and post- retrofit comparison purposes will be the certification emission levels determined during the original engine family certification, except:

[A] The baseline for particulate matter (PM) emissions for diesel engines whose PM emission levels were not determined during the new engine family certification process shall be 0.6 gram/bhp-hr.

[B] Formaldehyde emissions from any 1993 and earlier model year engine operating on methanol- or ethanol-based fuel shall be at or below the 1993 model year standard. Formaldehyde emissions from any 1994 or subsequent model year engine

operating on methanol- or ethanol- based fuel shall be at or below the formaldehyde standard for that model year.

[C] For diesel engines, baseline carbon monoxide and hydro carbon emissions shall be the original emission certification value for the engine's model year.

[D] For engine families originally certified to a combined HC plus NOx standard, to baseline HC and NOx standards will be the combined standard or-pro-rated by the HC and NOx portions, respectively, of the original emission certification levels. If the original emission certification levels are not available, the HC and NOx baseline standards will be pro-rated by the HC and NOx certification standards of the next later model year with separate HC and NOx standards.

(iii) The "useful life" shall be 120.000 miles for vehicles in Category II, and 180,000 miles for vehicles in Category III. Deteriorated exhaust emissions projected to the useful life shall not exceed the baseline rate by more than a factor of 1.30, except for the pollutant(s) for which credits will be generated, which will not exceed the credit standard declared on the certification application as required under 4(c) (i). The deteriorated evaporative emissions, if any, projected to the useful life shall not exceed baseline emissions.

(f) Test Procedures for Vehicles in Category III Certified for Emission Reduction Credit:

Vehicles in Category III certified for emission reduction credit may use these provisions, or the alternate test plan as given in 5(h).

The procedures outlined in paragraphs 5(d) (i) through (v) shall be used with the modifications listed in 5(e) (i) through 5(e) (iii).

(g) Alternate Test Procedure for vehicles in Category I, or for Vehicles in Categories II or III Not Being Certified for Credit Generation Purposes:

The manufacturer shall submit data from durability testing conducted using test procedures used in new vehicle or engine certification. The deteriorated useful life emission levels shall meet the applicable emission standards for vehicles or engines of that model year and fuel type. The Executive Officer may certify the retrofit system based on review of the durability test data. If durability test data are not available, the manufacturer shall use the following procedures:

(i) The retrofit manufacturer shall submit derived deterioration factors. The manufacturer shall submit test data that shows similar performance characteristics between the retrofitted vehicle or engine and the original equipment manufacturer vehicle or engine. The manufacturer shall submit test data showing component durability of the retrofit system. The manufacturer shall also submit a test plan describing the procedures that will be used to validate the derived deterioration factors within two years. The manufacturer derived deterioration factors and the test plan must be reviewed and approved by the Executive Officer.

(ii) The retrofit system shall be installed on the test vehicle or engine. Certification shall be conducted on the retrofitted vehicle or engine using the same test procedure used to certify the engine family when new. Deteriorated useful life emissions based on manufacturer derived deterioration factors shall meet the applicable new engine emission standards.

(iii) Following retrofit system certification, the manufacturer will conduct engine aging, either in-use or on a dynamometer, according to the specified test plan. Emissions testing shall be conducted on the aged retrofit vehicle or engine system using the same test procedure used to certify the engine family when new. Deteriorated useful life emissions based on durability testing shall meet the applicable new vehicle or engine emission standards for that vehicle model. The manufacture shall submit test data to verify the derived deterioration factors within two years of certification of the retrofit system.

(iv) Vehicles in Category III must meet the requirements of 5(d) (iii) and 5(d) (iv).

(h) Alternate Test Procedure for Vehicles in Category II or Category III Certified for Credit Generation Purposes:

The procedures outlined in 5(g) shall be used, with the following modifications:

(i) The manufacturer shall also meet the requirements in 5(e) (i) and 5(e) (ii).

(i) Deteriorated useful life emissions based on durability testing shall not exceed the original equipment manufacturer engine certification emissions level by more than a factor of 1.30, except for the pollutant(s) for which credits will be generated, which will not exceed the credit standard declared on the certification application as required under 4(c) (i). The deteriorated evaporative emissions, if any,

projected to the useful life, shall not exceed baseline emissions.

6. APPROVAL

(a) Issuance of Executive Orders:

If, after reviewing the test data and other information submitted by the retrofit system manufacturer, the Executive Officer determines that the retrofit system meets the applicable emission standards or the criteria of approved test plan, as applicable, an Executive Order shall be issued certifying the retrofit system for sale and installation on vehicles in the engine families specified in the application. The Executive Order shall specify, if applicable, that the retrofit system is certified as [A] converting a conventional motor vehicle into a TLEV, LEV or ULEV, [B] converting a TLEV into a LEV or ULEV, [C] converting a LEV into a ULEV or [D] for heavy-duty credit conversions, the applicable credit standard(s).

(b) Carry-Over and Carry-Across:

(i) Carry-over of emission test data from the previous model year to the following model year will be allowed, if the Executive Officer determines that the carry-over data will adequately represent the emissions performance of the retrofit system to be certified. Carry-across to similar engine families will also be allowed.

(ii) An original equipment manufacturer (OEM) that produces retrofit hardware which upgrades an old engine to the identical configuration of a newer engine family that the manufacturer also produces, may carry-across the newer engine family certification test data for the retrofit hardware certification process. (For these purposes, the term "identical" means that all engine parts on the retrofitted engine which affect emissions, such as pistons, cylinder heads, etc.~~,~~ must be of the same design and construction as those on the newer engine family. Engine calibration, including injection timing must also be identical.)

(iii) Applications for carry-over and carry-across must be accompanied by an engineering analysis demonstrating that the emissions and durability of the retrofit system and engine family for which certification is being sought will be adequately represented by a certified retrofit system/engine family application.

(iv) Applications for carry-over and carry-across will be evaluated according to the criteria contained in EPA Advisory Circular 17F, which is incorporated herein by reference, and paragraph 4.c.5 of the "California Exhaust Emission Standards and Test Procedures for 1988 and Subsequent Model Passenger Cars, Light-Duty Trucks, and

Medium-Duty Vehicles." These include, but are not limited to, similarity of catalyst location and configuration, similarity of fuel metering system, similarity of emission control system logic and design, and similarity of any other features that may affect the durability of the retrofit system's emission performance.

7. INSTALLATION REQUIREMENTS

(a) Prior to releasing a converted vehicle to the consumer, the installer of an alternative fuel gr credit-generating conventional fuel retrofit system shall submit the converted vehicle to a Bureau of Automotive Repair Referee Smog Check Station for inspection and testing except as provided in 7(b).

(i) The installer of an alternative fuel or credit-generating conventional fuel retrofit system shall keep a copy of the certificate of compliance, issued by the Bureau of Automotive Repair Referee Smog Check Station, as part of the record specified in paragraph 3(e). The certificate of compliance shall contain, but need not be limited to, the following: the vehicle's identification number, the vehicle's model year and make, the date of installation, and the emissions category to which the retrofitted system is certified (i.e., conventional vehicle, TLEV, LEV, or ULEV) or, for heavy-duty vehicles, the credit standard to which the system is certified. The original certificate of compliance shall be submitted to the vehicle owner upon the vehicle's release.

(ii) The installer of an alternative fuel or credit-generating conventional fuel retrofit system shall not release the converted vehicle to the consumer without the issuance of a certificate of compliance for the vehicle by a Bureau of Automotive Repair Referee Smog Check Station.

(iii) The installer of an alternative fuel or credit-generating conventional fuel retrofit system shall also meet the requirements of paragraph 9(c).

(b) The retrofit system installer may request Air Resources Board approval to use the alternative inspection schedule for fleet installation of the same retrofit kit on more than 10 vehicles with engines from similar engine families. If approval is granted the installer shall submit ten vehicles with engines from similar engine families retrofitted with the same kit to a Bureau of Automotive Repair Station as provided in 7(a) (i) and 7(a) (ii).

(i) If all ten vehicles receive a certificate of compliance, for subsequent applications of the same type, the Installer need only submit every tenth retrofitted vehicle to the Bureau of Automotive Repair pursuant to 7(a) (i) and 7(a) (ii) . For the remaining vehicles Included in the alternative inspection schedule that are not submitted to the Bureau of

Automotive Repair, the installer shall maintain a record of the vehicle's identification number, the vehicle's model year and make, the engine size, the manufacturer and fuel type of the retrofit kit, the date of installation, and the emissions category to which the retrofitted system is certified (i.e., conventional vehicle, TLEV, LEV, ULEV) or for heavy-duty vehicles, the credit standard to which the system is certified. The Air Resources Board may require random inspection of any vehicles subject to the alternate inspection schedule.

(ii) If any of the ten vehicles fail to pass inspection, the next set of ten retrofitted vehicles shall be subject to inspection at the Bureau of Automotive Repair, until an entire group of 10 passes.

8. IN-USE ENFORCEMENT TEST REQUIREMENTS

(a) Manufacturers of alternative fuel or credit-generating conventional fuel retrofit systems shall, upon order by the Executive Officer, perform in-use enforcement emission testing of their products. The Executive Officer may order in-use enforcement emission testing of not more than 20 percent of a manufacturer's certified retrofit systems/engine family applications per year. If 20 percent constitutes less than one of a manufacturer's certified systems, the Executive Officer may order in-use enforcement emission testing of not more than one certified system/engine family application per year. Manufacturers shall be required to perform emission testing of not less than ten vehicles per certified retrofit system/engine family application selected by the Executive Officer for in-use enforcement emission testing. Upon order by the Executive Officer, manufacturers shall perform the applicable emission tests pursuant to the following:

(i) No vehicle shall be accepted by the manufacturer as a representative vehicle for enforcement testing unless the following criteria are met:

(1) California certified and registered.

(2) Odometer indication of less than certified useful-life mileage and vehicle age within useful-life time period.

(3) No indication of abuse (e.g., racing, overloading, misfueling, or other misuse), neglect, improper maintenance or other factors that would have an effect on emission performance.

(4) No major repair to engine or major repair of vehicle resulting from collision.

(5) Lead content of fuel sample from the vehicle tank meets applicable standards.

(6) No indication of any problem that might jeopardize the safety of laboratory personnel.

(ii) The manufacturer shall, under ARB supervision, perform diagnosis or restorative maintenance on those vehicles selected for in-use enforcement testing. The manufacturer or a laboratory approved by the Executive Officer shall (1) identify part numbers of all essential emission control system components; (2) check air filter, all drive belts, all fluid levels, radiator cap, all vacuum hoses and electrical wiring related to emission control for integrity; check fuel metering and emission control system components for maladjustments and/or tampering, and record all discrepancies; (3) check ignition system with oscilloscope and replace any defective components; i.e., spark plugs, wires, etc.; (4) check compression; (5) check and adjust engine parameters to manufacturer's specifications; and (6) perform maintenance if the vehicle is within 500 miles of scheduled maintenance service.

(iii) For vehicles in Category I. the manufacturer or a laboratory approved by the Executive Officer shall perform the applicable emission test procedures set forth in the "California Exhaust Emission Standards and Test Procedures for 1988 and Subsequent Model Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles." The applicable emission standards shall be the vehicle's useful life standards as well as any intermediate emission standards, as stated in the Executive Order.

(iv) For vehicles in Category II not certified for credit generation, in-use enforcement exhaust and, if applicable, evaporative emissions shall be performed using the test procedures set forth in the "California Exhaust Emission Standards and Test Procedures for 1988 and Subsequent Model Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles". The inertia weight setting shall be equal to the average of the vehicle's curb weight and gross vehicle weight rating and road load horsepower based on the frontal area of the vehicle without modifications, as determined in "California Exhaust Emission Standards and Test Procedures for 1988 and Subsequent Model Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles," Section 9.b. For vehicles in Category III not certified for credit generation, in-use enforcement exhaust emission tests shall be performed in accordance with the test plan approved by the Executive Officer prior to certification testing of the engine family applications specified for in-use enforcement testing. For vehicles in Categories II

and III which are certified for credit generation. ~~i~~In-use enforcement testing will consist of repeating the procedures and requirements of paragraphs 5(e) and 5(f), respectively, except as provided for in paragraph 8(a) (viii), below.

(v) The applicable exhaust emission standards for vehicles in Categories II and III shall be the baseline emission rates established during certification testing of the engine family applications specified for in-use enforcement testing times 1.3except as provided in paragraphs 5(e) and 5(f) for credit generating systems. The applicable evaporative emission standards for vehicles in Categories II and III shall be the baseline emission rates established during certification testing of the engine family applications specified for in-use enforcement testing plus 0.5 grams except as proved in paragraphs 5(e) and 5(f) for credit generating systems.

(vi) Manufacturers shall complete in-use enforcement testing within 6 months of the issuance of the in-use compliance testing order and shall submit all test data to the Executive Officer within 30 calendar days following completion of testing.

(vii) Following review of manufacturer in-use enforcement test data, the Executive Officer may conduct confirmatory in-use enforcement testing.

(viii) OEM upgrade systems certified for credit-generation use as described in paragraph 6(b), shall be subject to the new engine family in-use testing requirements for the engine family on which the systems originally certified. Such systems will not be subject to the in-use enforcement testing requirements of these procedures.

(b) If the results of the in-use vehicle emission tests conducted pursuant to paragraphs 8(a)(i) through 8(a)(viii) indicate that the average emissions of the test vehicles for any pollutant exceed the applicable emission standards or specified limits for credit generation certification, the entire vehicle population so represented shall be deemed to exceed such standards. Upon order by the Executive Officer, the manufacturer shall have 45 days to submit an influenced recall plan in accordance with Sections 2111 through 2121, Title 13, CCR. If no such recall plan is submitted, the Executive Officer may order corrective action including recall of the affected vehicles in accordance with Sections 2122 through 2135, Title 13, CCR. For the purpose of these Procedures, the term "manufacturer" as referenced in Sections 2111 through 2135, Title 13, CCR, shall mean "retrofit system manufacturer."

9. WARRANTY REQUIREMENTS

(a) Requirements of Manufacturers:

The manufacturer of an alternative fuel or credit-generating conventional fuel retrofit system shall warrant to the person having the vehicle retrofitted and to each subsequent purchaser of the vehicle that the alternative fuel or credit-generating conventional fuel retrofit system is designed and manufactured to conform with the applicable requirements of these Procedures and is free from defects in materials and workmanship which cause the alternative fuel or credit-generating conventional fuel retrofit system to fail to conform with the applicable requirements of these Procedures or cause damage to any part on the retrofitted vehicle. This warranty shall be effective for three years or 50,000 miles, whichever first occurs, of customer service, and shall cover the full repair or replacement costs including the costs of diagnosis, labor, and parts (including any part on the retrofitted vehicle that is damaged due to a defect in the alternative fuel or credit- generating conventional fuel retrofit system).

(b) Extended Warranty Requirements:

Each manufacturer of an alternative fuel or credit-generating conventional fuel retrofit system shall identify in its application for certification the warranted parts whose individual replacement cost, at the time of certification, exceeds the cost limit defined in paragraph 9(b)(i). The replacement cost shall include the cost of the diagnosis, parts, and labor. The costs shall be those of the highest cost metropolitan area of California. Each manufacturer shall warrant to the person having the vehicle retrofitted and to each subsequent purchaser of the vehicle that these parts identified in its application for certification as exceeding the cost limit defined in paragraph 9(b)(i) are free from defects in materials and workmanship which cause the alternative fuel or credit-generating conventional fuel retrofit system to fail to conform with the requirements of these Procedures or cause damage to any part on the retrofitted vehicle, for seven years or 70,000 miles, whichever first occurs.

(i) The cost limit shall be calculated using the following equation:

$$\text{Cost limit}_n = \$300 \text{ X } (CPI_{n-2}/121.9)$$

where:
Cost limit_n is the cost limit for the year in which the alternative fuel or credit-generating conventional fuel retrofit system is to be certified.

n is the year in which the alternative fuel or credit-generating conventional fuel retrofit system is to be certified.

CPI is the annual average consumer price index for California published by the United States Bureau of Labor Statistics.

(ii) The cost shall be limit shall be revised annually by the Executive Officer. The highest cost metropolitan area in California shall be identified by the Executive Officer.

(iii) Each manufacturer shall submit to the Executive Officer the documentation used to identify the 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 replace the parts.

(c) Requirements of Installers:

Each installer of an alternative fuel or credit-generating conventional fuel retrofit system shall warrant to the person having the vehicle retrofitted and to each subsequent purchaser of the vehicle that the alternative fuel or credit-generating conventional fuel retrofit system will not fail to conform with the applicable requirements of these Procedures due to incorrect installation, and that no part on the retrofitted vehicle will be damaged due to incorrect installation. Installers of alternative fuel or credit-generating conventional fuel retrofit systems shall install only those systems of a certified configuration and shall agree to indemnify the person having the vehicle retrofitted and to each subsequent purchaser of the vehicle for the cost of repair of any vehicle upon which a noncertified configuration was installed. In addition, the installer shall agree to indemnify the person having the vehicle retrofitted and to each subsequent purchaser of the vehicle for any tampering fines that may be imposed as a result of improper installation of the alternative fuel or credit-generating conventional fuel retrofit system. The warranties and agreements to indemnify shall be effective for three years or 50,000 miles, whichever first occurs, of customer service, and shall cover the full repair or replacement casts including the casts of diagnosis, labor, and parts (including any part on the retrofitted vehicle that is damaged due to incorrect installation of the alternative fuel or credit-generating conventional fuel retrofit system).

Before an installer installs an alternative fuel or credit-generating conventional fuel retrofit system, he or she shall have submitted to the ARB a sample of the warranty statement to be provided by the installer in accordance with this paragraph.

APPENDIX C

C. Proposed Adoption of "California Certification and Installation Procedures For Alternative Fuel Retrofit Systems For On-Road Motor Vehicles and Engines"

[Note: All text is proposed for adoption. As permitted by section 8, title 2, California Code of Regulations, the proposed text is not underlined for ease of review.]

State of California

AIR RESOURCES BOARD

CALIFORNIA CERTIFICATION AND INSTALLATION PROCEDURES FOR ALTERNATIVE FUEL RETROFIT SYSTEMS FOR ON-ROAD MOTOR VEHICLES AND ENGINES

[Note: All text is proposed for adoption. As permitted by section 8, title 2, California Code of Regulations, the proposed text is not underlined for ease of review.]

Adopted: [DATE OF ADOPTION]

Note: These procedures are incorporated by reference into section 2030 & 2031, title 13, California Code of Regulations.]

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California Certification and Installation Procedures for Alternative Fuel Retrofit Systems for On-Road Motor Vehicles and Engines.

1. APPLICABILITY

(a) “California Certification and Installation Procedures for Alternative Fuel Retrofit Systems for On-Road Motor Vehicles and Engines” (these procedures) apply to alternative fuel retrofit systems designed for installation on conventional fueled on-road vehicles and engines in the passenger car, light-duty truck, medium-duty vehicle, and heavy-duty engine and vehicle classes for 2004 and subsequent model years.

(b) Only these procedures shall be used to certify alternative fuel retrofit systems to the same or a more stringent emission standard than the standards to which the base vehicle or base engine was originally certified.

(c) A certification of an alternative fuel retrofit system issued pursuant to these procedures shall have the effect of a certification of an alternative fuel retrofit system pursuant to Health and Safety Code section 43006. A certification for an alternative fuel retrofit system utilizing any fuel, issued pursuant to these procedures shall have the effect of an exemption issued pursuant to Vehicle Code Section 27156.

2. DEFINITIONS

(a) The definitions in Section 1900(b), chapter 1, title 13 of the California Code of Regulations (CCR) apply to these procedures with the following additions:

(1) "Alternative fuel" refers to liquefied petroleum gas, natural gas, alcohol, alcohol/gasoline blend, or any fuel subject to any provision of Title 13, California Code of Regulations, Chapter 5, Standards for Motor Vehicle Fuels, Sections 2290– 2293.5.

(2) "Alternative fuel retrofit system" or “retrofit system” is a package of fuel storage and delivery, ignition, emission control, on board diagnostic, and engine components that are modified, removed, or added during the process of modifying a motor vehicle or engine to operate on an alternative fuel.

(3) “Base vehicle” or “base engine” means a certified configuration of a motor vehicle or motor vehicle engine prior to any modifications necessary to operate on an alternative fuel or fuels.

(4) “Baseline test” means an emissions test of a motor vehicle or motor vehicle engine in a proper state of maintenance prior to any modifications necessary to operate on an alternative fuel.

(5) “Bi-fuel vehicle or engine” is any motor vehicle or motor vehicle engine that is designed to be operated on two fuels wherein the two fuels are stored on-board in separate fuel tanks and metered separately, but in operation the two fuels are combusted together continuously or during part of normal vehicle operation (i.e. vehicle start-up).

(6) "Conventional fuel" means gasoline or diesel fuel.

