ATTACHMENT 3

State of California AIR RESOURCES BOARD

CALIFORNIA EVAPORATIVE EMISSION STANDARDS AND TEST PROCEDURES FOR 2001 AND SUBSEQUENT MODEL MOTOR VEHICLES

Adopted: August 5, 1999 Amended: June 22, 2006 Amended: October 17, 2007 Amended: [insert amended date]

Note: Proposed amendments to this document are shown in <u>underline</u> to indicate additions and strikeouts to indicate deletions compared to the test procedures as last amended October 17, 2007. The text of modifications made subsequent to the January 23, 2009 Board Hearing, and described in the Notice of Availability of Modified Text (15-day Notice), is shown in <u>double-underline</u> to indicate additions and double-strikeout to indicate deletions. The second 15-day modified language now proposed by staff is shown in <u>bold italics double underline</u> to indicate additions and in <u>bold italicized double strikeout</u> to indicate deletions. Existing intervening text that is not amended is indicated by a row of asterisks (**

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* *) [No Change].

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CALIFORNIA EVAPORATIVE EMISSION STANDARDS AND TEST PROCEDURES FOR 2001 AND SUBSEQUENT MODEL MOTOR VEHICLES

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PART I. GENERAL CERTIFICATION REQUIREMENTS FOR EVAPORATIVE EMISSIONS

A. 40 CFR §86.1801-01 Applicability.

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PART II. DURABILITY DEMONSTRATION

A. Light- and Medium-Duty Vehicles

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5. Durability and Emission Testing Requirements; waivers

5.4. For purposes of certification, a <u>2012</u>2011 and subsequent offvehicle charge capable hybrid electric vehicle shall demonstrate the capability to <u>sufficiently purge its evaporative canister(s) during the exhaust emission test of the</u> supplemental two-day diurnal plus hot soak emission test sequence.

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5.4.2.1. In lieu of the optional engineering demonstration specified in section II.A.5.4.2., manufacturers of **20122011** and subsequent model-year off-vehicle charge capable hybrid electric vehicles that are equipped with non-integrated refueling canister-only systems may attest that the system's canister(s) shall have attained a purged condition when the vehicle has consumed at least 85% of its nominal fuel tank capacity.

PART III. EVAPORATIVE EMISSION TEST PROCEDURES FOR LIGHT- AND MEDIUM-DUTY VEHICLES

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C. Road Load Power, Test Weight, Inertia Weight Class, and Running Loss Fuel Tank Temperature Profile Determination

Amend 40 CFR §86.129-80 to include an additional subsection III.C.1. to read:

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1.3. The vehicle fuel tank shall be drained and filled to 40 percent of the nominal tank capacity with fuel meeting the requirements of paragraph section III.D.1. of these procedures. For all hybrid electric vehicles, except for 20122011 and subsequent model-year off-vehicle charge capable hybrid electric vehicles, the battery state-ofcharge shall be set at a level such that the auxiliary power unit would be activated by the vehicle's control strategy within 30 seconds of starting the first UDDS of the fuel tank temperature profile determination test sequence. If the auxiliary power unit is capable of being manually activated, the auxiliary power unit shall be manually activated at the beginning of and operating throughout the fuel tank temperature profile determination. For 2012-2011 and subsequent model-year off-vehicle charge capable hybrid electric vehicles, the battery state-of-charge shall be set at the level that results when the battery state-of-charge is initially set at the highest level allowed by the manufacturer and then decreased, as applicable, by the performance of a standard three-phase exhaust test, The vehicle shall be moved to the location where the driving cycle is to be conducted. It may be driven a maximum distance of 5.0 miles, longer distances shall require that the vehicle be transported by other means. For 20122011 and subsequent model-year offvehicle charge capable hybrid electric vehicles, the vehicle shall be either only pushed or towed to avoid disturbing the battery state-of-charge setting. The vehicle shall be parked for a minimum of 12 hours in an open area on a surface that is representative of the test road. The orientation of the front of the vehicle during parking (N, SW, etc.) shall be documented. Once the 12-hour minimum parking time has been achieved and the ambient temperature and weather conditions and track surface temperature are within the allowable ranges, the vehicle engine shall be started. The vehicle air

conditioning system (if so equipped) shall be set to the "NORMAL" air conditioning mode and adjusted to the minimum discharge air temperature and high fan speed. Vehicles equipped with automatic temperature controlled air conditioning systems shall be operated in "AUTOMATIC" temperature and fan modes with the system set at 72°F. The vehicle may be operated at minimum throttle for periods up to 60 seconds prior to beginning the first UDDS cycle in order to move from the parking location onto the road surface. The driver's aid shall be started and the vehicle operated over one UDDS cycle, then two NYCCs, and another UDDS cycle. The end of each UDDS cycle and the end of the two NYCCs shall be followed by an idle period of 120 seconds during which the engine shall remain on with the vehicle in the same transmission range and clutch (if so equipped) actuation mode as specified in 40 CFR §86.128-79 except for the following:

