State of California
AIR RESOURCES BOARD

**Final Statement of Reasons for Rulemaking,
Including Summary of Comments and Agency Response**

PUBLIC HEARING TO CONSIDER PLUG-IN HYBRID ELECTRIC VEHICLE TEST PROCEDURE AMENDMENTS AND AFTERMARKET PARTS CERTIFICATION REQUIREMENTS ADOPTION

Public Hearing Date: **January 22, 2009**
Agenda Item No.: **09-1-8**
Continuation of Public Hearing Date: **May 28, 2009**
Agenda Item No.: **09-5-4**

I. GENERAL

The Staff Report: Initial Statement of Reasons for Proposed Rulemaking ("Staff Report") entitled "Amendments to Test Procedures and Aftermarket Parts Certification Requirements: Amendments to Test Procedures and Aftermarket Parts Certification Requirements," released December 5, 2008, and the Supplemental Staff Report ("Supplemental Staff Report") entitled "Proposed Rulemaking for Plug-in Hybrid Electric Vehicles, Modifications to the Proposed Aftermarket Parts Certification Requirements," released May 12, 2009, are incorporated by reference herein.

In this rulemaking, the Air Resources Board (ARB or Board) adopted amendments to California Code of Regulations, title 13, sections 1961, 1962, 1962.1, 1976 and 1978, and to the incorporated "California Exhaust Emission Standards and Test Procedures for 2001 and Subsequent Model Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles", **"**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", "California Exhaust Emission Standards and Test Procedures for 2009 and Subsequent Model Zero-Emission Vehicles and Hybrid Electric Vehicles, in the Passenger Car, Light-Duty Truck and Medium-Duty Vehicle Classes", "California Evaporative Emission Standards and Test Procedures for 2001 and Subsequent Model Motor Vehicles", and "California Refueling Emission Standards and Test Procedures for 2001 and Subsequent Model Motor Vehicles".

These adopted amendments to the regulations and test procedures primarily adapt existing exhaust and evaporative emission test procedures to more accurately reflect the exhaust and evaporative emissions generated from new configurations of off-vehicle charge capable hybrid electric vehicles (more commonly referred to as

plug-in hybrid electric vehicles (PHEVs)).[1] Specifically, this rulemaking amends the existing exhaust emission test procedures applicable to hybrid electric vehicles to more accurately determine the contribution of the electric drive and vehicle exhaust emissions for PHEVs by including a determination of an equivalent all-electric range, providing test procedures for more advanced PHEVs, and amending current evaporative and on-board refueling vapor recovery (ORVR) test procedures to ensure that the evaporative emissions of PHEVs are accurately characterized for testing purposes when demonstrating compliance with the applicable evaporative-related emission standards.

This rulemaking also establishes new requirements and certification procedures applicable to the certification of aftermarket PHEV conversion systems that are designed and sold to convert in-use hybrid electric vehicles (HEVs) to PHEVs. These requirements and procedures specify exhaust and evaporative emissions, and ORVR test procedures that are intended to ensure that any converted vehicle will continue to comply with the same standards to which the original equipment manufacturer (OEM) HEV was certified. The aftermarket requirements also include phased-in testing and warranty requirements that are designed to provide PHEV manufacturers greater flexibility to encourage the development of such conversion systems.

On December 5, 2008, ARB published a notice for a January 22, 2009 public hearing to consider the proposed regulatory action. The Staff Report was also made available for public review and comment beginning December 5, 2008. The Staff Report provides the rationale for the adopted amendments and incorporated certification and test procedures. The text of the proposed amendments to title 13, California Code of Regulations (CCR) sections 1961, 1962, 1962.1, 1976 and 1978, and the incorporated "California Exhaust Emission Standards and Test Procedures for 2001 and Subsequent Model Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles", **"**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", "California Exhaust Emission Standards and Test Procedures for 2009 and Subsequent Model Zero-Emission Vehicles and Hybrid Electric Vehicles, in the Passenger Car, Light-Duty Truck and Medium-Duty Vehicle Classes", "California Evaporative Emission Standards and Test Procedures for 2001 and Subsequent Model Motor Vehicles", and "California Refueling Emission Standards and Test Procedures for 2001 and Subsequent Model Motor Vehicles" were included as Appendices to the Staff Report.

[1] Throughout this Final Statement of Reasons we will refer to these vehicles by their more common name, PHEVs. The use of this terminology should not imply that the charging sources are limited to the grid, as with the grid connected hybrid electric vehicle definition used in California Code of Regulations title 13, section 1961.1(e). Since these vehicles have several terms, and for clarification on this point, the test procedures and regulation language will utilize the more inclusive terminology of OVCC HEVs. The OVCC terminology includes non-grid battery charging sources such as solar panels.

On January 22, 2009, the Board conducted the public hearing and received oral and written comments. At the conclusion of the hearing, the Board adopted Resolution 09-6, in which it approved the originally proposed amendments with several modifications. Some of the modifications had been suggested by staff in a document and incorporated herein entitled "Staff's Proposed Regulatory Text Modifications" that was distributed at the hearing and that was Attachment G to the Resolution. The Resolution and Attachment G are available at ARB's Internet web page for this rulemaking: http://www.arb.ca.gov/regact/2008/phev09/phev09.htm. The Resolution directed the Executive Officer to incorporate the modifications into the proposed regulatory text, with such other conforming modifications and technical amendments as may be appropriate, and to make the modified text available for a supplemental comment period of at least 15 days. The Executive Officer was then directed either to adopt the amendments with such additional modifications as may be appropriate in light of the comments received, or to present the regulations to the Board for further consideration if warranted in light of the comments.

The January 22, 2009 notice also contained the text of proposed section 2032, title 13, California Code of Regulations and its incorporated procedure, "California Certification and Installation Procedures for Off-Vehicle Charge Capable Conversion Systems for 2000 and Subsequent Model Year Hybrid Electric Vehicles".

At the January hearing the Board also directed the Executive Officer and staff to return to the Board after consulting with affected conversion system manufacturers and others related to systems for conversions to PHEVs in several months to continue the Board's consideration of the proposed adoption of section 2032, title 13, California Code of Regulations and its incorporated procedure – the "California Certification and Installation Procedures for Off-Vehicle Charge Capable Conversion Systems for 2000 and Subsequent Model Year Hybrid Electric Vehicles". The Board then continued the January 23, 2009 public hearing until May 28, 2009.

On May 28, 2009, the Board conducted a public hearing and received oral and written comments. At that hearing staff presented a Supplemental Staff Report entitled "Proposed Rulemaking for Plug-in Hybrid Electric Vehicles, Modifications to the Proposed Aftermarket Parts Certification Requirements," and the Board adopted California Code of Regulations, title 13, section 2032 and the incorporated "California Certification and Installation Procedures for Off-Vehicle Charge Capable Conversion Systems for 2000 and Subsequent Model Year Hybrid Electric Vehicles." The adopted aftermarket regulation and incorporated certification procedure primarily establish certification procedures that provide PHEV manufacturers greater flexibility and create a phased approach to certification that encourages the development of such conversion systems. At the conclusion of that hearing the Board adopted Resolution 09-39, in which it approved the proposed regulation and incorporated certification procedure, with several modifications that were detailed in a document entitled "Proposed Regulation Order" that was distributed at the hearing and that was Attachment B to Resolution 09-39. The Resolution and Attachment B are available at ARB's website for this rulemaking: http://www.arb.ca.gov/regact/2008/phev09/phev09.htm. The Resolution directed the Executive Officer to incorporate the modifications into the proposed regulatory text,

with such other conforming modifications and technical amendments as may be appropriate, and to make the modified text, the Supplemental Staff Report as set forth in Attachment C, and any additional supporting documents and information as may be appropriate, available for public comment for a period of 15 days. The Executive Officer was then directed either to adopt the amendments with such additional modifications as may be appropriate in light of the comments received, or to present the regulations to the Board for further consideration if warranted in light of the comments.

The text of all the modifications to the originally proposed regulation, to the amendments to the regulations, and to the incorporated documents was first made available for a supplemental 15-day comment period by issuance of a "Notice of Public Availability of Modified Text." This Notice and the five attachments thereto was mailed on August 28, 2009 to all stakeholders, interested parties, and to other persons generally interested in ARB's rulemaking concerning exhaust and evaporative emission test procedures applicable to PHEVs, and to procedures applicable to the certification of aftermarket PHEV conversion systems. The "Notice of Public Availability of Modified Text" listed the ARB Internet site from which interested parties could obtain the complete texts of the regulations and the incorporated documents that would be affected by the modifications to the original proposal, with all of the modifications clearly indicated. These documents were also published on ARB's Internet web page for this rulemaking http://www.arb.ca.gov/regact/2008/phev09/phev09.htm on August 28, 2009. Four written comments were received during this 15-day comment period.

Subsequent to the first 15-day comment period, staff became aware that some of the proposed modifications as identified in the August 28, 2009 notice were inadvertent, and therefore needed to be rectified. Staff also proposed changes to address various issues related to the exhaust and evaporative emission test procedures, the refueling test procedures, and to the certification procedures applicable to certification of aftermarket PHEV conversion systems for clarifying changes to the evaporative emissions and refueling test procedures. The "Second Notice of Public Availability of Modified Text" listed the ARB Internet site from which interested parties could obtain the complete text of the regulation and the incorporated documents that would be affected by the modifications to the original proposal, with all of the modifications clearly indicated. These documents were also published on ARB's Internet web page for this rulemaking http://www.arb.ca.gov/regact/2008/phev09/phev09.htm on November 2, 2009. Two written comments were received during this 15-day comment period.

After considering the comments received during the two 15-day comment periods, the Executive Officer issued Executive Order R-09-016, adopting the amendments to California Code of Regulations, title 13, sections 1961, 1962, 1962.1, 1976 and 1978, and to the incorporated "California Exhaust Emission Standards and Test Procedures for 2001 and Subsequent Model Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles", **"**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", "California Exhaust Emission Standards and Test Procedures for 2009 and Subsequent Model Zero-Emission Vehicles and Hybrid Electric Vehicles, in the Passenger Car, Light-Duty Truck and Medium-Duty Vehicle Classes", "California Evaporative Emission Standards and Test Procedures for 2001 and Subsequent Model Motor Vehicles", and "California Refueling Emission Standards and Test Procedures for 2001 and Subsequent Model Motor Vehicles", and adopting California Code of Regulations, title 13, section 2032 and the incorporated "California Certification and Installation Procedures for Off-Vehicle Charge Capable Conversion Systems for 2000 and Subsequent Model Year Hybrid Electric Vehicles."

This Final Statement of Reasons (FSOR) updates the Staff Report and the Supplemental Staff Report by identifying and providing the rationale for the modifications made to the originally proposed regulatory text, including non-substantial modifications and clarifications made after the close of the second 15-day comment period. This FSOR also contains a summary of the comments received by the Board on the proposed regulation and the modifications and ARB's responses to those comments.

Incorporation of Test Procedures and Federal Regulations. The five amended test procedures ("California Exhaust Emission Standards and Test Procedures for 2001 and Subsequent Model Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles", **"**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", "California Exhaust Emission Standards and Test Procedures for 2009 and Subsequent Model Zero-Emission Vehicles and Hybrid Electric Vehicles, in the Passenger Car, Light-Duty Truck and Medium-Duty Vehicle Classes", "California Evaporative Emission Standards and Test Procedures for 2001 and Subsequent Model Motor Vehicles", and "California Refueling Emission Standards and Test Procedures for 2001 and Subsequent Model Motor Vehicles") are incorporated by reference in Title 13, CCR sections 1961, 1962, 1962.1, 1976 and 1978, and 2032. These test procedures in turn incorporate certification test procedures adopted by the United States Environmental Protection Agency (U.S. EPA) and are contained in Title 40, Code of Federal Regulations (CFR), Part 86.

Title 13, CCR sections 1961, 1962, 1962.1, 1976, 1978, and 2032 identify the incorporated ARB documents by title and date. The ARB documents are readily available from the ARB upon request, and were made available in the context of this rulemaking in the manner specified in Government Code Section 11346.5(b). The CFR is published by the Office of the Federal Register, National Archives and Records Administration, and is therefore reasonably available to the affected public from a commonly known source.

The test procedures are incorporated by reference because it would be impractical to print them in the CCR. Existing ARB administrative practice has been to have the test procedures incorporated by reference rather than printed in the CCR because these procedures are highly technical and complex. They include the "nuts and

bolts" engineering protocols required for certification of motor vehicles and have a very limited audience. Because ARB has never printed complete test procedures in the CCR, the affected public is accustomed to the incorporation format utilized therein. The ARB's test procedures as a whole are extensive and it would be both cumbersome and expensive to print these lengthy, technically complex procedures with a limited audience in the CCR. Printing portions of ARB's test procedures that are incorporated by reference would be unnecessarily confusing to the affected public.

The test procedures incorporate portions of the CFR because the ARB requirements are substantially based on the federal regulations. Manufacturers typically certify vehicles to a version of the federal emission standards and test procedures that have been modified by state requirements. Incorporation of the federal regulations by reference makes it easier for manufacturers to know when the two sets of requirements are identical and when they differ. Each of the incorporated CFR provisions is identified by date in ARB's test procedure documents.

Fiscal Impacts. The Board has determined that this regulatory action will not result in a mandate to any local agency or school district, the costs of which are reimbursable by the state pursuant to part 7 (commencing with section 17500), Division 4, title 2 of the Government Code.

Consideration of Alternatives. The amendments to existing test procedures and the new regulatory language (title 13, CCR section 2032) and incorporated "California Certification and Installation Procedures for Off-Vehicle Charge Capable Conversion Systems for 2000 and Subsequent Model Year Hybrid Electric Vehicles" proposed in this rulemaking resulted from extensive meetings and discussions between staff and the affected vehicle manufacturers, PHEV conversion system manufacturers, and others. As discussed in the Staff Report, staff evaluated and ultimately rejected alternatives, including: (1) not amending the exhaust test procedures, (2) waiting to amend the exhaust test procedures until the Society of Automotive Engineers finalizes revisions to test procedure (J1711) "Recommended Practice for Measuring the Exhaust Emissions and Fuel Economy of Hybrid-Electric Vehicles" (SAE J1711), (3) waiting for the federal government to adopt evaporative and on-board refueling vapor recovery test procedures applicable to PHEVs, (4) requiring conversion system manufacturers to recertify a vehicle with a conversion system installed as a new vehicle, and (5) evaluating conversion systems under existing California Vehicle Code section 27156 exemption procedures.

For the reasons set forth in the Staff Report, and based on staff's comments and responses at the January 22 and May 28, 2009 hearings and in this FSOR, the Board has determined that no alternative considered by the agency or brought to the attention of the agency would be more effective in carrying out the purpose for which the regulatory action was proposed or would be as effective and less burdensome to affected private persons than the action taken by the Board.

II. MODIFICATIONS TO THE ORIGINAL PROPOSAL

As previously discussed, at the January 22, 2009 public hearing the Board adopted the proposed amendments to the exhaust, evaporative, and refueling test procedures with several modifications. Subsequent to the hearing, staff proposed modifications to the regulatory text and the incorporated test procedures that largely align the regulation's terminology with the test procedure requirements, clarify testing and reporting requirements, provide manufacturers options to use alternate test procedures, and establish a three-tiered certification process to provide additional flexibility and reduced testing requirements for conversion system manufacturers while also limiting the potential emissions impacts from converted vehicles. These modifications were explained in detail in the Notice of Public Availability of Modified Text that was issued for a 15-day public comment period that began on August 28, 2009, and ended on September 14, 2009. In order to provide a complete FSOR for this rulemaking, the most significant modifications and clarifications are summarized below:

A. Modifications to Title 13, California Code of Regulations section 1962.1

Title 13, Section 1962.1, subparagraph (c)(3)(A) was amended to incorporate proposed modifications that were erroneously omitted. These modifications were also proposed for section C.3.3 of the "California Exhaust Emission Standards and Test Procedures for 2009 and Subsequent Model Zero-Emission Vehicles, and Hybrid Electric Vehicles, in the Passenger Car, Light-Duty Truck and Medium-Duty Vehicle Classes." These modifications align the regulation's terminology and requirements with those of the test procedure. In addition, a reference to a Society of Automotive Engineers (SAE) draft procedure was updated to reference the now adopted SAE procedure.

B. Modifications to the Test Procedure as Renamed and Incorporated by Reference "California Exhaust Emission Standards and Test Procedures for 2009 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 California Code of Regulations Section 1962.

1. Section D.2.11. This section was clarified to explicitly require manufacturers to report information regarding how the vehicle and battery break-in periods were determined for certification. The procedures were previously worded in such a way that they only implied that manufacturers should this information.

2. Section E.3.1.2(a) and E.3.2.2(a). The current test procedures require a manufacturer to determine the urban and highway all-electric range for a fuel cell vehicle and a hybrid fuel cell vehicle by filling the hydrogen tank and operating the vehicle over the applicable test cycle until it is no longer able to maintain the required speed and/or acceleration. However, the procedures do not formally specify how to establish the range using the all-electric range test for fuel cell

vehicles. Because the end of the test does not occur until the fuel tank is drained, this is a time consuming test. In order to reduce the testing time for these types of vehicles, staff originally proposed that the urban and highway all-electric range for a fuel cell vehicle and a hybrid fuel cell vehicle be determined in accordance with the recently adopted Society of Engineers test protocol, SAE J2572. Since the issuance of the 45-day notice, manufacturers have requested that they be allowed the option of using either the original test procedure or SAE J2572 to determine the urban and highway all electric range for a fuel cell vehicle and a hybrid fuel cell vehicle. This proposed modification allows both options to be used.

C. Modifications to "California Evaporative Emission Standards and Test Procedures for 2001 and Subsequent Model Motor Vehicles," adopted August 5, 1999, as last amended May 2, 2008, Incorporated by Reference in California Code of Regulations, Title 13, Section 1976

1. Section III.C.1.3 was modified to clarify its requirements and to ensure that the running loss fuel tank temperature profile determination is consistent with the running loss test.

2. Sections III.D.1.5, III.D.1.6, III.D.3.2, and III.D.3.3. were modified to update the previously outdated reference of 40 CFR 86.132-90 to 40 CFR 86.132-00.

Items 3 through 10 refer to off-vehicle charge capable hybrid electric vehicles that are equipped with non-integrated refueling canister-only systems

3. Section II.A.5.4 was modified to allow manufacturers of vehicles equipped with non-integrated refueling canister-only systems to attest that the system's canister will attain a purged condition when the vehicle has consumed at least 85% of its nominal fuel tank capacity, in lieu of conducting the currently optional engineering demonstration, and would be only be applicable to systems that inherently allow only refueling vapors to be stored in their canister, and, in which the inherent battery-charge operational mode characteristics cause the canister to experience only either no purge or partial purge during the supplemental two-day diurnal plus hot soak test sequence.

A manufacturer would provide the following statement in the application for certification, "The canisters in all vehicles equipped with the [indicate a specific evaporative/refueling family] shall have attained a purged condition when the vehicles have consumed at least 85% of their nominal fuel tank capacity. Assurance with this performance is based on the particular design specifications of the evaporative/refueling family, other inherent battery-charge operational mode characteristics of the vehicle's related systems, and other knowledge possessed by the manufacturer. Providing this assurance relieves the manufacturer of conducting a separate engineering evaluation for demonstrating the evaporative/refueling family's capability of purging its canister(s) during a supplemental two-day diurnal plus hot soak emission test sequence in which the battery state-of-charge setting is at the lowest level allowed by the manufacturer."

Staff also replaced the adverbial phrase “sufficiently purged,” that is used to describe the quality of a canister purge, with the phrase “purged,” because it is implicitly understood that “purged” means “sufficiently purged.”

4. Applicable subsections of section III.D.1.7.; section III.D.1.12.2.; sections III.D.3.3.2. and III.D.3.3.2.1.; sections III.D.3.3.6., III.D.3.3.6.13., and III.D.3.3.6.14., were modified or added, as applicable, in order to include an additional 95% fuel tank fill and vehicle drivedown steps, as well as an optional bench purge allowance. The additional ORVR-like 95% fuel tank fill and vehicle drivedown step were proposed to prevent residual vapor loading from a previous test sequence from invalidating test results due to the canister not being purged prior to the fuel-tank-refill canister-loading step. Staff also proposed that manufacturers be provided the option to purge the canister by performing a bench purging process.

Furthermore, a manufacturer would have the option to perform measured drains of a fuel tank in order to achieve the tank fill levels specified in subsequent fuel tank drain and fill steps.

The All-Electric Range Test provisions in section III.D.1.14. were relocated to section III.D.13., in order to reflect the fact that those tests are actually performed prior to the start of the initial fuel drain and fill step in the test sequence.

5. Language was added to the vehicle drivedown specifications of the test procedures in section III.D.1.7.2. to allow for temporary driving suspension for computer reset or driver relief, if a manufacturer chooses to perform a vehicle drivedown of 85% or less of rated fuel capacity.

6. Section III.1.D.7 was modified to allow manufacturers the option of using the more stringent 1.5 times working capacity, butane-nitrogen canister preconditioning loading method for exhaust emission testing to reduce the burden on manufacturers without reducing the stringency of the test procedures. The option would only be allowed when performing an exhaust emission testing sequence.

7. Section III.D.3.3.6.8 was modified by expanding the fuel dispensing temperature tolerance for the preconditioning only portion of the fuel-tank-refill canister loading procedures to 67°F +/- 3°F, from 67°F +/- 1.5°F, in order to provide flexibility for manufacturers in the testing process without adversely compromising compliance stringency, because ARB will be able to conduct certification confirmatory and in-use compliance testing at the same expanded fuel temperature tolerances.

8. The Running Loss test procedures in sections III.D.8.1.10., and III.D.8.2.5. were modified to clarify that vehicles can satisfy this requirement using either a separate test or an engineering evaluation.

9. Section III.10.3.14 was modified to allow manufacturers greater flexibility. Specifically, manufacturers of such vehicles are now allowed to satisfy this

requirement under the inherent ability of the vehicle's canister system to attain a purged condition when the vehicle has consumed at least 85% of its nominal fuel tank capacity, as discussed under item 3.

10. Section III.D.3.3.6 was clarified to specify that the canister shall have already achieved a stabilized state prior to the start of the applicable test sequence, and not prior to the fuel drain and fill step.

D. Modifications to "California Refueling Emission Standards and Test Procedures for 2001 and Subsequent Model Motor Vehicles," adopted August 5, 1999, as last amended May 2, 2008, Incorporated by Reference in California Code of Regulations, Title 13, Section 1978

1. The language on the Appendix F title page was revised to "Proposed Amendments to the Onboard Refueling Vapor Recovery Test Procedures."

2. Section II.B.4.4.2.1 was modified to clarify that the applicability of the option provided in the ORVR test procedures that allow manufacturers, if approved by the Executive Officer, to set the battery state-of-charge at a level that maximizes the amount of engine operation, prior to conducting the vehicle drivedown step, in order to reduce the amount of "wait time" for starting the fuel consumption process. Specifically, language was added to clarify that this option is available only as long as the stringency of the emission standards is not compromised, meaning that future in-use test results or other information will determine the continued validity of the option. Specifically, 2011 and subsequent model-year off-vehicle charge capable hybrid electric vehicles that are equipped with non-integrated refueling canister-only systems, are required to have the high battery state-of-charge setting only for the vehicle drivedown portion of the test sequence that occurs prior to the actual refueling test, and not the vehicle drivedown step that occurs earlier in the test sequence that is conducted to establish the initial testing state of the canister (section II.B.4.1.3.2.).

Items 3 through 7 relate to off-vehicle charge capable hybrid electric vehicles that are equipped with non-integrated refueling canister-only systems.

3. Sections: II.B. 4.1.2., II.B.4.1.3, II.B.4.1.3.1., II.B.4.1.3.2., II.B.4.1.3.3., II.B.4.1.4., II.B.4.1.5., II.B.4.1.6., II.B.4.1.7., II.B.4.1.7.1., and, II.B.4.1.16; and, sections II.B.4.4., II.B.4.4.2., II.B.4.4.2.1., II.B.4.4.4., II.B.4.4.5., II.B.4.4.6., II.B.4.4.7., II.B.4.4.8., II.B.4.4.9., and II.B.4.4.10., were modified to incorporate an additional 95% fuel tank fill and vehicle drivedown steps, and an optional bench purge allowance. The additional steps apply to 2011 and subsequent model-year vehicles and were added to purge the canister prior to the fuel-tank-refill canister-loading step and to establish the initial test state of the canister prior to any vapor loading. These processes can be accomplished by performing vehicle drivedowns, as specified in the ORVR test sequence, in which 85% or less as determined by the manufacturer, of the vehicle's fuel tank capacity is consumed. Staff accordingly added an additional 95% fuel tank fill step and vehicle drivedown step to the ORVR

test. In order to provide additional flexibility, staff proposed that a manufacturer have the option to accomplish the canister purge step by performing a bench purging process instead of conducting vehicle drivedowns. Approval to use this option will be based on the manufacturer's assurance that the canister will be bench purged by an equivalent volume of air corresponding to a consumption of 85%, or less as determined by the manufacturer, of the manufacturers' nominal fuel tank capacity. In addition, the characteristics of the purge flow through the canister, including the flow rates, will be representative of the flow that occurs under the UDDS cycles that are specified to occur during the vehicle drivedowns. Using this option eliminates the 95% fuel tank fill step that is performed before the vehicle drivedown. Furthermore, a manufacturer will have the option to perform measured drains of a fuel tank in order to achieve the tank fill levels specified in subsequent fuel tank drain and fill steps that will help to eliminate residual vapor loading from a previous test sequence which may cause invalid test results.

4. Provisions were added to the vehicle drivedown specifications of sections II.B.4.1.3, and II.B.4.4, which allow a manufacturer to perform a vehicle drivedown of 85% or less of rated fuel capacity, to allow for temporary driving suspension for computer reset or driver relief.

5. For only the preconditioning portion of the fuel-tank-refill canister-loading procedure the fuel dispensing temperature tolerance specified in section II.B.4.1.11, was expanded from 67°F +/- 1.5℉ to 67 °F +/- 3℉ , to provide flexibility for manufacturers in the testing process. Compliance stringency is not affected because ARB will be able to conduct certification confirmatory and in-use compliance testing at the same expanded fuel temperature tolerances.

6. The battery charging step from the canister preconditioning step was moved from the canister preconditioning step to the vehicle soak period (sections II.B.4.1.7.1.; and, II.B.4.4.2.) due to safety concerns. Specifically, the charging of an off-vehicle charge capable hybrid electric vehicle battery should be performed when fuel vapors are present in lower levels, such as during a vehicle soak period, than during the canister loading process.

7. Sections II.B.4.1.2, and II.B.4.1.3 were clarified to state that the canister shall have achieved a stabilized state prior to the start of the applicable test sequence, and not prior to the fuel drain and fill step.

E. Modifications to "California Certification and Installation Procedures for Off-Vehicle Charge Capable Conversion Systems for 2000 and Subsequent Model Year Hybrid Electric Vehicles," Incorporated by Reference in California Code of Regulations, Title 13, Section 2032 Being Made Available for Comment

Staff returned to the Board at a May 28, 2009 public hearing with proposed modifications to the originally proposed PHEV conversion system certification procedures. These modifications addressed the Board's direction to provide additional flexibility to conversion system manufacturers, while limiting the potential

emissions impacts of converted vehicles and addressing the requirements of the anti-tampering regulation.

Staff proposed a three tier certification process. Tier 1 allows the sale of up to 50 vehicle conversion systems. In the first tier, the conversion system manufacturer's application must address six main criteria: initial durability component data, a durability test plan for the converted vehicle, a consumer manual that shows at least a 3-year or 50,000 mile warranty on the conversion system, a discussion on the process to maintain records of sales and installations, an engineering analysis showing that a conversion does not impact the emissions of the original vehicle, and as part of the sale of the conversion, the consumer must sign a statement acknowledging that the conversion may ultimately result in the potential voiding of their OEM warranty. In addition, conversion system manufacturers must support all versions of their conversions throughout the vehicle's useful life.

Tier 2 allows the sale of up to 100 vehicle conversions. In the second tier, manufacturers must meet the first tier requirements along with three additional criteria: provide an onboard diagnostic compliance plan, submit a consumer manual which shows at least a warranty of 5 years or 75,000 miles, and submit emission test data which shows that the vehicle meets applicable emission standards, and does not trigger the onboard diagnostics malfunction indicator light (MIL) or diagnostic trouble code (DTC). During the second tier, ARB may perform confirmatory testing to verify the emission test data.

In the third tier, conversion system manufacturers must fully comply with the emission test procedures, among other requirements, to achieve certification. The requirements must be met when a manufacturer has sold 100 vehicle conversions. For this tier, all of the requirements of the previous two tiers must be met along with proof that the following requirements are met:

- The battery durability requirement is completed;
- The durability of the conversion is proven to last through the vehicle's useful life;
- The converted vehicle must fully comply with onboard diagnostics;
- The warranty for the conversion system must go through the remaining OEM warranty or the requirements in the second tier, whichever is longer;
- For conversions adding a supplemental battery, the warranty is reduced for the supplemental battery to the requirements in the second tier, (5 years/75,000 miles); and
- The exhaust-, evaporative-, and on-board-vapor-recovery-refueling emission standards testing for hybrid electric vehicles are satisfactorily completed.

For the third tier, the conversion system certification requirements are similar to those proposed by staff at the January Board Hearing with the exception of the warranty. The conversion system warranty originally proposed in the December 5, 2008 Staff Report was equivalent to the OEM warranty: 15 years or 150,000 miles, and 10 years or 150,000 miles for the zero-emission energy-storage device. The adopted certification requirements require a 5 year or 75,000 mile

warranty or the remaining OEM warranty, whichever is greater for the third tier, thus reducing the warranty requirements.

The compliance flexibility of the tiered certification procedure applies to the manufacturer and not to individual conversion system designs. Therefore, a manufacturer may choose to submit multiple applications for different conversion system designs; however, only fifty total conversions per manufacturer can be certified under Tier 1. This allows each company to make a decision on how many systems to develop and what will best serve the company's goals. After 5000 vehicles are converted industry-wide, Tier 1 and Tier 2 options are no longer available. This limits and controls the overall potential emissions and economic impacts for the tiers as discussed in the following section.

The tiered certification process provides additional flexibility that balances the potential impacts of conversions on air quality and the economy. The flexibility is provided to enable and encourage the conversion system industry to certify vehicles and, therefore, operate legally in California. As sales increase, staff anticipates conversion system manufacturers will have the resources needed to meet each tier of certification requirements.