(7) "Drivability" of a vehicle refers to the smooth delivery of power, as demanded by the driver. Typical causes of drivability degradation are rough idling, misfiring, surging, hesitation, or insufficient power. Conversion from gasoline to gaseous fuels usually entails a loss of volumetric efficiency, resulting in some power loss. Normal power loss shall not be considered to be drivability degradation.

(8) "Dual-fuel vehicle or engine" is any vehicle or engine that is designed to be operated on either an alternative fuel or a conventional fuel, with separate fuel tanks for each fuel on-board the vehicle. In operation, only one fuel is used at a time.

(9) “Emission warranty information report” means emission warranty information report as defined by section 2144, title 13, CCR.

(10) “Heavy-duty engine” means a heavy-duty engine as defined in Section 1900, title 13, CCR.

(11) “Heavy-duty vehicle” means a heavy-duty vehicle as defined in Section 1900, title 13, CCR.

(12) "Installer" refers to a person who installs alternative fuel retrofit systems on motor vehicles and/or engines for compensation or consideration of value; but does not necessarily include any person that assembles or produces an alternative fuel retrofit system for resale. Installers must be registered as Automotive Repair Dealers under California Business and Professions Code, section 9880 through sections 9889.68.

(13) “Light-duty motor vehicle” refers to either a passenger car or light-duty truck.

(14) “Light-duty truck” means light-duty truck as defined in Section 1900, title 13, CCR.

(15) “Medium-duty vehicle” means a medium-duty vehicle as defined in Section 1900, title 13, CCR.

(16) “Passenger car” means a passenger car as defined in Section 1900, title 13, CCR.

(17) "Retrofit system manufacturer", "manufacturer," or “converter” refers to a person or company who manufactures or assembles an alternative fuel retrofit system for sale in California and requests or is granted the Executive Order certifying the alternative fuel retrofit system.

(18) “Small volume retrofit system manufacturer” or “small volume conversion manufacturer” means a manufacturer with total California annual sales of less than 1,500 alternative fuel retrofit systems in any given calendar year. A manufacturer’s California sales shall consist of all alternative fuel retrofit systems produced by the manufacturer and delivered for sale in California, except that alternative fuel retrofit systems produced by the manufacturer and marketed in California by another manufacturer under the other manufacturer’s nameplate shall be treated as California sales of the marketing manufacturer. The annual sales from different firms shall be aggregated in the following situations: (1) alternative fuel retrofit systems produced by two or more firms, one of which is 10% or greater part owned by another, except in circumstances for which the Executive Officer determines that 10% or greater ownership by one of the firms does not result in responsibility for overall direction of both firms; or (2) alternative fuel retrofit systems produced by any two or more firms if a third party has equity ownership of 10% or more in each of the firms; or (3) alternative fuel retrofit systems produced by two or more firms having a common corporate officer(s) who is (are) responsible for the overall direction of the companies; or (4) alternative fuel retrofit systems imported or distributed by all firms where the alternative fuel retrofit systems are manufactured by the same entity and the importer or distributor is an authorized agent of the entity.

(19) “Sunset” for the purposes of these procedures shall mean after the 2017 model year.

(20) “Useful life” for purposes of these procedures, means the duration, expressed in miles or time period, of the longest durability period

for the new vehicle or engine emission standards to which the base vehicle or base engine was certified.

(21) “Warrantable condition” means any condition of an alternative fuel retrofit system that triggers the responsibility of the manufacturer to take corrective action pursuant to section 8 of these procedures.

(22) “Warranted part” means any part installed on a certified alternative fuel retrofit system, or installed in a warranty repair, which affects any regulated emissions from a previously certified vehicle or engine that is subject to any of the standards prescribed in the test procedures and the documents incorporated by reference herein.

(23) “Warranty period” means the period of time and mileage that the certified alternative fuel retrofit system or part thereof are covered by the warranty provisions.

3. GENERAL REQUIREMENTS

Overview: After submitting a request for certification pursuant to these procedures, manufacturers shall submit a test plan for approval prior to initiating any testing. Manufacturers must select for testing an emission test vehicle or engine that is representative of the vehicle or engine to be retrofitted for approval by the Executive Officer. The selection of vehicle models, engines, and transmissions must be approved by the Executive Officer as being representative of the engine families for which certification is sought, prior to the commencement of any testing.

The emission test vehicle or engine is then retrofitted with the alternative fuel retrofit system and driven for 4,000 miles or operated for 125 hours to ensure emissions stability. An emissions test is then performed to demonstrate compliance with the applicable emission standards. Durability testing is required; either through vehicle mileage accumulation, engine operation, or component bench aging, and another emissions test is performed to demonstrate compliance with applicable full useful life emission standards. Manufacturers must also perform tests to demonstrate compliance with the on-board diagnostic (OBD) requirements, provide a supplemental emissions control label and owner’s manual and meets warranty and installation requirements.

In addition to all other standards or requirements imposed, the following general requirements shall apply to all alternative fuel retrofit systems to be certified under these procedures:

(a) Minimum Product Specifications: Alternative fuel retrofit systems for gaseous fuels shall be equipped with a lockoff valve, actuated by an electrical or vacuum signal, preventing delivery of fuel to the fuel injection system while the engine is shut down and shall be equipped with or designed to operate

successfully with any feed-back or feed-forward controls of the base vehicle or engine.

(b) Drivability: The drivability of a vehicle equipped with an alternative fuel retrofit system shall not be degraded in such a way as to encourage consumer tampering. To verify that the drivability of a retrofitted vehicle is acceptable, the Executive Officer may require that an independent laboratory evaluate drivability. The Executive Officer's determination that drivability is acceptable must be based on an engineering evaluation of the alternative fuel retrofit system described in the application for certification or on reports or observations that alternative fuel retrofit systems similar in design to the system for which certification is sought have caused drivability degradation. The cost of this evaluation shall be borne by the manufacturer.

(c) On-Board Diagnostic (OBD) System Compatibility: If the vehicle/engine to be retrofitted was certified with an on-board diagnostic (OBD) system, pursuant to sections 1968.2, 1971, or 1971.1, title 13, California Code of Regulations (CCR), all applicable OBD requirements (e.g., monitoring, standardization, certification, demonstration) remain applicable with the exception of the changes and allowances made in these procedures. As such, the proper function of the on-board diagnostic system shall not be impaired as a result of the installation and operation of the alternative fuel retrofit system. This includes, but is not limited to; ensuring the converted vehicle’s or engine’s OBD system robustly detects malfunctions at the required emission thresholds, meets the required minimum monitoring frequency requirements, implements required monitors for applicable added or modified electronic hardware or emission controls, complies with standardization requirements, and is subject to required demonstration and production vehicle and engine testing. These requirements may necessitate modification of the original vehicle or engine OBD system. All modifications affecting OBD compliance including added, modified, or removed original vehicle hardware, (e.g., components, wiring) or software (e.g., programming, calibration) must be fully documented and described as part of the alternative fuel retrofit system certification application.

(d) No component or calibration of the alternative fuel retrofit system that could affect emission performance shall be adjustable by the system installer or the vehicle's user.

(e) Emission Control Label: The emissions control label requirements in Title 13, CCR, Section 1965, shall apply to installations of alternative fuel retrofit systems, with the following additions:

(1) The alternative fuel retrofit system manufacturer shall provide a

supplemental Emission Control Information label, which shall be affixed in a permanent manner to each retrofitted vehicle, in a location adjacent to the original Emission Control Information Label. If the supplemental label cannot be placed adjacent to the original label, it shall be placed in a location where it can be seen by a person viewing the original label

(2) The supplemental label shall show the vehicle or engine model year; applicable emission standards; Executive Order number certifying the alternative fuel retrofit system; retrofit system manufacturer's name, address, and telephone number; and shall state that the retrofitted vehicle or engine complies with California emission requirements. If the retrofit system has been certified as being capable of certifying the base vehicle or engine to a more stringent emissions standard, the label shall also display the applicable vehicle emission category of the converted vehicle or engine (e.g., ULEV, SULEV, etc.) The label shall also list any parts that were added and removed during installation of the alternative fuel retrofit system, as well as any changes in tune-up specifications required for the alternative fuel retrofit system. In addition, the label shall show the installer's name, address, and telephone number; date and mileage (retrofitted vehicle odometer reading) on which the alternative fuel retrofit system was installed; and date and mileage at which the alternative fuel retrofit system warranty expires. It is not necessary for emission control labels installed with alternative fuel retrofit systems to be machine readable. The supplemental label for an alternate fuel retrofit system shall clearly state that the vehicle or engine has been equipped with an alternative fuel retrofit system designed to allow it to operate on a fuel other than gasoline or diesel and shall identify the fuel(s) that the vehicle or engine is designed to use.

(f) Owner's Manual: Each alternative fuel retrofit system installed shall include an owner's manual containing at least the following information:

(1) a brief description of the alternative fuel retrofit system, including major components and their theory of operation;

(2) the correct refueling procedure for the alternative fuel retrofit system;

(3) a listing of necessary service and service intervals, as well as tune-up data, which differ from the service requirements specified by the vehicle's or engine's original manufacturer;

(4) the name, address, phone number, and website, if available, of the

manufacturer and installer, as well as a list of the names, addresses, and phone numbers of the major dealers in California who supply parts for, or service, the alternative fuel retrofit system; and

(5) warranty information.

(g) Warranty Notification: Notification to the alternative fuel retrofit system purchaser stating that installation of the alternative fuel retrofit system may affect the original equipment manufacturer's warranty. This notification must be signed by the purchaser prior to sale of the alternative fuel retrofit system and must maintained by the retrofit system manufacturer for the duration of the warranty period and must be supplied upon the request of the Executive Officer.

(h) Manufacturer Recordkeeping and Reporting Requirement: Retrofit system manufacturers shall maintain a record of the vehicle identification numbers or engine serial numbers and California license plate numbers of those vehicles or engines on which their alternative fuel retrofit systems have been installed. As part of this record, retrofit system manufacturers shall identify the installation date and the certification Executive Order number of those alternative fuel retrofit systems installed on each vehicle or engine and shall identify the vehicle or engine owner at the time of installation, including the owners' current addresses and phone numbers at the time of installation. The retrofit system manufacturer shall supply a copy of all installation information to the Executive Officer upon request. In addition, each retrofit system manufacturer shall report annual sales based on a standard calendar year for each certified alternative fuel retrofit system, identified by certification Executive Order number, to the Executive Officer by March 1 of the following calendar year.

(i) Installer Recordkeeping Requirement: Installers of alternative fuel retrofit systems shall maintain a record as specified in paragraph 3(h) of these procedures and shall provide this information to retrofit system manufacturers upon request.

4. EMISSION STANDARDS

(a) Test Vehicle or Engine: A maximum of one emission-data vehicle or engine per test group or engine family for which certification is sought shall be required. Each emission-data vehicle or engine, regardless of actual miles or hours of operation accumulated, shall be assumed to have zero miles or hours of operation accumulated at the time the alternative fuel retrofit system is installed in the base vehicle or engine.

Emission tests shall be performed on the emission-data vehicle or engine with at least 4,000 miles or 125 hours accumulated after the retrofit to stabilize emissions. Manufacturers may conduct emissions testing at zero miles or hours of operation to verify emission compliance.

(1) Mileage accumulation shall be representative of actual vehicle or engine use and may be acquired by driving the vehicle on the road or bench aging, provided that the manufacturer has prior approval by the Executive Officer.

(2) Vehicle mileage accumulation on a durability vehicle, engine hour accumulation on a durability engine, or bench aging of retrofit system components shall be conducted to determine deterioration factors. Before beginning any emission testing or bench aging, an applicant's test plan must be approved by the Executive Officer. The Executive Officer approval of bench aging procedures shall be contingent upon a demonstration by the applicant that bench aging produces deterioration factors at least as great as those resulting from durability vehicle or durability engine testing.

(3) Bench aging conducted in lieu of vehicle mileage accumulation or engine hour operation shall be conducted for a period of time such that the resulting deterioration of the alternative fuel retrofit system is equivalent to that which would occur during durability vehicle mileage accumulation over a mileage equal to the useful life applicable to the vehicle, or equivalent to that which would occur during durability engine hour operation over the useful life applicable to the engine.

(4) Manufacturers may submit proposals to utilize alternative test methods to the Executive Officer, such as the use of portable emission measurement systems (PEMS) in lieu of mileage or engine hour accumulation (e.g., manufacturers certifying systems for heavy-duty engines and vehicles that were originally certified under an engine-dynamometer test procedure may propose an alternative test method using PEMS). Manufacturers must also include in their proposals the criteria used to demonstrate equivalency to the applicable emissions standard (e.g., the level of PEMS emissions that is equivalent to the exhaust emissions standard as generated from an engine dynamometer). The Executive Officer shall approve the use of alternative test methods based on his or her determination that such test methods will generate test results that are sufficiently similar to the test results generated by a specified test method, and that the alternate test method criteria is sufficiently equivalent in stringency as the applicable emissions standards as generated by applicable test

procedures. The Executive Officer shall base his or her determination upon all information submitted by a manufacturer and upon good engineering judgment.

(b) Dual-Fuel and Bi-Fuel Vehicles:
Dual-fuel and Bi-fuel vehicles must be tested on each of the two fuels. The emissions standards of both fuels must be the same vehicle emission category that is applicable to the base vehicle (e.g., a base vehicle is a gasoline-fueled passenger car certified to the ULEV vehicle emission category of the LEV II standards in Title 13, California Code of Regulations (CCR), section 1961. If that base vehicle is converted to a dual-fuel vehicle, the alternative fuel retrofit system must demonstrate compliance with the ULEV vehicle emission category standards for both fuels).

(c) Exhaust Emission Standards:
Exhaust emissions from alternative fuel retrofit systems that are manufactured for sale, sold, or offered for sale in California, or that are introduced, delivered or imported into California commerce and that are subject to any of the standards prescribed in this article must not exceed the emission standards to which the base vehicle or base engine was originally certified. The retrofit system manufacturer shall demonstrate compliance with these requirements through durability and emission testing. For heavy-duty vehicle applications where alternate test procedures have been approved by the Executive Officer, retrofit system manufacturers may propose appropriate standards for Executive Officer approval.

(d) Evaporative and Refueling Emission Standards:
Evaporative and refueling emissions from alternative fuel retrofit systems that are subject to any of the standards prescribed in this article and the documents incorporated by reference herein shall at a minimum meet the same emission standards to which the base vehicle was originally certified, except as allowed in 4(d)(1)below:

(1) Alternative Fuel Retrofit Systems with Sealed Fuel Systems: Alternative fuel retrofit systems that have sealed fuel systems which can be demonstrated to have no evaporative emissions are exempt from testing the evaporative emissions. Demonstrations may be based on an engineering evaluation of the alternative fuel retrofit system and data submitted by the retrofit system manufacturer and must show that the alternative fuel retrofit system has no evaporative-related emissions under normal operation. All such demonstrations must be approved in advance by the Executive Officer.

5. TEST PROCEDURES

(a) The test procedures used to determine the emission levels of alternative fuel retrofit systems certified for use with passenger cars, light-duty trucks, and medium duty vehicles which were originally certified to an exhaust emission standard based on a chassis-dynamometer test procedure are set forth in the following test procedures:

(1) The test procedures for determining compliance with the LEV II exhaust emission standards in title 13, CCR section 1961 are set forth in the "California 2001 through 2014 Model Criteria Pollutant Exhaust Emission Standards and Test Procedures and 2009 through 2016 Model Greenhouse Gas Exhaust Emission Standards and Test Procedures for Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles," as amended December 6, 2012, and the "California Non-Methane Organic Gas Test Procedures," as amended December 6, 2012, which are incorporated herein by reference. In the case of hybrid electric vehicles, the certification requirements and test procedures for determining compliance with the emission standards in this section are set forth in the "California Exhaust Emission Standards and Test Procedures for 2005 through 2008 Model Zero-Emission Vehicles, and 2001 through 2008 Model Hybrid Electric Vehicles, in the Passenger Car, Light-Duty Truck and Medium-Duty Vehicle Classes," incorporated by reference in section 1962, the "California Exhaust Emission Standards and Test Procedures for 2009 through 2017 Model Zero-Emission Vehicles and Hybrid Electric Vehicles, in the Passenger Car, Light-Duty Truck and Medium-Duty Vehicle Classes," incorporated by reference in section 1962.1, and the "California Exhaust Emission Standards and Test Procedures for 2018 and Subsequent Model Zero-Emission Vehicles and Hybrid Electric Vehicles, in the Passenger Car, Light-Duty Truck and Medium-Duty Vehicle Classes" incorporated by reference in section 1962.2.

(2) The test procedures for determining compliance with the greenhouse gas emission levels from new 2009 through 2016 model year passenger cars, light-duty trucks and medium-duty passenger vehicles in title 13, CCR section 1961.1 are set forth in "California 2001 through 2014 Model Criteria Pollutant Exhaust Emission Standards and Test Procedures and 2009 through 2016 Model Greenhouse Gas Exhaust Emission Standards and Test Procedures for Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles," incorporated by reference in section 1961(d). In the case of hybrid electric vehicles, the certification requirements and test procedures for determining compliance with the emission standards in this section are set forth in the "California Exhaust Emission Standards and Test Procedures for 2009 through 2017 Model Zero-Emission Vehicles and Hybrid Electric Vehicles, in

the Passenger Car, Light-Duty Truck and Medium-Duty Vehicle Classes," incorporated by reference in section 1962.1.

(3) The test procedures for determining compliance with the LEV III exhaust emission standards in title 13, CCR section 1961.2 are set forth in the "California 2015 and Subsequent Model Criteria Pollutant Exhaust Emission Standards and Test Procedures and 2017 and Subsequent Model Greenhouse Gas Exhaust Emission Standards and Test Procedures for Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles," as amended December 6, 2012, the "California Non-Methane Organic Gas Test Procedures," as amended December 6, 2012, which are incorporated herein by reference. In the case of hybrid electric vehicles, the certification requirements and test procedures for determining compliance with the emission standards in this section are set forth in the "California Exhaust Emission Standards and Test Procedures for 2009 through 2017 Model Zero-Emission Vehicles and Hybrid Electric Vehicles, in the Passenger Car, Light-Duty Truck and Medium-Duty Vehicle Classes," incorporated by reference in section 1962.1, and the "California Exhaust Emission Standards and Test Procedures for 2018 and Subsequent Model Zero-Emission Vehicles and Hybrid Electric Vehicles, in the Passenger Car, Light-Duty Truck and Medium-Duty Vehicle Classes," incorporated by reference in section 1962.2.

(4) The test procedures for determining compliance with the greenhouse gas emission levels from new 2017 and subsequent model year passenger cars, light-duty trucks and medium-duty passenger vehicles in title 13, CCR section 1961.2 are set forth in "California 2015 and Subsequent Model Criteria Pollutant Exhaust Emission Standards and Test Procedures and 2017 and Subsequent Model Greenhouse Gas Exhaust Emission Standards and Test Procedures for Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles," incorporated by reference in section 1961.2. In the case of hybrid electric vehicles, the certification requirements and test procedures for determining compliance with the emission standards in this section are set forth in the "California Exhaust Emission Standards and Test Procedures for 2009 through 2017 Model Zero-Emission Vehicles and Hybrid Electric Vehicles, in the Passenger Car, Light-Duty Truck and Medium-Duty Vehicle Classes," incorporated by reference in section 1962.1, or the "California Exhaust Emission Standards and Test Procedures for 2018 and Subsequent Model Zero-Emission Vehicles and Hybrid Electric Vehicles, in the Passenger Car, Light-Duty Truck and Medium-Duty Vehicle Classes," incorporated by reference in section 1962.2, as applicable.

(5) The test procedures for determining compliance with the evaporative emissions standards for 2001 and subsequent model year motor vehicles are set forth in “California Evaporative Emission Standards and Test Procedures for 2001 and Subsequent Model Motor Vehicles” incorporated by reference in title 13, CCR section 1976(c).

(6) The test procedures for determining compliance with the vehicle refueling emissions standards for 2004 and subsequent model motor vehicles are set forth in “California Refueling Emission Standards and Test Procedures for 2001 and Subsequent Model Motor Vehicles,” adopted August 5, 1999, and last amended March 22, 2012, which is incorporated herein by reference in title 13, CCR section 1978(b).

(b) The test procedures used to determine emission levels of alternative fuel retrofit systems certified for use with heavy-duty engines, medium-duty vehicles that are incomplete, or diesel vehicles of 8,501-14,000 pounds gross vehicle weight rating (GVWR) which were originally certified under an engine-dynamometer test procedure, are set forth in the following test procedures:

(1) The test procedures for determining compliance with the exhaust emission standards in title 13, CCR section 1956.8(a)(2)(A) are set forth in the “California Exhaust Emission Standards and Test Procedures for 2004 and Subsequent Model Heavy-Duty Diesel-Engines and Vehicles,” adopted December 12, 2002, as last amended April 18, 2013, and the “California Interim Certification Procedures for 2004 and Subsequent Model Hybrid-Electric Vehicles, in the Urban Bus and Heavy-Duty Vehicle Classes,” adopted October 24, 2002, which are incorporated by reference herein.