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D. Test Procedure

The test sequence described in 40 CFR §86.130 through §86.140 shall be performed with the following modifications:

1. General Requirements

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1.1.1.4. <u>For 2001 through **2011**2010 model-year vehicles, t</u>∓he fuel tank shall be <u>initially</u> drained and filled to the prescribed tank fuel volume <u>of 40 percent of the</u> <u>manufacturer's nominal fuel tank capacity</u>, as specified in 40 CFR §86.1803-01, in preparation for the vehicle preconditioning. For hybrid electric vehicles only, the manufacturer may elect to perform the All-Electric Range Test pursuant to the <u>"California Exhaust Emission Standards and Test Procedures for 2003 and Subsequent</u> Model Zero-Emission Vehicles, and 2001 and Subsequent Model Hybrid Electric Vehicles, in the Passenger Car, Light-Duty Truck, and Medium-Duty Vehicle Classes,<u>"</u> as incorporated by reference in §1962(e), title 13, CCR, prior to fuel drain and fill.

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<u>1.2.1.5.</u> For 2001 through **20112010** model-year vehicles, t preconditioning drive shall be performed in accordance with 40 CFR §86.132-90, except that following the <u>initial fuel drain and fill step in this test sequence-vehicle</u> fueling step at , as specified in 40 CFR §86.132-90(a)(1), an <u>initial preconditioning</u> minimum soak period of a minimum of 6 hours shall be provided to allow the vehicle to stabilize to ambient temperature prior to the preconditioning drive. Vehicles performing consecutive tests at a test point with the same fuel specification and while remaining

under laboratory ambient temperature conditions for at least 6 hours, may eliminate <u>both</u> the initial fuel drain and fill and vehicle soak. In such cases, each subsequent test shall begin with the preconditioning drive.

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1.3<u>1.6.</u> For **20122011** and subsequent model-year vehicles, the vehicle preconditioning shall be performed in accordance with 40 CFR §86.132-00, except as amended by section III.D.3. Except for 2011 and subsequent model-year off-vehicle charge capable hybrid electric vehicles that are equipped with non-integrated refueling canister-only systems, Ffollowing the vehicle preconditioning drive, a second fuel drain and fill step shall be performed, in accordance with 40 CFR §86.132-90(a)(1), The fuel tank shall be filled to the prescribed tank fuel volume of 40 percent of the manufacturer's nominal fuel tank capacity, as specified in 40 CFR §86.1803-01. the fuel tank shall be drained and then filled to 40 percent capacity.

<u>1.6.1.</u> For a **20122011** and subsequent model-year off-vehicle charge capable hybrid electric vehicle, the vehicle preconditioning drive shall include at least one complete UDDS performed entirely under a charge-sustaining mode of operation,. <u>The battery state-of-charge net change tolerance provisions specified in section F.10.</u>, <u>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" shall not apply.</u>

1.7. For <u>2012</u>2011 and subsequent model-year off-vehicle charge capable hybrid electric vehicles that are equipped with non-integrated refueling canister-only systems, the following exceptions apply within 60 minutes of completing the vehicle preconditioning drive, a second fuel drain and fill step shall be performed. The fuel tank shall be filled to the prescribed tank fuel volume of 10 percent of the manufacturer's nominal fuel tank capacity, determined to the nearest one-tenth of a U.S. gallon (0.38 liter) with the specified fuel. In order to prevent any abnormal purging or loading of the refueling canister during this fill step, the refueling canister shall be isolated from its system. The manufacturer may isolate the canister using any method that does not compromise the integrity of the system. A description of the canister isolated from its system isolated from its system. When the refueling canister is isolated from its system, fuel vapors shall be allowed to be vented from the fuel tank, as appropriate, during this fill step.