The following Table 1 summarizes the requirements for each tier of PHEV Conversions:

Table 1: Tier Requirements

Tier[†]	Number of systems that can be sold in the tier[1]	Requirements prior to sale in the tier	Action items to proceed to next tier
1	0-50	1. Application (see below for items to be included) 2. Engineering analysis showing no impact on emissions (specifically canister purge and cold starts) 3. Submit durability test plan[2] and initial durability data (component and in-use)[3] 4. System Warranty 3yr/50K mi 5. Installation Warranty 3yr/50K mi 6. ARB approval of engineering analysis & submittal prior to exemption/sale 7. System supported throughout the vehicle's useful life	1. Conduct emission tests. 2. Develop process for compliance with OBD. 3. Maintain record of sales/installations. 4. Durability test plan begins for their vehicle[3]
2	51-100	1. Application for Tier 2 2. Emission test data 3. Show that durability testing has begun[3] 4. Show of readiness indicators set and no OBD MIL/ DTC during emission tests 5. OBD compliance plan 6. System warranty: 5yr/75K mi 7. ARB may perform confirmatory testing to verify emission test data. If requested, provide test vehicle. 8. ARB approval of submittal prior to exemption/sale	1. Start OBD compliance process. 2. Maintain record of sales/installations. 3. Continue durability testing
3	101+	1. Application for Tier 3 2. Durability test data to vehicle useful life[3] 3. Battery durability/test data 4. OBD approval 5. System warranty: 5yr/75K mi or remaining OEM warranty, whichever is longer 6. Supplemental battery warranty: 5 yr/75K mi 7. ARB approval of submittal prior to exemption/sale	1. ARB will begin in-use testing. If requested, conversion manufacturers provide converted vehicles[3]. 2. Maintain record of sales/installations.

[†] The tiered system ends and is no longer available for any manufacturer after a cumulative total from all manufacturers reaches 5000 vehicle conversion kits. For the 5001st vehicle conversion and all conversions thereafter, all manufacturers must meet the full certification requirements in the regulation. OBD compliance flexibility is still available under the OBD regulations.

[1] The experimental permit process allows manufacturers to produce a prototype system and test up to 5 vehicles. Manufacturers must apply for the permits and the vehicles cannot be sold.
[2] Plan must be for useful life of vehicle.
[3] Up to 5 vehicles temporarily needed for in-use testing.

To address these changes the following sections within the certification procedure were modified:

1. Section 2, Definition – the definition of a small volume off-vehicle charge capable conversion system manufacturer was added, including the distinguishing feature of a Tier 1 and a Tier 2 small volume manufacturer.

2. Section 3(c)(ii) – the requirement for the supplemental label to include a "Tier 1" or "Tier 2" notation, as appropriate, was added.

3. Section 3(e), Warranty Notification – modified to add a requirement for an OVCC conversion system manufacturer to provide notification to its purchaser that installation of the conversion system may affect its original vehicle warranty.

4. Section 3(f) – added a requirement for a small volume manufacturer to report installation information on a quarterly basis to ARB.

5. Section 4(b)(ii) – added a sample of the warranty notification in items to be submitted for a conversion system certification application.

6. Section 5(b) – added clarification that any conversion system must be durable and supported for the useful life of the vehicle.

7. Section 5.(e)(i) and (ii) - added special requirements for small volume manufacturers in lieu of full demonstration of durability, emissions and OBD II compliance.

8. Section 7(a) – revised warranty requirements for Tier 3 certified kits with warranty coverage for 5 years/75,000 miles or the remaining OEM warranty, whichever is greater.

9. Section 7(b) – added a special warranty provision for a supplemental battery conversion system, and for the purpose of this provision, defines what a supplemental battery conversion system means.

10. Section 7(c) - added special warranty requirements for small volume manufacturers.

11. Section 7(d) – reduced the warranty requirements of installers to 3 years/50,000 miles.

12. Section 8 – added provision for ARB to conduct confirmatory testing to confirm test results submitted by conversion manufacturers.

13. Section 9 – clarified that small-volume manufacturers are not subject to in-use testing requirements.

Staff also made minor, non-substantive modifications throughout the above test and certification procedures to provide additional clarity. Other non-substantive changes include correcting formatting and grammatical errors, and updating references to their most current versions.

III. MODIFICATIONS MADE SUBSEQUENT TO THE FIRST 15-DAY PUBLIC COMMENT PERIOD

As discussed above, subsequent to the first 15-day comment period, staff became aware that some of the proposed modifications as identified in the August 28, 2009 notice were inadvertent, and therefore needed to be rectified. Specifically, staff became aware that one of the proposed modifications to the exhaust emissions test procedure introduced an inadvertent modification, and as proposed, would modify the ZEV regulation's credit scheme in a manner that was never intended by staff. Staff therefore proposed modifications to rectify this oversight. Staff also proposed changes to address various issues related to the exhaust and evaporative emission test procedures, the refueling test procedures, and to the certification procedures applicable to certification of aftermarket PHEV conversion systems. These proposed modifications were explained in detail in a Second Notice of Public Availability of Modified Text that was issued for a 15-day public comment period that began on November 2, 2009, and ended on November 17, 2009. In order to provide a complete FSOR for this rulemaking, the most significant modifications and clarifications are summarized below:

A. Modifications to Title 13, California Code of Regulations section 1962.1

At the January 23, 2009, Board hearing, staff proposed modifications to section C.3.3 of the "California Exhaust Emission Standards and Test Procedures for 2009 and Subsequent Model Zero-Emission Vehicles, and Hybrid Electric Vehicles, in the Passenger Car, Light-Duty Truck and Medium-Duty Vehicle Classes," to reflect the proposed changes to the testing procedure applicable to plug-in hybrid electric vehicles. Staff also proposed changes to the associated ZEV regulation (title 13, California Code of Regulations section 1962.1(c)(3)(A). However, staff introduced an error by inadvertently modifying a subscript; this modification eliminated a variable that is necessary for the ZEV credit mechanism. Staff therefore rectified this oversight by amending the subscript, and thereby restored the eliminated variable to be consistent with its definition as intended and approved through the ZEV regulation that took effect on April 17, 2009. Specifically, staff corrected the reference to the subscript for "equivalent all electric range" (EAER) in cases where the charge depleting actual range from the urban cycle (R_{cda}) is greater than 40 miles in the California Code of Regulations, title 13, Section 1962.1, subparagraph (c)(3)(A) to $EAER_{u40}$. Staff also updated the definitions section in subparagraph (i) to specify that the charge depleting actual range (R_{cda}) is based on the urban cycle, and to correct the terminology in this section and in subsection (j). In the abbreviation section subparagraph (j) the term $EAER_{40}$ was updated to align the subscript correctly for the variable $EAER_{u40}$.

B. Modifications to the Test Procedure as Renamed and Incorporated by Reference, "California Exhaust Emission Standards and Test Procedures for 2009 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 California Code of Regulations Section 1962

1. Section B.2- Section was modified to include the terminology for the term "$EAER_{u40}$." This term is copied from the ZEV regulation. The term, R_{cdah}, is used in section F. 11 and in the definition section 1. For completeness this term is now included in the terminology list.

2. Section E- The title of the section was changed. To ensure that the effective dates of the amended test procedures will not disrupt certification or testing schedules, staff proposed to delay the applicability of the amendments from the 2011 model year until the 2012 model year. Accordingly, sections that referred to "2011 and subsequent Model Years" were changed to "2012 and subsequent Model Years." Furthermore, the sections stating that a manufacturer may elect to use these provisions to certify a 2009 or 2010 model year vehicle were changed to 2009 through 2011 Model Year vehicles.

3. Section F- The title of the section has changed. To ensure that the effective dates of the amended test procedures will not disrupt certification or testing schedules, staff proposed to delay the applicability of the amendments from the 2011 model year until the 2012 model year. Accordingly, sections that referred to "2011 and subsequent Model Years" were changed to "2012 and subsequent Model Years." Furthermore, the sections stating that a manufacturer may elect to use these provisions to certify a 2009 or 2010 model year vehicle were changed to 2009 through 2011 Model Year vehicles.

4. Section F.11.13- A new section was added to identify how to calculate $EAER_{u40}$. This calculation includes the correction for blended PHEV vehicles. The following equation is being added in order to help further clarify the determination of $EAER_{u40}$, a variable which is ultimately used to determine Zero-emission vehicle miles traveled (VMT) allowance when PHEV charge depleting range is equal to or exceeds 40 miles.

$$EAER_{u40} = \frac{ERF_u \times 40 \text{ miles}}{100}$$

Between 10 and 40 miles of charge depleting actual range from the urban cycle, this allowance is proportional to EAER and further modified by a utility factor. Beyond 40 miles, the zero emission VMT is still proportional to an EAER value, but one that is determined at a fixed or "capped" 40 mile range. For the vast majority of PHEVs in this range category, ERF_u will be 100% and the $EAER_{u40}$ value will be a constant 40 miles. For the rare case where a manufacturer might certify a blended PHEV with charge depletion range in excess of 40 miles, the allowance is based on $EAER_{u40}$, a 40 mile range value which is proportional to the ERF_u (electric range fraction). For example, a non-Blended 100% ERF_u PHEV would have an $EAER_{u40}$ of 40 miles, and a Zero-emission VMT allowance of 1.35, while a blended PHEV with 80% ERF_u will have an $EAER_{u40}$ of 32 miles and an allowance of only 1.08.

5. Section I- The title of the section was changed. The change modified the effective model year of this section from "2009 and 2010" to "2009 through 2011."

Although this is a substantive change, manufacturers may opt to use the procedures in subsection E and F.

C. Modifications to the Test Procedure as Incorporated by Reference as, "California Evaporative Emission Standards and Test Procedures For 2001 and Subsequent Model Motor Vehicles," Incorporated by Reference in California Code of Regulations Section 1976

1. Section III.D.1.7.10. was modified to indicate that only sections III.D.1.7.4., III.D.1.7.5., and III.D.1.7.6. are excluded when a manufacturer elects to use the optional canister butane load method. Specifically, the initial testing state of the canister must be established if the optional canister butane load method is elected. Thus, either a fuel tank drain and 95% fill step along with a vehicle drivedown step, or the optional canister bench purge step, must be done. Therefore, the steps specified in sections III.D.1.7.1., III.D.1.7.2., and III.D.1.7.3. should not be excluded. In addition, the fourth drain and fill step specified in section III.D.1.7.7. must also be performed in order for the fuel tank to have the proper fuel level prior to the start of the exhaust emission test. Lastly, the preconditioning soak specified in section III.D.1.7.8. must be conducted because this is when the optional canister butane loading would be performed.

2. Language was added to section III.D.1.7.3. to clarify that the optional canister bench purge can be performed either during the initial cold soak, as currently specified in section III.D.1.7.3., or after the vehicle preconditioning step in section III.D.1.6.1.

3. Language was added to section III.D.3.3.4 to clarify that the recently adopted requirement (that requires 2012 and subsequent model-year off-vehicle charge capable hybrid electric vehicles with non-integrated refueling canister-only systems to be preconditioned for the three-day diurnal test sequence using the fuel-tank-refill method specified in section III.D.3.3.6.,) may not apply when conducting only an exhaust emission test sequence. This possibility exists because a manufacturer may instead elect to perform the canister preconditioning and butane loading method specified in sections III.D.1.9., III.D.1.10., and III.3.3.4.

4. Section III.D.5.1.1 was clarified to indicate that the engine starting and cranking provisions in that section III.D.5.1.1. are not applicable to hybrid electric vehicles and to specifically clarify the applicable vehicle types that are subject to these requirements.

5. Section III.D.1.7.2 was modified to clarify that vehicles equipped with dual fuel tanks but that do not have selectable or isolatable systems are not subject to the existing requirement in this section to drive fuel out of one tank first, when vehicles are equipped with dual fuel tanks.

6. To ensure that the effective dates of the amended test procedures will not disrupt certification or testing schedules, staff proposed to delay the applicability of the amendments from the 2011 model year until the 2012 model year. Accordingly,

sections that refer to “2011 and subsequent Model Years” were changed to “2012 and subsequent Model Years.” Furthermore, the sections that state a manufacturer may elect to use these provisions to certify a 2009 or 2010 model year vehicle were changed to 2009 through 2011 Model Year vehicles.

D. Modifications to the Test Procedure as Incorporated by Reference as, “California Refueling Emission Standards and Test Procedures For 2001 and Subsequent Model Motor Vehicles,” Incorporated by Reference in California Code of Regulations Section 1978

1. The requirement in sections II.B.4.1.3. and II.B.4.4. to drive fuel out of one tank first, when vehicles are equipped with dual fuel tanks, does not reflect current practice because such vehicles may not be designed with selectable, or isolatable, systems. Such vehicles should not be subject to the existing requirement. Accordingly, new language to clarify the applicability of the requirement was added to sections II.B.4.1.3. and II.B.4.4.

2. Language was added to section II.B.4.1.3.3. to clarify that the optional canister bench purge step can be performed either during the initial soak period specified in 40 CFR §86.132-96(c)(1), as incorporated by reference, or after the vehicle preconditioning step, specified in section II.B.4.1.

3. To ensure that the effective dates of the amended test procedures will not disrupt certification or testing schedules, staff proposed to delay the applicability of the amendments from the 2011 model year until the 2012 model year. Accordingly, sections that referred to “2011 and subsequent Model Years” were changed to “2012 and subsequent Model Years.” Furthermore, the sections that stated a manufacturer may elect to use these provisions to certify a 2009 or 2010 model year vehicle were changed to 2009 through 2011 Model Year vehicles.

E. Modifications to the “California Certification and Installation Procedures for Off-Vehicle Charge Capable Conversion Systems for 2000 and Subsequent Year Hybrid Electric Vehicles,” Incorporated by Reference in California Code of Regulations Section 2032

Section 5(a) of the Certification and Installation Procedures was clarified by explicitly specifying the dates that the “California Exhaust Emission Standards and Test Procedures for 2005 Through 2008 Model Zero-Emission Vehicles and 2001 Through 2010 Hybrid Electric Vehicles in the Passenger Car, Light-Duty Truck, and Medium-Duty Vehicle Classes,” the “California Exhaust Emission Standards and Test Procedures for 2009 and Subsequent Model Zero-Emission Vehicles and Hybrid Electric Vehicles in the Passenger Car, Light-Duty Truck, and Medium-Duty Vehicle Classes,” the “California Evaporative Emission Standards and Test Procedures for 2001 and Subsequent Model Motor Vehicles,” and the “California Refueling Emission Standards and Test Procedures for 2001 and Subsequent Model Motor Vehicles,” were last amended.

Staff also made minor, non-substantive modifications throughout the above test and certification procedures to provide additional clarity.

IV. MODIFICATIONS MADE SUBSEQUENT TO THE SECOND 15-DAY PUBLIC COMMENT PERIOD

A. Modifications to the Test Procedure as Renamed and Incorporated by Reference, "California Exhaust Emission Standards and Test Procedures for 2009 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 California Code of Regulations Section 1962

1. Section F.5.1.7 was changed for typographical error correction. "Charging" was changed to "charge". ---B(4)29

2. Section F.5.2.1 was changed for typographical correction. "Each" was added. ---B(4)31

3. Section F.6.2.2.8 was changed to make a correction. Up to "two" was changed to "three". This change corrects staff's oversight – staff's intent was that the number of highway emission tests that can satisfy the SOC criterion be consistent the number of tests specified with section F.6.3.3.1(ii) (three emission measurement HFEDs), but inadvertently specified only two tests. Staff has accordingly modified this section to clarify its intent to maintain consistency with section F.6.3.3.1(ii).---B(4)34

4. Section F.7.1.2.1 was changed for clarification. Two sentences were combined so that the condition "for vehicles that allow manual activation of the auxiliary power unit" applies to the second sentence. ---B(4)35

5. Section F.7.3.2.1 was changed for clarification. Two sentences were combined so that the condition "for vehicles that allow manual activation of the auxiliary power unit" applies to the second sentence. ---B(4)36

6. Section F.7.4.4.1(i) of the HEV TPs, the last part of the first full sentence is redundant. The criterion in F.10 is always performed at the end of the test as identified in Section F.7.4.4.1. The phrase "at the end of the SC03 emission test" should be deleted as noted in the first 15-day change since it is not necessary. In addition, the second full sentence was not completely crossed out. The remaining part of the sentence is now removed. Previous changes to this section were made to be consistent with section E.8.4.4.1. The phrase that is deleted does not exist in section E.8.4.4.1. This section was also clarified to indicate that the engine needed to be turned off as well.

   This section should read as follows:

F.7.4.4.1 Amend subparagraph (d)(10): At the conclusion of the SC03 emission test, one of the following conditions shall apply:.

(i) For vehicles that do not allow the auxiliary power unit to be manually activated and are charge-sustaining over the SC03 test, record the battery state-of-charge to determine if the SOC criterion in section F.10 is satisfied ~~at the end of the SC03 emission test. If the SOC criterion is satisfied at the end of the SC03 emission test~~. If the SOC criterion is not satisfied , then turn off the vehicle and the cooling fan(s), allow the vehicle to soak in the ambient conditions of paragraph (c)(5) of this section for 10 ± 1 minutes, and repeat the dynamometer test run from subparagraph (d). ~~A total of two~~ Up to three SC03 emission tests shall be attempted to satisfy the SOC criterion.

7. Section F.7.4.4.1 was changed for correction. Section F.7.4.4.1 (ii) was deleted. Section F.7.4.4.1 (iii) was changed to F.7.4.4.1 (ii). ---B(4)37

8. Section E.8.1.2.1 was modified to clarify how to set battery state-of-charge for vehicles that allow manual activation of the auxiliary power unit. This is a non-substantive change as it deletes extraneous language that is already contained in the two subparagraphs below, and therefore helps clarify this provision. B(4)17

9. Section F.8 was changed – A period and a comma should be deleted. These are typographical corrections. This is not from a comment.

10. Section F.8 was changed for clarification. “charge depleting” was added in the third paragraph. ---B(4)39

11. Section F.11.13 was changed for a typographical correction. EFR_u is changed to ERF_u ---B(4)45

12. The fourth box in test sequence chart in Section G was changed for a typographical error. “CD” was changed to “CS”. This is not from a comment.

V. SUMMARY OF COMMENTS AND AGENCY RESPONSE

The ARB received 149 written comment letters or oral testimony during the 45-day comment period in response to the December 5, 2008 public hearing notice, and 162 written comments or oral testimony in response to the notice of continued hearing posted on April 17, 2009.

Four written comment letters were received during the first 15-day comment period in response to the notice of proposed modified text made available for comment on August 28, 2009. Two written comment letters were received during the second 15-day comment period in response to the notice of proposed modified text made available for comment on November 2, 2009. Listed below are persons and organizations that submitted comments.

During the 45-day comment period, the ARB received the following written comments:

Name	**Affiliation**
Adams, Dottie	Green Motors (Green Motors)
Adams, Krista	Private Citizen (K. Adams)
Adelman, Kim	Plug-In Conversions Corporation (Plug-In Conversions)
Allegra, Angela	Private Citizen (A. Allegra)
Allen, Liane	Private Citizen (L. Allen)
Atherton, Warren	Private Citizen (W. Atherton)
Bartosik, Mark	Private Citizen (M. Bartosik)
Bassett, Ruth	Private Citizen (R. Bassett)
Beard, Philip	Sonoma County GoLocal Cooperative (Sonoma GoLocal)
Bell, Daniel	Energy Efficiency Retrofitting (Energy Efficiency)
Blachman, Susan	Private Citizen (S. Blachman)
Black, Linda	Private Citizen (L. Black)
Bradford, Victor	Private Citizen (V. Bradford)
Brown, Judith	Private Citizen (J. Brown)
Buoye, Tom	Private Citizen (T. Buoye)
Burnette, Andrew	InfoWedge (InfoWedge)
Cederlind, Nicholas	Private Citizen (N. Cederlind)
Chang, Tommy	American Honda Motor Company (Honda)
Chang, Tommy	American Honda Motor Company (Honda)
Cox, Mike	Private Citizen (M. Cox)
Cusoe-White, Utaw	Private Citizen (U. Cusoe-White)
Dailey, Andrew	Private Citizen (A. Dailey)
Daniel, Erin	Private Citizen (E. Daniel)
Darr, Curtis	Private Citizen (C. Darr)
DeSando, Michele	Private Citizen (M. DeSando)

Name	Affiliation
DeWitte, Neil	Private Citizen (N. DeWitte)
Doney, Shelia	Private Citizen (S. Doney)
Dorosin, Leslie	Private Citizen (L. Dorosin)
Eshelman, Christopher	UMC (UMC)
Ewert, Chris	Ewert Energy Systems (Ewert Energy)
Fay, Glenn	Private Citizen (G. Fay)
Fingerman, Kevin	Private Citizen (K. Fingerman)
Foster, David	Private Citizen (D. Foster)
Foster, Stephen	Private Citizen (S. Foster)
Franks, Micah	Private Citizen (M. Franks)
Friedland, Jay	Plug In America (PIA)
Galcher, Leo	Private Citizen (L. Galcher)
Gendreau, Edouard	Private Citizen (E. Gendreau)
Gillis, Don	Private Citizen (D. Gillis)
Goggins, Alan	Private Citizen (A. Goggins)
Gold, Benjamin Ph.D.	Private Citizen (B. Gold)
Gooch, Debra	Private Citizen (D. Gooch)
Gore, Kay	Private Citizen (K. Gore)
Grove, Karen	Private Citizen (K. Grove)
Guldenbrein, Ross	Private Citizen (R. Guldenbrein)
Gulick, Allen	Private Citizen (A. Gulick)
Guzyk, Paul	3Prong Power, Inc. (3Prong Power)
Haima, Christopher	Private Citizen (C. Haima)
Hamilton, Christopher	Private Citizen (C. Hamilton)
Hamilton, F	Private Citizen (F. Hamilton)
Hamson, Michael	Private Citizen (M. Hamson)
Haralabatos, Irene	Private Citizen (I. Haralabatos)
Hardy, Melissa	Private Citizen (M. Hardy)
Jackson, Holly	Private Citizen (H. Jackson)
Jansen, Sherry	Private Citizen (S. Jansen)
Jester, Brad	Private Citizen (B. Jester)
John, Frank	Private Citizen (F. John)
Jones, Ben	Private Citizen (B. Jones)
Katz, Russell	Private Citizen (R. Katz)
Kenny, Peggy	Private Citizen (P. Kenny)
Koumanis, James	Private Citizen (J. Koumanis)
Kraemer, Susan	Private Citizen (S. Kraemer)
Kravitz, Jules	Private Citizen (J. Kravitz)
Krupnick, Jeff	Private Citizen (J. Krupnick)
Kydd, Paul	Partnerships 1, Inc. (Partnerships 1)

Name	Affiliation
Lang, Gillis	Private Citizen (G. Lang)
Lee, Jacob	Private Citizen (J. Lee)
Lenox, Carl	Private Citizen (C. Lenox)
Letovsky, Howard	Private Citizen (H. Letovsky)
Levin, Ross	Private Citizen (R. Levin)
Lipof, Carol	Private Citizen (C. Lipof) 3Prong Power, Inc. (3Prong Power)
Mack, Haley	Private Citizen (H. Mack)
Malone, Ann	Private Citizen (A. Malone)
Malone, Paul	Private Citizen (P. Malone)
Mas, Jeanette	Private Citizen (J. Mas)
Masia, Seth	Private Citizen (S. Masia, Solar Today Magazine)
Matos, Jorge	Private Citizen (J. Matos)
May, Andrew	Private Citizen (A. May)
McKinnon, Joel	Private Citizen (J. McKinnon)
Meyer, Cathy	Private Citizen (C. Meyer)
Meyer, Troy	Private Citizen (T. Meyer)
Michon, Marc	Private Citizen (M. Michon)
Miron, C.	Private Citizen (C. Miron)
Moss, Eugene	Private Citizen (E. Moss)
Nagler, Michael	Private Citizen (M. Nagler)
Nahser-Ringer, Erich	Private Citizen (E. Nahser-Ringer)
Nunez, Albert	Private Citizen (A. Nunez)
Overby, Darren	Private Citizen (D. Overby)
Patterson, Michelle	Private Citizen (M. Patterson)
Pelletier, Christian	Private Citizen (C. Pelletier)
Phelan, Daniel	Private Citizen (D. Phelan)
Pietras, Chris	Private Citizen (C. Pietras)
Protheroe, Charles	Private Citizen (C. Protheroe)
Protheroe, Robb	Plug-In Supply, Inc. (Plug-In Supply)
Protheroe, Robb	Plug-In Supply, Inc. (Plug-In Supply)
Quong, Spencer	Union of Concerned Scientists (UCS), Coalition for Clean Air (CCA), Friends of the Earth (FE), Energy Independence Now (EIN), Environment California (Env. Ca.) Center for Energy Efficiency and Renewable Technologies (CEERT)
Realivasquez, Ryan	Private Citizen (R. Realivasquez)
Rieley, James	Private Citizen (J. Rieley)
Rings, Matthew	Private Citizen (M. Rings)
Robbeloth, Greg	Private Citizen (G. Robbeloth)
Rosselli, John	Private Citizen (J. Rosselli)
Rota, Stefano	Private Citizen (S. Rota)
Rust, Tom	Private Citizen (T. Rust)

Name	Affiliation
Ryan, Rob	Private Citizen (R. Ryan)
Serotkin, David	Private Citizen (D. Serotkin)
Shechter, Jordan	Private Citizen (J. Shechter)
Sherwood, Daniel	3Prong Power, Inc. (3Prong Power)
Siegel, A	Private Citizen (A. Siegel)
Solomon, Shelby	Private Citizen (S. Solomon)
Spaiser, Leslie	Private Citizen (L. Spaiser)
Spivey, Edward	Private Citizen (E. Spivey)
Spivey, Edward	Private Citizen (E. Spivey)
Stacey, Tom	Private Citizen (T. Stacey)
Stevens, Gregory	Private Citizen (G. Stevens)
Stewart, Neely	Private Citizen (N. Stewart)
Stoll, Kevin	Private Citizen (K. Stoll)
Stoll, Rita	Private Citizen (R. Stoll)
Swenson, Eric	Private Citizen (E. Swenson)
Tellez, Michelle	Private Citizen (M. Tellez)
Titus, Jason	Private Citizen (J. Titus)
Trueblood, Cindy	Private Citizen (C. Trueblood)
Tuttle, Jack	Private Citizen (J. Tuttle)
Wallerstein, Barry	South Coast Air Quality Management District (SCAQMD)
Warfel, Gary	Private Citizen (G. Warfel)
Washburn, Bill	Private Citizen (B. Washburn)
Wayne, Gary	Private Citizen (G. Wayne)
White, Chuck	Private Citizen (C. White)
White, John	Private Citizen (J. White)
Williams, David	Private Citizen (D. Williams)
Woodruff, Steve	Private Citizen (S. Woodruff)
Woodson, Bill	Private Citizen (B. Woodson)
Zander, Susan	Private Citizen (S. Zander)
Zerboni, Perla	Private Citizen (P. Zerboni)

At the January 22, 2009, Board meeting, the ARB received the following written or oral comments:

Name	Affiliation	Written Comments	Oral Testimony
Burnette, Andrew	Private Citizen (A. Burnette) InfoWedge (InfoWedge)	No	Yes
Chang, Tommy	American Honda Motor Company (Honda)	No	Yes
Choudhary, Sanjeev	A123 Systems (A123)	Yes	Yes
Douglas, Steven	Alliance of Automobile Manufacturers (Alliance)	Yes	Yes
Guzyk, Paul	3Prong Power, Inc. (3Prong Power)	No	Yes

Name	Affiliation	Written Comments	Oral Testimony
Hatfield, Richard	KillaCycle (KillaCycle), & Alliance Renewable Energy (Alliance Renewable Energy) & California Cars Initiative (CalCars)	No	Yes
Huberty, Patrick	Gold Peak Industries (Gold Peak) & Plug-In Conversions Corp. (Plug-In Conversions)	Yes	Yes
Jones, Ben	Plug-In Supply, Inc. (Plug-In Supply, B. Jones)	No	Yes
Kulik, Ed	Ford Motor Company (Ford)	No	Yes
Kydd, Paul	Partnerships 1, Inc. (Partnerships 1)	Yes	Yes
Protheroe, Charles	Plug-In Supply, Inc. (Plug-In Supply)	No	Yes
Protheroe, Robb	Plug-In Supply, Inc. (Plug-In Supply)	Yes	Yes
Quong, Spencer	Union of Concerned Scientists (UCS)	No	Yes
Reisinger, Randy	California Cars Initiative (CalCars)	Yes	Yes
Schultz, Marston	Private Citizen (M. Schultz)	No	Yes
Sherwood, Daniel	3Prong Power, Inc. (3Prong Power)	No	Yes
Trombly, Jeanne	Plug-In America (PIA)	No	Yes

During the reopening of the comment period prior to the May Continuation Board Hearing, the ARB received the following written comments:

Name	Affiliation
Barna, Melanie	Private Citizen (M. Barna)
Baum, Elmer	Private Citizen (E. Baum)
Bender, Michael	Private Citizen (M. Bender)
Brown, Russell	Private Citizen (R. Brown)
Carpenter, Novella	Private Citizen (N. Carpenter)
Cederlind, Nicholas	Private Citizen (N. Cederlind)
Chau, Kiet	(Form Letter1) See Form Letter List Below
Chiacos, Michael	Community Environmental Council (Comm. Environmental) Private Citizen (M. Chiacos)
Davis, Taylor	Private Citizen (T. Davis)
Douglas, Steven	Alliance of Automobile Manufacturer (Alliance)
Gaydos, Gerry	(Form Letter2) See Form Letter List Below
Gerber, Gary	Sun Light & Power (Sun Light & Power) Private Citizen (G. Gerber)
Gremban, Ronald	California Cars Initiative (CalCars)
Harris, Zakiya	Private Citizen (Z. Harris)
Henry, William	Private Citizen (W. Henry)
Hill, David	Private Citizen (Hill)
Jones, Ben	Plug-In Supply, Inc. (Plug-In Supply)
Knapp, Jamie	Union of Concerned Scientists (UCS), American Lung Association (ALA), Coalition for Clean Air (CCA), Center for Energy Efficiency and Renewable Technologies (CEERT)
Kuchinski, Frank	Poulsen Hybrid, LLC (Poulsen Hybrid)
Kulik, Ed	Ford Motor Company (Ford)
Lincer, David	Private Citizen (D. Lincer)
Lord, Michael	Toyota Motor Engineering & Manufacturing (Toyota)
Neff, Fred	Private Citizen (F. Neff)

Name	Affiliation
Nicholls, Barry	Private Citizen (B. Nicholls)
Nordman, Lisa	Private Citizen (L. Nordman)
Peteet, Peter	Private Citizen (P. Peteet)
Protheroe, Chuck	Plug-In Hybrid Industry Association (PHEVIA)
Protheroe, Robb	Plug-In Supply, Inc. (Plug-In Supply)
Rentsch, Patrick	Private Citizen (P. Rentsch)
Rentsch, Tim	Private Citizen (T.Rentsch)
Rieley, James	Private Citizen (J. Rieley)
Rieley, James	Private Citizen (J. Rieley)
Rock, Gonzo	Private Citizen (G. Rock)
Rollins, Edward	Private Citizen (E. Rollins)
Schafer, Marvin	Private Citizen (M. Schafer)
Schilling, Wesley W	Private Citizen (W. Schilling)
Schultz, Marston	Private Citizen (M. Schultz)
Schwahn, Ingram	Private Citizen (I. Schwahn)
Sherwood, Daniel	3Prong Power, Inc. (3Prong Power)
Sinz, Peter	Private Citizen (P. Sinz)
Vasquez, Rose	Private Citizen (R. Vasquez)
Weverstad, Alan	General Motors (GM)
Woo, Jean	Private Citizen (J. Woo)
Woodruff, Steve	Private Citizen (S. Woodruff)

List of form letters submitted during the reopening of the comment period.