(2) The test procedures for determining compliance with standards in title 13, CCR section 1956.8(c)(1)(A) or (c)(1)(B) are set forth in the “California Exhaust Emission Standards and Test Procedures for 2004 and Subsequent Model Heavy-Duty Otto-Cycle Engines,” adopted December 27, 2000, as last amended April 18, 2013, the “California Non-Methane Organic Gas Test Procedures,” adopted July 12, 1991, as last amended December 6, 2012, and the “California Interim Certification Procedures for 2004 and Subsequent Model Hybrid-Electric Vehicles, in the Urban Bus and Heavy-Duty Vehicle Classes,” adopted October 24, 2002, which are incorporated by reference herein.

(c) For the applicable test procedures listed in section 5 of these procedures, the following exceptions shall apply:

(1) Where applicable, retrofit system manufacturers certifying natural gas or liquefied petroleum gas alternative fuel retrofit systems may use a

multiplier of 1.5 times their measured non-methane hydrocarbon (NMHC) results to determine compliance with the non-methane organic gas (NMOG) standards.

(2) Until the sunset, manufacturers of dual-fueled vehicles or engines may request to be exempted from performing required emissions testing on the original fuel of the base vehicle or base engine. All such requests must be approved in advance by the Executive Officer. The Executive Officer shall approve a manufacturer's request for an exemption if the retrofit system manufacturer demonstrates to the Executive Officer that the alternative fuel retrofit system does not alter or interfere with the normal operation of the base vehicle or base engine's original emission control system and will not affect the operation of the base vehicle or base engine's original emission control system. Demonstrations may be based on an engineering evaluation of the alternative fuel retrofit system and data submitted by the retrofit system manufacturer. The Executive Officer shall base his or her determination upon all information submitted by a manufacturer and upon good engineering judgment.

(3) Until the sunset, the following exceptions shall apply to small volume retrofit system manufacturers:

(A) All exhaust and evaporative emission testing for natural gas alternative fuel retrofit systems may use natural gas test fuel that meets the Federal natural gas certification fuel specifications as identified in the Code of Federal Regulations (40CFR), Part 86.1313-2007, dated July 01, 2011 which is incorporated by reference herein. This option requires retrofit system manufacturers to provide a fuel analysis with their final emission results using American Society for Testing and Materials (ASTM) test method listed in 40CFR, Part 86.1313-2007, which is incorporated by reference therein, to validate that the test fuel meets the federal natural gas certification fuel specifications. Commercially available natural gas fuel may be used for service accumulation without analysis.

(B) All exhaust and evaporative emission testing for liquefied petroleum gas (LPG) may use LPG test fuel that meets ARB motor-vehicle LPG fuel specifications as identified in Title 13, CCR, section 2292.6, last amended December 08, 1999 which is incorporated by reference herein. This option requires applicants to provide a fuel analysis with their final emission results using ASTM test methods listed in Title 13, CCR, section 2292.6, last amended December 08, 1999 which are incorporated by reference therein, to validate that the test fuel meets ARB motor-

vehicle fuel specifications. Commercially available LPG fuel may be used for service accumulation without analysis.

(C) Deterioration factors (DF) to determine compliance with applicable emission standards may be used in lieu of intermediate or high mileage emission tests. ARB shall provide assigned DFs to manufacturers. If no ARB assigned DFs are available, manufacturers may use the assigned DF's, as published by the U.S. EPA National Vehicle and Fuel Emissions Laboratory guidance letter CD-12-07 (Revised) dated March 30, 2012 and incorporated by reference herein, where applicable or may propose another DF in the absence of a U.S. EPA assigned DF. In proposing a DF the retrofit system manufacturer must demonstrate using test data, that the proposed DF is appropriate for use in determining compliance with the applicable emission standards. All such demonstrations must be approved in advance by the Executive Officer. The Executive Officer shall base his or her determination upon all information submitted by a manufacturer and upon good engineering judgment.

(D) Test procedures other than those specified in this Procedure may be used only if prior written approval is obtained from the Executive Officer. For purposes of this procedure, 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 utilized to generate test data, the results are compared to the applicable requirements. The Executive Officer shall base his or her determination whether a proposed alternate test procedure may be used upon all information submitted by a manufacturer and upon good engineering judgment.

6. ON-BOARD DIAGNOSTIC (OBD) REQUIREMENTS FOR RETROFIT CERTIFICATION

(a) All applicants must provide a Statement of Compliance, in writing, that the requirements of section 3(c) of these procedures have been met prior to receiving certification of their alternative fuel retrofit system. Specifically, except as provided in 6(b) and 6(c), manufacturers of retrofit systems must comply with section 1968.2, 1971, or 1971.1, title 13, CCR, as applicable, for OBD requirements applicable to the model year of the base engine/vehicle.

(b) Except as allowed in 6(b)(1), 6(b)(2), and 6(c) below, small volume retrofit system manufacturers of systems designed to convert gasoline base vehicles/engines subject to section 1968.2, title 13, CCR must comply with section 1968.2, title 13, CCR for OBD requirements applicable to the model

year of the engine. For the specific sections identified below, in lieu of complying with all applicable OBD requirements per section 1968.2, title 13, CCR, the manufacturer may use the following alternative criteria in 6(b)(1) or (2). For small volume retrofit system manufacturers certifying systems to section 1971 or 1971.1, title 13, CCR, or systems designed to convert diesel base vehicles/engines subject to section 1968.2, title 13, CCR, the manufacturer may propose a plan for EO approval to apply the provisions of 6(b)(1) and (2) below to the applicable sections of 1971, 1971.1, or 1968.2, title 13, CCR. The EO will approve the plan based on the appropriate application of these provisions to the applicable sections of 1971, 1971.1, or 1968.2.

(1) For applicants certifying to the same emission standard as the base vehicle or engine:

(A) Section 1968.2(e)(6.2.1)(C) – If the OBD system on the base engine/vehicle has a dedicated monitor to detect air-fuel ratio cylinder imbalance malfunctions specified in section 1968.2(e)(6.2.1)(C), title 13, CCR, the applicant may waive detection of the malfunctions by the dedicated monitor if the applicant demonstrates that the OBD system robustly detects (e.g., meets the in-use monitoring frequency requirements, avoids false passes and false indications of malfunctions) the imbalance malfunctions by using another monitor to detect them.

(B) Section 1968.2(h)(2.3): Durability requirements for OBD test vehicles: In lieu of using a vehicle required under section 1968.2(h)(2.3), title 13, CCR, applicants may use one of the following test vehicle configurations until the sunset (i.e., up to and including the 2017 model year):

1. A vehicle with the catalyst system and oxygen sensors aged per the bench aging cycle as specified in 6(b)(1)(B)1.a. through e. below. When conducting the aging, the catalyst system and oxygen sensors shall be placed and aged consistent with the test vehicle original equipment manufacturer (OEM) catalytic converter configuration (i.e., such that the relative distance between catalytic converter(s) and oxygen sensor(s) is maintained). Notwithstanding the above, aging with the downstream catalytic converter(s) located closer to the upstream converter(s) than in their OEM configured positions (i.e., in a hotter environment) is also acceptable to the ARB. Unleaded fuels commercially available in the United States shall be used during the aging.

a. Adjust parameters until stoichiometric operation is achieved with inlet temperature, exhaust flowrate, carbon monoxide (CO) concentration, and oxygen (O_2) concentrations specified in Mode No. 1 in Table 6.1.

b. Add enrichment until CO concentration specification of Mode No. 2 is achieved to determine enrichment amount to be used for Mode Nos. 2 and 3 in Table 6.1.

c. Remove enrichment and return to stoichiometric operation at Mode No. 1 specifications in Table 6.1.

d. Add air injection until O_2 concentration of Mode No. 4 is achieved to determine air injection flow rate to be used for Mode Nos. 3 and 4 in Table 6.1.

e. Perform aging cycling through Mode Nos. 1-4 in Table 6.1 for 100 hours.

6.1 Rapid Aging Test Procedure

Mode No.	Description	Parameter	Specification
1	Stoichiometric Fuel-Air Ratio (Closed-Loop)	Inlet Temperature Exhaust Flowrate Time Duration CO concentration O_2 concentration	$825^oC \pm 20^oC$ 80 SCFM[1] per catalytic converter 40 seconds ≤ 1.0% ≤ 1.0%
2	Fuel-Rich Operation (Power Enrichment) (Open-Loop)	Time Duration CO concentration set for	6 seconds 3.0%±0.3%
3	Fuel-Rich Operation with Air Injection	Time Duration Amount of Enrichment Air Injection Flow Rate	10 seconds same as used in Mode No. 2 same as used in Mode No. 4
4	Stoichiometric Operation with Air Injection (Closed-Loop)	Time Duration O_2 concentration	4 seconds 3.0%±0.3%

2. An in-use vehicle that has been converted with the applicant's alternative fuel retrofit system and has subsequently accumulated actual in-use mileage in excess of 25,000 miles on the alternative fuel. The proposed test vehicle must be complete, intact, and representative of the test group included in the application for certification. No component/system changes of the proposed test vehicle during mileage accumulation are allowed.

(C) Section 1968.2(h)(3): Demonstration testing requirements for certification: In lieu of meeting the testing requirements in section 1968.2(h)(3), title 13, CCR, applicants may use an alternative test plan that meets the following criteria in 6(b)(1)(C)1. through 4. until the sunset (i.e., up to and including the 2017 model year). After the

[1] "SCFM" refers to standard cubic feet per minute.

sunset (i.e., for 2018 and subsequent model years), applicants may use the testing requirements in 6(b)(2)(B):

1. *Section 1968.2(h)(3.1): Exhaust Gas Sensors:* Applicants may propose a single test using the worst case slow response pattern (e.g., symmetric slow response, asymmetric slow rich to lean transition) provided they can demonstrate, using good engineering judgment, that the pattern selected is the worst case in terms of affecting vehicle emissions with the least amount of sensor degradation. This testing shall be limited to the primary sensors. If the exhaust system contains exhaust gas sensors in parallel, the test shall be performed with the "parallel" sensors equally deteriorated. For other monitors required to be tested under section 1968.2(h)(3.1) (e.g., monitors that detect other sensor parameters that can cause emissions to exceed the malfunction threshold), the applicant shall meet the criteria of 6(b)(1)(C)4. below.

2. *Section 1968.2(h)(3.4): Fuel System:* For vehicles with adaptive feedback based on the primary fuel control sensor(s), applicants shall perform tests with the adaptive feedback based on the primary fuel control sensor(s) at the rich and lean limit(s) per the requirements of section 1968.2, title 13, CCR. For other monitors required to be tested under section 1968.2(h)(3.4) (e.g., monitors that detect malfunctions of the feedback based on a secondary fuel control sensor that can cause emissions to exceed the malfunction threshold), the applicant shall meet the criteria of 6(b)(1)(C)4. below.

3. *Section 1968.2(h)(3.7): Catalyst System:* Applicants shall perform a test using a catalyst system deteriorated to the malfunction criteria per the requirements of section 1968.2, title 13, CCR. If the catalyst system contains catalysts in parallel, the test shall be performed with the "parallel" catalysts equally deteriorated. If the MIL first illuminates after emissions exceed the applicable emission threshold specified in section 1968.2(e), title 13, CCR, in lieu of the 25-percent upper and lower limits specified in section 1968.2(h)(6.4.2)(B), title 13, CCR, the manufacturer shall use upper and lower limits of 50 percent of the applicable standard.

4. *Remaining Monitors*: Applicants may request a waiver from testing the remaining monitors (i.e., monitors specified under section 1968.2(h)(3), title 13, CCR, except for the monitors demonstrated per 6(b)(1)(C)1. through 3. of these procedures) provided the applicant submits a statement attesting the

underlying emission controls (e.g., exhaust gas recirculation (EGR) hardware and control calibration) of the waived monitors (e.g., EGR flow monitor) and the waived monitors themselves were not changed by the application of the alternative fuel retrofit system.

(D) Section 1968.2(i): Certification documentation requirements: In lieu of providing all the information required in section 1968.2(i), title 13, CCR, applicants may propose a documentation plan with limited OBD information for EO approval. The EO shall approve a documentation plan that includes all the modifications, deletions, and additions to the OBD system on the base vehicle/engine due to the addition of the conversion system, including a description of how these changes are integrated into the OBD system of the base vehicle/engine to ensure compliance with the standardization requirements of sections 1968.2(d)(2) and (g), title 13, CCR (e.g., how the conversion system achieves illumination of the malfunction indicator lamp and fault code reporting on the base vehicle or engine for faults detected by an added alternate fuel conversion system computer). The plan may exclude the submission of misfire percentage probability of detection charts required by section 1968.2(i)(2.5.2), title 13, CCR if the misfire monitor calibrations are not changed on the retrofit system.

(2) For applicants certifying to a more stringent emission standard than the base vehicle or engine:

(B) Section 1968.2(e)(6.2.1)(C): If the OBD system on the base engine/vehicle has a dedicated monitor to detect air-fuel ratio cylinder imbalance malfunctions specified in section 1968.2(e)(6.2.1)(C), title 13, CCR, the applicant may waive detection of the malfunctions by the dedicated monitor if the applicant demonstrates that the OBD system robustly detects (e.g., meets the in-use monitoring frequency requirements, avoids false passes and false indications of malfunctions) the imbalance malfunctions by using another monitor to detect them.

(C) Section 1968.2(h)(3): Demonstration testing requirements for certification: In lieu of meeting the testing requirements in section 1968.2(h)(3), title 13, CCR, applicants may use an alternative test plan that meets the following criteria in 6(b)(2)(B)1. through 2.:

1. *Sections 1968.2(h)(3.1), (h)(3.4), and (h)(3.7): Exhaust Gas Sensors, Fuel System, Catalyst System:* Applicants may use the alternative test plans specified in 6(b)(1)(C)1. through 3. above. For other monitors required to be tested under

sections 1968.2(h)(3.1) and (h)(3.4) (e.g., monitors that detect malfunctions of the feedback based on a secondary fuel control sensor that can cause emissions to exceed the malfunction threshold), the applicant shall meet the criteria of 6(b)(2)(B)2. below.

2. *Remaining Monitors*: Applicants may request to receive conditional certification based on the initial application prior to demonstrating the remaining monitors of the OBD system (i.e., monitors specified under section 1968.2(h)(3), title 13, CCR, except for the monitors demonstrated per 6(b)(2)(B)1. of these procedures). The EO shall remove the conditional status of the certification approval if the demonstration data are submitted within an appropriate time after conditional certification is granted and if the data show that the monitors operate and function properly at the more stringent emission standard.

(c) Certification documentation requirements: In lieu of providing all the information required in section 1968.2(i), 1971(f), and 1971.1(j), title 13, CCR, as applicable, for certification documentation requirements, applicants may propose a documentation plan with limited OBD information for EO approval. The EO shall approve a documentation plan that includes all the modifications, deletions, and additions to the OBD system on the base vehicle/engine due to the addition of the conversion system. This plan shall include a description of how these changes are integrated into the OBD system of the base vehicle/engine to ensure compliance with the standardization requirements of sections 1968.2(d)(2) and (g), 1971(d), and 1971.1(d) and (h), title 13, CCR, as applicable (e.g., how the conversion system achieves illumination of the malfunction indicator lamp and fault code reporting on the base vehicle or engine for faults detected by an added alternate fuel conversion system computer). The plan may exclude the submission of misfire monitor data demonstrating the probability of detection of misfire events required by section 1968.2(i) and 1971.1(j), title 13, CCR if the misfire monitor calibrations are not changed on the retrofit system.

7. REQUEST FOR CERTIFICATION

(a) A request for certification of an alternative fuel retrofit system shall be submitted to ARB by the manufacturer, or its authorized representative, intending to offer the alternative fuel retrofit system for sale in California in a format approved by ARB.

(b) The request must include all the information required pursuant to these procedures, including:

(1) Identification and description of the test group or engine family for which the alternative fuel retrofit system to be certified is designed;

(2) A complete description of the alternative fuel retrofit system, including detailed schematics, wiring diagrams, and parts list; an explanation of how the alternative fuel retrofit system interacts with or integrates into the base vehicle or base engine; all the necessary modifications to the base vehicle or engine and its OBD system; supplemental emission control label; owner's manual; warranted parts list; and warranty statements and warranty notifications;

(3) Procedures for installing and maintaining the alternative fuel retrofit system, including tune-up specifications and discussion of any special tools or techniques required for proper installation, maintenance, or operation;

(4) Names and addresses of installers;

(5) Names and addresses of the fabrication, assembly line, and test facilities where the alternative fuel retrofit system and its major components are manufactured and tested;

(6) Agreement to supply the Air Resources Board, within 45 calendar days of the Executive Officer's request, with any one or more of the vehicles used for certification testing or to provide Air Resources Board personnel with the equipment to inspect and test such vehicles at the manufacturer's facility, if requested by the Executive Officer; and

(7) All required emissions test data as specified in these procedures.

(c) Manufacturers planning to obtain ARB certification for the first time should send a "Letter of Intent" to certify alternative fuel retrofit systems in California to:

Chief
Mobile Source Operations Division
California Air Resources Board
9480 Telstar Avenue, Suite 4
El Monte, CA 91731
Attn: Alternate Fuel Retrofit System Certification

The Letter of Intent should include general information on the manufacturer's product offering and contact information including (i) base vehicle test group and/or base engine family, (ii) base vehicle or engine weight class; (iii) persons authorized to sign documents for submittal to ARB, (iv) persons authorized to submit signed documents to ARB, and (v) persons authorized to

communicate with ARB staff during the certification review process. Upon receiving the “Letter of Intent”, ARB will assign a manufacturer code to the manufacturer and register the authorized personnel in ARB’s electronic application submittal system. Thereafter, all certification related documents must be submitted electronically according to the format described by ARB through the electronic submittal system.

8. CONFIRMATORY TESTING

ARB may conduct confirmatory tests to verify the emission test results submitted by the retrofit system manufacturer. Confirmatory tests, if required, shall be performed by ARB within 45 days of receipt from the retrofit system manufacturer of all data, materials, and vehicles or engines necessary to conduct the test. Confirmatory testing conducted by ARB shall utilize the same test vehicle or engine and procedures as those used by the retrofit system manufacturer. In the event of discrepancies between ARB’s confirmatory test results and the retrofit system manufacturer’s test results, ARB’s evaluation for certification may be based solely on ARB’s test results.

9. WARRANTY REQUIREMENTS

(a) Requirements of Manufacturers:
Each retrofit system manufacturer shall warrant to the person having the vehicle or engine retrofitted and to each subsequent purchaser of the vehicle or engine that the alternative fuel retrofit system is designed and manufactured to conform with the applicable requirements of these procedures without causing damage to any part on the retrofitted vehicle or engine, and is free from defects in materials and workmanship which cause the alternative fuel retrofit system to fail to conform with the applicable requirements of these procedures or cause damage to any part on the retrofitted vehicle or engine. This warranty shall cover customer service and the full repair or replacement costs including the costs of diagnosis, labor, and parts, including any part on the retrofitted vehicle or engine that is damaged by the alternative fuel retrofit system. This warranty requirement will be effective from the date of installation to whichever is longer of 9(a)(1) or 9(a)(2).

(1) Three years or 50,000 miles, whichever occurs first.

(2) Remaining original emission-related equipment manufacturer warranty period.

(b) Extended Warranty Requirements:
Each retrofit system manufacturer shall identify in its application for certification the warranted parts whose individual replacement cost, at the time of certification, exceeds the cost limit defined in paragraph

9(b)(1). The replacement cost shall include the cost of the diagnosis, parts, and labor. The costs shall be those of the highest cost metropolitan area of California. Each retrofit system manufacturer shall warrant to the person having the vehicle or engine retrofitted and to each subsequent purchaser of the vehicle or engine that these parts identified in its application for certification as exceeding the cost limit defined in paragraph 9(b)(1) are free from defects in materials and workmanship which cause the alternative fuel or credit-generating conventional fuel retrofit system to fail to conform with the requirements of these procedures or cause damage to any part on the retrofitted vehicle or engine, for seven years or 70,000 miles, whichever occurs first.

(1) The cost limit shall be the same as calculated in CCR Title 13 Section 2037(c), except the model year shall be applicable to the calendar year the alternative fuel retrofit system is certified.

(2) The cost limit shall be revised annually by the Executive Officer. The highest cost metropolitan area in California shall be identified by the Executive Officer.

(3) Each manufacturer shall submit to the Executive Officer the documentation used to identify the 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 diagnose and replace the parts, using the highest cost metropolitan area in California.