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<u>1.7.2. After completion of the second fuel drain and tank refill step, the</u> <u>initial testing state of the canister shall be established by purging while performing</u> <u>either the chassis dynamometer procedure or the test track procedure, as described in</u>

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subparagraphs (d)(1) and (d)(2) of 40 CFR 86.153-98. For vehicles equipped with dual fuel tanks *that can be individually selected or isolated*, the required volume of fuel shall be driven out of one tank, the second tank shall be selected as the fuel source, and the required volume of fuel shall be driven out of the second tank. A manufacturer shall plan for interruptions in the vehicle drivedowns due to factors such as work schedules, driver relief, and test equipment considerations, using good engineering practice.

<u>1.7.3.</u> With advance Executive Officer approval, a manufacturer may optionally elect to bench purge the canister *either* during the initial soak period, specified in 40 CFR §86.132-00(c)(1), *or after the vehicle preconditioning drive step specified in section III.D.1.6.1.,* 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. Approval by the Executive Officer shall be based upon 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, and that the characteristics of the purge flow through the canister, such as flow rates, shall be representative of flow that occurs under the specified vehicle drivedown UDDS cycles. Within 60 minutes of completing the bench purging, the fuel drain and fill step specified in section III.D.1.7.4. shall be performed.

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<u>1.7.10.</u> When conducting only an exhaust emission test sequence, a manufacturer may elect to perform the canister preconditioning and loading method specified in sections III.D.1.9., III.D.1.10., and III.3.3.4., in lieu of the canister loading method specified in sections III.D.1.7.6. and III.D.3.3.6. Under such an election, the exceptions specified in sections <u>III.D.7.1. through III.D.1.7.9.</u>, III.D.1.7.4., III.D.1.7.5, and III.D.1.7.6. shall not apply.

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1.12.5. For 2009 and subsequent model-year hybrid electric vehicles, except for 201220112001 and subsequent model-year off-vehicle charge capable hybrid electric vehicles, battery state-of-charge setting prior to the standard three-phase test shall be performed pursuant to the supplemental requirements specified in section E.6.1.5 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."

1.12.6. For <u>2012</u>2011 and subsequent model-year off-vehicle charge capable hybrid electric vehicles, battery state-of-charge setting prior to the standard three-phase test shall be at the highest level allowed by the manufacturer in order to

eliminate or minimize the cumulative amount of the auxiliary power unit activation during either of the ensuing three-phase exhaust or running loss tests. This requirement shall be applicable regardless of a vehicle's ability to allow, or not to allow, manual activation of the auxiliary power unit. If off-vehicle charging is required to increase the battery state-of-charge for the proper setting, then this charging shall occur during the 12-to-36 hour soak period. The battery state-of-charge net change tolerance provisions specified in section F.10., 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" shall not apply.

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<u>1.18.5.</u> For 2009 and subsequent model-year hybrid electric vehicles, except for <u>2012</u>2011 and subsequent model-year off-vehicle charge capable hybrid electric vehicles, battery state-of-charge setting prior to the standard three-phase test in the supplemental two-day diurnal test sequence shall be performed pursuant to the supplemental requirements specified in section E.6.1.5 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."

1.18.6. For 20122011 and subsequent model-year off-vehicle charge capable hybrid electric vehicles, battery state-of-charge setting prior to the standard three-phase exhaust test in the supplemental two-day diurnal sequence shall be at the highest level allowed by the manufacturer in order to eliminate or minimize the cumulative amount of the auxiliary power unit activation during either of the ensuing three-phase exhaust or running loss tests. This requirement shall be applicable regardless of a vehicle's ability to allow, or not to allow, manual activation of the auxiliary power unit. If off-vehicle charging is required to increase the battery state-of-charge for the proper setting, then this charging shall occur during the 12-to-36 hour soak period. The battery state-of-charge net change tolerance provisions specified in section F.10., 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" shall not apply.

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<u>1.19.</u> The Executive Officer may conduct certification confirmatory tests and in-use compliance tests of <u>20122011</u> and subsequent off-vehicle charge capable hybrid electric vehicles using any of the following battery state-of-charge levels:

3. Vehicle Preconditioning

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3.2. The following language shall be applicable in lieu of 40 CFR §86.132-90(a)(4) for 2001 through **20112010** model-year vehicles; and, in lieu of 40 CFR §86.132-00(e) for **20122011** and subsequent model-year vehicles</u>.