Reference	Topic	Number of Letters
Form Letter1	Increase tier 1 limits	106
Form Letter2	Testing requirements for PHEV conversions	2

At the May 28, 2009, Board meeting, the ARB received the following written or oral comments:

Name	Affiliation	Written Comments	Oral Testimony
Carmichael, Tim	Coalition for Clean Air (CCA)	No	Yes
Holmes-Gen, Bonnie	American Lung Association (ALA)	No	Yes
Goldman, Les	A123 Systems (A123)	Yes	Yes
Gremban, Ronald	California Cars Initiative (CalCars)	Yes	Yes
Guzyk, Paul	3Prong Power, Inc. (3Prong Power)	No	Yes
Jones, Ben	Plug-In Supply, Inc. (Plug-In Supply)	No	Yes
Protheroe, Charles	Plug-In Hybrid Industry Association (PHEVIA)	No	Yes
Protheroe, Robb	Plug-In Supply, Inc. (Plug-In Supply)	No	Yes
Shears, John	Center for Energy Efficiency and Renewable Technologies (CEERT)	No	Yes
Sherwood, Daniel	3Prong Power, Inc. (3Prong Power)	No	Yes
White, John	A123 Systems (A123)	Yes	Yes

The ARB received the following written comments on the modifications or additional supporting information during the first 15-day comment period.

Name	Affiliation
Bailey, Michael	Private Citizen (M. Bailey)
Chang, Tommy	American Honda Motor Company (Honda)
Douglas, Steve	Alliance of Automobile Manufacturers (Alliance)
Korthof, Doug	Private Citizen (D. Korthof)

The ARB received the following written comments on the modifications or additional supporting information during the second 15-day comment period.

Name	Affiliation
Chang, Tommy	American Honda Motor Company (Honda)
Douglas, Steve	Alliance of Automobile Manufacturers (Alliance)

Set forth below is a summary of each objection or recommendation made regarding the specific regulatory action proposed, together with an explanation of how the proposed action was changed to accommodate each objection or recommendation, or the reasons for making no change. The comments have been grouped by topic whenever possible. Comments not involving objections or recommendations specifically directed toward the rulemaking or to the procedures followed by the ARB in this rulemaking are not included.

The comments are summarized below into five subsections: (A) General Comments, (B) Exhaust Emissions Test Procedure Related Comments, (C) Evaporative Emissions Test Procedure Comments, (D) Onboard Refueling and Vapor Recovery Test Procedure Comments, and (E) Aftermarket Conversion Systems Related Comments.

A. General or Overarching Comments Relating to All Proposed Modifications

(1) Written general or overarching comments during the 45 day comment period

A(1)1. Comment: "I am so pleased that California has initiated such an innovative plan with their partnership with Better Place." (S. Jensen)

Agency Response: This rulemaking action was not enacted by ARB in conjunction with "Better Place."

A(1)2. Comment: "I urge you to carefully consider taking any steps that would halt the adoption of the plug-in technology." (M. DeSando)

Agency Response: The portion of this rulemaking regarding certification requirements for plug-in hybrid vehicle conversion kits is necessary, because it establishes the procedures that allow conversion system manufacturers to legally sell such conversion kits in California. Without these procedures, these conversion kits cannot legally be sold in the State. Furthermore, the certification requirements now include a tiered certification process to ease manufacturer's burdens of the certification process.

A(1)3. Comment: The AQMD supports ARB's efforts to streamline the proposed plug-in hybrid electric vehicle test procedures and its aftermarket parts certification requirements. Amending the emission test procedures to appropriately address PHEV testing is an important step to provide certainty to automakers finalizing PHEV design and production plans to commercialize near-zero emission vehicles that can qualify for enhanced AT-PZEV credit provided in the recently adopted ZEV regulation. (SCAQMD)

Agency Response: The Agency welcomes SCAQMD's support of this rulemaking action.

A(1)4. Comment: "Given that hybrid systems are relatively new and especially, with plug-in systems, we recommend that the CARB Board include in its resolution for staff to conduct a review of the test procedures, perhaps every three years and report back to the CARB Board on any necessary amendments." (SCAQMD)

Agency Response: Staff will continue to monitor the appropriateness of the PHEV test procedures and revise them as needed to ensure that they accurately measure the exhaust and evaporative emissions and zero-emission range from PHEVs and fuel cell vehicles.

(2) Written and verbal general or overarching comments from the January Board Hearing

No general comments submitted during this time.

(3) Written general or overarching comments during the first 15 day comment period

A(3)1. Comment: The regulations will prevent PHEVs from being introduced into the market. (D. Korthof)

Agency Response: See Agency Response to Comment A(1)2.

A(3)2. Comment: The test procedure and certification amendments are balanced and fair. They allow economic growth and balance the environmental benefits. (M. Bailey)

Agency Response: The Board appreciates this supportive comment.

B. Exhaust Emissions Test Procedure Comments

(1) Written comments received during the 45 day comment period

B(1)1. Comment: "Overall, we support the new exhaust test procedures and feel that they are a good first step at measuring the emissions of the plug-in hybrid vehicles (PHEVs). However, at this time, the accuracy and consistency of the procedures cannot be confirmed because no major automotive company has produced a PHEV for testing. Furthermore, because other organizations, such as the Society of Automotive Engineers (SAE) and US Environmental Protection Agency, have yet to finalize their hybrid vehicle test procedures, there may be a lack of uniformity between the procedures which may lead to inconsistent results and increased testing costs. For these reasons, we strongly recommend that the Board approve the Hybrid Exhaust Test Procedures portion of the regulation, but have the staff report back to the Board within three years on their effectiveness and accuracy. The future appraisal should also include an evaluation of the Evaporative Test Procedures, and the proposed shortened All-Electric Range Determination Test Procedures (SAE J2572) using actual test data from hydrogen fuel cell vehicles." (UCS, CCA, FE, EIN, Env. Ca., CEERT)

Agency Response: No modifications were made in response to this comment. Staff will continue to monitor the appropriateness of the PHEV test procedures and revise them as needed to ensure that they accurately measure the exhaust and evaporative emissions and zero-emission range from PHEVs and fuel cell vehicles.

B(1)2. Comment: The commenter recommends replacing the term "All-Electric Range" with "ZEV Range" in Appendix D Sections 3.1.2 and 3.2.2 to avoid confusion and be consistent with Section 1962.1 of the ZEV Regulation. (Honda)

Agency Response: No modifications were made in response to this comment. The term "All-Electric Range" is the terminology used throughout the hybrid test procedures. Changing the terminology used in these two sections alone would create inconsistencies within the test procedure. Furthermore, staff believes that using two different terminologies to mean the same thing would create confusion to the reader.

B(1)3. Comment: The commenter recommends deleting R_{cda} from table used to determine Zero Emission PZEV Allowance (Appendix D Section 3.3(a)) and using $EAER_u$ consistently in the left column. (Honda)

Agency Response: No modifications were made in response to this comment. This comment is directed to a modification of the ZEV regulation's PHEV VMT allowance determination methodology and is therefore beyond the scope of this rulemaking**.**

B(1)4. Comment: The commenter wants to understand the Agency's rationale behind the change of the VMT allowance EAER. In the December 5, 2008 version, for Rcda > 40 miles, the VMT PZEV Allowance became $EAER_u$ instead of a fixed value at $EAER_{40}$ as in the October 2008 version. (Honda)

Agency Response: The Agency has modified this section in response to this comment. The omission of the subscript "40" was an editing error; staff needed to insert the subscript "u" to identify that the value came from the urban test cycle. $EAER_{u40}$ is the correct expression in the last row of the VMT allowance table. $EAER_{u40}$ is affixed value of 40 miles only in the case of non-blended PHEVs.

B(1)5. Comment: The commenter wants to understand how the cap for $EAER_{u40}/29.63$ was determined. (Honda)

Agency Response: The cap for $EAER_{u40}/29.63$ was established as part of another rulemaking (ZEV rulemaking), so this comment is directed to an issue that is beyond the scope of this rulemaking**.**

B(1)6. Comment: How was the equation for $EAER_u$ x $(1-UF_{Rcda})/$~~14.6~~ 11.028 determined. (Honda)

Agency Response: This equation is contained in the ZEV regulation's VMT allowance determination methodology, and was established as part of another rulemaking (ZEV rulemaking), so this comment is directed to an issue that is beyond the scope of this rulemaking**.**

B(1)7. Comment: Regarding Appendix D, Page F-17, Section 8, 50'F and 20'F Test Provision, should the terminology be "urban charge sustaining range test" or "urban charge sustaining test" as defined in Section F.5? (Honda)

Agency Response: Staff has clarified the language in the first 15-day public comment period. The correct terms are "urban charge depleting range test" and "urban charge sustaining emission test," respectively.

B(1)8. Comment: Regarding Appendix D, Page F-17, Section 8, 50'F and 20'F Test Provision, should it be "urban charge depleting range test" or "urban charge sustaining test" as defined in Section F.5? (Honda)

Agency Response: Staff has clarified the language in the first 15-day public comment period. The correct terms are "urban charge depleting range test" and "urban charge sustaining emission test," respectively.

(2) Written comments and verbal exhaust comments from the January Board Hearing

General

B(2)1. Comment: The PHEV test procedures should be reviewed in three years. The review should include testing of the shortened plug and testing of shortened hydrogen fuel cell zero emission range procedure using actual fuel cell vehicles. (UCS)

Agency Response: No modifications were made in response to this comment. Staff will continue to monitor the appropriateness of the PHEV test procedures and revise them as needed to ensure that they accurately measure the exhaust and evaporative emissions and zero-emission range from PHEVs and fuel cell vehicles.

Data Measuring and Reporting

B(2)2. Comment: ARB should eliminate specific data measuring and reporting requirements that do not meet at least one of the following criteria: 1) Is the information absolutely necessary to certify the vehicle? 2) Is the information required on a consumer on a consumer information label?; 3) Is the information needed to determine ZEV credits? (Alliance, Ford)

Agency Response: No modifications were made in response to this comment. The data measuring and reporting requirements of this rulemaking specify information needed to determine impacts on greenhouse gases, the electric power grid, and assess the progress of the technology. In addition, the data requirements are consistent with current requirements for electric vehicles.

Urban and highway test provisions

B(2)3. Comment: Request an option for 50 degree NMOG testing and highway testing – use of good engineering judgment to determine our worst-case emissions mode and provide CARB with data under this mode and an engineering attestation of compliance. (Alliance)

Agency Response: No modifications were made in response to this comment. Currently there exists a high degree of uncertainty of emissions from PHEVs because there is not extensive test data from such vehicles. Therefore, testing of both charge depleting and charge sustaining modes of operation for the urban tests are required to determine the worse case mode used for the 50 degree test.

Charge sustaining test

B(2)4. Comment: The commenter recommends adjusting the criteria from 1% of fuel energy consumed to the maximum of either 1% of the fuel energy consumed or 1% of the nominal battery capacity. This proposal could be applied to all hybrids, not just PHEVs. (Alliance)

Agency Response: No modifications were made in response to this comment. In section F.10.1. of the test procedure, an alternative state-of-charge net tolerance may be used if shown to be technically necessary and if approved in advance by the Executive Officer of the Air Resources Board.

B(2)5. Comment: The ARB should reconsider the practicality of the state of charge limit for PHEVs (controlling the battery system to 1% of fuel energy) and whether there are opportunities to provide additional changes. (Ford)

Agency Response: No modifications were made in response to this comment. In section F.10.1. of the test procedure, an alternative state-of-charge net tolerance may be used if shown to be technically necessary and if approved in advance by the Executive Officer of the Air Resources Board.

Equivalent all electric range (EAER)

B(2)6. Comment: The rate of charge depletion should be determined over the FTP4 test cycle (or 2) and extrapolating EAER based on battery system capacity (engineering design specification for the range of charge depletion from full charge to charge-sustaining mode), as an option to a full range depletion test. (Alliance)

Agency Response: No modifications were made in response to this comment. The charge depleting rate may change for subsequent test cycles. Such examples have been found in converted Plug-in Hybrid Electric Vehicles.

B(2)7. Comment: The Agency should provide an option that would shorten the procedure for charge depleting test to only two test cycles (urban, highway and US06) so that the rate of charge depleting in these two cycles can be extrapolated to predict the results of full charge depleting tests. (Ford)

Agency Response: No modifications were made in response to this comment. The charge depleting rate may change for subsequent test cycles. Such examples have been found in converted Plug-in Hybrid Electric Vehicles.

Exhaust sampling/test procedure

B(2)8. Comment: The test procedures should be modified to allow the use of a bag mini diluter (BMD) in lieu of using the CVS system to dilute and sample exhaust from the vehicle. (Alliance)

Agency Response: Staff agrees and has accordingly modified the test procedures in the first 15-day modifications.

B(2)9. Comment: The plug-in hybrid exhaust test procedures are a good first step in measuring vehicle emissions. However, these procedures should be reviewed within three years due to the present lack of vehicles on which to test the accuracy and consistency of the procedures. (UCS)

Agency Response: No modifications were made in response to this comment. However, staff will test plug-in hybrid electric vehicles as they become available, and will consider updating the plug-in hybrid exhaust test procedures in future rulemaking actions.

FCV range test

B(2)10. Comment: The SAE J2572 test procedure should not be required for fuel cell vehicle range testing, but should instead be allowed as an option. (Alliance)

Agency Response: Staff has incorporated this comment in the fuel cell vehicle range test provisions.

V_{system} Definition

B(2)11. Comment: The definition for V_{system} should be modified to: Open circuit voltage (OCV) that corresponds to the SOC of the target SOC during charge sustaining operation. This definition is more consistent with the direction of the SAE J1711 committee: (Alliance)

Agency Response: Staff agrees and has incorporated this comment.

Zero Emission VMT Allowance

B(2)12. Comment: The commenter reemphasizes the prior comment that the zero emission VMT allowance table shown on Page C-1 of Appendix D could create an unlevel playing field. (Honda)

Agency Response: See the Agency Response to comments B(1)4 through B(1)6, which are incorporated herein.

(3) Written exhaust comments during the first 15 day comment period

B(3)1. Comment: Table of Contents: Does not list F.9 "Additional Provisions." Adding this would change subsequent numbering. Also, there are two entries for F.11 listed in the Table of Contents and one is not correct. (Alliance)

Agency Response: The Table of Contents has been modified to incorporate these comments.

B(3)2. Comment: Section B.1 Definitions: The definitions for "Alternate Continuous Urban Test Schedule" and the "Alternate Continuous Highway Test Schedule" list a sequence of pairs of emissions test, with extended soaks (0 – 30 minutes) on the second test. The intent is to run as many UDDS's or HWY's in a row with the normal 10 minute soak for the UDDS, and likewise 15 second idles for the highway test. These extended soaks should be infrequent, and due to facility limitations. However the language in these definitions requires the manufacturer to repeat the extended soak after each pair. The commenter recommends changing wording on both definitions to allow the insertion of these extended soaks as needed, (again) due to facility limitations, and not be required on a periodic (or pair) basis, and also recommends 10-30 minute soaks for the UDDS, and for the highway tests either a 0-30 minute soak or a 15 second idle. (Alliance)

Agency Response: A 10-20 minute key off soak is specified for the "Alternative Continuous Urban Test Schedule" after two UDDS with a 10 minute key-off soak in between. A 10-20 minute key off soak is specified for the "Alternative Continuous Highway Test Schedule" after every two HFEDS with a 15 second key-

on idle in between. Staff believes this provides sufficient testing flexibility to change drivers and reset test equipment.

B(3)3. Comment: Section B.1 Definitions: A new definition is needed for "Alternate Continuous US06 Test Schedule", which would complement the already defined "Continuous US06 Test Schedule" with the provision for extended soak periods (0-30 minutes) due to facility limitations. The commenter recommends 0-30 minute soaks or a 1-2 minute idle. (Alliance)

Agency Response: No modifications were made in response to this comment. This only applies to the optional US06 cold start range test in section F.7.5. Since this test does not require emission sampling, there should not be a facility limitation.

B(3)4. Comment: Section B.1 Definitions: The definition for "charge-depleting net energy consumption" for Ecd should be AC energy only for a level playing field perspective. This would then include parasitic losses in the DC charger like the customer will see. (Alliance)

Agency Response: No modifications were made in response to this comment. AC and DC energy measurements are AC and DC charge energy consumption.

B(3)5. Comment: Section 3.3 – Zero Emission VMT PZEV Allowance: The commenter seeks clarification on which utility factor will be used from SAE J2841, and recommends changing the last sentence of this sections as follows: "The *Fleet* Utility Factor (UF) based on the charge depleting actual range (Rcda) shall be determined according to SAE J2841 March 2009." (Alliance)

Agency Response: No change was made in response to this comment. Society of Automotive Engineers (SAE) J2841 establishes a Utility Factor curve based on US Department of Transportation (DOT) National Household Travel Survey (NHTS) data. In the ZEV regulation, ARB presently makes use of the curve data from this entire data set and not from one of its optional data sub sets (urban or highway). All of the data sets in this SAE Recommend Practice (RP) are collectively referred to as "Fleet" Utility Factors (Fleet UF, Fleet UF-Urban, Fleet UF-highway), even though the term "Fleet" is not included in the definitions section. For example, the entire Table 2 in this SAE RP is entitled "Fleet Utility Factor Tables" even though it includes the overall data table as well as the optional urban and highway subsets. For the purposes of calculations for the ZEV Regulation, continue to make use of the overall UF derived from the entire DOT dataset, and not one of the UFs based on optional subsets of this DOT NHTS data. These overall UFs are the ones described in the first 3 columns of Table 2, and the 2nd column of Table 3 of SAE J2841 MAR2009.

B(3)6. Comment: Section E – HEV Procedures: General comment – no 20 or 50 degree testing guidance language is needed. (Alliance)

Agency Response: Guidance for 20 to 50 degree testing is not included in Section E because there are no special requirements for hybrid electric vehicles, except for off-vehicle charge capable hybrid electric vehicles specified in section F.8.

B(3)7. Comment: Sections E.3.3 (b) and E.3.3 (d) – Recording Requirements: The commenter suggests exempting this DC energy measurement from manufacturer testing of in-use customer vehicles or saleable vehicle testing due to the invasive nature of the measurement, and suggests allowing alternative methods to the measurement of net DC energy if approved in advance by the Executive Officer of the Air Resources Board. (Alliance)

Agency Response: No modifications were made in response to this comment. Sections E.6. and F.5. currently allow alternative test procedures, if approved in advance by the Executive Officer of the Air Resources Board.

B(3)8. Comment: Section E.6.2.1: Regarding sampling particulates using filter method of primary plus back up. The current practice for this type of sampling has been to utilize single high efficiency filters for this sampling. This method was granted per an EPA Dear Manufacture letter (CCD-04-08 ttp://www.epa.gov/dis/display_file.jsp?docid=14262&flag=1) to utilize Heavy Duty regulations on Light Duty testing. The commenter believes that those methods described in Part 1065 of the CFR should be allowed, and prefers that these allowances be granted within the regulations prior to finalization. This will avoid further workload for all parties for later deviation or approval. (Alliance)

Agency Response: The staff has modified section E.6.2.1 to in response to this comment to allow manufacturers to use CFR Part 1065 as an alternate method for particulate measurement, since it has been approved by the US EPA.

B(3)9. Comment: The commenter suggests the following deletion from Section E.8.1.2.1, but not from the CFR preconditioning sequence of 86.132.00 (n). Section E.8.1.2.1.1 - US06 Vehicle Preconditioning: Commenter suggests deleting subparagraph (i) and replacing it with “If the hybrid electric vehicle is charge-sustaining over the US06, battery state-of-charge shall be set at the lowest level allowed by the manufacturer. The auxiliary power unit shall be manually activated at the beginning of and operated throughout the US06 preconditioning cycle.” (Alliance)

Agency Response: The staff has modified section E.8.1.2.1 to include 40 CFR §86.132-00 (n) (i) and (ii). Staff agrees that these are necessary preconditioning requirements.

B(3)10. Comment: The commenter suggests the following deletion from Section E.8.1.2.1, but not from the CFR preconditioning sequence of 86.132.00 (n). Section E.8.1.2.1.2 - US06 Vehicle Preconditioning: Commenter suggests deleting subparagraph (ii) and replacing it with “If the hybrid electric vehicle is charge-depleting over the US06, battery state-of-charge shall be set at the level recommended by the manufacturer for activating the auxiliary power unit when

operating in highway driving conditions. The auxiliary power unit shall be manually activated at the beginning of and operated throughout the US06 preconditioning cycle." (Alliance)

Agency Response: The staff has modified and restructured section E.8.1.2.1 and E.8.1.2.1.1 to include 40 CFR §86.132-00 (n) (i) and (ii). Staff agrees that these are necessary preconditioning requirements.

B(3)11. Comment: The commenter suggests the following deletion from Section E.8.3.2.1 but not from the CFR preconditioning sequence of 86.132.00 (o). Section E.8.3.2.1.1 – SC03 Vehicle Preconditioning: Commenter suggests deleting subparagraph (i) and replacing it with "If the hybrid electric vehicle is charge-sustaining over the SC03, battery state-of-charge shall be set at the lowest level allowed by the manufacturer. The auxiliary power unit shall be manually activated at the beginning of and operated throughout the SC03 preconditioning cycle." (Alliance)

Agency Response: The staff has modified and restructured section E.8.3.2.1 and 8.3.2.1.1 to include 40 CFR §86.132-00 (o) (i) and (ii). Staff agrees that these are necessary preconditioning requirements.

B(3)12. Comment: The commenter suggests the following deletion from Section E.8.3.2.1 but not from the CFR preconditioning sequence of 86.132.00 (o). Section E.8.3.2.1.2 – SC03 Vehicle Preconditioning: Commenter suggests deleting subparagraph (ii) and replacing it with "If the hybrid electric vehicle is charge-depleting over the SC03, battery state-of-charge shall be set at the level recommended by the manufacturer for activating the auxiliary power unit when operating in highway driving conditions. The auxiliary power unit shall be manually activated at the beginning of and operated throughout the SC03 preconditioning cycle." (Alliance)

Agency Response: The staff has modified and restructured section E.8.3.2.1 and 8.3.2.1.2 to include 40 CFR §86.132-00 (o) (i) and (ii). Staff agrees that these are necessary preconditioning requirements.

B(3)13. Comment: The commenter suggests adding the following new section because it is not possible to read the sample bags to determine if State-of-Charge criterion is met in either the 15 second idle between highway drive cycles or the 1-2 minute idles between the UC06 drive cycles: Section E.10: "Manufacturers need to be allowed to launch the next drive cycle in a test sequence (example, end of charge sustaining HWY emissions test) while they are determining the SOC (including bag reads) for the previous drive cycle, then abort out of this new drive cycle if not required by the test procedure." (Alliance)

Agency Response: This has not been a concern for hybrid electric vehicles. However for off-vehicle charge capable hybrid electric vehicles, staff added section F.9.6 to allow starting the next cycle while determining whether the SOC criterion

has been met. This cycle may be aborted if the SOC criterion has been met for a previous cycle.

B(3)14. Comment: Regarding Section F – PHEV Procedures, the mileage limit listed in the CFR such as 40CFR600.006-89(g)(3) & (4), which requires a downward adjustment to fuel economy for vehicles tested above 6,200 miles, needs to be raised on test vehicles due to the long test sequences (like charge depleting range tests). (Alliance)

Agency Response: No changes were made in response to this comment.

B(3)15. Comment: Regarding Section F – PHEV Procedures, the commenter believes that these are very complex test procedures for new vehicle technologies. There will be unforeseen issues as we implement the test procedures and learn about PHEV's. (Alliance)

Agency Response: Staff agrees that these are complex test procedures and appreciate the Alliance's perspective and comments..

B(3)16. Comment: Regarding Section F – PHEV Procedures, the commenter believes that they will need flexibility in the future such as relief on test validation criteria. Trying to run multiple charge depleting UDDS, HWY or US06 test cycles and pass the myriad of validation criteria, relevant or not, on every test will be a major hurdle. The commenter suggests looking at relaxed validation criteria (perhaps like that found in the heavy duty regulations Part 1065) where it won't impact the numbers generated. Another suggestion would be for the regulations not to require bag emissions analysis during electric only modes (measure zero). (Alliance)

Agency Response: No changes were made in response to this comment. Although ARB agrees in principle with this comment, at this time there is insufficient data to specify validation criteria. However, validation concerns may be submitted for ARB review and approval on a case by case basis as stated in section F.5. :Alternative procedures may be used if shown to yield equivalent results and if approved in advance by the Executive Officer of the Air Resources Board.

B(3)17. Comment: Regarding section F.3.1 (b) – Recording Requirements: The ARB should: 1) exempt the DC energy measurement from manufacturer testing of in-use customer vehicles or saleable vehicle testing due to the invasive nature of the measurement; and 2) allow alternative methods of measuring net DC energy if approved in advance by the Executive Officer of the Air Resources Board. (Alliance)

Agency Response: No modifications were made in response to this comment. DC net energy data is needed to do determine the net energy from the battery during testing and the energy efficiency of the electric drive system. This has been a long standing requirement for hybrid electric vehicles.

B(3)18. Comment: Regarding section F.3.1 (c) – Recording Requirements: The phrase "or charge sustaining" should be deleted from this requirement because

there is no requirement to measure energy from a charge sustaining test. This would require a full battery recharge after every charge sustaining test which was not illustrated in figure G2 (45 day notice) and is extremely burdensome to the test process. (Alliance)

Agency Response: No modifications were made in response to this comment. However, guidance on vehicle charging after testing is provided in sections F.5.4.2 (iii) and F.5.4.3 (iii), and illustrated in the revised test sequence in section G. The procedure requires charging after either the charge depleting test or after charge sustaining test. ARB believes the current language provides the manufacturers more testing flexibility.

B(3)19. Comment: Regarding section F.3.1 (c) – Recording Requirements: This requirement should include recording the AC wall energy while the charger is plugged in, and recommend that a manufacturer stop charging the vehicle from the wall AC energy source within 3 hours once full charge is obtained. (Alliance)

Agency Response: No modifications were made in response to this comment. Section F.5.4.2 (iii) provides guidance on charging. When to stop charging the vehicle after the vehicle reaches full charge is not specified at this time because the charge energy after the vehicle reaches full charge is considered minimal. The energy consumed to reach full charge (as determined by the manufacturer) shall be used for energy calculations.

B(3)20. Comment: Section F.3.1 (d) – Recording Requirements: The ARB should exempt this DC energy measurement from manufacturer testing of in-use customer vehicles or saleable vehicle testing due to the invasive nature of the measurement, and allow alternative methods to the measurement of net DC energy if approved in advance by the Executive Officer of the Air Resources Board. (Alliance)

Agency Response: No modifications were made in response to this comment. DC energy data is needed to do determine net DC energy to charge the battery and determine the efficiency of the electric drive system. This has been a long standing requirement for hybrid electric vehicles. ARB may consider alternative methods to measure net DC charge energy in future rulemakings.

B(3)21. Comment: Section F.3.1 (d) – Recording Requirements: The phrase “or charge sustaining” should be deleted from this requirement because there is no requirement to measure energy from a charge sustaining test. This would require a full battery recharge after every charge sustaining test which was not illustrated in figure G2 (45 day notice) and is extremely burdensome to the test process. (Alliance)

Agency Response: Staff added sections F.5.4.3 (iii) and F.5.4.4 to clarify the requirements for vehicle charging. F.3.1 (d) is the requirement to measure of DC energy after either the charge depleting test or the charge sustaining test to full charge since these two are considered equivalent. Refer to the revised test sequence in section G.

B(3)22. Comment: Section F.3.1 (d) – Recording Requirements: This requirement should include recording the AC wall energy while the charger is plugged in and recommend that the manufacturer stop charging the vehicle from the wall AC energy source within 3 hours once full charge is obtained. (Alliance)

Agency Response: No modifications were made in response to this comment. Section F.5.4.2 (iii) provides guidance on charging. When to stop charging the vehicle after the vehicle reaches full charge is not specified at this time because the charge energy after the vehicle reaches full charge is considered minimal. The energy consumed to reach full charge (as determined by the manufacturer) shall be used for energy calculations.

B(3)23. Comment: Section F.3.2 – Regenerative Breaking: Section F.3.1 or F.3.2 should be deleted from this requirement and replaced with "this section F", which would bring in the normal CFR tolerances. The commenter explains that there are no speed or time tolerances specified in either section F.3.1 or F.3.2. (Alliance)

Agency Response: Staff agrees and has modified section F.3.2 to specify CFR tolerances.

B(3)24. Comment: Section F.5 – UDDS: The commenter recommends deleting "and determine the operation mode for US06 and SC03 emissions tests" from the requirement in this section starting with "The sum of NMOG + NOx emissions shall…" because there is no charge depleting US06 or SC03 emissions test procedures, and the identified text contradicts specific language in F7.1, F.7.2, F.7.3 and F.7.4 requiring these tests to be run in charge sustaining mode. (Alliance)

Agency Response: Staff has amended section F.5 to clarify that the US06 and SC03 tests are charge sustaining tests.

B(3)25. Comment: Section F.5.2.1 – UDDS: The following sentence should be deleted because it is not executable and does not specify what voltage to recharge it to:

"If the energy required to charge the vehicle from urban charge sustaining operation to full charge is not equivalent (within ± 1% of the AC energy) to the energy required to charge the vehicle from highway charge sustaining operation to full charge, the vehicle must be recharged. If the energy required to charge the vehicle from urban charge sustaining operation to full charge is equivalent (within ± 1% of the AC energy) to the energy required to charge the vehicle from highway charge sustaining operation to full charge, the vehicle may be recharged."

The commenter suggests changing the language to require fully recharging the battery to determine the AC wall charge energy, which is needed for reporting purposes. Then depending on the next test sequence, the vehicle is either discharged for a charge sustaining test the next day or the full battery charge is maintained for a charge depleting test the next day. (Alliance)

Agency Response: Staff has revised the proposed test sequence in section G to was clarify the charging option. Staff has also modified section 5.2.1 and deleted the equivalency criterion. If the equivalency criterion is met based on previous development data and approved in advance by the Executive Officer of the Air Resources Board, then the charge option in section 6.3.2 (iii) may be omitted.

B(3)26. Comment: Section F.5.2.1: Regarding sampling particulates using filter method of primary plus back up. The current practice for this type of sampling has been to utilize single high efficiency filters for this sampling. This method was granted per an EPA Dear Manufacture letter (CCD-04-08 ttp://www.epa.gov/dis/display_file.jsp?docid=14262&flag=1) to utilize Heavy Duty regulations on Light Duty testing. The commenter believes that the methods described in Part 1065 of the CFR should be allowed, and prefers that these allowances be granted within the regulations prior to finalization. This will avoid further workload for all parties for later deviation or approval. (Alliance)

Agency Response: Staff has amended section F.5.2.1 to allow the usage of CFR Part 1065 methods as an alternate method for particulate measurement, since they have been approved by the US EPA.

B(3)27. Comment: Section F.5.4.3 – UDDS-CD: The commenter suggests adding to this section, "After the Urban charge depleting range test is completed, recharge the battery (per 5.4.2) to full charge and record the AC energy required to do this. If the next test sequence does not require a full battery charge, discharge the battery to the manufacturer specified nominal SOC for charge sustaining operation, using good engineering judgment." (Alliance)

Agency Response: Refer to the revised proposed test sequence in section G for clarification. Staff added sections F.5.4.2 (iii) and F.5.4.3 (iii) to clarify the requirements for vehicle charging.