(c) Requirements of Installers:
Each installer of an alternative fuel retrofit system shall warrant to the person having the vehicle or engine retrofitted and to each subsequent purchaser of the vehicle or engine that the alternative fuel retrofit system will not fail to conform with the applicable requirements of these procedures due to incorrect installation, and that no part on the retrofitted vehicle or engine will be damaged due to incorrect installation. Installers of alternative fuel retrofit systems shall install only those systems of a certified configuration and shall agree to indemnify the person having the vehicle or engine retrofitted and to each subsequent purchaser of the vehicle or engine for the cost of repair of any vehicle or engine upon which a noncertified configuration was installed. In addition, the installer shall agree to indemnify the person having the vehicle or engine retrofitted and to each subsequent purchaser of the vehicle or engine for any tampering fines that may be imposed as a result of improper installation of the alternative fuel retrofit system. The warranties and agreements to indemnify shall be effective for 3 years or 50,000 miles, whichever occurs first, of customer service, and shall

cover the full repair or replacement costs including the costs of diagnosis, labor, and parts (including any part on the retrofitted vehicle or engine that is damaged due to incorrect installation of the alternative fuel retrofit system).

Prior to installation each installer must submit to ARB the warranty statement to be provided by the installer to the purchaser in accordance with the following paragraph 9.(c)(1).

(1) Warranty Review and Reporting Requirements. Each manufacturer shall monitor its warranty claims and retain them for a period of at least three years from the date of installation of the conversion. Manufacturers shall maintain the records in both hard copy and electronic format. Upon request by ARB, manufacturers shall make available the warranty claims or a report summarizing the warranty claims by production year, conversion system, vehicle or engine model and model year, total production, and individual component. Manufacturers may include in the report an explanation of the root cause of the component failure, if known, and whether or not an improved component has been developed. If warranty claims for an individual component exceed one (1) percent or 25 components for any specific application of its certified conversion kits, ARB may use the information to initiate confirmatory or in-use enforcement testing.

10. INSTALLATION REQUIREMENTS

(a) Prior to releasing a converted vehicle or engine to the consumer, the installer of an alternative fuel retrofit system for light and medium-duty vehicles shall submit the converted vehicle to a Bureau of Automotive Repair Referee Smog Check Station for inspection and testing, except as provided in section 10(a)(1). The installer shall not release the converted vehicle to the consumer without the issuance of Certificate of Compliance for the vehicle by a Bureau of Automotive Repair Referee Smog Check Station. The installer shall keep a copy of the Vehicle Inspection Report and provide a copy to the vehicle owner upon the vehicle's release.

(1) For fleet installations of multiple retrofit systems, the installer may transfer responsibility for the required inspections directly to the fleet owner. The installer must notify the fleet owner, in writing, of the requirements to submit the converted vehicles to a Bureau of Automotive Repair Referee Smog Check Station for inspection and testing. If the fleet owner agrees to perform the required inspections, they must submit copies of the certificates of compliance to the Executive Officer by December 31 of each year

for the installation of the alternative fuel retrofit systems that year.

11. APPROVAL

(a) Issuance of Executive Orders:
If, after reviewing the test data and other information submitted by the retrofit system manufacturer, the Executive Officer determines that the alternative fuel retrofit system meets the requirements of these procedures or the criteria of an approved test plan, as applicable, he or she shall issue an Executive Order certifying the alternative fuel retrofit system for sale and installation on the vehicles or engines with the test groups or engine families specified in the certification request.

(b) Carry-Over and Carry-Across:

(1) Carry-over of durability and emission test data from the previous model year to the following model year and from one test group or engine family to similar test groups or engine families will be allowed if the Executive Officer determines that the carry-over/carry-across data will adequately represent the durability and emission performance of the alternative fuel retrofit system to be certified.

(2) Requests for carry-over and carry-across must be accompanied by test data and an engineering analysis demonstrating that the durability and emission performance of the alternative fuel retrofit system and the test group or engine family for which certification is sought will be adequately represented by the durability and emission performance of the certified alternative fuel retrofit system and test group or engine family.

(3) Applications for carry-over and carry-across will be evaluated according to the criteria specified in EPA Advisory Circular 17F, dated November 16, 1982, updated January 21, 1988 which is incorporated by reference herein. The Executive Officer shall permit the use of federal durability data vehicles if he or she determines that the federal data will adequately represent the durability characteristics of the California configuration. This determination shall be based upon similarity of catalyst location and configuration; similarity of fuel metering system; similarity of major features of emission control system logic and design; and similarity of any other features determined by the Executive Officer to be likely to affect durability.

12. IN-USE ENFORCEMENT TESTING REQUIREMENTS

(a) Retrofit system manufacturers shall, upon order by the Executive Officer, perform in-use enforcement emission testing of their products. The cost of these tests shall be borne by the manufacturer. The Executive Officer may order in-use enforcement emission testing of not more than three retrofitted vehicles or engines per certified retrofit system test group or engine family per year. For each vehicle or engine that fails to meet the applicable emission standards, two more vehicles or engines shall be selected and tested up to a total of ten vehicles or engines. Upon order by the Executive Officer, manufacturers shall perform the applicable emission tests pursuant to the following:

(1) No vehicle or engine shall be accepted by the retrofit system manufacturer as a representative vehicle or engine for in-use enforcement testing unless the following criteria are met:

(A) California certified and registered.

(B) Odometer indication of less than the certified useful life mileage and vehicle age within the useful life time period.

(C) No indication of abuse (e.g. racing, overloading, mis-fueling, or other mis-use), neglect, improper maintenance, or other factors that would have an effect on emission performance.

(D) No major repair to engine or major repair of vehicle resulting from collision.

(E) No indication of any problem that might jeopardize the safety of laboratory personnel.

(2) The retrofit system manufacturer shall, under ARB supervision, perform diagnosis or restorative maintenance on those vehicles or engines selected for in-use enforcement testing. The retrofit system manufacturer or a laboratory approved by the Executive Officer shall (1) identify part numbers of all essential emission control system components; (2) check air filter, all drive belts, all fluid levels, radiator cap, all vacuum hoses and electrical wiring related to emission control for integrity; check fuel metering and emission control system components for maladjustments and/or tampering, and record all discrepancies; (3) check ignition system where applicable and replace any defective components that are due for replacement; (4) check and adjust engine parameters to manufacturer's specifications; and (5) perform maintenance if the vehicle is within 1,000 miles of scheduled maintenance service.

(3) The retrofit system manufacturer or a laboratory approved by the Executive Officer shall perform all applicable emission test procedures set forth in these procedures. The applicable emission standards shall be the vehicle's or engine's useful life standards as stated in the Alternative Fuel Retrofit System Certification Executive Order.

(4) For heavy-duty vehicle or engine applications where alternate test procedures and standards were used, the retrofit system manufacturer or a laboratory approved by the Executive Officer shall repeat the same alternate test procedures and standards approved to obtain their Alternative Fuel Retrofit System Certification Executive Order.

(5) Retrofit system manufacturers shall complete in-use enforcement testing within six months of the issuance of the in-use enforcement testing order by the Executive Officer and shall submit all test data to the Executive Officer within 30 calendar days following completion of testing.

(6) Following review of retrofit system manufacturer in-use enforcement test data, the Executive Officer may conduct confirmatory in-use enforcement testing.

(7) If the results of the in-use enforcement tests conducted pursuant to paragraphs 12(a)(1) through 12(a)(6) of these procedures indicate that the average emissions of the test vehicles or engines for any pollutant exceed the applicable emission standard, the entire vehicle or engine population so represented shall be deemed to exceed such standard. Upon order by the Executive Officer, the manufacturer shall have 45 days to submit a recall plan in accordance with Sections 2111 through 2121, Title 13, CCR. If no such recall plan is submitted, the Executive Officer may order corrective action including recall of the affected vehicles or engines in accordance with Sections 2122 through 2135, title 13, CCR. For the purpose of these procedures, the term "manufacturer" as referenced in Sections 2111 through 2135, title 13, CCR, shall mean "retrofit system manufacturer."

13. CONFIRMATORY IN-USE ENFORCEMENT TESTING REQUIREMENTS

(a) Emission Confirmatory Testing: The Air Resources Board may conduct confirmatory tests to verify the in-use enforcement emission test results submitted by the retrofit system manufacturer. Confirmatory tests, if required, shall be performed by the Air Resources Board within 45 days

of receipt from the retrofit system manufacturer all data, materials, and vehicles or engines necessary to conduct the test. Confirmatory testing conducted by the Air Resources Board shall utilize the same test vehicle or engine and procedures as those used by the retrofit system manufacturer. In the event of discrepancies between the Air Resources Board's confirmatory test results and the retrofit system manufacturer's test results, the Air Resources Board's evaluation for compliance may be based solely on the Air Resources Board's test results.

(b) OBD Confirmatory Testing: OBD confirmatory testing shall be conducted per section 1968.2 (h)(7) or 1971.1 (i)(6) as applicable.

APPENDIX D

D. Economic Analysis

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Economic Analysis of Certification Procedures

This appendix describes the methodology used to estimate differences in certification costs from the current alternate fuel conversion procedures to the proposed changes for conversion systems certified to the same chassis dynamometer based emission standard to that of the original vehicle subject to OBD requirements. These costs can be assigned to two areas related to certification: emission testing and OBD demonstration. Regarding emission certification, the proposed regulation does not change the estimated tailpipe testing costs and it eliminates the need to conduct the evaporative emissions test if the fuel system is enclosed yielding a reduction of $6,368 (staff used $6,400 for rounding purposes).

Certification costs vary depending on the complexity of the engine, emission control system used, and OBD capability. Therefore, staff decided to use a realistic worst case (most complex) system to estimate cost for the current OBD certification procedure. As shown in table D-1, staff estimates each OBD emission test will cost $2,100. This includes the cost to conduct the emission testing, collect OBD scan tool data and remove and replace the demonstration parts associated with each test. Staff applied the $2,100 test cost to each of the required emissions tests outlined in table D-2.

Table D – 1: Estimated Cost per Emission and Fault Insertion Test

Task	Cost
OBD Data Collection	$200
Emission Test	$1,500
Labor (4 Hours) per Test	$400
Total Cost per OBD Test	**$2,100**

Table D-2 estimates the total number of OBD certification tests and hardware costs and compares the number of tests and cost for the current (worst case) certification procedures with the proposed streamlined procedures for certification to the same chassis dynamometer based standards as the original vehicle. As shown in table D-2, the proposed test procedures will require four threshold monitor demonstration emission tests as compared to worst case scenario under the existing regulation of 19 threshold monitor demonstration emission tests.

Table D-3 provides a summary and comparison of OBD costs for certifying to the current worst case procedures to the more flexible procedures as proposed and to the recently revised EPA procedures as published by EPA. Since the number of tests is reduced, the cost for the OBD demonstration parts will decrease from $49,200 to

$42,000. The cost to conduct the demonstration tests will decrease from $39,900 to $8,400. Some of the costs for demonstration parts are specific to the vehicle/test group being tested (e.g., for the threshold catalyst) and are recurring for additional demonstration vehicles. Other costs for demonstration parts (e.g., exhaust gas sensor demonstration hardware) may be shared with other vehicles/test groups that utilize similar emission control system hardware that is compatible with the demonstration hardware. Lastly, the cost to age the vehicle to the level required for demonstration testing will decrease from $50,000 to $20,000.

Table D – 2: Estimated Alt Fuel Conversion OBD Demonstration Costs

System	Monitoring Requirement	Current ARB (Worst Case)	ARB Proposal	ARB Demonstration Hardware Cost
		# of Emission Tests		
Fuel System	Primary Rich	1	1	$1,000
	Primary Lean	1	1	
	Secondary Rich	1	0	$1,000
	Secondary Lean	1	0	
	Imbalance Rich	1	0	$1,000
	Imbalance Lean	1	0	
Exhaust Gas Sensor	6 Patterns	6	1	$5,000
Full Useful Life Catalyst		1	1	$35,000
EGR		1	0	$100
Misfire		1	0	$5,000
Air Injection		1	0	$100
Valve Timing	Advanced	1	0	$1,000
	Retarded	1	0	
	Response	1	0	
	Total OBD Tests	**19**	**4**	

Table D-3: Summary and Comparison of OBD Certification Costs

OBD Requirements	**Current ARB (Worst Case)** $/MY	**ARB Proposal** $/MY	**Current EPA** $/TG
OBD Emission Tests	$ 39,900	$ 8,400	$ 9,500
OBD Demonstration Parts	$ 49,200	$ 42,000	$ 13,000
OBD Test Vehicle Aging	$ 50,000	$ 20,000	$ 0
Total OBD Costs	**$ 139,100**	**$ 70,400**	**$ 22,500**

Table D-3 compares the cost of the current worst case scenario with the cost of staff's proposal based on the necessary demonstration parts and testing, yielding a projected and OBD demonstration cost savings of $63,500 per model year.

APPENDIX E

E. Reference Letters

Letter from Alternative Fuels Advocates, LLC to ARB August 2, 2012

Alternative Fuels Advocates, LLC

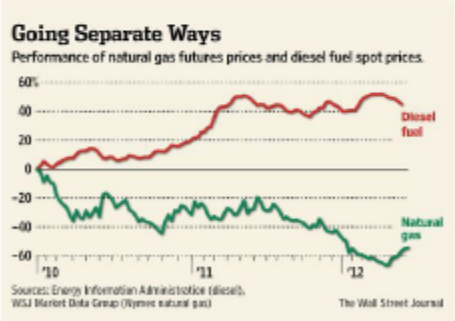
To: California Air Resources Board
Attn: Annette Hebert – Mobile Source Operations Division
cc: Tom Cackette – Chief Deputy Executive Officer
Date: August 2, 2012
Re: Streamlining of certain Natural Gas / Propane vehicle and engine certification procedures

Dear Annette,

We wish to thank you and your staff for taking time out of your busy schedules to meet with us on June 14th regarding this important subject. Alternative Fuels Advocates (AFA) is committed to working closely with the Natural Gas and Propane vehicle industries in providing the Air Resources Board (ARB) with data and resources necessary to update policies and regulations so as to lessen the burden on both the applicant and the ARB while still maintaining high standards of emissions and OBD monitoring compliance which California has pioneered over the years.

Background

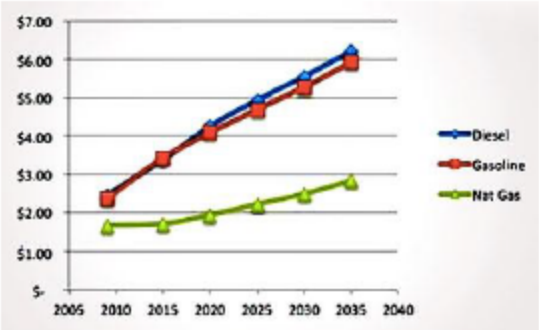
As depicted by the graph below, while consumers continue to be faced with higher petroleum derived fuel costs, the price at the pump for low carbon natural gas derived Natural Gas / Propane fuels has dropped dramatically. According to a recent US DOE report[1] while the nationwide average retail price for gasoline is at $3.89, the current nationwide average retail price for Natural Gas is $2.08 per gasoline gallon equivalent with Propane[2] averaging at $2.50 in the state.



[1] http://www.afdc.energy.gov/afdc/price_report.html

[2] California propane prices are considerably lower than the national average due to surpluses produced from oil and gas fields here. As California continues to rely on importing petroleum for vehicle fuel we are at the same time regrettably exporting much of our indigenously produced low carbon propane to other states and countries. Approximately 70% of the US propane supply is currently derived from domestic natural gas.

According to the U.S. Energy Information Administration's *Annual Energy Outlook 2011*, this trend is expected to continue for many years to come:



Over the first three years in which I was the Program Manger of the California Energy Commission's Alternative and Renewable Fuel and Vehicle Technology Program (program funding of $100 million per year in incentives for alternative fuels and advanced vehicle technologies), it became apparent that California public and private fleets, who desire to reduce petroleum use in favor of using non-petroleum, low carbon Natural Gas and Propane fuels , have been continually frustrated with the lack of ARB-certified vehicle and engine choices vis-à-vis to what is becoming increasingly available outside of California under recently-streamlined Federal certification procedures[3]. There is also a perception that the ARB certification process requires more time than is reasonably necessary, causing many potential applicants to shun the California market altogether[4].

Model Year 2012 Natural Gas& Propane Chassis & Engine Certifications		
	EPA	ARB
Certifications Issued	79	7
OEM Test Groups Covered	21	7
Applicants	11	4

For alternative fuel system manufacturers certification timeframes are crucial. There is a limited window from when the OEM ships the first vehicle of a model year to when the model year ends in which to fully engineer, test, and certify with both the US EPA and the ARB. Because of this crucial timing, manufacturers hold heightened concerns about the delays in the iterative certification process which can easily jeopardize the amount of time available for selling the once-certified vehicles. Standardizing the response times and schedules in the certification process could alleviate these concerns, provide certainty for hitting the vehicle 'sales

[3] http://www.epa.gov/oms/consumer/fuels/altfuels/420f11006.htm

[4] A preliminary analysis of certification processing times is included here as Attachment A.

window', and remove the existing industry stakeholder perceptions that the additional iterations are ill-focused at best, and/or punitive at worst.

In response to the reality of shrinking options for ARB-approved alternative fuel vehicle systems, many of the "CAA Section 177" states which had previously adopted California vehicle emissions standards are now forgoing the California standards and choosing to go with the Federal standards as pertaining to natural gas vehicles[5].

An improved and streamlined certification pathway for alternative fuel vehicle technologies, for both new and existing vehicles and engines, can serve as a discrete action that will help enable the state to meet its petroleum reduction and alternative fuels use goals, along with its climate change goals, with early adoption of low-carbon Natural Gas and Propane motor fuels. Lastly, the remedies proposed can be a catalyst to the benefit of increased economic development in this vital market sector of the economy, a benefit which is substantial and sustainable for several decades into the future.

Areas for Potential Streamlining
After consultation with the industry, we at Alternative Fuels Advocates have identified a number of areas in which the ARB could provide much needed administrative changes in lessening the certification burden for both examiner and applicant:

1. Improved guidance documentation
2. Alternative Fuels Specialists
3. Update of §2030 to reflect current state of the art
4. Harmonize natural gas certification fuel with Federal standard
5. Harmonize natural gas NMHC to NMOG multiplier with Federal standard
6. Relief from aged post-exhaust component requirements
7. Relief from re-validating dual-fuel gasoline systems
8. Leverage experience of the US EPA

1. Improved guidance documentation

We are encouraged that ARB has planned a workshop on August 14th and offer this summary of issues for guidance in advance. It would be very beneficial to the industry if the following areas were addressed in the guidance document and in subsequent initiatives to advance clean low carbon fuel conversion systems:

What constitutes a <u>complete</u> OBD II application and what are reliable turnaround times?
One clear message from the industry is that while the OBD II regulation may be well defined, specifics as to what documentation is required from an applicant alongside

[5] So far New Jersey and Pennsylvania have opted out of the California's arguably outdated §2030 standard, with a half dozen other states now considering similar legislative changes.

a reliable timeframe for productive two way iteration and eventual approval suffers from lack of definition regarding the procedure and its time requirements. Areas which could be better defined by the ARB OBD II group include:

- Examples of acceptable / unacceptable methods to induce faults
- Permissible shortcuts
- Typical mistakes made by first time applicants, testing omitted, etc.
- Common sources of rejection, i.e. missing datasets, tables, graphs, etc.
- What to do when you feel your application or responses have been ignored

Ideally the ARB would publish a template OBD II application example that includes all of the elements currently required for approval. This would eliminate the guesswork for first time applicants while also providing ARB OBD II examiners with complete applications in a more unified format.

Checklist of required submissions with estimated turnaround times for each is needed.

While the EPA Verify submission process has a clearly defined sequential pathway for dataset uploading and approval, the ARB relies on a more ad-hoc approach of requiring separate DMS uploads for not only the core application but also various other documents in addition to physical label submissions. Documenting these steps as well as estimated turnaround times for each would no doubt lessen the burden on ARB certification representatives, especially when working with first-time applicants.

Requirements for dual-fuel vehicle and engine certification

As elsewhere in the United States, dual fuel[6] vehicles could to be providing an important tool for California in transitioning to non-petroleum and low carbon fuel alternatives as the refueling infrastructure is being built out. While the USA EPA has in recent years issued dozens of certifications for dual fuel vehicle and engine systems, in California there have been no such certifications granted since 2005. Much of this is likely attributed to a lack of information in the public domain as to ARB's interpretation of the California regulations pertaining to dual-fuel vehicle certification requirements, alongside a clearly stated rationale for how they are more protective of public health and welfare than the updated applicable Federal standards.

The alternative fuel vehicle industry is becoming increasingly concerned that there are at least three dual-fuel applications in to the ARB for model year 2013 (one OEM, two SVM) with none yet approved as of the end of July.

Post-certification responsibilities

[6] Vehicles which operate either on gasoline or the alternative fuel, but not both simultaneously.