B(3)28. Comment: Section F.5.5.1 – Calculations: The definition for "n" (= number of hot start UDDSs in Charge Depleting operation) in this requirement is inconsistent with the "n" definition in Sections F.5.4.3 (i) and F.5.6.1. The commenter suggests the definition be consistent with F.5.6.1 as follows:

> "n= number of hot start UDDSs in Charge Depleting operation If there are no charge depleting hot start cycles, then use the next hot start cycle (after the cold start cycle) in the test sequence for the purpose of determining hot start emissions. For this case (no charge depleting hot start cycle), the manufacturer may optionally add one additional hot start cycle for an n=2." (Alliance)

Agency Response: Staff modified section F.5.5.1, so that the definition for 'n' is consistent between sections F.5.4.3(i), F.5.5.1 and F.5.6.1.

B(3)29. Comment: In determining emissions for the UDDS charge depleting range test, sections F5.5.1 and F.5.6.1 treat different types of Off-Vehicle Charge Capable

Hybrid Electric Vehicles, namely PHEV's and Extended Range Electric Vehicle's (EREV)[2], inconsistently. EREV's do not get credited with zero emissions (EV) modes. A more technically accurate approach would be to utilize Utility Factor equations as defined in SAE committees, which weight emissions based on the fraction of miles traveled in charge depleting and charge sustaining modes. (Alliance)

Agency Response No modifications were made in response to this comment. ARB continues to believe that it is appropriate to consider the worst-case driving conditions for evaluation of criteria pollutants from internal combustion (IC) engines even though these do not provide real-life worst-case emissions data for malfunctioning engine systems. A more technically accurate approach for future PHEVs might also consider the inclusion of emissions impacts from malfunctioning IC engines that continue to be driven prior to repair, or that are continued to be driven but never repaired. It is not yet clear why a PHEV with significant all electric range would have fewer lifetime emissions when it's engine malfunctions than other types of PHEVs. At this point, ARB does not yet have the means to estimate future emissions from malfunctioning PHEVs, or any reason to believe that PHEVs with more electric range will necessarily have lower lifetime criteria emissions than those without electric range.

B(3)30. Comment: Section F.6 – HFEDS: In the paragraph beginning with "The third HFEDS of the Highway Charge Sustaining Test shall…", the commenter suggests replacing "As an option,…" with "At the manufacturers option,…" (Alliance)

Agency Response: Staff modified section F.6 to clarify that the option of two emission measurements only applies to testing by the manufacturer. ARB will perform one cold start HFED followed by three emission measurement HFEDSs.

B(3)31. Comment: Section F.6 – HFEDS: The commenter suggests using the same wording as section F.5 for choosing operation mode. " 'Vehicles with more than one mode of operation of the auxiliary power unit (e.g., economy mode, performance mode, etc.) for a given charge depleting or charge sustaining test cycle must be tested in the mode(s) which represents ~~maximum~~ the worst case emissions ~~of operation~~ of the auxiliary power unit. Confirmatory testing may also be performed in any mode of operation to ensure compliance with emission standards." (Alliance)

Agency Response: Staff modified Section F.6 to be consistent with section F.5 with regards to vehicle operation modes.

B(3)32. Comment: Section F.6.2 – HFEDS and Section F.6.3.4 (ii) – HFEDS-CS: The commenter is concerned that the requirement implies that it only applies to the charge sustaining highway emissions test sequence, and that the language does not differentiate between charge sustaining and charge depleting test sequences. The commenter requests that language in Section F.6.2 be changed to clarify the

[2] This is an industry term describing a particular one type of PHEV. These vehicles should not be confuses with Zero Emission Vehicles, such as Battery Electric or Fuel Cell Vehicles.

following issue: "Third HFEDSs", "HFEDS preconditioning cycle", "HFEDS emission measurement cycle", "HFEDS emission test, two highway emission tests". It is unclear whether the preconditioning cycle is included or not in these counts. Is it 3 HFEDS total including the preconditioning cycle? (Alliance)

Agency Response: Staff modified sections F.6.2.2.3 and F.6.3.4 (ii) to clarify that the highway charge sustaining emission test sequence includes a cold start HFEDS followed by three emission measurement HFEDSs. The manufacturer has the option to perform only two emission measurement HFEDSs; however, ARB will perform three emission measurement HFEDSs.

B(3)33. Comment: Section F.6.2 – HFEDS and Section F.6.3.4 (ii) – HFEDS-CS: The commenter is concerned that the requirement implies that only applies to the charge sustaining highway emissions test sequence, and that the language does not differentiate between charge sustaining and charge depleting test sequences. The commenter requests that language in Section F.6.2 be changed to clarify the following issue. If the answer to exhaust comment B(3)32 above is 3 HFEDS cycles total, then this is inconsistent with all previous HEV test procedures which have 4 HFEDS cycles, 1 prep + 3 emissions. Why are PHEV's being treated differently than HEV's as far as the number of cycles allowed to achieve SOC? They should be the same. (Alliance)

Agency Response: Staff modified sections F.6.2.2.3 and F.6.3.3 (ii) (previously F.6.3.4 (ii)) to clarify that the highway charge sustaining emission test sequence includes a cold start HFEDS followed by three emission measurement HFEDSs. The manufacturer has the option to perform only two emission measurement HFEDSs; however, ARB will perform three emission measurement HFEDSs.

B(3)34. Comment: Section F.6.2 – HFEDS and Section F.6.3.4 (ii) – HFEDS-CS: The commenter is concerned that the requirement implies that it only applies to the charge sustaining highway emissions test sequence, and that the language does not differentiate between charge sustaining and charge depleting test sequences. The commenter requests that language in Section F.6.2 be changed to clarify the following issue: Section 6.2.2.3 The paragraph "Three HFEDSs, separated by a 15 second key-on hot soak period…If the SOC criterion is not satisfied, the test shall be stopped, and sections F.6.2.2.2 and this section F.6.2.2.3 shall be repeated…" wording needs to be corrected because it just directs the reader to paragraphs F.6.2.2.2 and F.6.2.2.3 instead of the guidance past this point – F.6.2.2.4+. The paragraph is out of place in the test process, should be at the end. (Alliance)

Agency Response: : Staff accommodated the request. Staff modified sections F.6.2.2.3 and F.6.3.3 (ii) (previously F.6.3.4 (ii)) to clarify the highway charge sustaining emission test sequence and to provide guidance on repeating the test starting at section F.6.2.2.2, if the SOC criterion is not met.

B(3)35. Comment: Section F.6.2 – HFEDS and Section F.6.3.4 (ii) – HFEDS-CS: The commenter is concerned that the requirement implies that it only applies to the

charge sustaining highway emissions test sequence, and that the language does not differentiate between charge sustaining and charge depleting test sequences. The commenter requests that language in Section F.6.2 be changed to clarify the following issue: Section 6.2.2.8 gives guidance on when to end the multiple charge sustaining HFEDS test sequence, but is incorrect for a charge depleting test sequence. (Alliance)

Agency Response: : Staff accommodated the request. Staff modified sections F.6.2.2.3 and F.6.3.3 (ii) (previously F.6.3.4 (ii)) to clarify the highway charge sustaining emission test sequence and provide guidance on repeating the test starting at section F.6.2.2.2. if the SOC criterion is not met. Section F.6.3.2 was modified to clarify the charge depleting range test requirements.

B(3)36. Comment: Section F.6.3.3 – HFEDS-CD: The commenter is concerned regarding this requirement, which implies that manufacturers need to repeat a HWY charge sustaining test sequence (F.6.2.2 and F.6.2.3) if they fail the HWY charge depleting test battery recharge test criteria. The commenter suggests that the sentence starting with "If the energy required to charge the vehicle…" be replaced with guidance on performing at a full battery charge without the 1% comparison criterion on the urban charge depleting test sequence. The commenter suggests adding the following requirement: "After the highway charge depleting range test is completed, recharge the battery (per 6.3.2) to full charge and record the AC energy required to do this. If the next test sequence does not require a full battery charge, discharge the battery to the manufacturer specified nominal SOC for charge sustaining operation, using good engineering judgment." (Alliance)

Agency Response: Staff clarified a misunderstanding, i.e. meeting the 1% criterion is not a requirement to continue the test sequence, but an option to omit charging after highway charge depleting range test. Staff modified section F.6.3.2 (previously F.6.3.3) to give clear instructions on vehicle charge options after the highway charge depleting range test. Section G was modified to illustrate this clarification.

B(3)37. Comment: Section F.6.3.4 (ii) HFEDS-CS: The commenter believes that additional clarification is needed on this requirement, and states that the requirement should: 1) state that the third HFEDS cycle is to be used for emissions compliance determination (NOx); and 2) allow for a fourth HFEDS cycle (includes prep) to be consistent with the HEV regulation. (Alliance)

Agency Response: Staff accommodated the request. Staff modified section F.6.3.3. (ii) (previously F.6.3.4 (ii)) to clarify the test sequence. Staff specified the fourth HFEDS cycle including preconditioning (third emission measurement cycle) and provided an option to use the third HFEDS cycle if the SOC criterion is met.

B(3)38. Comment: Commenter suggests that the following requirement should be deleted because it is overly burdensome as it implies that a manufacturer must repeat the HWY charge depleting test sequence if it fails to achieve ±1% SOC for the HWY charge sustaining test sequence:

> "The vehicle must meet the SOC criterion in section F.10 for the third HFEDS. If the SOC criterion is not satisfied, the test shall be stopped, and sections F.6.3.2, F.6.3.3, and this section F.6.3.4 shall be repeated."

The commenter instead suggests allowing a fourth HFEDS cycle (like HEV procedures) to achieve the ±1% SOC. (Alliance)

Agency Response: Staff accommodated the request. Staff modified sections F.6.2.2.3 and F.6.3.3 (ii) (previously F.6.3.4 (ii)) to specify the fourth HFEDS cycle including preconditioning (third emission measurement cycle) in the highway charge sustaining emission test sequence and provide guidance on repeating the test if the SOC criterion is not met.

B(3)39. Comment: Section F.7 – SFTP: The following clause appears to contradict specific guidance in sections F.7.1 & F.7.2 (US06) and F.7.3 (SC03) to run both of these tests in charge sustaining mode only. This clause appears focused to HEVs and not PHEVs:

> "Hybrid electric vehicles with more than one mode of operation for a given charge depleting or charge sustaining test cycle must be tested in the mode(s) which represents maximum operation of the auxiliary power unit. Confirmatory testing may also be performed in any mode of operation to ensure compliance with emission standards." (Alliance)

Agency Response: Staff modified section F.7 to clarify the emissions worst case operating mode such as economy mode and performance mode. This applies to both HEVs and PHEVs.

B(3)40. Comment: Section F.7 – SFTP: The commenter also recommends changing the clause in exhaust comment B(3)39 to be for charge sustaining modes of operation only since this should represent maximum APU operation with most PHEV vehicles because there are no charge depleting emissions test procedures / equations / algorithms for US06 or SC03 test sequences. Adding these would be extremely burdensome to manufacturers on an already lengthy test process. (Alliance)

Agency Response: Staff clarified a misunderstanding. Staff modified section F.7 to clarify the mode of operation, which was intended to distinguish modes such as economy mode and performance mode, not charge sustaining mode as the commenter suggested.

B(3)41. Comment: Section F.7.1.2.1.1 – US06 Vehicle Preconditioning: Subparagraphs (i) and (ii) should not be deleted from the CFR preconditioning sequence of 86.132.00 (n) because the CFR provides guidance on warming up the vehicle between the last test element and the US06 test sequence, especially if this soak period is > 2 hours. This guidance will be needed especially given this complex test sequence where delays may be encountered. (Alliance)

Agency Response: Staff modified sections E.8.1 and F.7.1 to include subparagraphs (i) and (ii) in 40 CFR §86.132-00 (n). ARB agrees that these are necessary preconditioning requirements.

B(3)42. Comment: Section F.7.2.1 – US06: The following clause is recommended for inclusion in this section:

> "A preconditioning cycle shall not be used for emission calculations. The US06 cycle that meets the SOC criteria shall be used to calculate emissions." (Alliance)

Agency Response: Staff accommodated the request. Staff modified section F.7.2.1 to clarify the cycle after preconditioning cycle shall be used for emission measurement if it meets the SOC criterion.

B(3)43. Comment: Section F.7.3.2.1.1 – SC03 Vehicle Preconditioning: Regarding the deletion of subparagraphs (i) and (ii). Commenter believes that these subparagraphs should not be deleted from the CFR preconditioning sequence of 86.132.00 (o) because the CFR provides guidance on warming up the vehicle between the last test element and the SC03 test sequence, especially if this soak period is > 2 hours. This guidance will be needed with such a complex test sequence where delays may be encountered. (Alliance)

Agency Response: Section E.8.3 and F.7.3 were modified to include subparagraph (i) and (ii) in 40 CFR §86.132-00 (o). ARB agrees that these are necessary preconditioning requirements.

B(3)44. Comment: Section F.7.4.4.1 (ii) and (iii) – SC03: This charge depleting clause contradicts specific guidance in F.7.3 (SC03) to run both of these tests in charge sustaining mode only. This language appears focused to HEV's, not PHEV's. (Alliance)

Agency Response: No modifications were made in response to this comment. This language was intended to cover a variety of vehicle designs, especially those seen in early HEV development. A vehicle will fall under only one of the categories (i, ii, or iii) so only one test is required. Although anticipated vehicle designs will be charge sustaining over the SC03, if there is a vehicle design that is depleting over the SCO3, it will tested in that mode.

B(3)45. Comment: Section F.8 – 20 & 50°F UDDS: This section does not provide general guidance on the test process such as temperature to refuel at or recharge at. (Alliance)

Agency Response: Staff clarified section F.8 provide additional guidance regarding vehicle preconditioning for 20 & 50°F tes ting.

B(3)46. Comment: Section F.8.3 – 20 & 50°F UDDS-CD: The commente r requests the deletion of "… according to section F.5.1…" from the following sentence because the vehicles must be preconditioned at the same temperature they will be tested at (CFR requirement for 20°F cold testing). (Alliance)

> "If measurement of worst case emissions requires the urban charge depleting range test to be performed, the vehicle shall be preconditioned ~~according to section F.5.1~~ and fully charged…" (Alliance)

Agency Response: Staff modified section F.8 to provide necessary guidance on preconditioning for 20 & 50°F testing.

B(3)47. Comment: The commenter's exhaust comment (B(3)47 is also consistent with the deletion of this phrase from F.8.2. (Alliance)

Agency Response: Staff addressed the comment in the first 15-day Notice in which Section F.8.2 was modified. No further revision was necessary.

B(3)48. Comment: Section F.9 – Additional Provision: The following additional provisions are suggested to improve testing efficiency and feasibility:

(Non-executable) Manufacturers need to be allowed to launch the next drive cycle in a test sequence (example, end of charge sustaining HWY emissions test) while they are determining the SOC (including bag reads) for the previous drive cycle, then abort out of this new drive cycle if not required by the test procedure. (It is not possible to read the sample bags in the 15 second idle between highway drive cycles nor the 1 – 2 minute idles between the US06 drive cycles.) (Alliance)

Agency Response: Staff added section F.9.6 to allow manufacturers to start the next drive cycle while determining whether the SOC criterion has been met. This cycle may be aborted if the SOC criterion has been met for a previous cycle.

B(3)49. Comment: Section F.9 – Additional Provisions: The following provision is suggested to improve testing efficiency and feasibility:

Allow manufacturers not to collect emissions samples for those drive cycles where the vehicle starts the test sequence in a non-APU firing mode (i.e., battery only operation), and continues to stay in this non-APU firing mode (again, battery only operation) for the duration of whole drive cycles. During the actual test, the manufacturer must validate the engine did not fire for these cycles. (Alliance)

Agency Response: Staff accommodated the request. Staff modified sections F.5.4.2. (ii) and F.6.3.2 (ii) to provide guidance on collecting emissions samples only in APU firing mode.

B(3)50. Comment: Section F.9 – Additional Provisions: The following provision is suggested to improve testing efficiency and feasibility: Allow manufactures to run the

charge depleting tests (UDDS, HWY, US06 AER range test) in a charge depleting sequence to optimize the test process (Alliance)

Agency Response: No modifications were made in response to this comment. Section F.5 already allows the use of alternative procedures if shown to yield equivalent results and if approved in advance by the Executive Officer of the Air Resources Board. Refer to the revised proposed test sequence in section G.

B(3)51. Comment: Section F.9 – Additional Provisions: The following provision is suggested to improve testing efficiency and feasibility: Allow manufacturer to run an additional charge sustaining prep 12 – 36 hours before the required test. (Alliance)

Agency Response: No modifications were made as a result of this comment. However, changes were made in sections F.5.1, F.6.1, F.7.1, and F.7.3 to provide necessary guidance on vehicle preconditioning. Refer to the revised proposed test sequence in section G.

B(3)52. Comment: Section F.9 – Additional Provisions: The following provision is suggested to improve testing efficiency and feasibility: (Non-executable) Because of the longer testing distances involved with PHEV testing, allow manufacturers to refuel the vehicle if they have determined there is insufficient fuel to run the next test sequence (example, before charge depleting highway range test). In this case, perform a 40% fuel fill with the option to disconnect the canister during this fuel fill, do not do a canister load, and optionally can do a prep cycle (12 – 36 hours before the test). (Alliance)

Agency Response: Staff accommodated the request. Section F.9.7 was added to allow refueling (fuel drain and fill) or adding fuel between tests.

B(3)53. Comment: Section F.9 – Additional Provisions: The following provisions is suggested to improve testing efficiency and feasibility: ARB will test vehicles in the same manner as tested by the manufacturer with respect to options selected (since there are several testing options provided for the manufacturer). (Alliance)

Agency Response: No modifications were made in response to this comment. The existing procedures already allow alternative test sequences and options to minimize testing; however, ARB intends to test according to the test sequence in Section G without any options.

B(3)54. Comment: Section F.11.3 – Calculations: The terms Y_h and D_h are not defined as to which HFEDS schedule they are derived from, and that they should be the same HFEDS as that used for NOx emissions compliance (“third”). (Alliance)

Agency Response: The hot start HFEDS referred to in section F.11.3 is the HFEDS that meets the SOC criterion for the charge sustaining test. This cycle is used for both NOx and CO_2 charge sustaining emissions. This will be the second or third emission measurement HFEDS in the charge sustaining test.

B(3)55. Comment: Section F.11.5 – Calculations: The ARB should work with industry on a correction algorithm to account for frictional losses due to the charge depleting cold start test and correct the cold start charge depleting highway test for these losses. (Alliance)

Agency Response: No change was made in response to this comment; however, ARB may collaborate with industry to develop such a correction algorithm in future rulemaking actions.

B(3)56. Comment: Section F.11.7 – Calculations: The reference to DC electrical energy
should be deleted because Ecd should be AC (wall) charge energy only, which would include charger efficiencies and allow for a level playing field. (Alliance)

Agency Response: No modifications were made in response to this comment. Both AC and DC energy shall be reported, as currently required by the current Hybrid Electric Vehicle test procedures.

B(3)57. Comment: Section G – Test Sequence Figure – This section is missing. The commenter suggested the following test sequence for high level exhaust only:

1. Preconditioning (fuel drain & fill, 6 hour soak, Prep Cycle, 2nd fuel drain & fill. 12-36 hours cold soak w/ canister butane load & full battery charge)
2. Charge depleting UDDS Test
3. Cold Soak (12-36 hour) + full recharge
4. Cold charge depleting HWY Test
5. Cold Soak (12-36 hours) + full recharge
6. Charge depleting US06 Range Test (optional)
    a. If charge depleting US06 test is run, run prep cycle and cold soak 12-36 hours
    b. If US06 is not run, discharge battery during step 5 above
7. Cold charge sustaining HFEDS Test
8. Preconditioning (fuel drain & fill, 12-36 hours cold soak w/ canister butane load)
9. Charge sustaining UDDS Test
10. Charge sustaining US06 Test
11. Charge sustaining SC03 Test
12. Prep Cycle at 50°F, Cold Soak at 50°F (full cha rge if charge depleting test is next)
13. 50°F charge sustaining or charge depleting UDDS Test
14. 75°F cold weather fuel change, 20°F Cold Soak, 20° Prep Cycle, 20°F Cold soak (full charge if charge depleting test is next)
15. 20°F charge sustaining or charge depleting UDDS Test

(Note additional preps as needed and need some flexibility in sequence for optimizing purposes) (Alliance)

Agency Response: The Agency did not incorporate the suggested test sequence, but did revise the proposed test sequence in section G. The fuel drain

and fill requirement after the Urban Charge Sustaining test was removed, and the charge option after the Highway Charge Depleting Range test was corrected. The 20 degree and 50 degree tests would be performed after the standard temperature test sequence in Section G; therefore they are not shown. Alternate test sequences may be performed provided that the required vehicle preconditioning is performed. However, ARB intends to test according to the test sequence in Section G.

B(3)58. Comment: Section H – SOC Figures: The commenter could not comment because the section is missing. (Alliance)

Agency Response: No modifications were made in response to this comment. The SOC figures of Section H were not provided in the first 15 day notice because no modifications were proposed to them in the first 15 day notice. These figures are provided in the exhaust test procedures.

B(3)59. Comment: The commenter repeated its earlier recommendation to replace the "Rcda >40 miles" in the left column of the Zero-Emission VMT Allowance Table with "EAERu > 40" miles and delete "Rcda=10 miles to 40 miles" to maintain consistency. (Honda)

Agency Response: Please see Agency Response to comments B(1)4 through B(1)6, which are incorporated by reference herein.

B(3)60. Comment: Section D.2.11: The commenter seeks clarification on how the new certification requirement for determining vehicle battery and break-in period, requiring that the "manufacturer shall use good engineering judgment in determining the proper stabilized emissions mileage test point and report same according to the requirements of section D.2.11," relates to the phrase "This information will be information for understanding in-use battery durability" from Page 4 of the Notice of Notice of Public Availability of Modified Text? (Honda)

Agency Response: No modifications were made in response to this comment. Although section E and F are new, these sections include the original language from what is now section I.2. The only change to this regulatory language is that ARB now asks for the method used for determination of the break-in period. This break-in period background information may or may not contain information regarding battery durability, but is still necessary in order for ARB to understand how manufacturers determine break-in periods

B(3)61. Comment: Section F.5.4.3: The following modifications are proposed:

> 5.4.3 Urban Charge Depleting Range Test.
> (i) At the end of the cold soak period, the vehicle shall be placed or pushed, onto a dynamometer and operated through the Continuous Urban Test Schedule until the SOC Net Change Tolerances (specified in section F.10 of these test procedures) that indicate charge sustaining operation are met for two consecutive UDDSs, or a single UDDS if data is provided showing that charge sustaining operation can consistently be maintained in one UDDS. If

there are no charge depleting hot start cycles, then use the ~~next~~ hot start cycle ~~(after the cold start cycle)~~ in the Urban Charge-Sustaining Emission test sequence for the purpose of determining hot start emissions. ~~For this case (no charge depleting hot start cycle), the manufacturer may optionally add one additional hot start cycle.~~

The commenter believes this proposal ensures a level playing field and more repeatable hot start emissions since a 10-to-30 minute hot soak time between every two UDDSs is permitted in the regulation for test facilities that can not perform the Continuous Urban Test Schedule, the hot start cycle emissions level could vary depending on the duration of hot soak time preceding the hot start cycle. On the other hand, in the Charge-Sustaining test sequence, the hot start cycle is preceded only with a consistent 10-minute hot soak time (not a 10 to 30 minute range), and hence ensures level playing field and emissions repeatability. (Honda)

Agency Response: No modifications were made in response to this comment. ARB requires a hot start UDDS within the charge depleting test. However, ARB will continue to work with manufacturers to further clarify this issue in future rulemakings.

B(3)62. Comment: If the proposal in exhaust comment B(3)62 is accepted by ARB, then Sections F.5.5.1 and F.5.6.1 for Gaseous and Particulate emissions, respectively, should also be revised to reflect this change. (Honda)

Agency Response: No modifications were made as a result of this comment. See Agency Response to B(3)61.

(4) Written exhaust comments during the second 15 day comment period

B(4)1. Comment: Commenter reiterated comment regarding section (c)(3)(A) made in the first 15-day comment period. The “Rcda > 40miles” in the left column of the VMT Allowance Table should be replaced with “EAERu > 40 miles”. And the “EAERu40/29.63” in the right column of the VMT Allowance Table should be replaced with “EAERu/29.63”.

As an alternative to the above comment, Honda proposes setting a cap in the point of 40miles is acceptable. However, the “EAERu40/29.63” in the right column of the VMT Allowance Table should be replaced with “1.35”. For a blended PHEV, if the vehicle has EAER>40mile and Rcda >EAER, it can not earn the Allowance rather than 40miles AER vehicle. Honda’s comments include an example comparing 41-mile AER with and without blended operation to illustrate their belief that the current calculation penalizes PHEV design with AER capable +blended strategies. (Honda)

Agency Response: See Agency Response to comment B(3)59. No modifications were made in response to this comment. These comments do not address changes made to the test procedure during the second 15-day comment

period and are outside the scope of the comment period. PHEV-related ZEV Regulation credit calculations were addressed and finalized in 2008.

B(4)2. Comment: Regarding section F.5.4.3, commenter reiterated the same comments made in the previous 15-day comment period. In the case there is no charge depleting hot start cycle, Honda proposes using the Hot Start UDDS emissions results from the Charge-Sustaining Test in the Charge Depleting Range Test sequence for the purpose of determining hot start emissions. (Honda)

Agency Response: Comment was rejected in the first 15-day comment period. See Agency Response to B(3)61.

B(4)3. Comment: Regarding section F9.6, commenter would like clarification on this new provision: "For CD test, the vehicle run shall consist of UDDS/HWY until CS operation is achieved for two consecutive UDDS/HWY." The commenter would like to know how this requirement will be applied. (Honda)

Agency Response: Since it is difficult to determine if the SOC tolerance is met immediately after the drive cycle, especially for the highway and US06 cycles, the next drive cycle must be started, while in the next drive cycle, if the SOC tolerance is calculated and criterion is met for the previous cycle, then the drive cycle may be aborted.

B(4)4. Comment: The commenter requests that these sections F5, F6, and F7 revert to the previous language of "maximum of operation". If CARB does not issue the guideline regarding test condition, the commenter states that it must look for worst case emission from several operation modes and that it is impossible for manufacturers to attest the real worst case emission. For vehicles with more than one mode of operation of the auxiliary power unit (e.g., economy mode, performance mode, etc.), manufacturers will need to evaluate on the worst case emission and demonstrate it. They will not know the definition of those modes nor will they understand what operation caused worst emission. (Honda)

Agency Response: This was addressed in the first 15-day comments. See Agency Response to Comment B(3)31. Maximum operation may not be the worst case emissions as originally assumed. The manufacturer shall meet emission standard in the mode of the highest emissions.

B(4)5. Comment: The proposed modification to sections E.3.1.2(a) and E.3.2.2(a) give the option of using both the original test procedure or SAE J2572 to determine the urban and highway all electric range for a fuel cell vehicle and a hybrid fuel cell vehicle. The commenter suggests that, in order to ensure a level playing field, these sections should only require the use of the SAE J2572 procedure for FCEV driving range determination, without allowing another optional procedure. They use examples to support the notion that, depending on vehicle design, the original method could produce a higher driving range results compared to the J2572 method. (Honda)

Agency Response: No modifications were made in response to this comment. The comment does not address changes made to the test procedure during the second 15-day comment period and is outside the scope of this comment period. Furthermore, state-of-the-art Fuel Cell vehicle prototypes now achieve ranges that greatly exceed the highest regulatory cutoff value of 300 miles, and staff also believes that marketable production fuel cell vehicles will also achieve ranges well in excess of 300 miles. With FCVs comfortably exceeding 300 miles range, small differences in range results with alternative procedures will have no bearing on ZEV credit earned.

B(4)6. Comment: The commenter expressed concern that the definition for Charge Depleting Actual Range (R_{cda}) contained in this section F.11.9 allows an R_{cda} variability that is too large since it depends on the variability of state-of-charge in the subsequent charge sustaining cycles. Instead, it recommends that ARB adopt the technical standard method used in Japan for Transition Cycle Charge Depleting Range, which is a mathematical method using CO2 emissions ratio in the Transitional Cycle to refine the accuracy of the resulting R_{cda} range. Comments include a description of Japan's technical standard method. (Honda)

Agency Response: No change was made in response to this comment. The new CO2 emission ratio method was presented after the test procedures had been published. There is another method proposed by SAE J1711 task force. The Agency does not have an opportunity to evaluate these new methods yet, but will investigate the proposed methods and may incorporate them in the test procedures in a future rulemaking.

B(4)7. Comment: The commenter expressed concern that the references to the ARB evaporative procedures in multiple locations of section F of the Exhaust test procedures are not consistent. They would like references to the ARB evaporative procedures to be consistent with section F.5.1. (Alliance)

Agency Response: No change was made in response to the comment. The references to the evaporative test procedures in section F accurately cite the specific sections as intended by staff. The references to the evaporative test procedure cited in section F.5.1 and F.5.3 are consistent."

B(4)8. Comment: Since there are several testing options provided for the manufacturer, the commenter suggests that additional language be included to state that the in-use and confirmatory testing shall be tested in the same manner as the manufacturer tested it with respect to options selected. (Alliance)

Agency Response: No change was made in response to this comment because the options provided for manufacturer are based on the condition that the test result is equivalent. The purpose of the options is intended to save manufacturer testing time if equivalent results are expected. The ARB will test according to test sequence specified in section G.

B(4)9. Comment: Request to increase the drive cycle tolerances to allow for greater and more frequent driver cycle violations during the charge depleting test for an EREV.

Agency Response: No change was made in response to this comment because this request is best handled on a case-bycase basis.

B(4)10. Comment: Request to reword Alternate Continuous Urban Test Schedule and the Alternate Continuous Highway Test Schedule to extend the soak period to 30 minutes maximum because some labs cannot meet the new 20 minute extended soak time allotment (Non Executable). Also recommends 10-30 minute soaks for the UDDS and, for the highway tests, either a 0-30 minute soak or a 15 second idle. The HWY test has an added 15 second key on "pause" which we assume is an idle. (Alliance)

Agency Response: See Agency Response to comment B(3)2.

B(4)11. Comment: Request to add a new definition to B.1 for "Alternate Continuous US06 Test Schedule", which would complement the already defined "Continuous US06 Test Schedule" with the provision for extended soak periods (0-30 minutes) due to facility limitations. Recommend 0-30 minute soaks or a 1 to 2 minute idle. (Alliance)

Agency Response: See Agency Response to comment B(3)3.

B(4)12. Comment: Request clarification in C.3.3 Zero Emission PZEV Allowance on which utility factor will be used from J2841. Recommend change to the last sentence of this section as follows: "The Fleet Utility Factor (UF) based on the charge depleting actual range (Rcda) shall be determined according to SAE J2841 March 2009." (Alliance)

Agency Response: No modifications were made in response to this comment. Society of Automotive Engineers (SAE) J2841 establishes a Utility Factor curve based on US Department of Transportation (DOT) National Household Travel Survey (NHTS) data. In the ZEV regulation, ARB presently makes use of the curve data from this entire data set and not one of it's optional data sub sets (urban or highway). All of the data sets in this SAE Recommend Practice (RP) are collectively referred to as "Fleet" Utility Factors (Fleet UF, Fleet UF-Urban, Fleet UF-highway), even though the term "Fleet" is not included in the definitions section. For example, the entire Table 2 in this SAE RP is entitled "Fleet Utility Factor Tables" even though it includes the overall data table as well as the optional urban and highway subsets. For the purposes of calculations for the ZEV Regulation, continue to make use of the overall UF derived from the entire DOT dataset, and not one of the UFs based on optional subsets of this DOT NHTS data. These overall UFs are the ones described in the first 3 columns of Table 2, and the 2nd column of Table 3 of SAE J2841 MAR2009.

B(4)13. Comment: Request the following change to Section 3.3.(a): For VMT credit with Rcda>40, change the divisor in the equation to 28.80 for all ERFu. This will harmonize the maximum VMT credit at Rcda=40 and ERFu=1, and the VMT credit for Rcda > 40. (Alliance)

Agency Response: No modifications were made in response to this comment. This comment is not specifically directed towards a change made to the test procedure during the second 15-day comment period.

B(4)14. Comment: In Section E, there is no 20 or 50 degree F testing guidance. (Alliance)

Agency Response: The comment was considered in the first 15 day comment period and rejected. See Agency Response to comment B(3) 6.

B(4)15. Comment: In Section E.3.3(b), request the DC energy measurement be exempted from manufacturers testing of in use customer vehicles or saleable vehicle testing due to the invasive nature of the measurement. Request allowing alternative methods to the measurement of net DC energy if approved in advance by the Executive Officer of the Air Resources Board. (Alliance)

Agency Response: The comment was considered in the first 15 day comment period and rejected. See Agency Response to comment B(3) 7.

B(4)16. Comment: In Section E.3.3(d), request the DC energy measurement be exempted from manufacturers testing of in use customer vehicles or saleable vehicle testing due to the invasive nature of the measurement. Request allowing alternative methods to the measurement of net DC energy if approved in advance by the Executive Officer of the Air Resources Board. (Alliance)

Agency Response: The comment was considered in the first 15 day comment period and rejected. See Agency Response to comment B(3) 7.

B(4)17. Comment: Request replacing “The auxiliary power unit shall be manually activated at the beginning of and operated throughout the US06 preconditioning cycle. For ~~hybrid electric~~ vehicles that allow manual activation of the auxiliary power unit, battery state-of-charge shall be set at the lowest level…” in Section E.8.1.2.1 with “For vehicles that allow manual activation of the auxiliary power unit, the auxiliary power unit shall be activated at the beginning of, and operated throughout, the US06 preconditioning cycle. Additionally for vehicles that allow manual activation, the battery state-of-charge shall be set at the lowest level that satisfies one of the following conditions: " (Alliance)

Agency Response: Staff accommodated the comment. The section was revised to clarify how to set the battery state of charge for vehicle that allow manual activation of the APU.

B(4)18. Comment: Wording change in Section E.8.2.1 conflicts with Section E.8.2.6.2(i) which allows up to three US09 emissions test to meet SOC criteria. Suggests replacing the second "shall" with "if it meets." (Alliance)

Agency Response: Staff rejected the comment because the intent appears to be clear. The agency may consider clearer languages in the test procedures in a future rulemaking.

B(4)19. Comment: Wording change in Section E.8.4.1 conflicts with Section E.8.4.4.1(i) which allows up to three SC03 emissions test to meet SOC criteria. Suggests replacing the second "shall" with "if it meets." (Alliance)

Agency Response: Staff rejected the comment because the intent appears to be clear. The agency may consider clearer languages in the test procedures in a future rulemaking.

B(4)20. Comment: (Non Executable). To enable reading of sample bags in the 15 second idle between highway drive cycles and the 1 – 2 minute idles between the US06 drive cycles, request addition of the following clause to Section E.10: "Manufacturers need to be allowed to launch the next drive cycle in a test sequence while they are determining the SOC (including bag reads) for the previous drive cycle, then abort out of this new drive cycle if not required by the test procedure. (Alliance)

Agency Response: The comment was rejected because this change cannot be made at this time and this issue has not been a concern for testing HEVs. See Agency Response to B(3)13. This will be considered in the next revision of the regulation to be consistent with F.9.6.

B(4)21. Comment: Provided the following suggestions for Section F: 1) Raise the mileage limit on test vehicles due to the long test sequences (like CD range tests); 2) Look at relaxing the validation criteria that uses CD UDDS, HWY, or US06 test cycles in a manner that won't impact the numbers generated; and 3) Use a more technically accurate approach to determining emissions for the UDDS CD range test (Sections F5.5.1 and F.5.6.1) such as utilizing Utility Factor equations as defined in SAE committees, which weight emissions based on the fraction of miles traveled in charge depleting and charge sustaining modes. (Alliance)

Agency Response: Subparts 1 and 2 of this comment were considered in the first 15 day comment period. See Agency Responses to comments B(3) 14, B(3)15, and B(3)16. Regarding subpart 3 of this comment: The use of Utility Factors does not necessarily result in a more "technically accurate" emissions result when characterizing a particular vehicle model. Utility Factor weighting is instead used in the subsequent application of emissions test results from these test procedures to assess the overall fleet-wide emissions impacts of a large-scale deployment of PHEVs.

B(4)22. Comment: (Non executable) In Section F.3.1, the following phrase: ""…The following data shall be recorded for all ~~charge-depleting range and exhaust~~ tests and for each individual test cycle therein…" implies AC and DC recharging energy will be required for all tests even though figure G-2 only requires this recharging energy to be performed after (1) the UDDS CS test, and (2) possibly the HWY CD tests. Also for CD test sequences like the HWY & UDDS, this statement would require AC recharging energy after each cycle, which is not executable (would have to stop a CD test sequence after each cycle then recharge the battery). (Alliance)

Agency Response: - No change was made in response to this comment. Sections F.3.1(c), F.3.1(d), are required during vehicle charging. F.3.1(f) applies to both emission testing and the vehicle charging. The Agency may consider the proposed modification in a future rulemaking.

B(4)23. Comment: Regarding section F.3.1 (b) - Suggest that ARB exempt DC energy measurement from manufacturer testing of in-use customer vehicles or saleable vehicle testing due to the invasive nature of the measurement, and allow alternative methods to the measurement of net DC energy if approved in advance by the Executive Officer of the Air Resources Board. (Alliance)

Agency Response: These comments were considered in the first 15 day comment period and rejected. See Agency Response to comment B(3) 17.

B(4)24. Comment: Regarding section F.3.1 (c) - The following phrase implies AC recharging energy will be required for all tests even though figure G-2 only requires this recharging energy to be performed after (1) the UDDS CS test, and (2) possibly the HWY CD tests.

> "(c) AC energy required to fully charge the battery after a charge depleting or charge sustaining test from the point where electricity is introduced from the electric outlet to the battery charger;" (Alliance)

Agency Response: No change was made in response to this comment because this requirement is only applicable during vehicle charging.

B(4)25. Comment: Suggests that Sections F.3.1(c) and F.3.1(d) should record the AC wall energy while the charger is plugged in. (Alliance)

Agency Response: These comments were considered in the first 15 day comment period and rejected. AC wall energy shall be recorded while the vehicle is plugged. See Agency Response to comment B(3)19.

B(4)26. Comment: Regarding section F.3.1 (d) - Suggest that ARB exempt DC energy measurement from manufacturer testing of in-use customer vehicles or saleable vehicle testing due to the invasive nature of the measurement, and allow alternative methods to the measurement of net DC energy if approved in advance by the Executive Officer of the Air Resources Board. (Alliance)

Agency Response: These comments were considered in the first 15 day comment period and rejected. See Agency Response to comment B(3)20.

B(4)27. Comment: Regarding section F.3.1 (d) - The following phrase implies DC recharging energy will be required for all tests even though figure G-2 only requires this recharging energy to be performed after (1) the UDDS CS test, and (2) possibly the HWY CD tests.

> "(c) DC energy required to fully charge the battery after a charge depleting or charge sustaining test from the point where electricity is introduced from the battery charger to the battery; and" (Alliance)

Agency Response: No change was made in response to this comment because this requirement is only applicable during vehicle charging.

B(4)28. Comment: Regarding section F.3.5 - Recommends that this requirement include sampling AC voltage and current at a higher frequency than 20hz depending on the integration techniques of the instrumentation used. Recommends referencing J1634, which specifies "bandwith of at least 10 times the maximum fundamental frequency." (Alliance)

Agency Response: No change was made in response to this comment. . The Agency believes 20 hz is adequate. Manufacturers may use frequency higher than 20 hz. The Agency may incorporate this change in the test procedures in a future rulemaking.

B(4)29. Comment: Regarding typographical error in section F.5.1.7: "…To determine charging sustaining operation…" "charging" should be "charge." (Alliance)

Agency Response: Staff has corrected the typographical error, "charging was changed to "charge".

B(4)30. Comment: Regarding section F.5.1.7, commenter suggests that the new requirement to use UDDS for the preconditioning cycle in the charge depleting range test and the charge sustaining emission test is unnecessarily burdensome and should be replaced with a manufacturer's determination that the vehicle is indeed in CS operation. Commenter notes that there is an allowance for alternate procedures to an actual emissions test, which does not require emissions data to prove that a preconditioning test was performed and should follow current cert procedure.

Agency Response: The commenter is correct. The preconditioning UDDS cycle before the urban charge sustaining test is the UDDS in the urban charge sustaining portion of the urban charge depleting test. Staff rejected this comment because the manufacturer has the option to use an alternate method for determining charge sustaining operation for preconditioning cycle that does not require emission testing.

B(4)31. Comment: Recommends inserting the word “each” before “followed” in the following Section F.5.2.1 requirement: “Overview. The charge depleting range test dynamometer run shall consist of a series of charge depleting UDDSs~~tests, after a second fuel drain and fill and a 12 to 36 hour soak period performed pursuant to the provisions of the “California Evaporative Emission Standards and Test Procedures for 2001 and Subsequent Model Motor Vehicles.” Each charge depleting test shall consist of one UDDS~~ *each* followed by a 10 minute key-off hot soak period until charge sustaining operation is achieved for two consecutive UDDSs. (Alliance)

Agency Response: Staff corrected typographical error. The word "each" was added which was omitted in error. The soak period is between each UDDS.

B(4)32. Comment: Suggests that the following language in Section F.5.2.1 is inconsistent stating that it is unclear how to do a full AC recharge after the CD UDDS and then discharge the battery for the CS UDDS within the allotted soak time.:

> “Vehicle charging shall be initiated within three hour after either the charge depleting range test or the charge sustaining emission test pursuant to section F.5.4.2. During charging, all requirements in section F.3 must be met, and energy consumption shall be calculated pursuant to the requirements in section F.11.7.”

Figure G-2 shows a full AC recharge only after the UDDS CS test, however F.5.2.1 (below), F.5.4.2 (CD UDDS) & F.5.4.3 (CS UDDS) state that a full AC recharge shall be initiated after either the CS or CD UDDS. (Alliance)

Agency Response: No change was made in response to this comment. No change is necessary because even though section G shows vehicle charging after the urban charge sustaining testing, the manufacturer has the option of charging after the charge depleting test.

B(4)33. Comment: Recommends, for clarity purposes, the following underlined language be added to Sections F.5.5.1 and F.5.6.1: “n = number of hot start UDDSs in Charge Depleting operation. If there are no charge depleting hot start cycles, then use the next hot start cycle (after the cold start cycle) in the test sequence for the purpose of determining hot start emissions. The manufacturer may optionally extend the number of cycles so that at least 2 hot start cycles, in any mode (CD, CS or transition), are included, so that n=2.” (Alliance)

Agency Response: No change was made in response to this comment because the current language allows two hot start cycles.

B(4)34. Comment: (Non executable) Suggests that the following phrase in Section F.6.2: “Up to two highway emission tests shall be allowed to satisfy the SOC criterion” is inconsistent with both the revised CS HWY language and the existing CD HWY language, and this phrase would also be in correct for CD HWY test sequence, and suggests that it should be changed. (Alliance)

Agency Response: Staff accepted the comment and modified F.6.2.2.8. The latest sentence was revised to be consistent with end of test requirement in F6.3.3(ii).

B(4)35. Comment: In section F7.1.2.1 USO6, recommends the following wording change to address condition when HEV cannot be manually activated. Replace:

"For vehicles that allow manual activation of the auxiliary power unit, battery state-of-charge shall be set at the lowest level allowed by the manufacturer. The auxiliary power unit shall be manually activated at the beginning of and operated throughout the US06 preconditioning cycle"

With

"For vehicles that allow manual activation of the auxiliary power unit, the auxiliary power unit shall be manually activated at the beginning, and operated throughout, the US06 preconditioning cycle. Additionally, for vehicles that allow manual activation, the battery state-of-charge shall be set at the lowest level allowed by the manufacturer. " (Alliance)

Agency Response: Staff agrees that the comment more clearly states the requirements applicable to vehicles that allow manual activation of the APU, and has modified section F.7.1.2.1 as suggested.

B(4)36. Comment: Comment: In section F7.3.2.1 SC03, recommends the following wording change to address condition when HEV cannot be manually activated. Replace:

"For vehicles that allow manual activation of the auxiliary power unit, battery state-of-charge shall be set at the lowest level allowed by the manufacturer. The auxiliary power unit shall be manually activated at the beginning of and operated throughout the SC03 preconditioning cycle"

With

"For vehicles that allow manual activation of the auxiliary power unit, the auxiliary power unit shall be manually activated at the beginning, and operated throughout, the SCV03 preconditioning cycle. Additionally, for vehicles that allow manual activation, the battery state-of-charge shall be set at the lowest level allowed by the manufacturer. " (Alliance)

Agency Response: See the Agency Response to Comment B(4) 35.

B(4)37. Comment: Regarding the charge depleting clause in Section F.7.4.4.1 (ii) & (iii) SC03, commenter suggests that the clause contradicts specific guidance in F.7.3 (SC03) to run both of these tests in charge sustaining mode only, and that the language appears focused to HEV's, not PHEV's. (Alliance)

Agency Response: Staff agrees with this comment and has deleted section F7.4.4.1(ii). F.7.4.4.1 (iii) was "For vehicles that allow the auxiliary power unit to be manually activated, turn off the vehicle two seconds after the end of the last deceleration." Charge depleting is not mentioned. It has been changed to F.7.4.4.1 (ii) after the original F.7.4.4.1 (ii) was deleted.

B(4)38. Comment: In the Section F.7.5 electric range test, the commenter suggests that, in the proposed 15-day changes (page 7) to the continuous US06 test, there is no need for the idle – the key should be allowed to be off. Keeping the vehicle idle

and not using it for forward movement, the commenter suggests, results in 4-8% of wasted energy for some vehicle designs. (Alliance)

Agency Response No change was made in response to this comment. Turning off the engine between the US 06 tests would deviate from the current test procedure.

B(4)39. Comment: In Section F.8, the commenter suggests that "CD Mode" be added to the following phrase recognizing that charging at 50ºF test or 20ºF test is needed only if CD mode is worst case for NMOG + NOx emissions:

> "For 50ºF and 20ºF CD Mode testing, vehicle charging, prior to emissions testing, shall be performed during the soak period at 50ºF and 20ºF, respectively." (Alliance)

Agency Response: Staff agrees with the comment and has modified section F.8 as suggested. The phrase "charge depleting" was inadvertently omitted.

B(4)40. Comment: The commenter recommends that the new guidance in Section F.8, which refers to Section F.5 for cold 20 and 50 ºF guidance, be narrowed as to what part of Section F.5 are applicable. For example, parts of F.5. would not be applicable like loading the canister, 1% SOC, AC recharging energy measurement, 68-86 ºF, etc. The intent of this phrase is to use applicable F.5 guidance like the running of CS and CD schedules. (Alliance)

Agency Response: No change was made in response to this comment. Staff will continue to monitor this issue and the Agency may incorporate this comment in the test procedures in a future rulemaking.

B(4)41. Comment: Section F.8 20ºF UDDS – Incorrectly suggests tha t the word "temperature" in the following sentence could imply that this is the only provision (20ºF) from CFR Part 86 Subpart C:

> "20 ºF testing shall be conducted pursuant to secti on F.5 and shall include the temperature provisions in 40 CFR Part 86 Subpart C - Emission Regulations for 1994 and Later Model Year Gasoline-Fueled New Light-Duty Vehicles, New Light-Duty Trucks and New Medium-Duty Passenger Vehicles; Cold Temperature Test Procedures"

The commenter recommends that the order be reversed, follow 40 CFR Subpart C test procedures with the test unique provisions of Sections F.5 and F.8 (Alliance)

Agency Response: No change was made in response to this comment. Staff believes that the existing language accurately specifies the applicable requirements. However, staff will continue to monitor this issue and the Agency may incorporate this comment in the test procedures in a future rulemaking.

B(4)42. Comment: The commenter requests adding the following additional provisions to Section F.9 to improve testing efficiency, and feasibility:

(a) Allow manufacturers to run the charge depleting tests (UDDS, HWY, US06 AER range test) in a CD sequence to optimize the test process.
(b) Allow manufacturer to run an additional CS prep 12 – 36 hours before the required test.
(c) F.9.7, In the case of a fuel fill allow the option to disconnect the canister during this fuel fill, do not do a canister load, and optionally can do a prep cycle (12 – 36 hours before the test).
(d) Provide that ARB will test the vehicles the same manner as the manufacturer tested it with respect to options selected, including for in-use and confirmatory testing. (Alliance)

Agency Response:
(a) See Agency Response to comment B(3) 50. (b) See Agency Response to comment B(3) 51.(c) No change was made in response to this comment. Please refer to "California Evaporative Emission Standards and Test Procedures for 2001 and Subsequent Model Motor Vehicles" for detailed instructions. (d) See Agency Response to comment B(3) 53.

B(4)43. Comment: Section F.11.3 does not define which HFEDS schedule Yh and Dh are derived from .Recommends using the same HFEDS as that used for NOx emissions compliance. (Alliance)

Agency Response: No change was made in response to this comment. See Agency Response to comment B(3) 54.

B(4)44. Comment: Recommends that ARB work with industry on an algorithm to correct Section F.11.3 calculations and account for frictional losses due to the CD cold start test and correct the cold start CD HWY for these losses. (Alliance)

Agency Response: See Agency Response to comment B(3) 55.

B(4)45. Comment: Suggests that, in Section F.11.13, EFR_u should be ERF_u. (Alliance)

Agency Response: Staff agrees with the comment, and has modified section F.11.13 as suggested to correct a typographical error.

B(4)46. Comment: Noted that Figure G-2 Test Sequence figure still does not have US06 AER, 50°F or 20°F cycles. (Alliance)

Agency Response: No change was made in response to this comment. The current G diagram was not intended to cover US06 AER, 50°F or 20°F cycles. However, the recommended changes may be incorporated in the test procedures in a future rulemaking.

B(4)47. Comment: Commenter notes that Figure G-2 does not show a preconditioning test before the UDDS CS test and assumes this refers to the CS portion of the CD UDDS test. (Alliance)

Agency Response: The commenter's assumption is correct. No change was made.

C. Evaporative Test Procedure Comments

(1) Written evaporative comments during the 45 day comment period

C(1)1. Comment: Fuel Tank Temperature Profile Determination. As proposed, the running loss fuel tank temperature profile determination is not consistent with the running loss test. To wit, this section requires the SOC to be such that the APU is activated within 30 seconds of starting the first UDDS. This will probably NOT match the SOC at the beginning of the running loss test. We recommend revising this to ensure the SOC is consistent with the expected SOC at the beginning of the running loss test (ref.: section III.C.1.3.). (Alliance)

Agency Response: ARB agrees with this comment and will revise the applicable section to clarify the requirement with respect to 2011 and subsequent model-year off-vehicle charge capable hybrid electric vehicles. Specifically, in order to be consistent with the expected SOC at the beginning of the running loss test, the battery state-of-charge for these vehicles should be set at a level that was initially at the maximum level allowed by the manufacturer minus any battery energy that was consumed during the standard three-phase exhaust test.

C(1)2. Comment: The reference 40 CFR 86.132-90 is outdated and superseded by section 40 CFR 86.132-00. Therefore, 40 CFR 86.132-00 should be used as the reference. Section 40 CFR 86.132-90 can not be found on the e-CFR website anymore. Reference sections III.D.1.5.; IIID.1.6.; III.D.3.2.; and, III.D.3.3.). (Honda)

Agency Response: ARB agrees that CFR 86.132-90 is outdated. Accordingly, staff has modified the evaporative test procedures to specify that references to the obsolete CFR 86.132-90 will apply only to 2001 through 2011 model-year vehicles, while references to CFR 86.132-00 will apply to 2012 and subsequent model-year vehicles (ref,: sections III.D.1.5.; III.D.1.6.; III.D.3.2; and, III.D.3.3.).

(2) Written and verbal evaporative comments from the January Board Hearing

C(2)1. Comment: 4-Phase versus 3-Phase for Evap testing (section III.D., and Figure 3A): The proposed regulation requires a 3-phase exhaust test prior to fuel tank stabilization and a separate 4-phase exhaust test for exhaust testing. We recommend allowing a 4-phase exhaust test in lieu of the 3-phase test to reduce the testing burden. As a backstop, ARB could conduct the evaporative emissions test using the 3-phase exhaust test (ref.: section III.D.; and, Figure 3A). (Alliance, Ford)

Agency Response: No modifications were made in response to this comment. The existing test procedures already allow HEV manufacturers the option of performing the four-phase Federal Test Procedure (FTP) exhaust test, in conjunction with the 3-day diurnal evaporative test sequence, with Executive Officer approval if the manufacturer can provide data demonstrating compliance with the standards using the standard three-phase test (ref.: Figure 3B; and, section III.D.1.7.1, of the existing Evap Test Procedures). Staff is therefore not proposing any changes to this existing option. Use of this option does not relieve a manufacturer from still performing a 3-day diurnal plus hot soak emission test using the three-phase FTP exhaust test for purposes of demonstrating compliance at some point in the HEV certification process. Thus, the option has the possibility of providing a manufacturer with some degree of testing arrangement flexibility, depending on its own particular circumstances, while ensuring that the required stringency of the emission standard is maintained.

(3) Evaporative comments received during the first 15-day comment period

C(3)1. Comment: Section III.D.1.5: The 2001 through 2010 references infers that, after 2010, no vehicles can skip the first drain & fill and six hour soak even if performing consecutive tests and kept under lab temperature conditions for at least 6 hours. Conventional vehicles and HEVs should be able to skip this if it's appropriate. (Alliance)

Agency Response: No modifications were made in response to this comment. The proposed 15-day changed language clarifies that test vehicle preconditioning for 2011 and subsequent model-year vehicles will be performed as specified in CFR 86.132-00, as modified by the California test procedures. An allowance for these vehicles to skip the first drain and fill step and six-hour soak, when conducting consecutive tests under specific laboratory temperature conditions for at least six hours, is included in CFR 86.132-00(c)(2). Thus, 2011 and subsequent model-year vehicles are allowed the same considerations as exist for 2001 through 2010 model-year vehicles.

C(3)2. Comment: The optional canister bench purge option is not available. In discussions with CARB it was stated that there would be an optional canister bench purge available at this step (ref.: section III.D.17.2.). (Alliance)

Agency Response: No modifications were made in response to this comment. The optional canister bench purge step is available and is included in section III.D.1.7.3. This section states that, "With advance Executive Officer approval, a manufacturer may optionally elect to bench purge the canister during the initial soak period, specified in 40 CFR §86.132-00(c)(1), in lieu of performing the second fuel drain/fill and vehicle drivedown steps specified in sections III.D.1.7.1. and III.D.1.7.2."

C(3)3. Comment: Possible typographical error – the reference to section III.D.7.1, should most likely reference section III.D.1.7.1 (ref.: section III.D.10.). (Alliance)

Agency Response: Staff agrees and has corrected the citation to "section III.D.1.7.1."

C(3)4. Comment: Section III.D.1.7.10 adds the optional canister butane load for PHEV exhaust emissions testing, but excludes sections III.D.1.7.1 through III.D.1.7.9. If section III.D.1.7.3 is excluded, the optional bench purge would be excluded and the 95% fuel fill and drive-down would be required. Therefore, the butane load option would offer little benefit and would most likely not be utilized. If section III.D.1.7.7 is excluded the 40% drain and fill step is skipped and the vehicle would enter the exhaust test sequence with either the 40% drain and fill prior to the first 6 hour soak or the amount of fuel remaining post of the drive-down event. (Alliance)

Agency Response: Staff agrees with this comment. Some of the steps specified in sections III.D.1.7.1. through III.D.1.7.9. should not be excluded if a manufacturer elects to perform the optional canister butane load method allowed under section III.D.1.7.10. Specifically, the initial testing state of the canister must be established if the optional canister butane load method is elected. Thus, either a fuel tank drain and 95% fill step along with a vehicle drivedown step, or the optional canister bench purge step, must be performed. Therefore, the steps specified in sections III.D.1.7.1., III.D.1.7.2., and III,D.1.7.3. should not be excluded. In addition, the fourth drain and fill step specified in section III.D.1.7.7. must also be performed in order for the fuel tank to have the proper fuel level prior to the start of the exhaust emission test. Lastly, the preconditioning soak specified in section III.D.1.7.8. must be conducted because this is when the optional canister butane loading would be performed. Accordingly, staff included modifications to section III.D.1.7.10., as part of the second 15-day Notice, to indicate that only sections III.D.1.7.4., III.D.1.7.5., and III.D.1.7.6. are excluded when a manufacturer elects to use the optional canister butane load method.

Furthermore, staff now believes that when a manufacturer elects to perform the optional canister bench purge, the bench purge can be done either during the initial soak period, as currently specified in section III.D.1.7.3., or after the vehicle preconditioning step, specified in section III.D.1.6.1. Either option is reasonable because this is when the process for establishing the initial testing state of the canister is currently started. Accordingly, staff included modifications, as part of the second 15-day Notice, that added language to section III.D.1.7.3. that clarifies that the optional canister bench purge can be performed either during the initial cold soak or after the vehicle preconditioning step.

C(3)5. Comment: Clarification - sections III.D.1.18.6 and III.D.1.12.6 appear to be identical and may be a repeat of the same information. (ref.: section III.D1.12.6.). (Alliance)

Agency Response: No modifications were made in response to this comment. The language in these two sections is identical. However, section

III.D.12.6. pertains to the three-day diurnal test sequence, while section III.D.1.18.6. pertains to the supplemental two-day diurnal test sequence.

C(3)6. Comment: Clarification – section III.D.3.3.4. could include a reference in the underlined sentence to indicate that vehicles tested for exhaust emissions only are excluded. (Alliance)

Agency Response: Staff agrees that it would be helpful to clarify that the recently adopted requirement in section III.D.3.3.4. (that requires 2011 and subsequent model-year off-vehicle charge capable hybrid electric vehicles with non-integrated refueling canister-only systems to be preconditioned for the three-day diurnal test sequence using the fuel-tank-refill method specified in section III.D.3.3.6.), may not apply when conducting only an exhaust emission test sequence. This possibility exists because a manufacturer may choose to instead perform the canister preconditioning and butane loading method specified in sections III.D.1.9., III.D.1.10., and III.3.3.4. Accordingly, staff included modifications, as part of the second 15-day Notice, that added clarifying language to section III.D.3.3.4

C(3)7. Comment: Section III.D.5.1.1.references engine starting and crank time requirements. HEV and PHEV vehicles should be excluded from this requirement. (Alliance)

Agency Response: Staff agrees that the engine starting and cranking provisions in section III.D.5.1.1. are not applicable to hybrid electric vehicles and therefore added additional language to this section to specifically clarify the applicable vehicle types that are subject to these requirements.

C(3)8. Comment: Clarification – The reference in section III.D.1.7.2 to driving the fuel out of one tank first in dual tank systems could be clarified to indicate that this only applies to selectable dual tank systems (ref.: section III.D.1.7.2.). (Alliance)

Agency Response: Staff agrees that the existing requirement does not reflect current practice where vehicles may be equipped with dual fuel tanks, yet do not use selectable, or isolatable, systems. Such vehicles should not be subject to the existing requirement. Staff has therefore added new language to clarify the applicability of this requirement in section III.D.1.7.2.

(4) Evaporative comments during the second 15-day comment period

C(4)1. Comment: Since there are several testing options provided for the manufacturer, the test procedures should provide that ARB will test the vehicles in the same manner as the manufacturer tested them, with respect to the options selected, including for in-use and confirmatory testing. (Alliance)

Agency Response: No changes were made in response to the comment. Optional allowances are provided in the test procedures in order to reduce manufacturers' testing burdens by providing flexibility in the testing process without

compromising the stringency of the emission standards. Furthermore, some optional methods are allowed only if a manufacturer has first obtained advance approval from the Executive Officer. This advance approval requirement provides ARB with a safeguard for ensuring continued compliance with the emission standards if an optional method is later determined to compromise stringency. This safeguard is especially relevant since PHEV-related technologies are so new at this time. Since certifying using either the specified method or an optional method will produce valid test results for demonstrating compliance with the applicable emission standards, ARB may elect to use either one of them when conducting certification confirmatory tests and in-use compliance tests.

C(4)2. Comment: Section III.D.1.7.10. adds the optional canister butane load for PHEV exhaust emissions testing, and originally excluded sections III.D.1.7.1 through III.D.1.7.9. During the 1st 15-day comment period, AAM indicated that sections III.D.1.7.3 and III.D.1.7.7 should not be excluded. Under further review, the original ARB text [in the 1st 15-day Notice] was appropriate, and sections III.D.1.7.1 through III.D.1.7.9 should be excluded. (Alliance)

Agency Response: No changes were made in response to the comment. The use of the provision in section III.D.1.7.10. is optional for manufacturers. The intent of this section is to provide flexibility in the exhaust testing process, without compromising the stringency of the emission standards, by allowing the use of a simpler, albeit more stringent, canister loading method. However, manufacturers are currently allowed to propose, for Executive Officer approval, an alternative test procedure for demonstrating compliance with these standards, as long as the alternative method yields results that are either equivalent to, or more stringent than, the required results (ref.: section III.G.). Thus, a manufacturer may propose an alternative test procedure, to the Executive Officer, that specifically excludes sections III.D.1.7.1., through III.D.1.7.3.; and, sections III.D.1.7.7. through III.D.1.7.9., since section III.D.1.7.10., already excludes sections III.1.7.4. through III.D.1.7.6. Approval of such a request would be based on satisfying the required stringency criteria.

C(4)3. Comment: Clarification – To sections III.D.1.9 and III.D.1.10. To facilitate the use of the optional canister butane load for PHEV exhaust emissions testing outlined in section III.D.1.7.10, sections III.D.1.9 and 1.10 could be modified. For clarification purposes these sections could be modified to indicate these sections apply to both evaporative and non-integrated ORVR control canisters. This could be accomplished by changing “evaporative control canister” to one of the following: canister, the vehicle’s canister, or the evaporative and/or ORVR control canister. (Alliance)

Agency Response: The use the optional canister butane loading method specified in section III.D.1.7.10., is allowed only when conducting exhaust emission testing of PHEVs that are equipped with non-integrated refueling canister-only systems. Specifically, the language in section III.D.1.7., and the exceptions indicated in the subsections of section III.D.1.7., are applicable only to “… 2012 and subsequent model-year off-vehicle charge capable hybrid electric vehicles that are

equipped with non-integrated refueling canister-only systems…." Sections III.D.1.9. and III.D.1.10. are applicable to all vehicles except 2012 and subsequent model-year off-vehicle charge capable hybrid electric vehicles that are equipped with non-integrated refueling canister-only systems, since section III.D.1.7.6. imposes on these vehicles the fuel-tank-refill canister-loading method specified in section III.D.3.3.6. The only situation in which sections III.D.1.9. and III.D.1.10. apply to 2012 and subsequent model-year off-vehicle charge capable hybrid electric vehicles that are equipped with non-integrated refueling canister-only systems is when a manufacturer elects to use the option specified in section III.D.1.7.10. In this situation, it is understood that the "evaporative control canister" indicated in section III.D.1.7.9. must be a canister for a non-integrated refueling canister-only system, and not an evaporative (i.e., diurnal) canister, otherwise the option does not apply. Accordingly, staff did not make the change requested by the comment.