A clearly stated summary of §1968.2(j) production vehicle reporting requirements, warranty and recall reporting, running change notification, end of year fees, and other post-certification responsibilities would assist the alternative fuel system supplier in maintaining compliance.

2. Alternative Fuels Specialists

As provided above, the macroeconomics favoring demand for low carbon natural gas and propane fueled vehicles should continue for the foreseeable future. While the OEMs are once again making efforts to supply product to this market there will no doubt be increased strain on ARB staff to field requests from consumers and small volume manufacturers for guidance in understanding and meeting California's regulations.

In a manner similar to EPA's OTAQ successful initiatives, we would encourage the ARB to appoint at least one senior staff member to focus on outreach and in expediting regulatory compliance activities for all of the alternative fuels. The specialist will also be able to draw on ARB staff expertise as needed. For example one source of frustration to some current applicants occurs when the examiner managing the certification is unfamiliar with the base OEM gasoline vehicle and application, resulting in what would otherwise be avoidable time-consuming correspondence between the alternative fuels applicant and examiner.

3. Update §2030 to reflect current state of the art

California's requirement for separate certification pathways as to new vehicle conversions (expiring at model year end) and retrofit vehicle conversions (never expiring) is a serious and substantial barrier to the nascent California alternative fuel vehicle industry. As we discussed in our meeting in June, Title 13 §2030 – Certification and Installation Procedures for Alternative Fuel Retrofit Systems – was implemented *seventeen years ago* and clearly needs updating to reflect the state of the art today. It is encouraging that the ARB is planning to revisit this regulation next year, however in the mean time we suggest that administrative guidance be published as soon as possible for those wishing to pursue this non-expiring certification pathway to include:

- OBD regulations should correspond to the model year of the vehicle, i.e. §1968.2 not §1968.1 for OEM model years 2005 and newer [§2030 3(iii)]
- Test procedures should also correspond to those applicable to the vehicle model year
- OBD approvals previously granted under new vehicle certification should be applicable for retrofit certification for the same OEM test groups
- Certification and VECI labeling to current standards (i.e. SULEV) should be acceptable as these standards didn't exist in 1995 [§2030 3(b)]
- Assigned DF's may be utilized in lieu of mileage accumulation [§2030 5(g)] so long as data is provided showing less deteriorative effect on emissions control components while running on the alternative fuel (i.e. comparative

mid-catalyst temperature traces). Kit manufacturers must come back within two years to validate the DFs per MAC 95-10

- Durability of components added to the vehicle may be demonstrated via manufacturer-provided bench data as is the case for new vehicle certification
- Use of criteria per 40 CFR §85.510(b)(1)(A) to determine carry-across to similar engine families / test groups [§2030 6(b)]
- Limit testing to one or two vehicles which might be required for in-use testing[7] as currently the regulation is "not less than ten vehicles" [§2030 8(a)]
- Guidance as to how to test Category III "vehicles" for pre- and post-conversion emissions [§2030 5(d)] as it is impossible to load a chassis dynamometer with a vehicle in this weight category and furthermore Federal regulation requires engine dynamometer validation.

4. Harmonize certification fuel with Federal standard

Natural Gas Emissions Test Fuel

The following table provides a comparison between the California and Federal Regulations for natural gas vehicle certification test fuel:

Natural Gas Test Fuel Comparison

	California 13 CCR 2292.5	Federal 40 CFR 86.113-94
Cost in gasoline gallon equiv.	Over $100	Under $2
Lead time	3 months - custom	None - ubiquitous
Methane	90.0% ± 1.0%	89% min.
Ethane	4.0% ± 0.5%	4.5% max.
C3 & Higher	2.0% ± 0.3%	2.3% max.
C6 & Higher	0.2% max.	0.2% max.
Oxygen	0.5% max.	0.6% max.
Inert Gases	3.5% ± 0.5%	4% max.

It is unfortunate that California continues to cling to the outdated notion of low methane, high ethane fuel composition along the SAE J1616 recommended practices continuum[8] as somehow causing higher emissions – when in reality the opposite is true. Public-domain test data from Southern California Gas Company and additional data in possession of AFA shows that the *California test fuel consistently provides marginally cleaner results* as compared to the Federal Natural Gas test fuel, and that

[7] By comparison, the verified diesel emission control system (VDECS) retrofit in use compliance requirements provide that only four (4) units per engine family need be tested, and then only after 100 units or more are in use in California. Note also that §2030 8(a) could be misconstrued as having the potential to require up to 20 percent of all systems/engines sold to be called out of the field for in-use testing, which would be a daunting sword over the manufacturer's head indeed.

[8] SAE J1616, in summary, recommends motor vehicle fuel methane composition of 88 to 96 mole percent with the balance being a decreasing proportion of non-methane alkanes (i.e., ethane, propane, butanes, etc.).

variations to as low as 78.8% methane have little impact on emissions or fuel economy of natural gas vehicles[9].

We note that the California regulation provides that fuel meeting the Federal criteria may be used for mileage accumulation and OBD II validation but not for determining emission level certification. Furthermore, in practice, the ARB does indeed accept certification data from test vehicles operating on commercially available Natural Gas sources so long as a chemical analysis is provided. We would encourage the formalization of this policy, and eventual change in the regulation, so as to harmonize with the less burdensome Federal requirement.

5. Harmonize NMHC to NMOG multiplier with Federal standard

Producing NMOG emission data is a very expensive and time-consuming process. Sample exhaust must be impinged and forwarded on to third party laboratories for additional speciation to obtain these values. While post-test NMHC data may be used as a surrogate for NMOG for gasoline and diesel via established multipliers, no such multipliers exist for California certification of Natural Gas test results.

Recognizing this, the US EPA has reviewed Natural Gas data submitted over many years and has determined a worst-case factor of 1.5x NMHC to NMOG. We ask ARB to harmonize with this Federal multiplier, and provide clear guidance for this change.

6. Relief from aged post-exhaust component requirements

A significant hurdle for Natural Gas and Propane fuel system providers is California's requirement to use a vehicle aged to the end of full useful life for use in OBD II validation testing[10]. While obtaining aged Natural Gas and Propane components such as fuel regulators and injectors is generally not a hardship, procuring aged OEM post-exhaust components (catalysts, O2 sensors) using an ARB-approved durability procedure generally costs in excess of $30,000 and can take many weeks. However, this is also contingent on the manufacturer being able to readily access the components at the start of a new model year (late summer/early fall).

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[9] In response to "hot gas" vehicle fuel concerns raised by ARB, a comprehensive study on Natural Gas fuel properties vs. resulting emissions was performed for Southern California Gas Company (Sempra) by Sierra Research in November 2009. The resulting data shows no evidence of Natural Gas formulation influencing vehicle emissions. In response, ARB Executive Order dated October 12, 2010 to Southern California Gas Company *temporarily* exempts Sempra customers from regulation 13 CCR 2292.5, as the ARB continues its evaluation of the relationship between Natural Gas fuel composition and emissions. Due to the temporary nature of the order, the regulatory uncertainty it provides gives cause for ongoing concern for transit districts, thousands of transit bus patrons, school bus districts and school children, and other natural gas fleets and vehicle users, and appears to exceed the authority provided to ARB for its requested CAA Section 209(b) waivers to address natural gas vehicle fuel properties. The full report may be downloaded here: http://www.socalgas.com/documents/business/gasquality/SierraResearch_EffectsofGasCompositiononEmissionsfromaLight-DutyNatural GasVehicle.pdf

[10] §1968.2(h)(2.3)

As discussed earlier, given a limited window of opportunity each model year, a delay of even a few weeks in waiting on catalyst aging can make the difference between providing vehicles to California customers or not prior to the OEM ending production of the current model year base gasoline vehicle. This issue directly limits the 'market window' of certified vehicle availability, which jeopardizes the sales volume for that model year vehicle- a crucial element in the decision to attempt to certify in California, or not.

In the past decade since California's requirement to use a representative end of life vehicle in OBD II validation was implemented, post-exhaust components have become significantly more *durable*. OEMs have progressed from reporting large multiplicative 100k miles deterioration factors in model year 2000 to relatively insignificant 120k miles additive factors in model year 2012 as shown in the following table of 70th percentile DF values, as published under 40 CFR §86.1826(b)(1)(i).

Model Yr.	NMHC	CO	NOx
2000 (multiplicative)	1.8 x	1.9 x	2.3 x
2005 (multiplicative)	1.37 x	1.62 x	1.73 x
2012 Bins 2-3 (additive)	0.002 +	0.1 +	0.00 +
2012 Bins 4-5 (additive)	0.012 +	0.3 +	0.01 +
2012 Bins 6-8 (additive)	0.030 +	0.6 +	0.04 +

The US EPA has also determined from extensive experience with alternative fuel vehicle and engine data that *"based on knowledge of exhaust temperature development data at the catalyst inlet, it is reasonable to conclude that, in general, OEM DFs developed on gasoline would represent a worst case DF relative to DFs developed using Natural Gas, LNG, Propane, and ethanol fuel types"*[11].

As the OEM DF for a given test group is already known on gasoline, and given the above broad industry DF data, it would seem reasonable to us that threshold monitors which are calibrated using durable state of the art 4k miles catalysts would provide fully compliant results on end of useful life catalysts as well, especially if OEM DF's were included in the emissions result in determining compliance with the applicable threshold.[12]

7. Relief from re-validating dual-fuel gasoline systems

As discussed above, ARB guidance in the public domain as to dual-fuel vehicle and engine system certification pathways would be very beneficial.

---

[11] Ref. CD-12-07 analysis published March 20, 2012 – http://www.epa.gov/otaq/datafiles/cd1207.pdf

[12] Note this proposed alternate test vehicle environment would not apply to the catalyst monitor validation which would continue to be deteriorated per criteria presented in §1968.2(e)(1.2.7)

In cases where the gasoline system hardware and calibration remain unchanged, it would seem reasonable to rely on OBD data as submitted by the OEM as is the case with the Federal requirements and also, for example, as allowed by the ARB in its soon to be enacted specially constructed vehicle regulation[13]. However, currently for dual-fuel vehicles the ARB requires the following evaporative tests to be run:

a. 2-day evaporative test (gasoline only)
b. 3-day evaporative test with running loss (gasoline)
c. 3-day evaporative test with running loss (Natural Gas)
d. 2-day evaporative test (CNG)

The estimated cost of this testing is $25,000. We agree that testing is necessary if significant changes are made to the gasoline fuel system (fuel tank, canister configuration etc.), however when the closed Natural Gas system is added without making any changes to the base OEM gasoline system, it seems reasonable that this requirement be waived in harmony with well-established Federal procedures[14].

Finally, we are aware that the ARB has required at least one alternative fuel system provider to provide a **full OBD II demonstration on both fuels**, effectively doubling the time and costs associated with certification to upwards of $400,000 or more. While the rationale for this testing requirement is confidential between the ARB and the applicant, on the surface it would appear to be an overreach of regulatory interpretation, especially as applied to a single-year certification of a vehicle from a small volume manufacturer[15].

8. Leverage experience of the US EPA

Together with all automotive manufacturers, alternative fuel systems suppliers appreciate the efforts underway to participate in the Verify project with the US EPA so as to harmonize certification application data for all certification categories. We also encourage the ARB to draw on the extensive experience that the US EPA OTAQ group has gained in examining alternative fuel vehicle and engine data.

Many of the suggestions contained in this letter have been requested by individual manufacturers in the past, resulting in latitude by the ARB on a case-by-case basis only. For years the US EPA took the same approach, however with the growing number of applicants and submissions it became clear to US EPA that reviewing statistically significant data already in its files to come up with improved regulation would greatly reduce the time wasted by both applicant and examiner. Much of this

[13] Ref. California Proposed Regulation Order Title 13, Division 3, Chapter 1, Article 1.5, section (g)(10)

[14] This is of course provided that the alternative fuel system provider is able to demonstrate that gasoline vapors are being continuously purged while operating on either fuel, thus the evaporative emissions of the vehicle will be unchanged.

[15] The only regulation we could find which specifically calls out options for dual-fuel OBD II monitoring pertains to denominator specifications as presented in §1968.2(d)(4.3.2), hence our desire as stated earlier for public domain guidance from the ARB as to its interpretation of the regulation in ensuring full OBD II compliance while operating on either fuel.

Federal data and experience would be of benefit for California to consider in looking toward updated regulations covering alternative fuel vehicles and engines as well.

Summary

We trust that the upcoming workshop is a signal that the ARB is beginning to take a more proactive approach in balancing the demands of a rapidly growing low carbon alternative fuels industry with the need for California to remain vigilant as to mobile source emission reduction goals. Our impression is that the industry is prepared to provide data and additional laboratory validation if required to support the improvement and streamlining of processes and removal of undue validation burdens.

We are determined to continue this collaborative and collegial initiative with your agency and are very encouraged by the response to date. The Natural Gas and Propane vehicle industries are engaged in seeking the administrative remedies in the near-term that can lead to a more robust alternative fuel vehicle production and sales environment for California. This is critically important now, at a time when California consumers seek viable non-petroleum, low-carbon and more affordable fuel and vehicle choices for their fleets and households.

We look forward with optimism, and believe that the Air Resources Board staff will seek additional information if necessary, and continue the open collaboration with these dynamic fuel and vehicle industries. This effort will be a key to opening the door to an improved and eased set of certification procedures that can result in a reduced petroleum, low-carbon fuels and vehicles, and an enhanced economic transportation future for California and its citizens.

Attachment A
Comparison of Certification Timelines

Data in the public domain as to response times from each agency is scarce. Very few of the FOI versions of manufacturers applications to EPA for certificates of conformity are posted at the EPA online document index system, and of those only a fraction include data which indicate dates of OBD II and full certification application. Additional FOI documents could be requested from EPA and possibly from the ARB for a more complete statistical analysis.

No public data exists as to OBD II application response times from ARB, so presented here is public data from EPA only.

OBD II Application Response Time

From scarce FOI applications which include both OBD submission and approval dates:

Manufacturer	Test Group*	Federal OBD Application Date	Federal OBD Approval Date	Days
Roush	ARIID05.46R6	10/08/09	10/15/09	7
BAF Technologies	ABAFT05.41FN	10/29/09	11/03/09	5
Altech Eco	BAECT04.64DB	07/07/10	07/22/10	15
Altech Eco	BAECV02.5VEA	01/07/10	01/13/10	6
IMPCO	BZ9XV03.9GD9	11/12/09	11/23/09	11
Autogas America	BAGTT06.2375	08/23/10	09/15/10	23

			Avg. days:	**11**

Certification Application Response Time

For the following analysis we assume simultaneous applications to EPA and ARB:

Manufacturer	Test Group*	Submitted	EPA Cert	Days	ARB Cert	#Days
BAF Technologies	BBAFT05.45HK	11/29/10	12/21/10	22	5/11/11	163
	BBAFT02.01DV	09/22/12	10/01/10	9	5/11/11	231
	ABAFV04.61FN	11/10/09	11/24/09	14	12/17/09	37
	ABAFT05.41FN	09/29/09	11/10/09	42	12/17/09	79
	ABAFT05.42FN	08/10/09	09/25/09	46	12/17/09	129
Baytech Corp.	BBYTT06.0918	09/16/10	11/12/10	57	12/20/10	95
NaturalDrive	BNTDT06.0FEB	12/01/10	12/08/10	7	12/09/10	8
Roush	BRIIT05.45HN	06/28/10	07/02/10	4	03/18/11	263
				---		---
			EPA Avg:	**25**	**ARB Avg:**	**126**

* Indicates the EPA test group; corresponding ARB test group names may differ for same carlines.

Letter from Natural Gas Coalition to ARB, March 8, 2013

California Natural Gas Vehicle Coalition

March 8, 2013

Annette Hebert
Chief Mobile Source Operations Division
California Air Resources Board
9480 Telstar Avenue, Suite 4
El Monte, CA 91731
Re: CARB's Alternative Fuel Vehicle Conversion Certification Program

Dear Annette:

The California Natural Gas Vehicle Coalition appreciates the time and effort the Air Resources Board put into the working group calls and the workshop in El Monte in January. Simplifying and improving the alternative fuel conversion certification program is a top priority for our organization. The time and expense involved in complying with the Air Resources Board's (ARB) certification program is a significant obstacle to getting more clean alternative fuel vehicles onto California roads.

As we commented to you and more broadly in our newsletter our members felt pretty good about the direction in which ARB was moving on this issue coming out of the January 22 workshop. However the letter we received a couple weeks later responding to our suggested changes to the On Board Diagnostics portion of the program left us feeling much less positive. That said we are still motivated to work with you to make this program simpler and more practical without sacrificing air quality.

This letter is intended to be an overview of the concerns and suggestions the California Natural Gas Vehicle Coalition and our members have raised. Individual companies will provide more detailed and technical suggestions to ARB. CNGVC is asking the Air Resources Board to: simplify the on-board diagnostics (OBD) testing requirements, simplify the reporting requirements for the testing that is done, simplify the application process to enable a speedy transition from an alternative fuel vehicle original equipment Executive Orders (EO) to an aftermarket EO, extend the life of EOs, allow the use of commercially available fuel for testing, simplify the evaporative emissions

testing for dual fuel vehicles, and review and seek alignment with the USEPA's certification program.

On Board Diagnostics testing requirements

As we have discussed this is where most of the cost and time are spent in ARB's certification process. Our members maintain that ARB's significantly more burdensome requirements do not provide significantly more air quality benefits than the USEPA program. We submit that ARB requirements are a significant obstacle to getting more clean cars onto California roads.

We strongly support reducing the testing, limiting the recalibration of monitors, and reducing the volume of reporting that is required. The contrast between ARB's and USEPA's programs in this area is quite striking. EPA requires calibration and emissions testing of 5 major monitors. Companies are required to report emission test results. This can be done in a few pages, sometimes just one spreadsheet. EPA staff is often able to review this information in just a week and make a quick determination of whether to approve or not approve. Contrast that process with ARB's. ARB requires more monitors to be adjusted, more tests for each of those monitors to be conducted, lots of documentation on the adjustments to monitors, and obviously many more test results to be reported. This often leads to a package that is 200-300 pages long. It takes ARB about 3 months to review this package and then there is often considerable Q&A between ARB and the applicant.

Possibly the most costly and time consuming portion of ARB's OBD testing is the requirement to age components for testing. USEPA allows the use of assigned deterioration factors rather than the threshold aged approach. We strongly encourage ARB to allow companies that have proven their technical skill and reliability to use assigned deterioration factors to demonstrate compliance with your OBD requirements.

Application process

We strongly support allowing alternative fuel certifications for new vehicles or engines to automatically qualify for aftermarket certification if requested. We believe this request can be made with a one page letter or possibly by checking a box on the application form. Some additional documentation will be needed for labeling and warranty changes but that should be all that is needed.

Extension of certification life

We support the extension (renewal) of new vehicle or engine certifications to allow manufacturers one full year of sales. For us this means and Executive Order would extend until December 31st of the year following a given model year. This change

should be helpful but is not an alternative to shortening the certification process on the front end. As a reminder once we pass the first Quarter of each calendar year it is challenging to get current model year vehicles from the OEMs because they are switching production to the new model year.

Test fuel

We request that ARB allow companies to use commercially available fuel rather than a specialized test fuel. Commercially available fuel is more representative of the real world and thus real world emissions. Test fuel can cost $100 per gallon. Our second option would be for ARB to harmonize natural gas certification test fuel requirements with federal standards.

Evaporative Testing

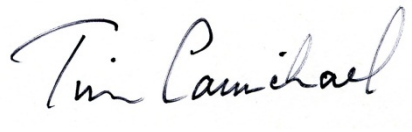
The time and cost to conduct the evaporative testing for dual fuel vehicles is unreasonable and unnecessary. The shed testing currently required includes four tests which all together can take a month. We believe the same verification can be achieved with one 2 or 3 day test just on the natural gas system. We encourage ARB to review the current requirements in this area.

USEPA's approach

As you know USEPA revamped their testing and certification program in the last 18 months. We understand that ARB staff is reviewing this program. We appreciate this and request that ARB look for every opportunity to align ARB's requirements with EPA's to reduce costs and time for the companies seeking to bring more clean vehicles to market.

The California Natural Gas Vehicle Coalition thanks you for the work you and your team have put into reviewing this program and seriously considering our suggestions for improvements.