C(4)4. Comment: We request the option for manufacturers to use robot drivers for the 85% tank drivedown. Increase the drive cycle tolerances to allow for greater and more frequent driver cycle violations during 85% drivedown and for the charge depleting test for an EREV. (Alliance)

Agency Response: As explained in the Agency Response to Comment C(4)2, a manufacturer is allowed to propose an alternative test procedure for demonstrating compliance with the emission standards. The use of robot drivers in the 85% fuel tank vehicle drivedowns, and increases in the drive cycle tolerances, may be proposed to the Executive Officer for consideration as alternative test procedure methods. Accordingly, staff did not make the changes requested by the comments.

D. Onboard Refueling and Vapor Recovery (ORVR) Test Procedure Comments

(1) Written ORVR comments during the 45 day comment period

D(1)1. Comment: Commenter recommends changing the Title for Appendix F from "PROPOSED AMENDMENTS TO THE ON ROAD VAPOR RECOVERY TEST PROCEDURES" to "PROPOSED AMENDMENTS TO THE ON BOARD VAPOR RECOVERY TEST PROCEDURES." (Honda)

Agency Response: The language on the title page will be revised to indicate, "Proposed Amendments to the Onboard Refueling Vapor Recovery Test Procedures."

(2) Written and verbal ORVR comments from the January Board Hearing

No comments received during this comment period

(3) Written comments during the first 15 day comment period

D(3)1. Comment: [Clarification – reference to driving the fuel out of one tank first in dual tank systems. Could include input to indicate that this only applies to selectable dual tank systems (ref.: sections II.B.4.1.3.; II.B.4.4.). (Alliance)

Agency Response: Staff agrees that the existing requirement does not reflect current practice where vehicles may be equipped with dual fuel tanks, yet do not use selectable, or isolatable, systems. Such vehicles should not be subject to the existing requirement. Accordingly, new language to clarify the applicability of the requirement will be added to sections II.B.4.1.3. and II.B.4.4.

D(3)2. Comment: No optional canister bench purge option is available. In discussions with CARB it was stated that there would be an optional canister bench purge available at this step. (ref.: section II.B.4.1.3.). (Alliance)

Agency Response: The optional canister bench purge step is available and is included in section II.B.4.1.3.3. This section states that, "With advance Executive Officer approval, a manufacturer may optionally elect to bench purge the canister during the initial soak period, specified in 40 CFR §86.132-96(c)(1), in lieu of performing the second fuel drain/fill and vehicle drivedown steps specified in sections II.B.4.1.2. and II.B.4.1.3." Accordingly, no change to the existing language is required.

E. Conversion Certification Procedure Comments

(1) Written comments received during the 45 day comment period
Comments received from December 11, 2008 (#1) through January 21, 2009 (#133)

General Comments
E(1)1. Comment: Non specific or not related to the board item. (S. Jansen, E. Spivey, H. Mack, A. May, C. Pietras, C. Darr, K. Adams, S. Rota, G. Robbeloth, T. Meyer, E. Daniel, J. Mas, J. Rieley, P. Zerboni, D. Gooch, C. White, M. Nagler, T. Buoye, M. Tellez, E. Gendreau, J. Koumanis, InfoWedge, M. Michon, R. Bassett, S. Masia, S. Kraemer, T. Stacey, J. Matos, M. DeSando)

Agency Response: No response is necessary as these comments were not objections or recommendations specifically directed at the Agency's proposed adoption of the regulation and incorporated certification procedure for evaluating and exempting PHEV conversion systems.

E(1)2. Comment: The Board should not adopt the proposed regulation (as proposed in the Notice of Public Hearing released on December 5, 2008). The commenters specifically request that the Board not regulate aftermarket conversions of HEVs to PHEVs. (L. Spaiser, E. Swenson, J. Shechter, R. Realivasquez, G. Stevens, J. Lee, H. Jackson, J. Tuttle, G. Lang, J. Krupnick, N. DeWitte)

Agency Response: The Board did not adopt the proposed certification requirements for PHEV conversion systems at the January 22, 2009 public hearing, but directed staff to work with stakeholders to develop a proposal that allowed more

flexibility and created a phased approach to certification that encouraged the development of such systems. Staff developed and presented a revised proposal that was adopted with modifications by the Board at the May 28, 2009 public hearing. The commenters also seem to overlook the fact that unless the Board adopted these certification requirements, conversion system manufacturers would have no legal avenue of selling their systems in California.

E(1)3. Comment: Commenters asked the Board to delay the rulemaking deadline to give time for ARB to consult with all stakeholders, including experts in the field and small conversion companies, and to develop a regulation that would alleviate Board concerns while helping the PHEV conversion industry mature and become successful. (L. Dorosin, E. Nahser-Ringer, P. Kenny, L. Allen, C. Lipof, 3Prong Power, 3Prong Power, G. Wayne, J. White, R. Levin, B. Jones, A. Goggins, S. Blachman)

Agency Response: See the Agency Response to Comment E(1)2, which is incorporated into this response herein

E(1)4. Comment: The ARB should only regulate conversion kits if it has evidence that such kits violate safety or emissions requirements, and if it "suspects" that testing one or two vehicles would provide representative data of the emissions performance of converted vehicles. (V. Bradford)

Agency Response: No modifications were made in response to this comment. As explained in Section 3.5 of the Staff Report: Initial Statement of Reasons (ISOR) for this rulemaking, VC 27156 and Health and Safety Code section 43006 authorize ARB to exempt aftermarket parts and to certify alternative fuel conversion systems, respectively, to ensure that any aftermarket modifications to vehicles do not reduce the effectiveness of any required pollution control devices, or do not cause the modified vehicles' emissions to exceed applicable standards. The Board found in Resolution 09-39 that the proposed certification procedure requirements would allow conversion system manufacturers to certify their systems while also ensuring that the converted vehicles emissions will not increase. Therefore, ARB's authority to regulate conversion kits is clearly specified and established in this rulemaking.

E(1)5. Comment: CARB should work with the non-profit organization CalCars.org, by adding to their existing open source design repository any modifications to the run cycle or vehicle components that would allow modified HEVs to satisfy clean air requirements. (3Prong Power, R. Levin)

Agency Response: Staff worked with CalCars and other stakeholders to develop certification requirements that provided conversion manufacturers more flexibility than the initially proposed procedures, and that established a phased approach to certification that encouraged the development of such systems. This updated proposal was adopted with modifications by the Board at the May 28, 2009 Board Hearing.

E(1)6. Comment: Commenters requested ARB to seek less restrictive options, lower level of regulations, and lower cost options. (G. Stevens, I. Haralabatos, R. Guldenbrein, C. Trueblood, B. Washburn)

Agency Response: See the Agency Response to Comment E(1)5, which is incorporated into this response herein.

E(1)7. Comment: Many commenters asked the Board to accept CalCars recommendations. (F. John, F. Hamilton, D. Foster, R. Ryan, M. Michon, D. Williams, K. Stoll, R. Stoll, R. Katz, J. Brown, UMC, N. Stewart, S. Zander, A. Nunez, Sonoma GoLocal, T. Rust, K. Gore, A. Goggins, S. Blachman, B. Jester)

Agency Response: See the Agency Response to Comment E(1)5, which is incorporated into this response herein.

Economic Impacts

E(1)8. Comment: The proposed conversion system regulation imposes excessive economic hardships on new and existing small conversion companies and startups. (S. Doney, L. Galcher, A. Allegra, J. Titus, K. Fingerman, A. Malone, C. Lenox, A. Gulick, C. Pelletier, Plug-In Conversions, 3Prong Power)

Agency Response: The Agency Response to Comment E(1)5 is incorporated herein. As previously discussed, the Board directed staff to work with conversion companies and other stakeholders to develop a proposal that allowed more flexibility and created a phased approach to certification that encouraged development of systems. This proposal was adopted with modifications by the Board at the May 28, 2009 Board Hearing. The economic impacts of the revised certification requirements are reduced or shifted and are more fully explained in the Supplemental Staff Report for this rulemaking released on May 12, 2009.The revised certification requirements for Tiers 1 and 2 utilize submitted data rather than testing results, reducing costs. In addition, the reduced warranty periods in the revised certification requirements shift most of the warranty costs and risk from the conversion system manufacturers to the consumer.

E(1)9. Comment: The commenter is concerned regarding high compliance costs, and is seeking ways to reduce them. Specifically, the commenter estimates that the regulations would have the following compliance costs for one of the company's three Prius conversion products: First year: $1,552,260 (which includes emission testing: $38,660; OBD compliance: $16,500; application process: $12,100; test vehicles: $210,000; warranty-first year: $275,000; and potential lost revenue in CA during certification: $1,000,000), followed by $275,000 per year for nine years (warrantee cost), thus totaling $4 million over 10 years. (Plug-In Supply)

Agency Response: The Agency disagrees with these cost estimates, and provided a thorough discussion of its estimates of the economic impacts associated with certification of PHEV conversion systems in the Staff Report. The Agency maintains that the commenter's inclusion of potential lost revenue as a "compliance

cost" associated with certification is inappropriate, because unless and until certification is obtained, selling an uncertified conversion kits is illegal.

E(1)10. Comment: The commenter is concerned over lost jobs and revenue in California. It estimates a loss of 27 jobs across the country, and approximately 250 units not being sold in California at $8000 each ($4M in sales and $0.31M in taxes). (Plug-In Supply)

Agency Response: See the Agency Response to Comment E(1)9, which is incorporated into this response. It is inappropriate to speculate regarding potential lost revenue associated with sales of uncertified conversion kits, as such sales are illegal.

E(1)11. Comment: The commenter requests a a reduction and/or elimination of emission testing fees for PHEV conversions. (M. Patterson).

Agency Response: No modifications were made in response to this comment. Fees for emission testing are established by independent laboratories, not ARB. Moreover, the revised staff proposal that the Board adopted with modifications on May 28, 2009 already does provide for the requested reduction or elimination of test fees. The revised requirements delay submission of emission test data until a certain number of conversion systems are sold, and in addition, the certification requirements only require manufacturers to perform a minimal number of emission tests to demonstrate emissions compliance.

E(1)12. Comment: Similar comment to E(1)11. The commenter suggests that the Board pay for testing, then charge $20 per unit sold, or limit the cost of testing to no more than the cost of one conversion. (M. Bartosik).

Agency Response: No modifications were made in response to this comment. The Agency Responses to Comments E(1)4 and E(1)(11) are incorporated herein. The Board's authority to establish regulations and associated test procedures pertaining to aftermarket conversions is derived from statutory authority; such authority does not require the Board to either compensate manufacturers for testing costs, to offset its costs by charging manufacturers, or that it limit test costs to a specified amount.

E(1)13. Comment: The benefits from reduced fuel usage, , public health and air quality, and/or advancing product development that will result from PHEV conversions outweigh the benefits of the proposed regulation and make the conversions unworthy of regulation at this time. (E. Spivey, J. Rosselli, C. Haima, C. Meyer, M. Cox, A. Dailey, A. Siegel)

Agency Response: No modifications were made in response to this comment. The Agency Response to Comments E(1)4 is incorporated herein. The potential benefits provided by PHEV conversion systems do not outweigh the need for establishing certification requirements for such systems.

Fairness complaints

E(1)14. Comment: The commenter implies that ARB is discriminating against small companies and favoring large automakers, through these proposed regulations. (G. Fay)

Agency Response: No modifications were made in response to this comment. See the Agency Response to Comment E(1)5, which is incorporated into this response herein. The certification requirements adopted with modifications by the Board at the May 28, 2009 Board Hearing provide unprecedented flexibility for conversion system manufacturers. In contrast, OEM automakers are subject to significantly more extensive emissions testing and warranty requirements in order to certify vehicles.

E(1)15. Comment: The regulation would effectively create a monopoly, because only one conversion company can afford the testing. (C. Protheroe)

Agency Response: No modifications were made in response to this comment. The Agency Responses to Comments E(1)4 and E(1)11 are incorporated herein. ARB does not agree with this comment. The regulation establishes certification requirements that specify a minimal number of emission tests needed to demonstrate emissions compliance. A thorough discussion of testing costs is provided in the Staff Report. In addition, the revised proposal adopted with modifications by the Board at the May 28, 2009 Board Hearing allows conversion system manufacturers to delay performing emission test data until a certain number of conversion systems are sold.

E(1)16. Comment: The commenter requests that it be granted the same 500 unit exemption already granted to one supplier. (Plug-In Supply)

Agency Response: No modifications were made in response to this comment. The Agency previously granted one supplier an exemption from VC 27156, under an interim process that was provided to allow the legal sale of PHEV conversion systems while appropriate certification procedures were being developed.. The exemption was granted based on emissions testing, OBD II evaluation and component durability demonstration. This same process was also offered to other suppliers that were interested in the early introduction of their PHEV conversion systems in California. However, only one supplier followed though and obtained a VC 27156 exemption. All suppliers are now subject to the certification requirements adopted in this rulemaking.

E(1)17. Comment: The proposed required testing will negatively affect overall public opinion of both hybrid and electric car businesses. (N. Cederlind)

Agency Response: The Agency Responses to Comments E(1)4 and E(1)11 are incorporated herein. The Agency does not agree with the comment. The certification requirements for PHEV conversion systems, including emissions testing, is needed to ensure such systems comply with statutory mandates that that they

neither reduce the effectiveness of any required pollution control devices, nor cause the modified vehicles' emissions to exceed applicable standards. .

E(1)18. Comment: Public citizens will be at the mercy of the automakers without access to the source code of Prius's and other hybrid vehicle computers. (D. Overby)

Agency Response: No change was made in response to this comment. Public citizens should not have easy access to the vehicle's on-board computers in order to change calibrations or alter OBD II system programming. OEM manufacturers spend substantial resources to develop on-board computer software and calibrations in order to meet ARB's emission standards and OBD II requirements. Control and diagnostic algorithms are therefore proprietary and cannot be accessed without permission from the OEMs. In addition, conversion system manufacturers, like other aftermarket parts manufacturers, must make a business case for converting a HEV to a PHEV with the understanding that any aftermarket part that alters the design or performance of any required motor vehicle pollution control device or system is prohibited for sale or installation by Vehicle Code section 27156. Also see the Agency Reponse to E(1)39 below.

Exhaust emissions testing (includes cold engine start)

E(1)19. Comment: The emissions testing requirements should be affordable for small businesses. (S. Solomon, K. Grove)

Agency Response: The Agency Response to Comment E(1)11 is incorporated herein. The Agency included in the regulation options that reduce the test requirements for small volume manufacturers.

E(1)20. Comment: Commenters state that, by maintaining the initial engine run sequence on startup that is already programmed into hybrid vehicles, cold engine start concerns are alleviated, negating the need for expensive emissions testing. (3Prong Power, J. McKinnon) Similar comments: (B. Woodson, B. Gold, Energy Efficiency, P. Malone, E. Moss, K. Grove, C. Trueblood, D. Serotkin). Software (PHEV kit I) can also reduce this problem. (S. Woodruff)

Agency Response: No modifications were made as a result of this comment. Based on data submitted from aftermarket PHEV manufacturers, the initial engine run sequence on startup that is programmed into hybrid vehicles does not guarantee that modified PHEVs will pass emission testing. Therefore, emissions testing is necessary.

E(1)21. Comment: Commenters want data collection and evaluation to:

1. Determine whether concerns are really a problem in typical driving conditions and not under a laboratory worst case scenario. (J. Kravitz)
2. Gather real duty-cycle and emissions data on PHEVs in use to better inform a future regulation. Data collection programs could include continuous I/M that would monitor and report OBD trouble codes in real-time using cellular technology. (InfoWedge)

3. Provide for practical evaluation of systems technology. (Plug-In Conversions)

Agency Response: No modifications were made as a result of this comment. Cold start is major source of emissions for all vehicles, including PHEVs, and this is best evaluated under controlled conditions found in the laboratory. PHEVs will be monitored by OBD systems to ensure emission performance during typical driving conditions. Staff will collect data to evaluate emission performance during typical driving conditions.

E(1)22. Comment: Commenter contends that cold engine restart should be compared to a vehicle that has been burning fuel constantly for 15, 30, 60 or more miles. (S. Woodruff)

Agency Response: No modifications were made as a result of this comment. In a typical Super Ultra Low Emission Vehicle after-treatment system, for example, most of the hydrocarbons are emitted during cold start. Burning fuel constantly in a fully warmed up engine with after-treatment system typically does not significantly contribute to hydrocarbon exhaust emissions. Additionally, the test protocol has been well established. Any changes would require extensive research to determine equivalency to the current protocol.

Evaporative emissions testing

E(1)23. Comment: Commenters have provided suggestions on how to deal with evaporative canister purging and negate the need for testing:

1. With a supplemental hybrid, the engine is running all the time, and the problem is non-existent. (Partnerships 1)
2. Require the PHEVs to run the IC until the CAT is operational upon startup. (L. Galcher, L. Black, 3Prong Power)
3. Work with aftermarket plug-in manufacturers to discuss ways to use catalytic converters effectively, and to discharge vaporized gasoline. (M. Franks, L. Black)
4. Program PHEV's fuel-driven engines start briefly once every three days regardless of vehicle use. (Sonoma GoLocal)
5. Electrically heat the catalytic converter. (W. Atherton)

Agency Response: Since the goal of using battery power is to minimize engine operation as much as possible running the engine all of the time in order to provide adequate canister purge defeats the goal. Also, requiring a PHEV to run the IC engine, at start up, until the catalyst is operational is an approach that is already used by manufacturers. For instance, currently exhaust certified “super ultra-low emission” vehicles (SULEVs) are designed to rapidly warm-up their catalysts in order to control their “cold start” exhaust emissions. Since these preparatory catalyst warm-ups are already used for controlling exhaust emissions, it is not necessary to also do it solely for enabling canister purging.

For aftermarket PHEV conversions, the ability to control “cold start” exhaust emissions depends on the design of the original vehicle. For example, older

vehicles that lack inherent “cold start” exhaust emission controls may have a difficult time meeting the exhaust emission standards if they are re-designed to use engine activation solely for warming up the catalyst in preparation for controlling purged evaporative emissions. Regardless of a vehicle’s catalyst warm-up strategy, PHEVs, including aftermarket PHEV conversions, must comply with the applicable evaporative emission standards. As for the Agency working with aftermarket PHEV converters to find ways to make the catalysts more effective, ARB does not specify the technology that must be used to demonstrate compliance with the emission standards. It is more proper that such decisions be made by the manufacturers or converters themselves.

The suggestion that PHEVs be programmed to start their fuel-driven engines briefly once every three days regardless of vehicle use is something that is already accounted for in the Evaporative Test Procedures. Specifically, HEV manufacturers are required to submit an engineering evaluation of their canister purge operation for controlling canister breakthrough emissions. This submission must include a manufacturer-specified duration (i.e., “X number of days”) between engine activations solely for purging the canister between engine activations solely for purging the canister (ref.: sections III.D.10.3.12 through III.D.10.3.14, of the Evaporative Test Procedures). However, in practice, such engine activations are typically unnecessary because other routine engine activations, such as those performed for controlling “cold start” exhaust emissions, provide enough engine operating time to effectively purge the canisters.

Lastly, electrically heated catalysts have been used by some conventional vehicles to control their “cold start” exhaust emissions. However, integrating electrically heated catalyst technology in to a vehicle that did not previously have it could be technically challenging. Again, this is really a decision that can be made only by an aftermarket PHEV converter. Nevertheless, an aftermarket PHEV conversion, even one that used an electrically heated catalyst, must be in compliance with the applicable emission standards whether or not the original vehicle used an electrically heated catalyst. For aftermarket PHEV conversions, the objective remains demonstrating that the conversion has not affected the OEM-certified evaporative emission control system’s effectiveness in complying with the applicable emission standards. Accordingly, there are not any modifications to the test procedures based on the comments.

E(1)24. Comment: Commenter would like waivers for emission testing requirements until better ones can be found. (M. Franks, L. Black)

Agency Response: No modifications were made in response to this comment. The required evaporative emission test procedures reflect the “worst-case” mode of PHEV owner driving, including aftermarket PHEV conversion owners, by accounting for the potential to “always plug-in” the PHEV. This means their vehicles would always start the commutes in a charge-depleting mode of operation, which leads to eventually canister emission breakthroughs. This is a highly probable condition and becomes a significant factor in evaluating the evaporative emission characteristics of these vehicles. Therefore, it must be accounted for in order for the

evaporative emission test procedures to effectively evaluate the ability of the vehicle's evaporative emission control system, under the "worst-case" test conditions, to comply with the applicable emission standards for the required useful life period. Therefore, the current test procedures provide the best standardized method for obtaining accurate, consistent, and reproducible emission data for determining compliance with the applicable emission standards, as well as for comparison purposes between other light-duty vehicles. It is not necessary to offer waivers from the emission standards or test procedures since better methods are not currently needed. However, as additional in-use PHEV operational information becomes available, the test procedures may be re-evaluated and revised in the future, if needed.

Battery Warranty

E(1)25. Comment: Commenters generally requesting that ARB drop battery warranty requirements due to economic hardship and the notion that it would force companies to go out of business or underground. (Partnerships 1, S. Woodroof, S. Solomon, Ewert Energy, D. Addams)

Agency Response: No change was made in response to this comment. The Agency disagrees that conversion manufacturers and installers should be exempted from the proposed warranty requirements because the record amply demonstrates that warranty provisions are needed to ensure that converted vehicles will comply with applicable emission standards.

As explained in Section 3.3 of the Staff Report: Initial Statement of Reasons (ISOR) for this rulemaking, PHEVs are classified as enhanced advanced technology partial allowance zero-emission vehicles (enhanced AT PZEVs).

To qualify as a PZEV, a vehicle must, among other requirements, be certified to the 150,000 mile super-ultra-low-emission vehicle (SULEV) exhaust emission standards for passenger cars and light-duty trucks in section 1961(a)(1), and have its emission related components be covered under a performance and defects warranty for 15 years or 150,000 miles, whichever first occurs.[3] To qualify for as an AT PZEV, a vehicle must additionally have its zero-emission energy storage devices be covered under warranty requirement for 10 years or 150,000 miles, whichever first occurs.

During the January 23, 2009 public hearing, staff explained that it was proposing warranty requirements for aftermarket PHEV conversions in order to ensure that those conversions would not undermine the OEM warranties applicable for PZEVs (25:14 to 26:4), that are in turn designed to ensure that OEM PZEVS can continue to comply with their stringent exhaust and evaporative emission standards.

Specifically, in reference to conversion kits that affect a HEVs primary battery, Chairman Nichols explained during the hearing that the primary reason that the Board required OEM PZEVs to be covered under a 15 year/150,000 mile emissions

[3] The warranty time period is ten rather than fifteen years for a zero emission energy storage device used for traction power, such as the battery in a hybrid-electric vehicle.

warranty was because of the Board's belief that the warranty would provide the impetus for manufacturers to design their systems to be more durable, which would directly affect the emissions performance of their vehicles (87:10-25). This rationale also explains why the Agency believes that the proposed warranty requirements are necessary – they will encourage manufacturers to design and manufacture conversion systems that are sufficiently durable to ensure that the converted vehicle emissions are controlled at acceptable levels as the vehicles and systems age. Moreover, at the May 29, 2009 Board Hearing, the warranty coverage was amended to be the following, whichever is longer from the date of installation: 5 years/75,00 miles whichever first occurs; or remaining OEM warranty period.

The alternative proposed by the commenters – leaving the terms of the warranty to be regulated strictly by market forces fails to recognize or address this consideration, and in fact could result in warranty terms and conditions that would not cause manufacturers to ensure their conversion systems are sufficiently durable to control emissions.

The Agency agrees that conversions that involve adding a supplemental battery and that are designed such that if the supplemental battery conversion system is malfunctioning, disconnected, turned off, or removed, the vehicle returns to its pre-conversion emission control state, are less likely to adversely affect the ability of the converted vehicle to comply with applicable emission standards, and can accordingly be subjected to different warranty conditions than conversions involving replacements or that directly affect the vehicle's primary battery.

E(1)26. Comment: The warranty requirement is inappropriate for supplemental hybrids because failure of the supplemental system will simply disable it, and the vehicle will revert to its former status until repairs are made. There will be no adverse impact on emissions at all relative to the pre-conversion status. (Partnerships 1)

Agency Response: See Agency Response to Comment E(1)25.

E(1)27. Comment: It is not reasonable to require conversion companies to take full responsibility of the warranty for upgrading only one aspect of the vehicle, and requiring OEMs to reset the warranty start date for converted vehicles less than 6 years old will deter OEMs from releasing conversions for their own vehicles. (Ewert Energy)

Agency Response: Warranty requirements under this procedure apply to PHEV conversion system manufacturers and cover only defects in materials and workmanship of the conversion system and any damage it will cause to any part of the converted vehicle. It does not require conversion manufacturers to take over the full vehicle warranty. Moreover, at the May 29, 2009 Board Hearing, the warranty coverage was amended to be the following, whichever is longer from the date of installation: 5 years/75,00 miles whichever first occurs; or remaining OEM warranty period. This provision should address concerns regarding resetting of warranty start date for vehicles less than six years old. In addition, no OEMs have submitted

comments stating that these warranty provisions will prevent or deter them from certifying conversion kits. Also, see Agency Response to Comment E(1)25.

E(1)28. Comment: ARB should require OEMs to maintain responsibility for warranty issues that are not caused by the conversion. (D. Gillis)

Agency Response: No change was made in response to this comment. See Agency Response to Comment E(1)25. Also, the Agency explained in the Staff Report, the required warranty is similar to that required for alternative fuel conversion systems and their installers with respect to holding conversion system manufacturers responsible for repairing or replacing OEM parts that are damaged because of a defect in the conversion system.

E(1)29. Comment: The requirement that conversion companies warrant their newly installed conversion battery system for 10 years or 150,000 miles should be revised or postponed. The conversion battery system should be subject only to the balance of the original OEM warranty on the grounds that the original HEV battery system warranty is based on a system that utilizes a much lower SOC range. A PHEV battery system utilizes a much wider SOC range, which reduces battery cycle life. (Plug-In Conversions)

Agency Response: No change was made in response to this comment. See Agency Response to Comment E(1)25

Warranty Disclosures

E(1)30. Comment: Conversion system company warranties should not be the Board's concern – customers should be made aware of the battery expectations and then those customers can decide if the warranty offered by the supplier/installer is sufficient. (G. Lang, 3Prong Power, G. Warfel, W. Atherton, L. Dorosin, K. Grove, C. Miron)

Agency Response: See Agency Response to Comment E(1)25.

E(1)31. Comment: Warranty requirements should not be a concern of CARB so long as the vehicles' emission standards are maintained during the original emissions warranty period. (PIA), or provided emissions do not get worse once the parts not under warranty fail. (M. Hardy, Sonoma GoLocal)

Agency Response: See Agency Response to Comment E(1)25.

E(1)32. Comment: Providers of "plug-in" conversions should not have to provide warranties or guarantees beyond those required by traditional car maintenance and repair shops. (D. Phelan, U. Cusoe-White)

Agency Response: See Agency Response to Comment E(1)25.

Other Warranties

E(1)33. Comment: The ARB should reevaluate the proposal for a 15-year warranty on emissions control system components to allow sufficient time to assess the impact of PHEV aftermarket systems." (Plug-In Conversions)

Agency Response: No change was made in response to this comment. See Agency Response to Comment E(1)25.

E(1)34. Comment: Commenter requesting ARB to delineate warranty requirements for conversions of existing hybrid cars versus conventional internal combustion engine (ICE) vehicles to PHEVs, especially since there would be no prior batteries needing warranty clarification on converted ICEs. (PIA)

Agency Response: The warranty requirements applicable to conversions of HEVs to PHEVs are set forth in section 7 of the "California Certification and Installation Procedures for Off-Vehicle Charge Capable Conversion Systems for 2000 and Subsequent Model Year Hybrid Electric Vehicles," adopted December 2, 2009. Currently there are no procedures applicable to converting ICE powered vehicles to PHEVs. Also see Agency Response to Comment E(1)25.

Modification of OBD system to accommodate conversion system components

E(1)35. Comment: The requirement for modification of the OBD system to accommodate all the major components of the hybrid conversion system is unwarranted. Conversion does not appreciably modify the IC engine, OBD system or their operation. Failure of the supplemental system will simply disable it, and the vehicle will revert to its former status until repairs are made. There will be no adverse impact on emissions at all relative to the pre-conversion status. (Partnerships 1, 3Prong Power)

Agency Response: No modifications were made as a result of this comment. An OBD system is only one part of the total solution by ARB to minimize emissions for air pollution reduction and prevention. It is a diagnostic system incorporated into the vehicle's powertrain computer that verifies if an emission control system is functioning within acceptable parameters or detects a malfunction as soon as it toccurs. OBD systems consist mainly of software designed into the vehicle's onboard computer that monitors virtually every component and system that can cause an increase in emissions. When an emission-related malfunction is detected, the OBD system alerts the vehicle operator by illuminating the malfunction indicator light on the instrument panel. By alerting the driver to malfunctions as they occur, repairs can be made promptly, which result in fewer emissions from the vehicle.

Today's vehicles are incredibly complex; therefore, it is difficult to accurately predict the full impact of the aftermarket conversion (AMC) system to the OBD system until specifics are known about the base vehicle and about the hybrid modification itself. Conversions that add hybrid functionality will affect the original vehicle's OBD system. As simple examples, systems (when properly operating or after partially deterioration) that cause more frequent engine re-starts or go longer between re-starts may result in increased tailpipe emissions from the re-starts. Systems that initially result in substantially less frequent engine operation also may result in

reduced monitoring frequency of key emission controls such as the catalyst or evaporative emission system—two components that still need to function as effectively as they do in the unmodified configuration to keep in-use emissions low. Assumptions that a PHEV will always be 'at least as clean' as the unmodified system are simply incorrect and have been shown to be wrong on prototype PHEVs. AMC system manufacturers will have to plan for OBD compliance in their system design and will likely need to integrate substantially with the OEM system to be successful. AMC system manufacturers must assume they have adversely impacted the OEM OBD system and will likely need to add OBD content and recalibrate some existing portions of the system to bring the modified vehicle into compliance. Complying with the OBD regulation takes more than showing that the modified vehicle does not set false faults (e.g., cause diagnostics to erroneously conclude there are faults when none actually exist). A compliant OBD system is one that detects all the required faults when they occur, detects those faults as frequently as required, and detects those faults at the required tailpipe emission levels. A compliant system will detect all faults that can cause an emission increase, including faults of added hardware as part of the conversion system. AMC system manufacturers that add hardware to the system will likely need to add OBD compliant diagnostics for each and every electronic component and carefully integrate fault handling of these diagnostics with the OEM OBD system. AMC systems that simply "disable themselves" or attempt to "revert back to the OEM system" upon malfunction are generally not sufficient solutions to comply and often result in emission faults going undetected in-use.

E(1)36. Comment: Suggest ARB revise proposed regulations. PHEVs are currently exempt from SMOG testing, therefore the OBD data log does not serve a useful function in detecting problems with emission systems. (3Prong Power)

Agency Response: No modifications were made as a result of this comment. Smog Check is the main tool that is used after certification to determine if vehicles have emission related problems and need emission systems repair. AMC installations are usually verified for correct installation and checked for ARB certification at Smog Check stations. HEVs are currently excluded from the Smog Check program because of software and hardware limitations with the current Smog Check equipment that was not designed to accommodate vehicles with engines that may start and stop or not run during the test sequence. However, the Bureau of Automotive Repair (BAR) is currently working on near-term equipment upgrade specifications that would allow HEVs to be inspected properly. Accordingly, uncertified and illegal conversions may temporarily escape detection but will eventually be identified during Smog Check. And, like all 1996 and newer vehicles, OBD is the primary mechanism used by the Smog Check program to identify vehicles in need of emission repair and is largely responsible for ensuring in-use vehicles are properly operating. Allowing PHEVs to be certified with improperly functioning OBD systems would undermine the ARB's efforts to keep all in-use vehicles operating at the emission levels they were designed and certified to meet.

E(1)37. Comment: Requiring modification of the OBD system is prohibitively expensive and quite unnecessary. (Partnerships 1)

Agency Response: No modifications were made as a result of this comment. AMC system OBD requirements were presented to the Board, deemed cost effective and necessary, and as a result were adopted.

E(1)38. Comment: Urge ARB to revise the proposed regulation since OBD requirements were not created with PHEVs in mind. PHEVs may not meet the minimum frequency for OBD measurements of engine related functions since with a PHEV the engine operates only a fraction of the time as compared with a standard vehicle. (3Prong Power)

Agency Response: No modifications were made as a result of this comment. We acknowledge that compliance with these new vehicle OBD requirements is a complex task requiring a significant level of expertise. However, OBD is only one aspect of the significantly difficult task of designing a vehicle to meet ARB and U.S. EPA requirements not to mention safety and other related requirements and the requirements are not selectively waived or ignored based on the level of (or lack of) experience of the entity trying to certify. The requirements all exist for very distinct reasons and play unique roles in achieving California's clean air goals and it is inappropriate to try and claim that some are more or less important than others. Vehicle manufacturers have substantial resources committed to staff and development processes as well as control and diagnostic algorithms that are indeed proprietary and are not openly shared with others. Again, however, designing and building compliant cars is complex and the requirements should not be waived or undermined by inexperienced manufacturers modifying vehicles with limited to no comprehension of what they are doing. Staff understands that most aftermarket conversion system manufacturers will need some time to comprehend the OBD requirements, identify the likely impacts, progress to the necessary level of expertise to successfully integrate with the OEM OBD system, and develop solutions to bring a compliant product to the marketplace. As such, the staff report indicated that AMC system manufacturers need to have a viable road map to achieving full OBD compliance in a timely manner to get certified. Given the complexity of today's vehicles, this will likely require support from OEMs, OEM suppliers, and/or OEM engineering contractors to ensure successful integration of the aftermarket system.

As interim relief, ARB staff previously stated it will consider reduced monitoring frequency, where appropriate, for PHEVs (and is currently doing so with OE PHEVs). Further, the deficiency provisions in the OBD regulation provide a limited relief valve for manufacturers attempting to comply in full but falling short or needing a little extra time to get there. Together, this should provide time for AMC system manufacturers to gain necessary in-use experience regarding how the AMC vehicle is operated, how often the monitors run, and to use that information to refine the aftermarket conversion OBD system. However, manufacturers will still need to meet the vast majority of the OBD requirements and limited relief would only be provided primarily in the area of minimum monitoring frequency. Further, such relief would only be granted for the short term and only in cases where the manufacturer has determined what is needed to come into full compliance and has a plan to do so in an expeditious manner. ARB will not approve systems with such reduced monitoring frequency that any monitors are effectively disabled, or the vehicle is otherwise

incompatible with the Smog Check inspection process. For example, some hybrid conversion designs prevent OBD monitors from running altogether. This is not an acceptable practice as that monitored component is still relied on for proper emission control. Staff is in the process of drafting regulation language revising denominator requirements to address the unique engine operation characteristics associated with PHEV systems and expects to finalize those during the next rulemaking of the OBD regulation. In the meantime, the OBD regulation allows the ARB to adjust items as needed and PHEV manufacturers (OE or aftermarket) can work with staff to reach an interim agreement.

E(1)39. Comment: The biggest issue in complying with OBD II standards is that many of the OEMs have proprietary data not available during the testing process. Therefore it is difficult for aftermarket converters to prove they are in compliance with the regulation. We ask ARB to make an exception to this regulation for small scale convertors and suggest other alternatives. (Ewert Energy, PIA)

Agency Response: Please see Agency Response to E(1)38.

E(1)40. Comment: ARB should make an exception to this regulation for small scale converters and offer other alternatives, such as requiring aftermarket converters to demonstrate, to the best of their knowledge, they are not impairing the vehicles ability to monitor emissions, or requiring additional mandatory emission tests that wouldn't otherwise be required. (Ewert Energy)

Agency Response: No modifications were made as a result of this comment. As stated above in Agency Response to comment E(1)38, OBD plays an important role in minimizing emissions from in-use vehicles and is the sole regulation that works throughout the life of the vehicle and is responsible for identifying each individual vehicle in need of repair. Making sure each and every vehicle is operating at the emission levels it was designed to is essential for California's clean air goals and necessitates that each and every vehicle have a functional OBD system, regardless of the size of the manufacturer that originally certified it or subsequently modified it. Developing OBD strategies and solutions to meet OBD system operation requirements for the life of the vehicle, like all ARB regulations, is a complicated task requiring a significant level of expertise. Detailed knowledge of the impact of the AMC system to the OEM OBD system is essential since conversions that add hybrid functionality will affect the original vehicle's OBD system. Expertise will likely be needed to assess how the OEM calibrations are affected by the AMC system, how to recalibrate monitors with the AMC system installed, and other affected interfaces between the base vehicle and the AMC hybrid modification.

Staff understands that most AMC system manufacturers, including low volume AMC manufacturers, will need time and resources to comprehend OBD requirements, identify the likely impacts, and develop solutions to bring a compliant product to the marketplace. Accordingly, staff is proposing the use of existing deficiency provisions in the OBD regulation that allow certification of systems that fall short of fully meeting all of the OBD system requirements. Deficiencies can be awarded in cases where the AMC system manufacturer has made a good faith effort to comply and has a

plan to come into full compliance as expeditiously as possible. Using this mechanism, staff could certify systems that fall short in one or more areas as long as the AMC manufacturer had attempted to comply and had a valid plan to address the shortcomings in a reasonable timeframe. There are some restrictions on items that can be treated as deficiencies, but those are consistent with the type of shortcomings where it would not be appropriate to certify the AMC system. Further, ARB will not approve systems that compromise OBD monitoring capability or if the vehicle is incompatible with Smog Check inspection.

E(1)41. Comment: Commenter suggests making the Staff Report's Appendix text about gradual phase-in of OBD II standards more visible to all parties. (PIA)

Agency Response: No modifications were made as a result of this comment. A method of gradual phase-in is described in Appendix J of the Supplemental Staff Report dated May 12, 2009. It has been posted on the ARB website since publication at http://www.arb.ca.gov/regact/2008/phev09/suppisor.pdf

Suggested General Alternatives

E(1)42. Comment: Commenters contend that it is too early to regulate the PHEV conversion market and offer alternatives such as:

1. Require registration as a PHEV developer until volumes become significant and making safety and original emission control function be the only requirement. Then implement the PHEV conversion regs when volumes reach 10,000 units. (D. Gillis)
2. Require testing after 10,000 units sold per manufacturer. (M. Bartosik)
3. Have "looser regulations" until the number of PHEV conversions reach 3-5% of hybrids. (3Prong Power)
4. Have a "waiver" for small companies that build a small number of vehicles/conversion kits. (D. Serotkin, 3Prong Power, R. Levin).
5. Have a waiver for emissions testing based on projected sales and inclusion of emission test results from the non-altered OEM vehicle. (M. Rings)
6. Wait until a few designs are beginning to dominate the market before implementing strict regulations, as proposed. (S. Foster)
7. Exclude industry members producing PHEV conversions below a certain threshold. (C. Hamilton)
8. Relax regulations for smaller companies until there are a few thousand aftermarket PHEVs on the road." (Green Motors)

Agency Response: As discussed above, the Board did not adopt the proposed certification requirements for PHEV conversion systems at the January 22, 2009 Public Hearing, but instead directed staff to work with stakeholders to develop a proposal that allowed more flexibility and created a phased approach to certification that encouraged development of systems. This proposal was adopted with modifications by the Board at the May 28, 2009 Board Hearing.

E(1)43. Comment: Commenter submitting that ALL aftermarket parts for vehicles should require the same certification as proposed for PHEV conversions, putting all aftermarket parts on equal footing. (M. Hamson)

Agency Response: No modifications were made in response to this comment. The Agency response to Comment E(1)4 is incorporated herein. This rulemaking action is specifically limited to aftermarket conversion systems designed to convert HEVs to PHEVs; the record for this rulemaking does not contain any facts, studies or other data pertaining to aftermarket parts or systems applicable to vehicles that are not HEVs. However, staff may decide to consider incorporating relevant aspects of this rulemaking in future aftermarket parts rulemakings.

E(1)44. Comment: ARB should have separate and shorter warranty periods for plug-in hybrid conversions that do not modify the existing hybrid battery. (PIA)

Agency Response: Please see the Agency response to Comment E(1)25. The certification requirements adopted by the Board at the May 28, 2009 Board Hearing included a modification which added a special warranty provision for supplemental battery conversion systems, along with a definition for supplemental battery conversion system.

Commenters in support of the PHEV Aftermarket regulations as proposed:

E(1)45. Comment: The cost of emissions testing is not completely unreasonable, and requiring the completed conversions to meet individual state periodic inspections for emissions is justified. (Partnerships 1)

Agency Response: ARB agrees with this comment, especially after staff collaborated with stakeholders to develop a proposal that allowed more flexibility than the original proposal and that created a phased approach to certification that encouraged development of systems. This proposal was adopted with modifications by the Board at the May 28, 2009 Board Hearing.

E(1)46. Comment: "The AQMD staff supports the efforts of CARB throughout its public process to streamline the proposed plug-in hybrid electric vehicles test procedures and aftermarket parts certification requirements to reduce the time and cost of PHEV testing and provide flexibility requested by automakers, while preserving the essential emissions characterization elements, and ensuring that developers and manufacturers will provide the warrantee necessary to make certain that emission reductions continue. Amending the emission test procedures to appropriately address PHEV testing is an important step to provide certainty to automakers finalizing PHEV design and production plans to commercialize near-zero emission vehicles that can qualify for enhanced AT-PZEV credit provided in the recently adopted ZEV regulation.

Given that hybrid systems are relatively new and especially, with plug-in systems, we recommend that the CARB Board include in its resolution for staff to conduct a review of the test procedures, perhaps every three years and report back to the CARB Board on any necessary amendments." (SCAQMD)

Agency Response: ARB appreciates SCAQMD's support of this rulemaking action. Staff will continue to work with industry to resolve issues regarding the conversion system certification requirements, and may propose modifications to address such issues in a future rulemaking.

Writer suggested changes to the regulation

E(1)47. Comment: Exempt supplemental plug-in hybrids conversions as long as they continue to meet state periodic emission inspection requirements. (Partnership 1)

Agency Response: No changes were made in response to this comment. . HEVs are currently excluded from the Smog Check program because of software and hardware limitations with the current Smog Check equipment that was not designed to accommodate vehicles with engines that may start and stop or not run during the test sequence.

E(1)48. Comment: Add an additional category to the definition of "Off-Vehicle Charge Capable" Page B-4, Appendix D and Page 1 of Appendix G to the effect: "Supplemental OVCC converted vehicles are those in which the conversion leaves the original propulsion, emission and evaporation control systems substantially unmodified in the function and operation, for which the original vehicle certification is adequate and additional testing and regulations are unnecessary." (Partnership 1)

Agency Response: No changes were made in response to this comment. Any aftermarket part that alters the design or performance of any required motor vehicle pollution control device or system is prohibited for sale or installation by Vehicle Code section 27156. This same section authorizes ARB to exempt such parts from this prohibition if ARB finds that such parts do not reduce the effectiveness of any required pollution control device or do not cause vehicle emissions to increase. It is therefore not permissible to broadly exempt supplemental OVCC conversion kits from these provisions, as these kits are still aftermarket parts that are subject to the provisions of VC 27156.

E(1)49. Comment: Allow ARB to Issue, immediately and on request, a "Certificate to Perform R&D" to a developer of systems intended to improve gas mileage. (H. Letovsky)

Agency Response: No changes were made in response to this comment. Developers may currently apply for experimental permits that are intended to allow for development of prototype vehicle operations.

E(1)50. Comment: Allow ARB to provide free emissions and compliance testing for all holders of said "Certificate to Perform R&D." (H. Letovsky)

Agency Response: No changes were made in response to this comment. ARB does not and cannot perform emissions testing for individual manufacturers that hold experimental permits. Independent testing laboratories are available for emissions and compliance testing.

E(1)51. Comment: Allow ARB to extend the same 500 unit courtesy that Hymotion got to all developers of PHEV modification units. (H. Letovsky)

Agency Response: See Agency Response to Comment E(1)16.

E(1)52. Comment: Require developers of R&D PHEV modification units to take full responsibility for any loss, failure, or warranty problems that the PHEV modification unit causes to the end user with the full understanding that they are participating in a technology development exercise. (H. Letovsky)

Agency Response: This comment is based on a misunderstanding of ARB's experimental permit process. The PHEV conversion system certification requirements are intended to ensure that conversion systems meet applicable warranty and durability requirements. In contrast, the experimental permit process is solely intended to allow the use of non-certified vehicles and technology for non-commercial purposes.

E(1)53. Comment: Allow ARB to make production PHEV modification units, when certified, carry the same warranty requirements as loss indemnifications that are required for other aftermarket parts. (H. Letovsky)

Agency Response: The certification requirements adopted by the Board at the May 28, 2009 Board Hearing include warranty requirements for conversion kits that are analogous to those required for other aftermarket parts.

(2) Written and verbal conversion comments received at the January 22, 2009 Board Hearing

General Comments

E(2)1. Comment: All companies involved in PHEV conversions should simply be required to register with CARB, inventory their completed conversions, project their 2009 volume, and make themselves available for a more deliberative process. The commenter suggests that CARB talk to all stakeholders to ensure a process that considers all aspects of the conversion industry. (CalCars).

Agency Response: The Agency did engage in such extensive deliberations with the affected industry. See Agency Response to Comment E(1)2.

E(2)2. Comment: The proposed regulations do not address all modes of operation of converted hybrid vehicles. (Plug-In Supply)

Agency Response: The adopted regulation and incorporated test procedure need not include every conceivable mode of operation of converted PHEVs, as long as they include sufficient modes of operation to satisfy the Board that the conversion kits will neither reduce the effectiveness of any required pollution control devices, nor cause the modified vehicles' emissions to exceed applicable standards.

E(2)3. Comment: Commenter asking ARB to clarify which regulations the hybrid conversions are subject to versus the non-hybrid conversions. (PIA)

Agency Response: The adopted PHEV conversion system certification requirements are only applicable for converting an existing HEV to a PHEV. At this time, ARB is not proposing certification requirements for non-hybrid conversions.

E(2)4. Comment: The commenter is concerned that regulatory action on the PHEV conversion industry is premature, contending there is no industry at present, the number of converted vehicles will be minimal for several years, the probability is that conversion will reduce emissions, the technology is evolving rapidly, the time needed to observe progress will not result in environmental harm, and US competitiveness is harmed when nascent green industries are destroyed. (Partnerships 1)

Agency Response: See Agency Response to Comment E(1)2.

E(2)5. Comment: The Commenter seeks a delay in the regulation to give time for data collection and use that data to modify the regulation "down the road." He contends that early adopters would be willing to spend $7-10K on conversions and be part of the process of studying I/M for reporting OBD problems and in-use testing of real-time emissions. (A. Burnette, InfoWedge)

Agency Response: See Agency Response to Comment E(1)2.

E(2)6. Comment: Commenter asks staff to find ways to apply AB 118 funds to bring PHEV conversions to market more quickly (i.e., pay for testing). (A. Burnette, InfoWedge, 3Prong Power)

Agency Response: No change was made in response to this comment. This rulemaking establishes procedures that manufacturers may elect to follow in order to legally sell and offer to sell conversion systems designed to convert HEVs to PHEVs. Only manufacturers that elect to enter the conversion system marketplace are required to incur these costs, and such manufacturers do so in full recognition of the associated costs.

AB 118 created the Alternative and Renewable Fuel and Vehicle Technology Program. This program is administered by the California Energy Commission, (CEC), and provides:

> "upon appropriation by the Legislature, grants, revolving loans, loan guarantees, loans, or other appropriate measures, to public agencies, vehicle and technology consortia, businesses and projects, public-private partnerships, workforce training partnerships and collaboratives, fleet owners, consumers, recreational boaters, and academic institutions to develop and deploy innovative technologies that transform California's fuel and vehicle

types to help attain the state's climate change policies. H&S Code section 44272(a).

H&S Code section 44272(c)(6) states that projects to develop and improve "light-, medium-, and heavy-duty vehicle technologies that provide for better fuel efficiency and lower greenhouse gas emissions, alternative fuel usage and storage, or emission reductions, including … conversions of hybrid technology to plug-in technology through the installation of safety certified supplemental battery modules," are eligible for funding, but such funding is administered by the CEC (H & S Code section 44273), and not the ARB. The Investment Plan for the Alternative and Renewable Fuel and Vehicle Technology Program, approved by the Energy Commission in April 2009, includes funding for PHEV conversions as the commenter suggests. (Please see the following reference for more information http://www.energy.ca.gov/2009publications/CEC-600-2009-008/CEC-600-2009-008-CMF.PDF see pages 14 and 15.)

In this rulemaking, the Board did not direct staff to help conversion manufacturers obtain AB 118 funds in order to help offset manufacturers' testing costs; however, during the May 28, 2009 public hearing, Chairman Nichols indicated that she was going to write a letter to the Department of Energy stating that ARB was going to be certifying conversions, and supporting funding from the Economic Recovery Act going to Clean Cities for these conversion projects. [208:15-25].

E(2)7. Comment: Commenter stating that it is too early to regulate the after market PHEV industry and suggesting they work with CARB to come up with ways to stay in business and serve the needs of their customers. (3Prong Power, Plug-In Supply, B. Jones)

Agency Response: See Agency Response to Comment E(1)2.

CalCars suggested Tiered approach

E(2)8. Comment: If CARB fails to allow simple CARB registration suggested by CalCars, then CalCars proposes the staff devise a set of graduated rules, suggested in their testimony, to require increasing compliance only as each manufacturer sells significant volumes of conversions. Commenter suggests the following graduated regulation scheme:

1) New conversion company presents CARB with engineering proposal showing how their conversion will avoid increased criteria pollutant emissions then shows a running prototype. Each completed conversion is subject to an ordinary end-user smog test for that model of unconverted vehicle. The buyers sign a contract acknowledging the level of warranty accompanying the product, accepting the level of risk for an 'experimental' conversion, and committing to periodic smog tests by owners that are not otherwise required of SULEV vehicles for several years.
2) After selling 10 conversions, the manufacturer explains how the now-current version(s) avoid mechanical, reliability, and emissions problems, and shows on paper how the system preserves OEM OBD functionality.*

3) After selling 100 systems, one vehicle undergoes the most basic manufacturer emissions testing, and the conversion manufacturer shows how known OEM OBD functionality is both preserved and enhanced with similar capabilities warning of conversion components needed service.
4) After selling 1000 systems, the company complies with CARB's whole set of production conversion rules.
*Note: Under such a plan, for conversions to prove preservation of OEM OBD functionality, CARB would have to require some cooperation from automakers, who would need to provide aftermarket conversion companies with internal details of how their OBD systems comply with emissions regulations. Alternatively, conversion companies could collaborate on building a database of discovered OBD functionality for each vehicle model, but this approach would only work if CARB were to allow compliance with this aftermarket industry database as proof of preservation of OEM OBD functionality. (CalCars, M. Shultz)

Agency Response: The Board did not adopt the proposed certification requirements for PHEV conversion systems at the January 22, 2009 Public Hearing. The Board directed staff to work with stakeholders to develop a proposal that allowed more flexibility and created a phased approach to certification, that largely incorporated the concepts proposed by the commenter. This proposal was adopted with modifications by the Board at the May 28, 2009 Board Hearing.

Battery Warranty

E(2)9. Comment: The requirement that conversion companies warrant their newly installed conversion battery system for 10 years or 150,000 miles should be revised or postponed on the grounds that, because PHEVs use a wider range of battery SOC, battery life cycle is reduced when compared to batteries used in conventional hybrids, which use a narrower SOC range. The commenter submits that a newly installed conversion system battery should only be subject to the balance of the original warranty. (Plug-In Conversions, Gold Peak)

Agency Response: No changes were made in response to this comment. See Agency Response to Comment E(1)25.

E(2)10. Comment: Commenter asks for allowance for replacing lead-acid batteries used in their conversion product, since they won't last up to the warranty requirements. (Plug-In Supply)

Agency Response: No changes were made in response to this comment. See Agency Response to Comment E(1)25.

E(2)11. Comment: The commenter is concerned that lithium ion battery technology is too new to know whether such batteries can last 10 year/150,000 miles per the supplemental battery warranty requirement. The commenter requests that battery warranties be set by market pressures provided failure does not increase emissions. (KillaCycle, Alliance Renewable Energy, CalCars)

Agency Response: No changes were made in response to this comment. See Agency Response to Comment E(1)25.

Conversion System Warranty

E(2)12. Comment: Commenter suggests that conversion system warranty provisions should not be part of the aftermarket certification requirements on the grounds that they would:

1. Add dramatically to the cost and harm the market for PHEV conversions in California. The 10-year proposed warranty will become a limiting factor in that they will not be able to provide it OR providing it will increase the cost to the extent that the conversion system is no longer a viable value proposition to customers.
2. Do nothing to improve their system's ability to meet staff's emission objectives. This assessment is based on the fact that, if the supplemental battery fails, the vehicle will revert to stock operating mode rendering emissions no worst than they were before the conversion. (A123)

Agency Response: No changes were made in response to this comment. See Agency Response to Comment E(1)25.

E(2)13. Comment: The commenter is concerned that warranty requirements will destroy the industry based on fact that it would be unfinanceable due to lack of track record and implied unlimited liability. (Partnerships 1)

Agency Response: No changes were made in response to this comment. See Agency Response to Comment E(1)25.

Emissions Warranty

E(2)14. Comment: Commenter recommends that ARB reevaluate the proposal for a 15-year warranty on emissions control system components to allow sufficient time to assess impact of PHEV after market systems. (Plug-In Conversions, Gold Peak)

Agency Response: See Agency Response to Comment E(1)25.

E(2)15. Comment: Commenter suggestis that, because emissions are regulated by the state and tested every two years, special hybrid warranties are not required. If the hybrid system fails, the vehicle will revert to its pre conversion conditions. (Partnerships 1)

Agency Response: See Agency Response to Comment E(1)25. Moreover, HEVs are currently excluded from the Smog Check program because of software and hardware limitations with the current Smog Check equipment that was not designed to accommodate vehicles with engines that may start and stop or not run during the test sequence.

E(2)16. Comment: The commenter questioned the logic of requiring a 10-year emission system warrantee. He is under the impression that a vehicle under warranty is not required to undergo smog checks every two years. (M. Schultz)

Agency Response: See Agency Response to Comment E(1)25.HEVs are currently excluded from the Smog Check program because of software and hardware limitations with the current Smog Check equipment that was not designed to accommodate vehicles with engines that may start and stop or not run during the test sequence.

Emissions Reductions Evaluation

E(2)17. Comment: The commenter asks ARB to provide a practical evaluation of emission reduction systems technology in the regulation. (Plug-In Conversions, Gold Peak Industries)

Agency Response: The PHEV conversion system certification requirements adopted with modifications by the Board at the May 28, 2009 Board Hearing contain appropriate methodologies for demonstrating compliance with the adopted standards..

OBD Requirements and Emissions Compliance

E(2)18. Comment: Appendix J of the proposed certification requirements indicates a high level of integration with the OEM OBD system will likely be required. Since many OEM's OBD systems use proprietary algorithms and protocols, this should not be part of PHEV aftermarket certification requirements. (A123)

Agency Response: Please see Agency Response to E(1)39.

E(2)19. Comment: We feel that a demonstration to show a AMC system does not interfere with the vehicle's OBD system and is appropriately monitored for faults should be sufficient. The requirement to integrate closely with the vehicle's OBD system should not be necessary to certify an aftermarket PHEV conversion system. (A123)

Agency Response: Please see Agency Response to comment E(1)40.

E(2)20. Comment: Additional regulations are unwarranted. OBD monitoring is not required since hybrid system failure does not increase emissions over the original vehicle. (Partnerships 1)

Agency Response: Please see Agency Response to comment E(1)35.

E(2)21. Comment: We appreciate your flexibility with OBD system compatibility and allowing a phase-in due to the difficulty in getting data codes. (PIA)

Agency Response: The Agency appreciates the comment.

Cost of Compliance

E(2)22. Comment: The commenter countered ARB's findings of no significant economic impact and submitted written comments highlighting its cost of

compliance, and estimated lost jobs and revenue to California, all identical to those submitted in their 45-day comment letter. (Plug-in Supply)

Agency Response: See Agency Response to Comment E(1)9.

Exemption & Extension

E(2)23. Comment: Commenters requested the same 500 unit exemption already granted to one conversion kit supplier (i.e., allow a company to sell 500 conversions before they must comply with the regulation). (Plug-in Supply, KillaCycle, Alliance Renewable Energy, CalCars, 3Prong Power)

Agency Response: See Agency Response to Comment E(1)16.

E(2)24. Comment: Commenter suggesting that compliance with the aftermarket regulation should be delayed until such time as OEMs are selling PHEVs. (3Prong Power)

Agency Response: No change was made in response to this comment. Any aftermarket part that alters the design or performance of any required motor vehicle pollution control device or system is prohibited for sale or installation by Vehicle Code section 27156. See Agency Response to Comment E(1)2.

Support of Aftermarket Certification Procedures

E(2)25. Comment: Commenter supporting the aftermarket regulations as proposed stating that consumers should expect aftermarket parts to meet the same standards posed on vehicle manufacturers. (Alliance)

Agency Response: The Board directed staff at the January 22, 2009 Public Hearing to work with stakeholders to develop a proposal that allowed more flexibility and created a phased approach to certification that encouraged development of systems. This proposal was adopted with modifications by the Board at the May 28, 2009 Board Hearing.

(3) Written conversion comments received during the May reopening of the comment period

General Comments

E(3)1. Comment: General comments were received without specific recommendations on proposed changes: (W. Schilling, Z. Harris, L. Nordman, S. Woodruff, I. Schwahn, N. Carpenter, N. Cederlind, R. Vasquez, G. Rock, F. Neff, P. Sinz, J. Rieley, E. Rollins, J. Rieley, M. Barna)

Agency Response: No response is necessary as these comments were not objections or recommendations specifically directed at the Agency's proposed adoption of the regulation or incorporated certification procedure for evaluating and exempting PHEV conversion systems.

E(3)2. Comment: The commenter asserted the virtue of PHEV conversions' role in growing demand for PHEVs and charging infrastructure, advancing both technologies while lowering their costs, and developing vehicle-to-grid technology. Commenter reasons that these virtues merit a lighter regulatory touch than other alternative fuels, and warrant incentives to grow the technology. (3Prong Power)

Agency Response: The certification requirements adopted with modifications by the Board at the May 28, 2009 Board Hearing included additional flexibility and a phased certification approach to encourage development of such systems.

E(3)3. Comment: The commenter stated the important role that PHEV conversions play in testing the reliability and endurance of different battery technologies to help industry determine what will work in the real world. Also suggested the need for ICE-to-PHEV conversion. (CalCars)

Agency Response: No change was made in response to these comments. The Agency does not presently know if battery manufacturers are interested in partnering with PHEV conversion system manufacturers for durability studies. Also, this rulemaking is strictly limited to aftermarket conversion systems designed to convert HEVs to PHEVs; the record for this rulemaking does not contain any facts, studies or other data pertaining to aftermarket parts or systems applicable to vehicles that are not HEVs.

E(3)4. Comment: Commenter supports revisiting these procedures at a later date to see if adjustments are needed. (Ford)

Agency Response: Staff will continue to work with industry to resolve issues regarding the conversion system certification requirements, and may propose modifications to address such issues in a future rulemaking.

Requests for delaying regulation

E(3)5. Comment: Commenter requests delaying these regulations to accommodate its next generation conversions and to add procedures to test advanced-generation PHEV conversions. Commenter requests simple test to proved emissions are reduced, OR have the Board direct staff to test and approve all electrification products including PHEVs for free. (Plug-In Supply)

Agency Response: See the Agency response to E(1)11. The Board did not adopt the proposals for free Board conducted testing. See the Agency Response to Comment and E(1)12.

E(3)6. Comment: ARB should provide manufacturers a two year window to comply with the new regulations. (Poulsen Hybrid)

Agency Response: No change was made in response to this comment. The certification requirements adopted with modifications by the Board at the May 28, 2009 Public Hearing are based on system sales and do not provide a delay in implementation. .

E(3)7. Comment: Commenter requested that the Board either: 1) keep regulations as-is but delay implementation for two years or until industry-wide sales reach 14,000 units; or 2) delay battery durability test requirements to 500 units or 3 years to allow for data accumulation, and incentivize conversions by paying for successful emissions testing. (PHEVIA)

Agency Response: No change was made in response to this comment. The certification requirements adopted with modifications by the Board at the May 28, 2009 Public Hearing do not provide a delay in implementation. Battery durability test requirements were delayed to after 100 vehicle conversions. See also Agency Response to Comment E(1)12.

Comments on Tiered Ramp-up for certification

E(3)8. Comment: Commenters requested that ARB increase the Tier 1 Ceiling from 10 to 100 vehicles, reasoning that a higher ceiling will allow start-ups time to refine products, develop business, and generate revenue. Spreading the testing cost over 100 sales would amount to an additional $2000 per conversion, which commenters feel is manageable. (3Prong Power, Form Letter 2, B. Nicholls, D. Lincer, M. Chiacos, Comm. Environmental, T. Davis, Form Letter 1, Similar comments: R. Brown, M. Schafer; M. Schultz; G. Gerber, Sun Light & Power, P. Peteet, E. Baum)

Agency Response: The Board fully considered this comment and its associated rationale at the May 28, 2009 Board Hearing, but decided to limit the Tier 1 Ceiling to 50 vehicles because it decided this number was sufficiently low to allow the Board to make a finding that no emissions increases would result from modified vehicles without requiring these vehicles to be tested.

E(3)9. Comment: Commenters suggesting different Tier 1 Ceiling numbers such as:

- 100 to 200. (M. Bender, T. Rentsch)
- 1000. (W. Henry, J. Woo, P. Rentsch, Poulsen Hybrid, Plug-In Supply)

Agency Response: See Agency Response to Comment E(3)8.