Sincerely,



Tim Carmichael

President

APPENDIX F

F. Participants, Public Notices, and Workshop Presentations

Public Workshop and Workgroup Meeting Participants

Organization/Company/Agency		
Alternative Fuels Advocates, LLC		Fuel Freedom
Alternative Fuels Assoc.		GNA
Arro Autogas		Greenkraft
AVL		IMPCO
BAF		Inspired Fuel Concepts, Inc.
Blue Star Gas		Landirenzo
CA Natural Gas Vehicle Coalition		Mazda
Caltek USA		Mutual Propane
Campbell-Carnell		Robert Myers, Consultant
Cavagna Group		NRDC
City of Los Angeles-Fleet Services		New West Technologies
City of Monterey Park		North American Repower
Clean Air Power		Prins Alternative Fuel Systems
Clean Fuel USA		Roush
CNG Consulting		SoCal Green Taxi
CNG United		South Coast Air Quality Management District
Complete Coach Works		
Delta Liquid Energy		Suburban Propane
Dunlap Group		Tiax LLC
ECO		Tom's Truck Center
Emissions Compliance Services		Transfer Flow, Inc.
Emissions Guru		Tweny Corp.
Engine and Aftertreatment Engineering		VIA Motors
		Western Propane Gas Association
FEV, Inc.		Western Research Institute
Fiat Industrial S.P.A.		Westport

Air Resources Board

Mary D. Nichols, Chairman
9480 Telstar Avenue, Suite 4
El Monte, California 91731 • www.arb.ca.gov

Matthew Rodriquez
Secretary for
Environmental Protection

Edmund G. Brown Jr.
Governor

July 20, 2012

Mail-Out #MSO 2012-02

To: ALL MANUFACTURERS OF
- PASSENGER CARS (PC), LIGHT-DUTY TRUCKS (LDT), MEDIUM-DUTY VEHICLES (MDV) AND ENGINES USED IN SUCH MDV
- HEAVY-DUTY (HD) VEHICLES AND ENGINES USED IN SUCH HD VEHICLES
- ALTERNATIVE FUEL RETROFIT SYSTEMS

ALL OTHER INTERESTED PARTIES

SUBJECT: Public Workshop to Discuss Current Alternative Fuel Conversion Requirements for New and Used Vehicles and Engines used in Such Vehicles

The California Air Resources Board (ARB) staff invites you to participate in a public workshop to clarify ARB's current requirements regarding conversion of vehicles and engines to operate on alternative fuels. Vehicle and engine manufacturers and other interested parties are welcome to provide input. The workshop will be held at the following time and location:

Date:	Tuesday, August 14, 2012
Time:	9:00 a.m. – 1:00 p.m. (PST)
Location:	California Air Resources Board Annex 4 Auditorium 9528 Telstar Avenue El Monte, CA 91731

Since United States Environmental Protection Agency promulgated changes to its rules affecting alternative fuel conversions in 2011, ARB has received numerous inquiries regarding its requirements for conversion of vehicles and engines to alternative fuels. The primary fuels of interest have been liquefied natural gas, compressed natural gas, and propane. Manufacturers have requested guidance on how to certify and show compliance with ARB's regulations. As a result, the workshop is intended to clarify ARB's regulations and test procedures regarding conversions of new (unregistered) vehicles and engines and in-use (already registered) vehicles and engines to operate on alternative fuels. The workshop will focus on both new vehicle and engine and in-use vehicle and engine certification processes. It will cover the timing needed for certification review, filing and electronic process, testing and other requirements, and documents to be submitted.

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

California Environmental Protection Agency

Printed on Recycled Paper

Prior to the workshop, a draft guidance document, agenda and any handouts will be available on the ARB website at http://www.arb.ca.gov/msprog/onroad/cert/ldctp/ldctp.htm

For those unable to attend in person, this workshop will be available by webinar. Prior to the workshop, the webinar link will be available on website listed above.

If you have a disability-related accommodation need, please go to http://www.arb.ca.gov/html/ada/ada.htm for assistance or contact the ADA (Americans with Disabilities Act) Coordinator at (916) 323-4916. If you need assistance in a language other than English, please contact the Bilingual Coordinator at (916) 322-0473.

Your participation in the workshop is welcome. If you cannot attend, but would like to provide comments, or if you have any questions regarding conversions of new PC, LDT, *and chassis certified MDV, please contact Mr. Duc Nguyen, Manager of the On-Road* Light-Duty Certification Section, at (626) 575-6844 or by email at dnguyen@arb.ca.gov. For questions regarding conversions of new HD vehicles and engines, including engines used in diesel and incomplete MDV 8,501 to 14,000 pounds gross vehicle weight rating, please contact Ms. Kimberly Pryor, Manager of the Compression-Ignition and Heavy-Duty Certification Section, at (626) 575-6640 or by email at kpryor@arb.ca.gov. For questions regarding aftermarket retrofit system conversions of used vehicles and engines, please contact Ms. Rose Castro, Manager of the Aftermarket Parts Section, at (626) 575-6848 or by email at rcastro@arb.ca.gov.

Sincerely,

Annette Herbert, Chief
Mobile Source Operations Division

August 14, 2012 Workshop Presentation

Certification of Alternative Fuel Conversions for New and Used Vehicles/Engines

Workshop

August 14, 2012

California Environmental Protection Agency
Air Resources Board

1

Outline

- Scope
- Regulations
  - New Vehicles/Engines Certification
  - Aftermarket Retrofit
  - OBD II
- Certification/Retrofit Procedures

California Environmental Protection Agency
Air Resources Board

2

Scope of Workshop

- Alternative fuel conversion of new versus used vehicles/engines
- Applicable vehicles/engines:
  - Light-duty vehicles (passenger cars, light-duty trucks, medium-duty passenger vehicles, medium-duty vehicles)
  - Heavy-duty vehicles/engines

California Environmental Protection Agency
Air Resources Board

3

Scope of Workshop
(continued)

- Applicable alternate fuels:
  - Dedicated alternative fuel
    - Compressed Natural Gas (CNG)
    - Liquefied Natural gas (LNG)
    - Liquefied Petroleum Gas (LPG or Propane)
  - Dual-fuel (e.g., gasoline or CNG operation solely)
  - Bi-fuel (e.g., diesel and CNG together)

California Environmental Protection Agency
Air Resources Board

4

New versus Used in California

- New vehicle:
  - vehicle whose equitable or legal title has never been transferred to an ultimate purchaser
- Used vehicle:
  - vehicle whose equitable or legal title has been transferred to an ultimate purchaser
- New engine:
  - engine or engine/vehicle whose equitable or legal title has never been transferred to an ultimate purchaser
- Used engine:
  - engine or engine/vehicle whose equitable or legal title has been transferred to an ultimate purchaser

California Environmental Protection Agency
Air Resources Board

5

Ultimate Purchaser in California

- Ultimate Purchaser is the first person to purchase a new motor vehicle/engine for purposes other than resale
- The transfer of the equitable or legal title, and not the actual vehicle, to the ultimate purchaser makes the vehicle no longer a new vehicle

California Environmental Protection Agency
Air Resources Board

6

Certified for Sale in California

- No vehicle/engine may be sold in CA before it has been certified by ARB
- Vehicle/engine may be sold and operated in California if built in all material respects as described by the manufacturer and approved by ARB

Air Resources Board 7

No Modifications to Certified Vehicles/Engines

- Emission-related modifications to vehicles/engines causing them to no longer be in their certified configuration are considered tampering
- The modifier must obtain California certification to sell the vehicles/engines

Air Resources Board 8

Alternative Fuel Vehicle/Engine Conversion Paths

- New Vehicle/Engine
  - The manufacturer of the alternative fuel conversion will be considered the OEM and must comply with all new vehicle/engine requirements
  - The OEM may receive an Executive Order to sell new converted vehicle/engine in CA
- Used Vehicle/Engine
  - The manufacturer of the alternative fuel conversion kit must comply with the aftermarket alternative fuel procedures
  - The alternative fuel conversion manufacturer may receive an Executive Order to sell conversion kits in CA

Air Resources Board 9

New Vehicle/Engine Regulations

- 13 CCR § 1961
  - Exhaust Emission Standards and Test Procedures - 2004 and Subsequent Model Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles.
- 13 CCR § 1956.8
  - Exhaust Emissions Standards and Test Procedures -1985 and Subsequent Model Heavy-Duty Engines and Vehicles.
- 13 CCR § 1976
  - Standards and Test Procedures for Motor Vehicle Fuel Evaporative Emissions.
- 13 CCR § 1968.2
  - Malfunction and Diagnostic System Requirements -2004 and Subsequent Model-Year Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles and Engines.
- 13 CCR § 1971
  - Engine Manufacturer Diagnostic System Requirements -2007 and Subsequent Model-Year Heavy-Duty Engines.
- 13 CCR § 1971.1
  - On-Board Diagnostic System Requirements -2010 and Subsequent Model-Year Heavy-Duty Engines.

Air Resources Board 10

New Vehicle/Engine Certification Requirements

- Submit an application and update it for changes
- Meet the applicable emission standards and adhere to the appropriate test procedures
- Demonstrate durability
- Meet the applicable labeling requirements
- Provide emissions warranty to the ultimate purchaser
- Identify all makes and models
- OBD II

Air Resources Board 11

New Vehicle/Engine Certification Requirements

- Identify all makes and models
  - Manufacturer's name and its own model names, or
  - With permission from base vehicle/engine OEM, manufacturer may use the OEM's make and model names

Air Resources Board 12

Exhaust and Evaporative Requirements

- Vehicles/engines must adhere to applicable tailpipe exhaust emissions requirements
- Vehicles must adhere to applicable evaporative emissions requirements
  - SHED testing for light-duty vehicles
  - SHED testing or engineering evaluation for heavy-duty vehicles
  - Fuel tank, fuel lines, canister, etc.

Air Resources Board 13

In-Use Vehicle/Engine Warranty Reporting

- New alternative fuel vehicle/engine OEMs are required to report failed emission-related parts
  - 3 years for light-duty vehicles
  - 5 years for high cost parts
  - 12 years for PZEV (10 years for HEV battery pack)
  - 5 years for heavy-duty engines

Air Resources Board 14

Aftermarket

- No aftermarket part that alters or modifies the design or function of the original emission control system may be sold or installed on a vehicle/engine unless the part has been approved by ARB

Air Resources Board 15

Aftermarket Regulations

- Applicable to used vehicles/engines
- Statutory authority: HSC 43006
- Regulations contained in:
  - Sections 2030 & 2031 Title 13, CCR
  - "California Certification and Installation Procedures for Alternative Fuel Retrofit Systems for Motor Vehicles Certified for 1994 and Subsequent Model Years and for All Model Year Motor Vehicle Retrofit Systems Certified for Emission Reduction Credit," last amended September 25, 1997
  - http://www.arb.ca.gov/msprog/aftermkt/altfuel/altfuel.htm

Air Resources Board 16

Aftermarket Certification Requirements

- Compliance with base vehicle/engine certification emission standards or more stringent standards
- Testing based on engine family
- Durability demonstration
- On-Board Diagnostic II compliance
- Evaluation of impact on auxiliary emission control devices
- Supplemental emission control information label
- Manufacturer and installer warranty
- Installation inspection
- In-use enforcement testing

Air Resources Board 17

New Vehicle/Engine Certification Process

Air Resources Board 18

Major Steps for Certification

1. (New Mfrs.) Register with U.S. EPA and ARB.
2. Group vehicles/engines into test groups/engine families.
3. Demonstrate service accumulation durability & emissions compliance for each test group/engine family.
4. Submit Applications to ARB via the Document Management System (DMS).

Major Steps for Certification

(continued)

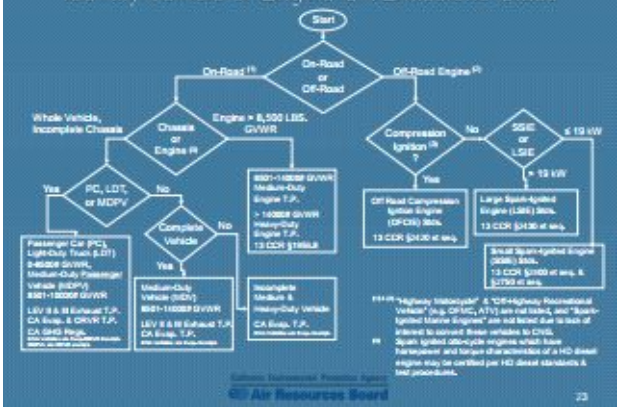
5. Receive Certificate of Conformity from U.S. EPA and Executive Order from ARB.
6. Produce and label each vehicle/engine according to specifications described in applications.
7. Do not introduce vehicles/engines into commerce in CA until certified.
8. Receive U.S. EPA and ARB approval for any emissions-related production running changes.

New MFR Must be Registered

- Register with U.S. EPA as a manufacturer.
- Submit to ARB via regular mail a hard copy "Letter of Intent" to certify vehicles in CA.
  - Name, address, e-mail, Mfr.'s name, EPA-assigned Mfr.'s code, types of vehicles/engines to be certified.
- ARB assigns unique ARB Mfr.'s code to enable access to Document Management System (DMS).
- ARB issues its Executive Orders (EOs) to the vehicle/engine manufacturer.

Certification Process Flowchart

Identify Vehicle or Engine CA Emissions Class



Certification Application Submittal

- Letter of Intent
- Cover letter/Statements of Compliance
- Application
  - Certification summary
  - Supplemental Information
- Emission Control Label
- Warranty Statement
- Tamper Resistance Compliance
- Durability Plan
- OBD II Documentation
- Confirmatory Test data
- NMOG, VEC, ABT Plan (if applicable)

Post-Certification

- NMOG, VEC Fleet Average or ABT (Averaging, Banking, Trading) Reports
- Manufacturer-Run In-Use Testing (LD)
- Running Changes
  - Submit new application if changes are made during the model year
- Field Fixes
- Carryover Applications
  - May carry over emission data to the next model year
  - Must submit an application each year

Air Resources Board 25

Passenger Car, Light-Duty Truck, Medium-Duty Passenger Vehicle

Examples: car, pick-up, SUV, passenger van

Testing Requirements:

- FTP (NMOG, CO, CO_2, NO_x, PM, HCHO); HWFET (NO_x, CO_2); 50°F FTP[1] (NMOG, CO, NO_x, HCHO); 20°F FTP (CO)
- Evaporative: Diurnal (3-day & 2-day), Hot Soak, Running Loss, ORVR
  - Dedicated CNG and LNG fueled vehicles are exempt
  - MDPVs are ORVR exempt

[1] LPG is subject to the 50°F test; CNG is exempt.

Air Resources Board 26

Medium-Duty Vehicle Complete Vehicle – Chassis Certified

Examples: full size pick-up, cargo van

Testing Requirements:

- FTP NMOG, CO, NO_x, HCHO; HWFET NO_x
- Evaporative: Diurnal, Hot Soak, Running Loss
  - Dedicated CNG and LNG fueled vehicles are exempt

LEV-II Regs. Webpage:
http://www.arb.ca.gov/msprog/levprog/test_proc.htm

Air Resources Board 27

Medium & Heavy-Duty Vehicle Incomplete Chassis

Examples: truck chassis, van chassis

Testing Requirements:

- Evaporative: Diurnal, Hot Soak, Running Loss
  - HD chassis, compliance by engineering analysis
  - Dedicated CNG and LNG fueled vehicles are exempt

Evaporative Emissions Regs. Webpage:
http://www.arb.ca.gov/msprog/evap/evap.htm

Air Resources Board 28

Medium & Heavy-Duty Engine

Examples: heavy-duty truck, bus

Testing Requirements:

- HD Otto or Diesel cycle engine test procedures; THC/NMHC, CO, NO_x, HCHO, PM
- Engines intended for HD vehicle applications, e.g., urban bus, must adhere to heavy heavy-duty diesel standards & test procedures

Heavy-Duty Engine Regs. Webpage:
http://www.arb.ca.gov/msprog/onroadhd/onroadhd.htm

Air Resources Board 29

Emission Standards & Test Procedures, CA vs. U.S. EPA

When certifying to a CA standards ***all*** CA test procedures must be followed

- Example: CA vehicles > 8,500 lbs. GVWR are tested with dynamometer loading set at adjusted loaded vehicle weight (ALVW or (curb weight+GVWR)÷2, whereas federal medium-duty passenger vehicles are tested at loaded vehicle weight (curb weight+300 lbs.))
- When certifying to the "Cleaner Federal Vehicle" or "BIN" standard, the test vehicle's weight follows EPA's test procedures

Air Resources Board 30

On-Road Vehicles (PC, LDT, MDV, MDE, HDV/E)

Certification Requirements:

- Labeling
  - Vehicle Emission Control Information (VECI) / Engine Label
    - Under hood or affixed onto the engine block, permanent
    - Identifies engine & evaporative family
    - Identifies CA, 50-state, 49-state certification status
    - Vacuum hose routing diagram, if applicable
    - EPA Conversion Label (mileage & date of conversion) must be separate from VECI / engine label
  - Environmental Performance (EP) Label
    - Applies to PC, LDT, MDPV
    - Smog Score from cert. std.
    - Global Warming Score from CO_2-equivalent emissions
    - OK to use Federal Fuel Economy and Environment Label

Air Resources Board 31

Group Vehicles/Engines into Exhaust Families

- Characteristics of Test Groups/Engine Families
  - Displacement, number of cylinders, cylinder configuration
  - Emission control systems, i.e., catalytic converter number & location, EGR, SCR or DPF
  - Fuel system, i.e., carburetor, TBI, MFI, SFI
  - Cooling Mechanism, i.e., liquid vs. air

[Ref. 40 CFR §86.1827-01]

Air Resources Board 32

Group Vehicles into Evaporative Families LP and Dual Fuel with Gasoline

- Characteristics of Evaporative Families
  - Vapor Storage Device design, i.e., canister housing material & working capacity
  - Fuel Tank design, i.e., metal vs. plastic, vented vs. unvented
  - Fuel System, i.e., carburetor, TBI, MFI, SFI
  - Purge strategy, i.e., uncontrolled vs. controlled

[Ref. 40 CFR §86.1821-01]

Air Resources Board 33

Carryover Data

- Must submit certification application for each model year
- May carry over emission data from the previous model year, as long as, no changes to the engine or emission control system
- May carry across emission data from one engine family to another, if representative
- Subject to ARB Approval

Air Resources Board 34

Certification 101

A new vehicle or engine must comply with exhaust and evaporative standards. For PC, LDV, complete MDV, and MDPV, the whole vehicle, not the engine by itself, is certified.

- Chassis or engine dyno testing for exhaust emissions
- **S**ealed **H**ousing for **E**vaporative **D**etermination (SHED) testing for evaporative emissions
- **O**n-board **R**efueling **V**apor **R**ecovery (ORVR) testing for refueling emissions

Air Resources Board 35

Demonstrate UL Durability & Emissions Compliance

Chassis-based durability used here for illustration. Engine dynamometer-based durability follows similar requirements.

1. a. Durability Demonstration
   - Accumulate mileage on a prototype test vehicle.
   - Mileage or service accumulation cycle is set forth in 40 CFR, §1823-01 for PC/LDT/chassis-certified MDV.
   - Conduct periodic exhaust & evaporative emission tests during mileage accumulation per restrictions in 40 CFR, §1834-01 for PC/LDT/chassis-certified MDV.

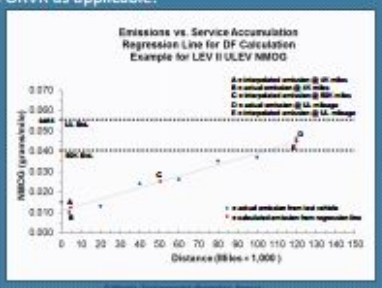
Air Resources Board 36

Demonstrate UL Durability & Emissions Compliance (cont'd)

1. b. Durability Demonstration – Evaporative System
   - Evaporative emission control system component bench aging, See Mail-out 93-23, or request assigned deterioration factor
1. c. Test vehicle ■ worst case configuration in test group having greatest probability of exceeding the standards
1. d. Unscheduled maintenance must be approved by ARB
1. e. All test data and projected emissions must be below applicable standard
1. f. Calculate deterioration factors (DF) for all pollutants

Demonstrate UL Durability & Emissions Compliance (cont'd)

2. a. DF calculated from **least squares linear regression** of emission test data. Plot separate regression lines for NMOG, NO_x, CO, HCHO, PM, Evap and ORVR as applicable.