E(3)10. Comment: Commenter suggesting different Tier 2 Ceiling numbers such as:

- 500 (T. Rentsch)

Agency Response: The Agency response to Comment E(3)8 is incorporated herein. The Board fully considered comments to raise the numbers of vehicles in Tiers 1 through 3 at the May 28, 2009 Board Hearing, but ultimately decided to limit 100 vehicle conversion systems under the Tier 2 requirements.

E(3)11. Comment: The commenter suggested different total conversions numbers

- 25,000 or 50,000 (T. Rentsch)

Agency Response: The Agency response to Comment E(3)8 is incorporated herein. The Board fully considered comments to raise the numbers of vehicles in Tiers 1 through 3 at the May 28, 2009 Board Hearing ,but ultimately decided not to increase to the limit of 5,000 vehicle conversion systems certified under Tier 1 and 2 options.

E(3)12. Comment: The commenter expressed concern that the proposed Tier 1 and 2 requirements impose significantly less stringent requirements on aftermarket converters and considerably greater flexibility as compared to the proposal that staff presented at the January Board hearing. The commenter suggests that any further relaxation of these requirements is unwarranted and would lead to a further increase in the potential for increased emissions and conversion systems that do not operate properly (including the OBD system) and are not durable. This could have the unintended consequence of "poisoning" the public's perception of PHEV technology. (GM)

Agency Response: The Board specifically directed staff at the January 22, 2009 public hearing to consult with stakeholders in order to develop a proposal that allowed conversion manufacturers more flexibility. Staff's revised proposal incorporated a phased approach to certification that encouraged the development of these systems, and the Board adopted staff's revised approach with modifications. Specifically, the Board placed limits on the vehicles eligible to be certified under the Tier 1 and Tier 2 categories, to ensure that any emissions increases from modified vehicles that were certified under the Tier 1 and Tier 2 provisions would be de minimis. The Agency therefore believes that the adopted provisions will adequately address the commenter's concern.

E(3)13. Comment: The commenter requests that the 5000 limit be clarified in the rules to apply only to Tier 1 and Tier 2 conversions, since Tier 3 conversions, which will have been tested per the previous non-tired proposal, do not have the perceived potential of impacting emissions that Tier 1 and Tier 2 vehicles might have. (CalCars)

Agency Response: No change was made in response to this comment. The 5,000 vehicle conversion system limit applies to all converted vehicles, not only conversion systems certified under the Tier 1 and 2 options.

Suggestions on funding or incentives for PHEV conversions

E(3)14. Comment: Use stimulus funding to support retrofitting, testing, and general PHEV promotion. (J. Woo)

Agency Response: Stimulus funding is not available to ARB for implementation. Individual manufacturers are encouraged to investigate opportunities for stimulus of other sources of funding.

E(3)15. Comment: Place a $25,000 cap on amount small manufacturer must spend on testing. (Poulsen Hybrid)

Agency Response: See Agency Response to Comment E(1)11.

Financial hardship comments

E(3)16. Comment: Commenter stating that they cannot afford to comply estimating their costs to comply with each Tier in the first year at $1,254,000 in the first year and estimating their potential lost revenue in California during certification at $1,667,000. (Plug-In Supply)

Agency Response: See Agency Response to Comment E(1)9.

Evaporative Emissions

E(3)17. Comment: Commenter seeking clarification on Section II 1.12.6 and 5.4, which seem to contradict each other. One requires a maximum state of charge prior to the 2/3 day diurnal; while the second clause requires a minimum state of charge to that the vehicle can maximize its amount of purge. (D. Hill)

Agency Response: No modifications were made as a result of this comment. The sections are not contradictory. These items were explained in both the "Staff Report: Initial Statement of Reasons," and its Appendix I, "Technical Support Document for Proposed Amendments Related to Evaporative and Onboard Refueling and Vapor Recovery Test Procedures," that were issued in conjunction with the public notice for the Board Hearing conducted on January 23, 2009.

Section III.D.1.12.6. (note that there is not a "Section II 1.12.6" in the Evaporative Test Procedures) and section III.D.5.4.1. specify different battery state-of-charge (SOC) levels (i.e., maximum or minimum) because the test sequences specified by each section have different objectives. While the two-day diurnal test sequence elevates canister capacity, permeation control, and canister purge capacity, its main objective is to demonstrate the system's ability to adequately purge captured vapors when the vehicle is driven for only a short duration, as is demonstrated during the exhaust emission test portion of the evaporative test sequence.

However, since the goal of using battery power is to reduce or eliminate engine use, PHEVs may be more challenged to adequately purge their canisters because the canisters are purged only during engine use (i.e., when suitable engine manifold vacuum is available). In the situation where an in-use vehicle owner chooses to "always plug-in," the commutes would start with a battery SOC at a maximum level. Thus, the PHEV would always start operating in a "charge-depleting" mode. Accordingly, for test purposes, it is therefore reasonable to set the battery SOC at a maximum level prior to the exhaust emission test portion of both the three-day diurnal test sequence (specified in section III.D.1.12.6.) and the two-day test sequence (specified in section III.D.1.18.6.) because this condition is representative of actual real-world conditions. Furthermore, since it may be a challenge to purge under such charge-depleting conditions, this situation also establishes the representative "worst-case" test condition. Testing vehicles under the representative "worst-case" conditions ensures compliance with the applicable emission standards at any time, and location in the state, during their useful lives.

While setting the battery SOC at a maximum level does allow for evaluating canister capacity, permeation control, and canister purge capacity, the corresponding reduction in engine operation prevents accomplishing the test's main objective of demonstrating adequate purge during a short drive. This problem was resolved by adding a second two-day diurnal test sequence in which the battery SOC is set at a minimum level in order to maximize engine operation during the exhaust emission test portion of the test sequence, (i.e., operation in a "charge-sustaining" mode). Consequently, PHEV manufacturers are now required to perform two separate two-day test sequences, one with the battery SOC at a maximum level, as specified in section III.D.1.18.6., and another one with the battery SOC at a minimum level, as specified in section III.D.5.4.1. However, to reduce the testing burden of performing the second two-day test sequence, manufacturers have the option of demonstrating the system's purge adequacy during a short drive using other methods, such as by submitting an engineering evaluation. Such engineering evaluations are less burdensome because this work would already be done as part of the system's development by the manufacturers. Therefore, there is not any need to modify the test procedures based on this comment.

E(3)18. Comment: Commenter requests that the test procedure be modified so only a charge sustaining drive cycle is required before testing for evaporative emissions because most customers have longer drive cycles than required by the test procedure, so that the engine does, in fact, run in charge sustaining mode most days; therefore enabling proper canister purge. Furthermore, conversion customers that do minimal driving and maintain their vehicle in a charge depletion mode will probably find EV (i.e., Electric Vehicle) technology more appealing and switch to that technology. Also, requiring a PHEV to operate only in a charge depletion mode before testing for canister purge is analogous to requiring standard hybrids to be parked while the driver rides a bicycle around before testing for canister purge. Although both situations increase evaporative emissions, they deserve to be encouraged and not prohibited due to technicalities of a test procedure. (3Prong Power)

Agency Response: As explained in the Agency Response to Comment E(3)17, in-use PHEV owners may choose to "always plug-in," which means that their vehicles would always start their commutes in a charge-depleting mode of operation (i.e., at a maximum battery SOC level). Thus, even with aftermarket PHEV conversions, there is no guarantee that all PHEVs, not just the ones owned by the commenter's customers or by their subsequent owners, will always experience in-use driving events that are shorter than those performed in the evaporative emission test sequences, or that "always plugging-in" aftermarket conversion customers will ultimately adopt EVs instead of PHEVs. The "always plugged-in" in-use PHEV owner is a highly probable circumstance that consequently leads to establishing the battery SOC maximum level as the "worst-case" test condition. Therefore, the requirement to set the battery SOC at a maximum level prior to the exhaust emission testing portion of the evaporative emission test sequence is reasonable.

The analogy of comparing a PHEV being operated only in a charge-depleting mode before evaporative testing with a standard HEV being parked while the driver rides a

bicycle before the tests is not reasonable because these vehicles have potentially different evaporative emission characteristics due to their essentially different technologies. One is a PHEV with the potential to be "always plugged-in," and thus never have routine engine activations, while the other is an HEV that is designed to have routine engine activations. Nevertheless, while each vehicle could have different evaporative emission characteristics due to its different technology, each vehicle, including aftermarket PHEV conversions, must comply with the same applicable evaporative emission standards.

It is true that canisters in both conventional vehicles and HEVs, which are parked without any engine operation for a long period of time, will eventually become saturated and have uncontrolled canister emission breakthroughs. However, this condition is more of a problem with older vehicles, which are used less frequently over time, and which were produced prior to the more stringent evaporative emission control standards which phased in starting with the 1995 model year. For instances, current in-use "partial zero-emission vehicles, or "PZEVs," have demonstrated the ability to avoid canister breakthroughs for lengthy periods beyond the required three-day standard. Thus, in time, as the natural attrition process eliminates the older, more-polluting vehicles, more of the remaining vehicles will use better evaporative emission controls. This trend is significant because almost one half of all of the ozone-forming hydrocarbon emissions that are currently emitted by on-highway vehicles in California are evaporative emissions. Thus, allowing new aftermarket PHEV conversions that may have the same undesirable evaporative emission characteristics of the older vehicles is not reasonable. Accordingly, no modifications to the test procedures are warranted.

E(3)19. Comment: Commenters with suggestions on vehicle operation requirements in lieu of extensive evap and OBVR testing:

- have the engine start at the beginning and heat up the catalytic converter, then run the car in EV mode. J. Woo #167
- make sure conversions purge the OEM canister during non-EV only trips (CalCars)

Agency Response: The recommendation to activate the engine at the start of a commute to heat up the catalyst, and then run the vehicle in an EV mode, is a partial description of an approach that is already used by manufacturers. Current exhaust certified "super ultra-low emission" vehicles (SULEVs) are designed to rapidly warm-up their catalysts in order to control their "cold start" exhaust emissions. Since these preparatory catalyst warm-ups are already used for controlling exhaust emissions, it is not necessary to also do it solely for enabling canister purging. This means that SULEV PHEVs can also use an "aggressive" purge strategy in which the canister purging begins very shortly after engine activation, and continues throughout the commute under the appropriate engine conditions. In general, this approach can be used by various PHEV system architectures, and not only just by EVs. However, for aftermarket PHEV conversions, the applicability depends on the design of the original vehicle. For example, older vehicles that lack inherent "cold start" exhaust emission controls may have a difficult time meeting the exhaust emission standards if they are re-designed

to use an engine activation solely for warming up the catalyst in preparation for controlling purged evaporative emissions. Regardless of a vehicle's catalyst warm-up strategy, PHEVs, including aftermarket PHEV conversions, must comply with the applicable evaporative emission standards. Accordingly, there are not any modifications to the test procedures based on this comment.

The recommendation for making certain that the aftermarket PHEV conversions purge the OEM canister during "non-EV only" trips is also already accounted for in the Evaporative Test Procedures. Specifically, HEV manufacturers are required, by the existing Evaporative Test Procedures, to submit an engineering evaluation of their canister purge operation for controlling canister breakthrough emissions. This submission must include a manufacturer-specified duration between engine activations solely for purging the canister (ref.: sections III.D.10.3.12 through III.D.10.3.14, of the Evaporative Test Procedures). However, in practice, such engine activations are typically unnecessary because other routine engine activations, such as those performed for controlling "cold start" exhaust emissions, as discussed above, provide enough engine operating time to effectively purge the canisters. For aftermarket conversions, the objective remains demonstrating that the conversion has not affected the OEM-certified evaporative emission control system's effectiveness in complying with the applicable emission standards. Accordingly, the change requested by the comment is not necessary.

E(3)20. Comment: Commenters lamenting on the "lunacy" of the proposed requirement for canister venting on PHEVs, which is not placed on conventional vehicles or HEVs, even though they may sit unused and venting. (Plug-In Supply, PHEVIA)

Agency Response: As explained in the Agency Response to Comment E(3)17, the canister venting, or purging, requirement is reasonable because of the potential for PHEV owners, as well as aftermarket PHEV conversion owners, to "always plug-in," which can then lead to a continuous canister emission breakthrough. Furthermore, as described in the Agency Response to Comment E(3)18, although conventional vehicles have the potential to eventually develop a canister breakthrough, current PZEVs are able to avoid canister breakthroughs for lengthy periods beyond the required three-day period. Canister breakthroughs are more of a problem with older vehicles, which were never designed to control evaporative emissions for multiple days. But older vehicles are a decreasing proportion of the vehicle population, and PZEVs are an increasing proportion, so the overall level of evaporative emissions continues to decrease with time. Current HEVs are subject to engine activation requirements for solely canister purging, as discussed in the Agency Response to Comment E(3)18. Accordingly, the change recommended by the comments is unwarranted.

E(3)21. Comment: Commenter suggesting that current emissions test procedures are outdated and do not accurately reflect PHEV owners' driving, which leads to PHEVs and HEVs that have been optimized for passing tests instead of performing efficiently and cleanly. (PHEVIA)

Agency Response: The required evaporative emission test procedures are not outdated and do reflect possible PHEV owner driving. As explained in the Agency Response to Comment E(3)17, in-use PHEV owners, including aftermarket PHEV conversion owners, have the potential to "always plug-in," which means that their vehicles would always start their commutes in a charge-depleting mode of operation, which leads to eventually canister emission breakthroughs. This is a highly probable condition and becomes a significant factor in evaluating the evaporative emission characteristics of these vehicles. Therefore, it must be accounted for in order for the evaporative emission test procedures to effectively evaluate the ability of the vehicle's evaporative emission control system, under the "worst-case" test conditions, to comply with the applicable emission standards for the required useful life period. In the future, as additional in-use PHEV operational information becomes available, the test procedures may be re-evaluated and revised if needed. Until that time, the current test procedures provide the best standardized method for obtaining accurate, consistent, and reproducible emission data for determining compliance with the applicable emission standards, as well as for comparison purposes between other light-duty vehicles. Accordingly, there are not any modifications to the test procedures.

E(3)22. Comment: Commenter offers the following alternative to full evaporative emissions testing and validate low-conversion emissions: Reduce purging of evaporative canister: Do not disable engine start-up and warm-up upon initial vehicle activation. Once every day (or X days, as decided by CARB), force engine operation for long enough to purge the canister. (CalCars)

Agency Response: As explained in the Agency Response to Comment E(3)19, preparatory catalyst warm ups are already used by manufacturers, and HEV manufacturers are also already required by the existing Evaporative Test Procedures to specify a duration (i.e., "X number of days") between engine activations solely for purging the canister. Although, in practice, activating the engine solely for the purpose of purging the canister are unnecessary because other routine engine activations, such as for preparatory catalyst warm ups, provide enough engine operating time to effectively purge the canisters. Thus, no modifications to the test procedures based on the comment are required.

Onboard Diagnositics (OBD)

E(3)23. Comment: Commenter requests CARB to include additional OBD-related requirements by including Production Vehicle Evaluation testing. This testing would be limited to the OBD monitors that are added to the PHEV conversion, or any existing monitors that were modified in the process of having the vehicle converted. (Ford)

Agency Response: All of the OBD requirements apply to a system converted and certified by an AMC system manufacturer. One of the requirements contained in the OBD regulation is production vehicle evaluation testing and AMC manufacturers would be subject to performing such testing on converted vehicles. Such testing, as a general practice, would likely be limited to monitors added, modified, or reasonably expected to be impacted by the modified system.

Exhaust Emissions Test Procedures

E(3)24. Comment: Commenter suggesting that current emissions test procedures are outdated and do not accurately reflect PHEV owners' driving, which leads to PHEVs and HEVs that have been optimized for passing tests instead of performing efficiently and cleanly. (PHEVIA)

Agency Response: No modifications were made as a result of this comment. The test protocol is well established and represents vehicle emission performance for the most common driving conditions. Any changes would require extensive research to determine equivalency to the current protocol.

E(3)25. Comment: Commenter offers the following alternatives to full exhaust emissions testing and validate low-conversion emissions:

- Engine warm-up under load: Do not disable engine start-up and warm-up upon initial vehicle activation. Then, force periodic restart of the engine to ensure maintenance of the catalytic converter's (CAT's) temperature. Periodic restarts can be timed for pauses no longer than the maximum encountered in unconverted vehicles, or the CAT temperature can be measured, and a restart initiated before its temperature falls below a specified ignition temperature. To run the vehicle as a pure electric, with no engine start, engine start must be inhibited until a no-load warm-up period is ensured, or until the vehicle is deactivated and reactivated in a mode where the engine is immediately started and warmed-up. (CalCars)

Agency Response: No modifications were made as a result of this comment. The test protocol is well established and represents vehicle emission performance for the most common driving conditions. Any changes would require extensive research to determine equivalency to the current protocol.

Warrantees

E(3)26. Comment: Commenter requests an explicit exclusion of performance warranty on the battery and contends that the supplemental battery should be held to the same standard as HEV batteries, which does not warranty against degradation of the battery capacity over time. Commenter believes that performance degradation of the battery over time should not be interpreted as a reason to replace the entire battery under warranty. (3Prong Power)

Agency Response: See Agency Response to Comment E(1)25.

E(3)27. Comment: Commenter suggesting that the battery warranty requirements be reduced to a maximum of 3 years on the grounds that requiring a warranty period greater than that offered by battery manufacturers will force companies to incorporate the cost of one or more battery replacements into the initial cost of the system. (Plug-In Supply)

Agency Response: See Agency Response to Comment E(1)25.

E(3)28. Comment: Commenter suggests that ARB mandate a warranty that the conversion system will not adversely affect vehicle emissions. Also suggests letting performance and consumer protection warranties be dictated by the private sector. (PHEVIA)

Agency Response: See Agency Response to Comment E(1)25.

E(3)29. Comment: Commenter seeking clarification on whether a conversion warranty is required to extend beyond the OEM warranty on the vehicle when a conversion is applied to a vehicle with a shorter remaining or run-out OEM warranty. If so, would the conversion manufacturer have to warrantee just the conversion and any parts it may harm, OR would they have to warrantee the OEM powertrain beyond its OEM warrantee in order to maintain compliance with emission requirements? If the latter is the case, the commenter expressed concerns of complete infeasibility. (CalCars)

Agency Response: See Agency Response to Comment E(1)25.

E(3)30. Comment: Commenter suggests that the required conversion warranty cover only whatever battery capacity or capability is required, given the conversion's electronics, to maintain required emissions levels , not what may be necessary for any particular level of plug-in performance. For consumer protection, commenter suggests requiring only that the vehicle work as well as before conversion during the warranty period, and that the conversion manufacturer state its additional battery warranty. (CalCars)

Agency Response: See Agency Response to Comment E(1)25.

Durability Requirements

E(3)31. Comment: Commenter suggests that the battery durability requirements be revisited to provide for a reduced set of requirements for OBD reporting, battery warranty, and emission testing if it can be shown that a deactivation of the conversion system reverts the vehicle to its stock performance. (Plug-In Supply)

Agency Response: ARB does not agree with the comment. The certification requirements adopted with modifications by the Board at the May 28, 2009 Board Hearing do not include reduced battery durability requirements for conversion systems that revert to stock vehicle performance upon conversion system deactivation.

E(3)32. Comment: Commenter espousing the infeasibility of lifetime testing of batteries that go into conversions because it takes years to complete, possibly resulting in the battery technology becoming obsolete before the tests are complete. Accelerated cycle testing is problematic because 1) it requires large and expensive automated test equipment, 2) it is difficult to match to expected road use and conditions, 3) the timeline can often be accelerated by a factor of only 4 or 5, and 4) the effects are nonlinear and cannot necessarily be extrapolated from early results. It is totally unfeasible for largely-sales-financed small conversion manufacturer to be

able to show vehicle-life durability beyond a few thousand miles prior to selling 100 conversions and requiring Tier 3 certification to continue. (CalCars)

Agency Response: ARB does not agree with the comment. Bench aging and mileage accumulation are standard methods for durability testing. The certification requirements adopted with modifications by the Board at the May 28, 2009, Public Hearing allow battery durability testing to be completed after 100 conversion systems are sold.

CalCars Proposal

E(3)33. Comment: Commenter recommends the following alternative to CARB staff's three Tier proposal: The addition of a requirement to outfit specified numbers of each manufacturer's converted vehicles with instrumentation that can collect and record real world driving, battery and reliability data, then transmit CAN bus information to a central server. The data can then be anonymzed and released publically to the benefit of CARB, automakers, and conversion companies. Commenter proposes that CARB require the following of conversion companies:

- Outfit, as described above, one Tier 1 vehicle, 5% of all Tier 2 vehicles, and 1% of Tier 3 vehicles.
- Make anonymized data available monthly or quarterly to CARB, which CARB will immediately publish it its website.

Commenter then suggest that, to be certified Tier 2, the operation of these solutions must be demonstrated to CARB staff, either by direct demonstration or by results from an instrumented Tier 1 conversion; and that Tier 3 certification will require ongoing verification of the solutions on instrumented Tier 2 and Tier 3 vehicles. (CalCars)

Agency Response: ARB did not incorporate any of the commenter's suggestions in the certification requirements adopted by the Board at the May 28, 2009 Public Hearing. The use of datalogging is creative but not appropriate for certification.

General Comments in support of staff's proposal for PHEV aftermarket conversion requirements

E(3)34. Comment: Commenter (Alliance of Automobile Manufacturers) with opinion that the stringency of the regulations should not be reduced beyond what the staff proposes without jeopardizing PHEV vehicles. Also supports the approach of phasing into increasingly stringent requirements that approach the OEM level of complexity. Reasons cited include the need for environmental and consumer protections; the need to ensure marketplace fairness for future technology vehicles; and the need to protect certified HEVs from modifications that could adversely affect their emission performance and/or paint a negative picture of the technology. Commenter strongly supports anti-tampering provisions of California Vehicle Codes 27156, 38391 and the Clean Air Act, section 203. (Alliance)

Agency Response: See Agency Response to Comment E(3)12.

E(3)35. Comment: Commenter asking ARB to preserve its strong aftermarket regulations while also providing flexibility for PHEV conversion companies. Commenter wants ARB to ensure that conversion vehicles are safe and do not result in additional emissions, consistent with the requirements for other aftermarket conversions and products, and require emissions testing and appropriate safety tests for all plug-in hybrid conversion kits. (UCS, ALA, CCA, CEERT)

Agency Response: See Agency Response to Comment E(3)12.

E(3)36. Comment: Commenter generally supporting staff's proposed requirements for aftermarket conversions and their important roll in addressing California and Federal "anti-tampering" provisions (California Vehicle Codes 27156, 38391 and the Clean Air Act, section 203), which Ford Motor Company strongly supports. (Ford)

Agency Response: ARB agrees with the comment.

E(3)37. Comment: Commenter concerned about significant risk to emissions compliance resulting from converting a HEV to a PHEV. Commenter agrees with staff proposal as aligns well with the goal of not compromising evaporative, exhaust and OBD performance, and will hopefully prevent unintentional consequences for a technology that has not yet been given an opportunity to succeed on a large scale. Commenter believes that aftermarket conversions should comply with a substantially similar certification process as OEM PHEVs to help prevent negative customer experience. (Ford)

Agency Response: See Agency Response to Comment E(3)12.

E(3)38. Comment: Commenter supports strong aftermarket conversion certification requirements for PHEVs. OEMs must comply with a comprehensive set of requirements that it must meet to ensure compliance with exhaust emission standards, evaporative emission standards, and on-board diagnostic system requirements over the full useful life of the vehicle. In addition, OEMs are faced with extended emission warrantee requirements of 15 years/150,000 miles (or 10 years for energy storage devices such as batteries) for products certified as PZEVs. OEMs must also meet strict Federal Motor Vehicle Safety Standards. (GM)

Agency Response: See Agency Response to Comment E(3)12.

E(3)39. Comment: Commenter opposes relaxing the requirement further than currently proposed by ARB staff. They believe that durability and warrantee requirements similar to those imposed on OEMs are appropriate and reasonable to ensure the environmental integrity of PHEV conversions. Without such requirements, it is possible that the lack of assured product durability may have a negative influence on the emerging market. (Toyota)

Agency Response: See Agency Response to Comment E(3)12.

Commenters unhappy with the proposed three-tier system

E(3)40. Comment: Commenter requesting that Tier 1 either 1) be eliminated all together, 2) have emissions testing requirements increased, or 3) be eliminated after a total of 1,000 PHEV conversions are on California roads. Commenter also asking the Board to make a clear statement that this tiered approach is not an option for other aftermarket components. Commenter cites concern that the proposed Tier 1 requirements set an unacceptably low standard for the following reasons:

- The Tier 1 exemption could set a bad precedent which may result in other aftermarket industries asking for similar emissions exclusions.
- Tier 1 emission test exemption may result in gross polluting and poorly engineered vehicles, and possibly safety incidents. The inability to pay for and pass an emission test may imply that the company does not have financial and engineering resources to warranty and modify these vehicles in a clean and safe manner.
- The process of converting the vehicle will likely void the original equipment manufacturer emissions warranty of 15 years or 150,000 miles. The lack of a warranty may result in gross polluting vehicles that are exempt from the Smog Check Program, so there is no way to monitor their emissions performance over time.

(UCS, ALA, CCA, CEERT)

Agency Response: See Agency Response to Comment E(1)45.

(4) Written and verbal conversion comments from the May Board Hearing

General

E(4)1. Comment: Commenter generally supports the proposed regulation but would like to have it amended per his suggestion detailed below under "Warrantee Requirements." (A123)

Agency Response: The Board agreed with the commenter and directed staff to include a special warranty provision for supplemental battery conversion systems.

E(4)2. Comment: Commenter generally supports the proposed regulation but would like to see consideration given to other aftermarket conversions systems for flex fuel, natural gas, etc. (CEERT)

Agency Response: At this time no modifications are proposed for other aftermarket conversion systems.

CalCars Proposal

E(4)3. Comment: CalCars provided both written and oral comments similar their 45-day written comments, #177 except for the following:

1. Commenter suggests replacing dynamometer testing with verification – on paper for Tier 1 and 2, and via physical verification as well for Tier 3 – of implementation of accepted solutions – of or new solutions accompanied by solid documentation and test results assuring efficiency.

2. Outfit a representative sample of conversions per CalCars proposal detailed in #177 with one exception – 10% of Tier 1 vehicles (not the one Tier 1 vehicles proposed in #177). (CalCars)

Agency Response: ARB does not agree with the comments. Certification must be supported by emissions test data using standard methodology. ARB continues to review and investigate new testing methods and incorporates them when and if appropriate.

Tier 1

E(4)4. Comment: Commenter concerned that their company has no hope of being legitimate with Tier 1 set at 10 vehicles because they will be unable to spread the testing costs over few vehicles. Commenter would prefer to convert 100 vehicles before having to do lab testing. (3Prong Power)

Agency Response: See Agency Response to Comment E(3)8.

E(4)5. Comment: Commenter suggests that Tier 1 should be raised to 100 vehicles and/or the state should provide financial assistance for testing. (3Prong Power-BHW & BHO-Guzyk)

Agency Response: See Agency Response to Comments E(3)8 and E(1)12.

E(4)6. Comment: Commenters providing oral comments identical to their 45-day written comments: (Plug-In Supply, PHEVIA)

Agency Response: See Agency Response to Comments E(3)8, E(3)10, and E(3)11.

E(4)7. Comment: Commenter expressing concern that Tier 1 is too lenient and could result in gross polluting vehicles on the road. Commenter suggested:
1) eliminating the Tier 1 piece,
2) including actual emissions testing in the Tier 1 requirements, or
3) Phasing out Tier 1 after 1000 plug-in hybrid conversions are on the road.
(ALA, CCA)

Agency Response: See Agency Response to Comment E(1)45.

Request for Delay

E(4)8. Comment: Commenter providing oral comments identical to their 45-day written comments: (PHEVIA)

Agency Response: See Agency Response to Comment E(3)7.

Warrantee Requirements

E(4)9. Comment: Commenters providing written and/or oral comments identical to their 45-day written comments: (CalCars, Plug-In Supply)

Agency Response: See Agency Response to Comment E(1)25.

E(4)10. Comment: Commenter recommends adding the following new paragraph following to Appendix B immediately after subparagraph 7(a), then renumbering the following paragraphs under "7. Warrantee Requirements."

"Requirements of Manufacturers Providing Supplemental Batter Conversion Systems:

(b) For the purposes of this Requirement, a Supplemental Battery Conversion System means a conversion system consisting of an OVCC battery system that supplements the original equipment vehicle manufacturer traction battery and that is designed to be capable of being readily turned off and/or removed and to return the original vehicle to its pre-conversion emissions control state.

The warrantee requirement for such Supplemental Battery Conversion System shall be the same as that outlined in Paragraph 7(a) above provided that the applicable time periods shall be:

(i) 5 years or 75,000 miles, whichever occurs first, on the Supplemental Battery Conversion System.

(ii) Remaining original equipment warrantee period (maximum 10years from the date of original purchase) on any damage to the original equipment traction battery caused by the Supplemental Battery Conversion System resulting in warrantee claims against the original vehicle manufacturer.

(iii) Remaining original equipment warrantee period (maximum 15 years from date of original purchase) on any damage to the original equipment emission control system caused by the Supplemental Battery Conversion System resulting in warrantee claims against the original vehicle manufacturer.

In addition to the coverage requirements outlined in Paragraph 7(a) above, in the event that a Supplemental Battery Conversion System purchaser asserts a claim under subparagraphs 7(b)(ii) and/or 7(b)(iii) above because the original equipment vehicle manufacturer has alleged that the defect in question was caused by the Supplemental Battery Conversion System and therefore refuses to make any repairs under warrantee, the Supplemental Battery Conversion System manufacturer shall cause such repairs to be made and in consideration assume the rights to any claims that the Supplemental Battery Conversion System purchaser may have against the original equipment vehicle manufacturer.

The Supplemental Battery Conversion System manufacturer shall provide a warrantee to the Supplemental Battery Conversion System purchaser reflecting the requirements in this Paragraph 7." (A123)

Agency Response: See Agency Response to Comment E(1)25.

E(4)11. Comment: Commenter pleading with board to support the above proposal made by J. White. (A123)

Agency Response: See Agency Response to Comment E(1)25.

Durability Requirements

E(4)12. Comment: Commenter providing oral comments identical to their 45-day written comments: (Plug-In Supply)

Agency Response: See Agency Response to Comment E(3)31.

Financial Hardship

E(4)13. Comment: Commenters providing oral comments identical to their 45-day written comments: (Plug-In Supply, PHEVIA[4])

Agency Response: See Agency Response to Comment E(1)9.

Evaporative Emissions

E(4)14. Comment: Commenter providing oral comments identical to their 45-day written comments: (Plug-In Supply)

Agency Response: These comments were already addressed as written comments. See the Agency Responses to Comments E(3)20 and E(3)21.

(5) Written conversion comments during the 15 day comment period

E(5)1. Comment: Commenter believes the test procedure and certification amendments are balanced and fair. They allow economic growth and balance the environmental benefits. (M. Bailey)

Agency Response: No modifications were made as a result of this comment. The Board approved the regulations and procedures as proposed by staff along with other modifications.

[4] PHEVIA is an industry association that was formed after the January Board Hearing, the group is related to Plug-In Supply.