Demonstrate UL Durability & Emissions Compliance (cont'd)

2. b. Determine multiplicative DFs.

$$DF_{50K} = \frac{C}{A} = \frac{\text{Projected emissions @ 50K miles}}{\text{Interpolated emissions @ 4k miles}}$$

$$DF_{UL} = \frac{E}{A} = \frac{\text{Projected emissions @ UL mileage}}{\text{Interpolated emissions @ 4K miles}}$$

Determine additive DFs:

$DF_{50K} = C - A$

$DF_{UL} = E - A$

Demonstrate UL Durability & Emissions Compliance (cont'd)

3. Determine certification level for all pollutants. All certification levels must be ≤ the applicable certification standard
4. Retain test vehicle for possible confirmatory testing at ARB and for testing future production running changes

Other Ways to Demonstrate UL Durability

- Carry across DFs from OEM
  - Good engineering practice, i.e., vehicle/engine operating on alternate fuel causes less deterioration to emission control system than gasoline operation
  - Obtain permission from OEM to use their durability data.
- Accelerated mileage accumulation or engine dyno accumulation
- Bench aged catalysts & other emission control devices
- Assigned DFs
  - Not automatic
  - Must make a showing of durability of fuel and emission control system

Auxiliary Emission Control Devices (AECDs)

1. AECD: Any element of design which senses temperature, vehicle speed, engine RPM, transmission gear, manifold vacuum, or any other parameters for the purpose of activating, modulating, delaying, or deactivating the operation of any part of the emission control system

Auxiliary Emission Control Devices (AECDs) (cont'd)

2. All AECDs must be described in the application and approved by ARB
3. Unapproved AECDs may be deemed a defeat device – a violation of certification

   [Ref. 40 CFR, §86.1809-01 for PC/LDT/chassis certified MDV]

   [Ref. 40 CFR, §86-004-16 for MDE/HDE/HDV]

Air Resources Board 43

Model Year

- New Vehicles/Engines are certified and EOs are issued on a model year basis
- A model year generally runs from Jan. **2** of the previous calendar year for which the model year is named to Dec. 31 of the calendar year for which the model year is named, e.g., a 2012 model year vehicle/engine may be produced from Jan. 2, 2011 through Dec. 31, 2012
- A model year "X" vehicle/engine cannot be produced after Dec. 31 of calendar year "X"

Air Resources Board 44

Model Year (Cont'd)

A manufacturer may certify an alternate fuel conversion using the previous model year base vehicle/engine (e.g., a 2013 CNG vehicle using a 2012 base gasoline vehicle) provided that from one model year to the next:

- The emission control system remains the same
- The emission standards remain the same
- Phase-in requirements (e.g., emission standards, OBD II monitoring) are met
- OBD II deficiencies are addressed or remedied
- Advance planning is key to successful carry-over of previous model year's data

Air Resources Board 45

Additional Requirements

- Assembly Line End-Of-Line Test (PC, LDT,& chassis-certified MDV only)
  - Functional check of the emission control system
  - Usually entails interrogating the OBD II system
  - Required on 100% of all CA vehicles
- Identify locations of all assembly plants and distribution centers (upon request)
- Identify special procedures and tools used in the conversion process
- ARB personnel is allowed access to assembly plants, distribution facilities, and test facilities for the purpose of vehicle selection (for confirmatory/audit testing) and for observing emission tests

Air Resources Board 46

Aftermarket Retrofit Certification Process

Air Resources Board 47

Retrofit System Certification Process

- Manufacturer submits certification plan
- ARB approves durability and emission testing plan
- Manufacturer conducts testing per ARB approved plan
- Manufacturer submits certification application
- ARB evaluates the application and issues the Executive Order upon approval

Air Resources Board 48

Test Requirements On-Road Retrofit System

- Emission testing and durability
- Test procedures based on vehicle category
  - Category I: PC, LDT, MDV certified to chassis dynamometer-based standards
  - Category II: GVWR ≤ 14,000 lbs. certified to engine dynamometer-based standards
  - Category III: GVWR > 14,000 lbs. certified to engine dynamometer-based standards

Air Resources Board 49

Test Requirements - Category I

- Actual mileage accumulation
  - Emission test at 4,000 miles
  - Mileage accumulation to useful life
  - Emission test after mileage accumulation
  - Show compliance with certification standards & determine deterioration factors (DF)
- Bench aging
  - Emission test at 4,000 miles
  - Remove retrofit system and bench age retrofit system to useful life
  - Re-install bench aged system and emission test
  - Show compliance with certification standards & determine DFs

Air Resources Board 50

Test Requirements - Category I (Continued)

- Alternate test procedure (ARB MAC 95-10)
  - Emission test at 4,000 miles
  - Apply DFs and show compliance with certification standards
  - Qualify DFs prior to certification and validate DFs within two years of certification
  - Emission test at end of durability testing and validate DFs

Air Resources Board 51

Test Requirements - Category I (continued)

- To use derived or U.S. EPA-assigned DFs:
  Submit DF qualification data & DF validation plan prior to certification
- Submit DF qualification data
  - Base vehicle and retrofitted vehicle performance characteristics, such as air/fuel calibration control, catalyst temperature traces
  - Component durability data, such as data from previously certified system/vehicle, bench testing
- Submit DF validation plan
  - Dynamometer driving schedules/in-use mileage accumulation routes
  - Emission test mileage points up to useful life
  - Maintenance schedules

Air Resources Board 52

Test Requirements - Category II

- Actual mileage accumulation or bench aging
  - Establish baseline emissions - use same test procedures as Category I
  - Emission test at 4,000 miles; emissions </= 1.10 times baseline
  - Mileage accumulation or bench aging to useful life (UL)
  - Emission test at UL miles; emissions </= 1.3 times baseline

Air Resources Board 53

Test Requirements - Category II (continued)

- Alternate test procedure (ARB MAC 95-07) :
  Use derived or U.S. EPA-assigned (Guidance letter CCD-00-12) deterioration factors
  - Emission test at 100 hours using same test procedures used by base engine to certify when new
  - Apply deterioration factors (DF) and show compliance with certification standards
  - Qualify DFs prior to certification and validate DFs within two years of certification
  - Emission test at end of durability testing and validate DFs

Air Resources Board 54

Test Requirements - Category III

- Actual mileage accumulation or bench aging
  - Establish baseline emissions - use test procedures proposed by manufacturer and approved by ARB
  - Emission test at 4,000 miles; emissions </= 1.10 times baseline
  - Mileage accumulation or bench aging to 180,000-mile useful life
  - Emission test at 180,000 miles; emissions </= 1.3 times baseline

Air Resources Board

55

Test Requirements - Category III

- Alternate test procedure (ARB MAC 95-07):
  Use derived or U.S. EPA-assigned (Guidance letter CCD-00-12) deterioration factors
  - Emission test at 100 hours using same test procedures used by base engine to certify when new
  - Apply deterioration factors (DF) and show compliance with certification standards
  - Qualify DFs prior to certification and validate DFs within two years of certification
  - Emission test at end of durability testing and validate DFs

Air Resources Board

56

Test Requirements-Category II & III (continued)

- To use derived or U.S. EPA-assigned DFs:
  Submit DF qualification data and DF validation plan prior to certification
- Submit DF qualification data
  - Base engine and retrofitted engine performance characteristics, such as
    horsepower & torque curves, fuel feed curves, air/fuel calibration control, catalyst temperature traces
  - Component durability data, such as
    data from previously certified system/engine, bench testing

Air Resources Board

57

Test Requirements-Category II & III (continued)

- Submit DF validation plan
  - Engine dynamometer schedules or in-use mileage accumulation routes representative of in-use engine operation
  - Emission test mileage points - minimum of 1,000 hours (diesel)/2,000 hours (gasoline); must show correlation between hours and miles
  - Maintenance schedules

Air Resources Board

58

Test Requirements - Category II & III (continued)

- To generate credits, perform actual mileage accumulation or bench aging
  - Base engine certification emission levels = baseline emissions
  - Emission test at 4,000 miles using same test procedures used by base engine to certify when new; emissions </= 1.10 times baseline emissions
  - Mileage accumulation or bench aging to 120,000- or 180,000-mile useful life (UL)
  - Emission test at UL miles; emissions </= credit standards or 1.3 times baseline emissions

Air Resources Board

59

Other Requirements On-Road Retrofit System

- Dual-fuel system (utilizes an alternative fuel or a conventional fuel) tested using each fuel
- Evaporative emission test determined based on retrofit system design
- Manufacturer describes impact on AECD (auxiliary emission control devices)
- OBD compliance

60

Carry-Over & Carry-Across On-Road Retrofit System

- Carry-over of emission data allowed if data represent emissions from the vehicle/engine seeking certification
- Carry-over & carry-across of durability data allowed if (ARB MAC 95-05):
  - Durability data vehicle/engine shared among engine families as found in the base vehicle/engine certification application and use the same retrofit system
  - If engines do not share durability data vehicle/engine:
    - Durability data must be derived from an engine certified to same or more stringent emission standards
    - Durability data engine and engine seeking certification must have similar engine characteristics/weight category
    - Catalyst temperatures of engine seeking certification are equal to or less than those of the durability data engine (EPA Advisory Circular 17F)

Air Resources Board 61

Gasoline Deterioration Factors On-Road Retrofit System

- Use of gasoline DFs allowed if following conditions are met (ARB MAC 95-05):
  - One-time demonstration of retrofit system durability for:
    - Emissions, calibration, and catalyst temperature data at 4,000 miles and at useful life
  - Following the one-time durability demonstration, provide:
    - Equivalent gasoline and alternative fuel calibration (lambda, air/fuel ratio curves) at 4,000 miles
    - Equivalent gasoline and alternative fuel catalyst temperatures at 4,000 miles

Air Resources Board 62

On-Road Supplemental Label

- Affix adjacent to the original vehicle emission control information label
- Supplement label shall show:
  - Base vehicle/engine model year
  - Retrofit system certification Executive Order number
  - Retrofit system manufacturer name, address, phone number
  - Credit standards, if applicable
  - List of base vehicle/engine parts removed during the conversion
  - Changes to tune-up specifications required by retrofit system
  - Installer name, address, phone number
  - Date of retrofit system installation
  - Mileage and date at which retrofit system warranty expires
  - Statement that retrofitted vehicle/engine complies with California emission requirements
  - Statement that the vehicle/engine has been retrofitted to operate on a fuel other than gasoline or diesel and identify the alternative fuel

Air Resources Board 63

Manufacturer & Installer Warranty On-Road Retrofit System

- Manufacturers
  - Warrant retrofit system to meet California requirements for 3 years or 50,000 miles or 7 years or 70,000 miles (high cost parts), whichever first occurs, from the date of installation
  - Warranty covers costs of diagnosis, parts, and labor
- Installers
  - Warrant installation work for 3 years or 50,000 miles, whichever first occurs, from the date of installation

Air Resources Board 64

On-Road Installation Inspection

- Prior to releasing a retrofitted vehicle to end user, installer submits the vehicle to the Bureau of Automotive Repair (BAR) Referee Smog Check Station for inspection and testing and obtains certificate of compliance
- Alternative inspection schedule
  - Installer submits 10 vehicles with similar engine families to Referee station
  - If all ten vehicles receive a certificate of compliance, installer allowed to only submit every tenth retrofitted vehicle
  - Installer maintains records on the remaining vehicles

Air Resources Board 65

On-Road In-Use Enforcement Test Requirements

- Manufacturers subject to in-use enforcement testing
- Testing on no more than 20 percent of certified retrofit systems/engine family applications per year
- Emission testing on no less than 10 vehicles per certified retrofit system/engine family application selected for in-use testing
- If average emissions exceed standards, recall may be ordered

Air Resources Board 66

Contacts

- Mr. Duc Nguyen, Manager of the On-Road Light-Duty Certification Section
  dnguyen@arb.ca.gov
- Ms. Kimberly Pryor, Manager of the Compression-Ignition and Heavy-Duty Certification Section
  kpryor@arb.ca.gov
- Ms. Rose Castro, Manager of the Aftermarket Parts Section
  rcastro@arb.ca.gov

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On-Board Diagnostics (OBD) Requirements

- Applicable to new vehicles and engines
- Applicable light-duty regulations
  - 1968.2 OBD II (light-duty) and 1968.5 OBD II enforcement
  - In place since the 1996 model year
- Applicable heavy-duty regulations
  - 1971 EMD (engine manufacturer diagnostics)
  - 1971.1 HD OBD (heavy-duty) and 1971.5 HD OBD enforcement
    - Full HD OBD not required until 2018 (proposed) MY
    - "EMD+" per 1971.1(d)(7.5) required on 2013+MY
- OBD website:
- http://www.arb.ca.gov/msprog/obdprog/obdprog.htm

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1

OBD 101

- Mostly software in the engine and other ECUs
  - Not a magic sensor that directly measures tailpipe emission levels
- Runs 'monitors' in the background to diagnose emission-controls
  - Monitors virtually every powertrain component/system that can affect emissions
  - Typically 200+ monitors on an individual vehicle
  - Most critical monitors correlated to tailpipe emissions, less critical monitors calibrated to verify function/rationality
- Illuminates the MIL and stores info for repair techs for faults
- Dominant mechanism used in Inspection programs nationwide to fail vehicles (e.g., vehicles in need of emission repairs)

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Major Areas for Alt Fuels

- Work involved to comply
- Certification process
- Post-Certification required testing

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Work involved to comply with OBD

- Base OEM Vehicle Selection
  - Start with OBD II certified
  - Convert the same model year (e.g., a 2012 vehicle to a 2012 alt fuel vehicle)
- Control strategy/calibration changes to base vehicle
  - Base control calibration changes (e.g., EGR flow rates, etc.) can alter OBD requirements
- Emission threshold monitors
  - Critical emission controls monitored to detect faults before tailpipe emissions exceed a specified level (e.g, detect an EGR fault before > 1.5x standards)
  - Rely on correlation established by manufacturer from sensed parameter to tailpipe emission level (e.g., sense EGR flow and correlate to tailpipe emission level as flow is restricted)
  - Change to alt fuel alters this correlation
    - Tailpipe emissions may be more sensitive/less sensitive to same degree of fault
  - Certifying conversion to a different tailpipe std (LEV as a SULEV) exacerbates this
    - Emission data required

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Work involved to comply with OBD (cont.)

- Demonstration testing
  - Each emission threshold monitor tested with fault implanted
    - Verifies fault detected before exceeding emission threshold
  - Required on 1-3 vehicles per year per manufacturer
  - OBD data collected during testing called out in (i)(2.4)
  - Done on vehicle representative of full useful life (e.g., 120,000 miles)
- Added/Modified/Deleted components
  - Need to add monitors for added components
  - Need to verify/recalibrate monitors for modified components
  - Need to 'cleanly' disable diagnostics for deleted components

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5

Work involved to comply with OBD (cont.)

- Monitoring frequency
  - Minimum in-use frequency required for most critical monitors
  - Data in vehicle tracks how often monitors run relative to how often vehicle is operated
  - Conversions need to ensure they don't jeopardize monitoring frequency
- Standardization
  - SAE and ISO standards called out in section (g)
  - Covers everything from real-time sensor data to information about the calibration being run by the vehicle
  - Conversions need to verify the data being output is still accurate
    - Deleted components/disabled monitors reported appropriately
    - Appropriate fault codes being used
    - Calibration version (CAL ID) information changed to reflect alt fuel calibration

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6

Certification Process

- Certification plans, OBD groups, test vehicle selection
  - Come in well in advance of cert with plans for the year
    - Identify all test groups to be converted/offered for sale, projected sales, etc.
  - ARB will identify specific test groups for demonstration, post-certification testing, etc.
    - Based on total number of test groups planned for the year
- Application
  - Detailed submittal requirements called out in section (h)
    - System description, summary table, etc.
  - Need to document added/modified/deleted diagnostics
    - Fastest review if you use strike-out/underline to show changes from OEM
  - Demonstration data showing emission threshold compliance
- Deficiencies
  - Can still be certified if you fall short of requirements
  - Deficiency(ies) can be granted
    - Require ARB approval, must meet good faith effort to comply and to come into compliance as fast as possible, restrictions on carry-over of deficiencies
  - More than two and $25-$50 per vehicle per deficiency fines apply

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7

Post-Certification Testing

- Standardization Compliance
  - (j)(1): Uses SAE J2534 reprogramming interface plus SAE J1699-3 software to test adherence to standardization requirements
  - Test one production vehicle per test group, within first two months of production
- Monitor Compliance
  - (j)(2): Implants fault one by one to verify MIL illumination for every diagnostic
  - 2-6 vehicles per year by size of manufacturer, within first six months of production
  - No emission testing, only test monitors added/modified/affected by alt fuel conversion
- In-use Monitoring Frequency Compliance
  - (j)(3): Download standardized data from actual in-use vehicles to verify minimum monitoring frequency satisfied
  - Up to 15 vehicles per test group, within first 12 months of production
  - Uses standard scan tool to download data

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8

OBD Contacts

- Contacts:
  Mike McCarthy, Manager - mmccarth@arb.ca.gov
  Advanced Engineering Section

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9

Notice for January 22, 2013 Workshop

Air Resources Board

Mary D. Nichols, Chairman
9480 Telstar Avenue, Suite 4
El Monte, California 91731 • www.arb.ca.gov

Matthew Rodriquez
Secretary for
Environmental Protection

Edmund G. Brown Jr.
Governor

December 13, 2012 Mail-Out #MSC 12-27

TO: All Interested Parties

SUBJECT: PUBLIC WORKSHOP TO DISCUSS PROPOSED AMENDMENTS TO THE ALTERNATIVE FUEL CONVERSION CERTIFICATION PROCEDURES FOR NEW AND IN-USE VEHICLES AND ENGINES

The Air Resources Board (ARB or the Board) staff invites you to participate in a public workshop to discuss proposed amendments to the alternative fuel conversion certification procedures. Recent changes promulgated by the U.S. Environmental Protection Agency (U.S. EPA) to its procedures for certifying alternative fuel conversions generated numerous inquiries from industry regarding suggested updates to ARB's regulations. ARB also held an educational public workshop to discuss current alternate fuel conversion requirements for new and used vehicles and engines used in such vehicles on August 14, 2012, in El Monte, California. In response to comments received, staff is now considering changes to the current alternative fuel conversion certification procedures for both new (unregistered) and in-use (already registered) vehicles and engines.

You may attend the public workshop in person or participate via teleconference. The workshop will be held at the date and time shown below:

Date:	Tuesday, January 22, 2013
Time:	1:00 p.m. to 4:00 p.m. (Pacific Time)
Location:	Air Resources Board Auditorium – Annex 4 9528 Telstar Avenue

The following information is needed to participate via teleconference:

Call-in Time:	Between 12:45 p.m. and 1:00 p.m.
USA Toll Free Number:	888-677-4430
Passcode:	36034

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

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At the public workshop, staff will discuss preliminary concepts in how to simplify the application process while preserving emissions benefits including how to better align ARB's alternative fuel certification procedures with changes recently promulgated by U.S. EPA. These include: applicability, demonstrating emission compliance, demonstrating on-board diagnostic compliance, and carry-over for new vehicle/engine alternative fuel certifications to subsequent model years. Regarding these proposals, the primary fuels of interest are liquefied natural gas, compressed natural gas, and propane; however, conversions to other fuels may be discussed.

Staff will post an agenda and presentation on ARB's On-Road Light Duty Emissions Certification Requirements website at http://www.arb.ca.gov/msprog/onroad/cert/ldctp/ldctp.htm and on the Aftermarket, Performance and Add-On Parts – Certification of Alternate Fuel Retrofit Systems website at http://www.arb.ca.gov/msprog/aftermkt/altfuel/altfuel.htm prior to the workshop.

The Mobile Source Program Mailouts and Manufacturers Advisory Correspondence (ms-mailings) list serve will be used to notify stakeholders of upcoming events relating to proposed changes to the alternative fuel conversion certification procedures. If you would like to receive notification by email of upcoming events relating to the proposed changes, please sign up at http://www.arb.ca.gov/listserv/listserv_ind.php?listname=ms-mailings.

Interested members of the public may present comments orally or in writing at the workshop. Comments may also be submitted by postal mail before the workshop or by electronic submittal:

Postal Mail: Mr. Dean Bloudoff
Air Resources Board
1001 "I" Street, P.O. Box 2815
Sacramento, California 95812

Electronic submittal: dbloudof@arb.ca.gov

If you need special accommodation due to a disability, please go to http://www.arb.ca.gov/html/ada/ada.htm for assistance, or contact the American Disabilities Act Coordinator at (916) 323-4916. If you require other special accommodations or language services please contact Ms. Dee Enos-Friedman, at (916) 322-4722 or via email at denosfri@arb.ca.gov, as soon as possible or no later than 10 business days before the scheduled workshop.

Teletypewriter/Telecommunications Device for the Deaf/Speech-to-Speech users may dial 7-1-1 for the California Relay Service.

We welcome and encourage your participation. If you have any questions about this workshop, please contact Mr. Craig Duehring, Manager, at (916) 323-2361, or via email at cduehrin@arb.ca.gov, or Mr. Dean Bloudoff, Air Resources Engineer, at (916) 322-8987, or via email at dbloudof@arb.ca.gov.

Sincerely,

/s/

Robert H. Cross, M.S.M.E., P.E.
Chief, Mobile Source Control Division

cc: See next page

January 22, 2013 Workshop Presentation

Public Workshop: Proposed Amendments to the Alternative Fuel Conversion Certification Procedures for New and In-Use Vehicles and Engines

Air Resources Board Auditorium
El Monte, California
January 22, 2013

California Environmental Protection Agency

Air Resources Board

Agenda

- Purpose
- Background
- Preliminary staff proposals
- Other items under consideration
- Next steps
- Contact information

Need for Proposed Amendments

- Update and simplify the application and approval process
- Update the in-use alternative fuel certification requirements
- Better align ARB's procedures with recent changes adopted by U.S. EPA
- Streamline ARB's new and in-use alternative fuel vehicle/engine certification requirements

Background

- New vs. used (in-use) alternative fuel conversions differ
- Overview of the current New vehicle/engine conversion requirements
- Overview of the current in-use vehicle/engine conversion requirements

New vs. Used Conversions

- New vehicle/engine: equitable title has <u>never</u> been transferred to an ultimate purchaser
- Used (in-use) vehicle/engine: any vehicle/engine that is not "new"
- Issue: Requests for in-use conversions of previously ARB certified new vehicle/engine requires applicant to repeat certification
  - Must comply with <u>all</u> new vehicle/engine certification requirements

New Vehicle/Engine Certification Requirements

- Submit an application and update it for changes
- Meet the applicable emission standards and adhere to the appropriate test procedures
- Demonstrate durability
- Meet the applicable labeling requirements
- Provide emissions warranty to the ultimate purchaser
- Identify all makes and models
- Comply with on-board diagnostic (OBD) requirements

New Vehicle/Engine Regulations

- 13 CCR § 1962
  - Exhaust Emission Standards and Test Procedures – 2004 and Subsequent Model Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles.
- 13 CCR § 1956.8
  - Exhaust Emissions Standards and Test Procedures – 1985 and Subsequent Model Heavy-Duty Engines and Vehicles
- 13 CCR § 1976
  - Standards and Test Procedures for Motor Vehicle Fuel Evaporative Emissions.
- 13 CCR § 1968.2
  - Malfunction and Diagnostic System Requirements – 2004 and Subsequent Model-Year Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles and Engines.
- 13 CCR § 1971
  - Engine Manufacturer Diagnostic System Requirements – 2007 and Subsequent Model-Year Heavy-Duty Engines.
- 13 CCR § 1971.1
  - On-Board Diagnostic System Requirements – 2010 and Subsequent Model-Year Heavy-Duty Engines.

In-Use Vehicle/Engine Certification

- Applies to the conversion of any vehicle/engine that's not "new"
- Certification program administered by ARB's Aftermarket Parts Section
- Successful applicants receive a non-expiring Executive Order
- Allows applicants to market and sell alternative fuel retrofit systems in California

In-Use Vehicle/Engine Certification Requirements

- Comply with base vehicle/engine certification emission standards or more stringent standards
- Certification based on engine family
- Demonstrate durability
- Supplemental emission control information label
- Manufacturer's and installer's warranty
- Evaluation of impact on auxiliary emission control devices
- Comply with OBD requirements
- Installation inspection
- In-Use enforcement testing

In-Use Vehicle/Engine Regulations

- 13 CCR § 2030
  - Liquefied Petroleum Gas or Natural Gas Retrofit Systems.
- Associated Test Procedures:
  - California Exhaust Emission Standards and Test Procedures for Systems Designed to Convert Motor Vehicles Certified for 1993 and Earlier Model Years to Use Liquefied Petroleum Gas or Natural Gas Fuels
  - California Certification and Installation Procedures for Alternative Fuel Retrofit Systems for Motor Vehicles Certified for 1994 and Subsequent Model Years and for All Model Year Motor Vehicle Retrofit Systems Certified for Emission Reduction Credit

Preliminary Staff Proposals

Application Process

- New vehicle/engine alternative fuel certifications will automatically qualify for aftermarket certification if requested
- Develop separate webpage for all alternative fuel conversion certification information
- Extend or renew new vehicle/engine alternative fuel certifications to allow manufacturers 1 full year of sales

Test Fuel

- Harmonize natural gas certification test fuel requirements with Federal Standards
- Investigate the feasibility of harmonizing liquid propane gas certification test fuel requirements
- Harmonize natural gas NMHC to NMOG multiplier with Federal Standards

Dual-Fuel Systems

- Currently, new vehicle/engine must comply with exhaust and evaporative emission standards when operating on each fuel
- In-Use: For evaporative emissions, manufacturers can provide engineering justification for a test waiver with the original fuel
- Investigate the feasibility of allowing similar engineering justification to waive exhaust emissions testing with the original fuel

Deterioration Factors (DF's)

- Numeric factors applied to low mileage mass emissions to account for the potential increase in emissions due to mileage accumulation
- Defined as the estimate of the ratio of the true mean response at high mileage to the true mean response at low mileage
- Used to determine compliance probabilities in lieu of high-mileage emissions tests

DF's (continued)

- New and in-use alternative fuel certification allows the use of assigned DF's
- In-use requires manufacturers to validate assigned DF's within 2 years of receiving certification
- Investigating the feasibility of replacing DF validation with in-use testing
- Request for data

OBD Requirements

- Investigating the feasibility of reducing testing/recalibrating of threshold monitors
- Investigating the feasibility of reducing full useful life testing
- Considering changes that would move some testing to post-certification in lieu of pre-certification

OBD Requirements (continued)

- Changes would also require additional commitment by alternative fuel conversion manufacturers
  - Extended warranty
  - Recall provisions
- Changes may require cap on annual sales, would only be available to alternative fuel conversion manufacturers (not OEM vehicle/engine manufacturer)

Installation Control

- Regulations currently require post-conversion BAR inspection for each in-use conversion
- Investigating the feasibility of alternative installation controls
- Actively seeking stakeholder input

In-Use Compliance Testing

- In-use emissions testing is required upon order by ARB's Executive Officer
- Testing of a minimum of ten vehicles per engine family is required, but only if requested
- Staff open to reducing the requirements, actively seeking stakeholder input

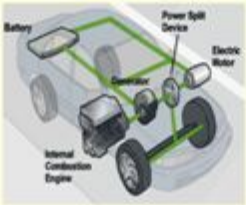
Update In-Use Certification Procedures

- Staff is proposing changes to §2030
  - Streamline test procedures
  - Update regulatory language
  - Where feasible, align procedures with recent changes adopted by U.S. EPA

Alternative Test Methods

- What role, if any, can alternative test methods, such as PEMS, play in the certification process?
- Are these types of systems robust enough for certification testing or should they only be used for in-use compliance?
- Actively seeking stakeholder input
- Data needs

Other Items Under Consideration



New/In-Use Hybrid Conversions

- Should hybrid conversions be included in the proposed regulatory changes?
- Is there a market demand for these types of systems?
- Complexity of conversion may need to be considered
- Actively seeking stakeholder input

Next Steps

- Please provide comments to ARB by mid February
- Next workshop tentatively scheduled for April, 2013
- Third quarter 2013 Board hearing

Contact Information

Craig Duehring
(916) 323-2361
cduehrin@arb.ca.gov

Dean Bloudoff
(916) 322-8987
dbloudof@arb.ca.gov

For More Information…

New vehicle/engine alternative fuel conversion certifications, please go to:
http://www.arb.ca.gov/msprog/onroad/cert/ldctp/ldctp.htm

In-use vehicle/engine alternative fuel conversion certifications, please go to:
http://www.arb.ca.gov/msprog/aftermkt/altfuel/altfuel.htm

Certification Contact Information

- Mr. Duc Nguyen, Manager, On-Road Light-Duty Certification Section
  dnguyen@arb.ca.gov
- Ms. Kimberly Pryor, Manager, Compression-Ignition and Heavy-Duty Certification Section
  kpryor@arb.ca.gov
- Mr. Tony Martino, Manager, Aftermarket Parts Section
  amartino@arb.ca.gov
- Mr. Mike McCarthy, Manager, Advanced Engineering Section (OBD) mmccarth@arb.ca.gov

Notice for May 1, 2013 Workshop

Air Resources Board

Mary D. Nichols, Chairman
9480 Telstar Avenue, Suite 4
El Monte, California 91731 • www.arb.ca.gov

Matthew Rodriquez
Secretary for
Environmental Protection

Edmund G. Brown Jr.
Governor

April 9, 2013 Mail-Out #MSC 13-11

TO: All Interested Parties

SUBJECT: PUBLIC WORKSHOP TO DISCUSS PROPOSED AMENDMENTS TO THE ALTERNATIVE FUEL CONVERSION CERTIFICATION PROCEDURES FOR NEW AND IN-USE VEHICLES AND ENGINES

The California Air Resources Board (ARB or Board) invites you to participate in a public workshop to discuss proposed amendments to the alternative fuel conversion certification procedures for both new and in-use vehicles and engines. Alternative fuel conversions involve reconfiguring a previously certified gasoline or diesel vehicle or engine to operate on natural gas, propane, alcohols, or a blend of conventional and alternative fuels. Staff will be soliciting input on proposals to address the following areas:

- Application and review process
- Requirements for demonstrating emission compliance
- Test fuel specifications
- Requirements for demonstrating on-board diagnostic compliance
- Changes to address the sales window for converted vehicles and engines
- Other items of interest

Workshop Participation

You may attend the public workshop in person or participate via teleconference. The workshop will be held at the date and time shown below:

Date:	Wednesday, May 1, 2013
Time:	1:00 p.m. to 4:00 p.m. (Pacific Time)
Location:	Air Resources Board Auditorium – Annex 4 9528 Telstar Avenue El Monte, California 91731

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

California Environmental Protection Agency

Printed on Recycled Paper

The following information is needed to participate via teleconference:

USA Toll Free Number:	888-677-4430
International	1-517-308-9042
Passcode:	29542

Background

On August 14, 2012, staff held an informational workshop in El Monte, California, to discuss ARBs current alternative fuel conversion requirements for new and used vehicles and engines. Based on comments received at the workshop and recent changes adopted by the U.S. Environmental Protection Agency (U.S. EPA) to their procedures for certifying alternative fuel conversions, staff began investigating the need for updates to ARB's procedures.

On January 22, 2013, staff held a public workshop in El Monte, California, to discuss preliminary concepts designed to simplify the application process and better align ARB's alternative fuel conversion certification procedures with the changes recently adopted by U.S. EPA.

At both workshops, staff solicited comments from stakeholders and affected industry to develop staff's current proposals. These proposals will be presented to all interested parties at the May 1 public workshop.

Additional Information

Staff will post presentation materials and an agenda prior to the workshop to ARBs alternative fuel conversion certification procedures website at, http://www.arb.ca.gov/msprog/onroad/altfuelconv/altfuelconv.htm .

ARB will also use the Alternative Fuel Conversion Certification Procedures list serve to provide stakeholders with further information regarding staff's proposals. If you wish to sign up for this list serve, please visit: http://www.arb.ca.gov/listserv/listserv_ind.php?listname=altfuelconv

Interested members of the public may present comments orally or in writing at the workshop. Comments may be submitted by email to dbloudof@arb.ca.gov or by postal mail before the workshop:

Postal Mail: Mr. Dean Bloudoff
Air Resources Board
1001 "I" Street, P.O. Box 2815
Sacramento, California 95812

If you require special accommodations or have special language needs, please contact Ms. Dee Enos-Friedman, at (916) 323-4440 or via email at denosfri@arb.ca.gov, as soon as possible or no later than 10 business days before the scheduled workshop. Teletypewriter/Telecommunications Device for the Deaf/Speech-to-Speech users may dial 7-1-1 for the California Relay Service.

We welcome and encourage your participation. If you have any questions about this workshop, please contact Mr. Craig Duehring, Manager, at (916) 323-2361 or via email at cduehrin@arb.ca.gov, or Mr. Dean Bloudoff, Air Resources Engineer, at (916) 322-8987 or via email at dbloudof@arb.ca.gov.

Sincerely,

/s/

Annette Hebert, Chief
Mobile Source Control Division

cc: Mr. Craig Duehring, Manager
In-Use Control Measures Section
Mobile Source Control Division

Mr. Dean Bloudoff
Air Resources Engineer
Mobile Source Control Division

Ms. Dee Enos-Friedman
Office Technician
Mobile Source Control Division

May 1, 2013 Workshop Presentation

Public Workshop: Proposed Amendments to the Alternative Fuel Conversion Certification Procedures for New and In-Use Vehicles and Engines

Air Resources Board Auditorium
El Monte, California
May 1, 2013

California Environmental Protection Agency

Air Resources Board

1

Agenda

- Purpose
- Background
- Staff proposal
- Next steps

2

Need for Proposed Amendments

- Better align ARB's procedures with recent changes adopted by U.S. Environmental Protection Agency
- Streamline ARB's new and in-use alternative fuel vehicle/engine certification programs
- Update and simplify the application and approval process
- Reduce market barriers for small volume convertors
- Preserve emission benefits

3

Background - New Vehicle Conversions

- Requires new vehicle/engine certification
- Submit an application and update it for changes
- Meet the applicable emission standards and adhere to the appropriate test procedures
- Demonstrate durability
- Meet the applicable labeling requirements
- Provide emissions warranty to the ultimate purchaser
- Identify all makes and models
- Comply with on-board diagnostic (OBD) requirements

4

Background - New Vehicle/Engine Certifications

- 13 CCR § 1961 - Exhaust Emission Standards and Test Procedures - 2004 through 2019 Model Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles.
- 13 CCR § 1961.1 - Greenhouse Gas Exhaust Emission Standards and Test Procedures - 2009 through 2016 Model Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles.
- 13 CCR § 1961.2 - Exhaust Emission Standards and Test Procedures - 2015 and Subsequent Model Passenger Cars, Light-Duty Trucks and Medium-Duty Vehicles.
- 13 CCR § 1961.3 - Greenhouse Gas Exhaust Emission Standards and Test Procedures - 2017 and Subsequent Model Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles.
- 13 CCR § 1956.8 - Exhaust Emissions Standards and Test Procedures - 1985 and Subsequent Model Heavy-Duty Engines and Vehicles.
- 13 CCR § 1976 - Standards and Test Procedures for Motor Vehicle Fuel Evaporative Emissions
- 13 CCR § 1968.2 - Malfunction and Diagnostic System Requirements – 2004 and Subsequent Model-Year Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles and Engines.
- 13 CCR § 1971 - Engine Manufacturer Diagnostic System Requirements – 2007 and Subsequent Model-Year Heavy-Duty Engines.
- 13 CCR § 1971.1 - On-Board Diagnostic System Requirements – 2010 and Subsequent Model-Year Heavy-Duty Engines.

5

Background - In-Use Vehicle Conversions

- Requires Aftermarket Parts certification
- Certify to same or more stringent emission standards
- Certification based on engine family
- Demonstrate durability
- Supplemental emission control information label
- Manufacturer's and installer's warranty
- Evaluate the impact on auxiliary emission control devices
- Comply with OBD requirements
- Installation inspection
- In-use enforcement testing

6

In-Use Vehicle/Engine Conversion Regulations

- 13 CCR § 2030
  - Liquefied Petroleum Gas or Natural Gas Retrofit Systems
- 13 CCR § 2031
  - Alcohol or Alcohol/Gasoline Fuels Retrofit Systems
- Associated Test Procedures:
  - California Exhaust Emission Standards and Test Procedures for Systems Designed to Convert Motor Vehicles Certified for 1992 and Earlier Model Years to Use Liquefied Petroleum Gas or Natural Gas Fuels
  - California Certification and Installation Procedures for Alternative Fuel Retrofit Systems for Mot Vehicles Certified for 1994 and Subsequent Model Years and for All Model Year Motor Vehicle Retrofit Systems Certified for Emission Reduction Credit
  - California Exhaust Emission Standards and Test Procedures for Systems Designed to Convert Motor Vehicles Certified for 1992 and Earlier Model Years to Use Alcohol or Alcohol/Gasoline Fuels

7

Discussion Overview

- Single process to certify retrofit systems
- Streamlined application and review process
- Reduced testing requirements
- Demonstrate base vehicle emissions maintained
- Better alignment with U.S. EPA requirements
- Not applicable to full vehicle certification

8

Summary of Added Flexibility

- Applies to small-volume convertors
- For previously CA certified vehicles only
- For conversions to the same tailpipe emission standard as the base vehicle
- Added flexibility for emissions testing
- Reduced OBD demonstration
- Changes sunset after 5 years

9

Small Volume Convertors

- Defined as retrofit system manufacturers with California annual sales of less than 4,500 alternative fuel retrofit systems in any given calendar year
  - Out-of-state sales don't apply
  - All engine families/fuel types

10

Retrofit System Certification

- For conversions to the same tailpipe emission standard as the base vehicle
- Certifies conversion kit and installation
- Provides path for converting relatively new vehicles at the point of sale
- Issue "non-expiring" Executive Order
- Applies to new and used vehicle conversions

11

Certification Fuel

- Natural Gas
  - Same as Federal Standards
- Liquid propane gas
  - Same as motor vehicle fuel per Title 13, California Code of Regulations, section 2292.6
- Fuel specifications handout available

12

Allow Emissions Multiplier

- For exhaust emissions testing, allow for option to use non-methane hydrocarbon (NMHC) X1.5 multiplier for both liquid propane gas & natural gas to determine non-methane organic gases (NMOG)
- Currently administratively allowed for natural gas conversions if requested

Test Waivers for Dual-Fuel Systems

- Applies to exhaust and evaporative emissions testing on the original fuel
- Manufacturers must submit an engineering justification for the waiver(s)
- Waivers will be allowed where no changes have been made that effect emissions while operating on the original fuel
- Requires approval by the Executive Officer

Deterioration Factors (DF's)

- Allow for use of U.S. EPA assigned DF's in lieu of high-mileage emissions tests
  - Accepted for test vehicles with mileage accumulation up to 25K miles
  - Test vehicles with >25K miles may prorate assigned DF's
- Manufacturer's may propose DF for Executive Officer approval if none available
- DF validation replaced with in-use testing

Streamlined OBD Proposal

- Available to small volume convertors for conversions to same emission standard as base vehicle
- Reduced to 4 demonstrations (demos) if no changes
- Allows use of less expensive rapid aged parts or in-use vehicle
- Unchanged monitors only required to show functionality
- Requires compliance statement for all monitors
- Post-certification testing unchanged

OBD Application

- Focused only on retained demos & added/modified/deleted hardware and software
- Waive additional tests if underlying/base emission controls unchanged
  - Such as: EGR, VVT, misfire, cold start, secondary air, A/F cylinder imbalance rich & lean, downstream O2 sensor(s)

OBD Retained Demos

- Fuel system rich & lean, oxygen (O2) sensor, catalyst monitor demonstration
  - Only require "worst-case" pattern for O2 sensor demo
  - Add options in lieu of original equipment manufacturer full useful life aged demo parts
    - Rapid aged catalyst(s) & O2 sensor(s) per Aftermarket Parts aging cycle, or
    - Complete/converted in-use vehicle >25K miles
  - Catalyst monitor demo still requires threshold catalyst(s)
    - Margins increased additional 25% to eliminate under/over shooting

OBD Waived Demos

- Unchanged monitors
  - Implant gross fault(s) & show monitor detects, no emissions test
- Requires applicants to provide compliance statement for all monitors
- No change to post-certification compliance testing

In-Use Compliance Testing

- In-use emissions testing is required upon request by ARB's Executive Officer
- Emissions testing of a minimum of 3 vehicles per engine family
- For each failure, 2 more vehicles must be tested up to a maximum of 10
- Requires convertors to track/report sales

Smog Check

- Registration of vehicle conversions previously registered on different fuel
- Allow fleets to assume responsibility for required Bureau of Automotive Repair (BAR) inspection
- Currently seeking BAR input

Alternative Test Methods

- Investigating option to use PEMS for heavy-duty alternative fuel conversions
- PEMS used in lieu of engine dynamometer testing
- Cost-effective alternative for generating data on emissions compliance
- Convertors agree to sign up for PEMS in-use compliance testing

Conversion to a More Stringent Emissions Standard

- Currently required to adhere to the new vehicle/engine certification requirements
  - Fuel change not enough to reduce emissions to meet the more stringent standard – requires re-engineering
  - Changes impact other emission control components, such as catalytic convertors, OBD systems
  - Changes fall outside the design scope of the original base vehicle
  - Full certification needed to ensure expected emissions reductions achieved throughout the converted vehicles actual life

Issues for Conversion to a More Stringent Emission Standard

- Not needed to sell conversions in California
  - Primarily for carpool lane access, incentive funding
- Staff's proposal already reduces market barriers for conversions
  - Adequate to show base emissions maintained
  - Not adequate to address changes to a lower standard
- Full testing needed to assure lower emissions throughout vehicles useful life
- Changes could undermine purpose of economic incentives

Next Steps

- Please provide comments to ARB by mid May
- Send comments to Craig Duehring at cduehrin@arb.ca.gov
- Initial Statement of Reasons available August 7, 2013
- September 2013 Board hearing

Contact Information

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For More Information…

Please visit the Alternative Fuel Conversion Certification Procedures informal regulatory page at:
http://www.arb.ca.gov/msprog/onroad/altfuelconv/altfuelconv.htm

Stay informed by joining the Alternative Fuel Conversion Certification Procedures list serve at:
http://www.arb.ca.gov/listserv/listserv_ind.php?listname=altfuelcon

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