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3.3. The following language shall be applicable in lieu of 40 CFR §86.132-90(b) for 2001 through **20112010** model-year vehicles. For **20122011** and subsequent model-year vehicles, the vehicle preconditioning shall be performed in accordance with 40 CFR §86.132-00(f) through (j), except when amended by the following language.

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3.3.2. Except for <u>2012</u>2011 and subsequent model-year off-vehicle charge capable hybrid electric vehicles that are equipped with non-integrated refueling canister-only systems, Tthe fuel tank(s) of the prepared vehicle shall <u>undergo the second fuel drain and fill step of the test sequence</u>, be drained and refilled with the applicable test fuel, as specified in paragraph<u>section</u> III.F. of these procedures, to the prescribed tank fuel volume of 40 percent of the manufacturer's nominal fuel tank capacity, as defined in 40 CFR §86.1803-01. The vehicle shall be refueled within 1 hour of completion of the preconditioning drive. <u>For 2011 and subsequent model-year off-vehicle charge capable hybrid electric vehicles that are equipped with non-integrated refueling canister-only systems, the second fuel drain and fill step shall be performed as specified in section III.D.1.7., with the applicable test fuel specified in <u>section III.F.</u></u>

3.3.2.1. For **20122011** and subsequent model-year off-vehicle charge capable hybrid electric vehicles that are equipped with non-integrated refueling canister-only systems, the exceptions specified in sections III.D.1.7.1 through III.D.1.7.10., shall apply, along with the applicable test fuel specified in section III.F.

3.3.3. Following the <u>second</u> fuel drain and fill described in <u>subparagraphsection</u> <u>III.D</u>.3.3.2. above, the test vehicle shall be allowed to soak for a period of not less than 12 <u>orand- not</u> more than 36 hours prior to the exhaust emissions test. <u>Except for</u> <u>2012</u><u>2011</u> and subsequent model-year off-vehicle charge capable hybrid electric vehicles that are equipped with non-integrated refueling canister-only systems, <u>Pd</u>uring the soak period, the canister shall be connected to a pump or compressor and loaded with butane as described in <u>section III.D.</u>3.3.4. below for the three-day diurnal sequence and in <u>section III.D.</u>3.3.5. below for the supplemental two-day diurnal sequence. For all vehicles subjected to exhaust emissions testing only, the canister loading procedure as set forth in <u>paragraphsection III.D.</u> 3.3.4. below shall be used. For <u>2012</u>2011 and <u>subsequent model-year off-vehicle charge capable hybrid electric vehicles that are equipped with non-integrated refueling canister-only systems, the canister shall be loaded according to the fuel-tank-refill canister-loading method specified in <u>section III.D.3.3.6.</u>, for both the three-day diurnal sequence and the supplemental two-day diurnal sequence.</u>

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3.3.4. For the three-day diurnal sequence, the evaporative emissions storage canister(s) shall be preloaded with an amount of butane equivalent to 1.5 times the nominal working capacity. For vehicles with multiple canisters in a series configuration, the set of canisters must be preconditioned as a unit. For vehicles with multiple canisters in a parallel configuration, each canister shall be preconditioned separately. For vehicles equipped with a non-integrated refueling emission control system, the non-integrated canisters shall be preconditioned for the three-day diurnal test sequence according to the procedure in section III.D.3.3.5.1.(a) below. All 20122011 and subsequent model-year off-vehicle charge capable hybrid electric vehicles equipped with non-integrated refueling canister-only systems shall be preconditioned for the three-day diurnal test sequence according to the procedure specified in section III.D.3.3.6., unless a manufacturer is conducting only an exhaust emission test sequence, in which case the optional canister preconditioning and loading method allowed by section III.D.1.7.10. may apply. If a vehicle is designed to actively control evaporative or refueling emissions without a canister, the manufacturer shall devise an appropriate preconditioning procedure subject to the approval of the Executive Officer. If canisters on both certification and production vehicles are equipped with purge and load service ports, the service port shall be used for the canister preconditioning. The nominal working capacity of a carbon canister shall be established by determining the mass of butane required to load a stabilized canister to a two2-gram breakthrough. The 2-gram breakthrough is defined as the point at which the cumulative quantity of hydrocarbons emitted is equal to 2 grams, as defined in section I.B.1.3. The determination of nominal capacity shall be based on the average capacity of no less than five canisters which are in a stabilized condition. For stabilization, each canister must be cycled no less than 10 times and no more than 100 times to a two2-gram breakthrough with a 50/50 mixture by volume of butane and nitrogen, at a rate of 15 ± 2 grams butane per hour. Each canister loading step must be preceded by canister purging with 300 canister bed volume exchanges at 48 SCFH. The following procedure shall be used to preload the canister:

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3.3.6. After the <u>soak periodsecond fuel drain and tank refill step</u> specified in section III.D.1.7.5., is completed, the canister for a **20122011** and subsequent modelyear off-vehicle charge capable hybrid electric vehicle equipped with a non-integrated refueling canister-only system shall be preconditioned and loaded according to the following steps. Prior to conducting the applicable test sequencethese steps, the canister shall have already achieved a stabilized state, such as is accomplished using the stabilization method described in section III.D.3.3.4. Good engineering practice and safety considerations, such as, but not limited to, adequate ventilation and appropriate electrical groundings, shall apply.

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5. Engine Starting and Restarting.

5.1. Amend 40 CFR §86.136-90 to read as follows:

<u>5.1.1.</u> Revise sectionsubparagraph (c) to read: <u>Except for hybrid electric</u> <u>vehicles, if</u> the vehicle does not start after the manufacturer's recommended cranking time (or 10 continuous seconds in the absence of a manufacturer's recommendation), cranking shall cease for the period recommended by the manufacturer (or 10 seconds in the absence of a manufacturer's recommendation). This may be repeated for up to three start attempts. If the vehicle does not start after three attempts, the reason for failure to start shall be determined. The gas flow measuring device on the CVS (usually a revolution counter) or CFV shall be turned off and the sampler selector valves, including the alcohol sampler, placed in the "standby" position during this diagnostic period. In addition, either the CVS should be turned off, or the exhaust tube disconnected from the tailpipe during the diagnostic period. If failure to start is an operational error, the vehicle shall be rescheduled for testing from a cold start.

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8. Running Loss Test

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8.1.10. Tank pressure shall not exceed 10 inches of water during the running loss test unless a pressurized system is used and the manufacturer demonstrates in a separate test that vapor would not be vented to the atmosphere if the fuel <u>fill pipe</u> cap was removed at the end of the test. For **20122011** and subsequent model-year offvehicle charge capable hybrid electric vehicles that are equipped with non-integrated refueling canister-only systems, a manufacturer shall demonstrate in either a separate test or an engineering evaluation, that vapor would not be vented to the atmosphere if the fuel fill pipe cap was removed at the end of the test. Transitory incidents of the

pressure exceeding 10 inches of water, not greater than 10 percent of the total driving time, shall be acceptable during the running loss test if the manufacturer can demonstrate that the tank pressure does not exceed 10 inches of water during in-use operation. No pressure checks of the evaporative system shall be allowed. If the manufacturer suspects faulty or malfunctioning instrumentation, a repair of the test instrumentation may be performed. Under no circumstances will any changes/repairs to the evaporative emissions control system be allowed.

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8.2.5. Tank pressure shall not exceed 10 inches of water during the running loss test unless a pressurized system is used and the manufacturer demonstrates in a separate test that vapor would not be vented to the atmosphere if the fuel <u>fill pipe_cap</u> was removed at the end of the test. For **20122011** and subsequent model-year offvehicle charge capable hybrid electric vehicles that are equipped with non-integrated <u>refueling canister-only systems</u>, a manufacturer shall demonstrate in either a separate test or an engineering evaluation, that vapor would not be vented to the atmosphere if the fuel fill pipe cap was removed at the end of the test. Transitory incidents of the pressure exceeding 10 inches of water, not greater than 10 percent of the total driving time, shall be acceptable during the running loss test if the manufacturer can demonstrate that the tank pressure does not exceed 10 inches of water during in-use operation. No pressure checks of the evaporative system shall be allowed. If the manufacturer suspects faulty or malfunctioning instrumentation, a repair of the test instrumentation may be performed. Under no circumstances will any changes/repairs to the evaporative emissions control system be allowed.

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10. Diurnal Breathing Loss Test

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10.1.14.10.3.14. Add sectionsubparagraph (v) to read: The manufacturer shall specify the time interval of auxiliary power unit operation necessary to purge the evaporative emission control canister, and shall submit an engineering analysis to demonstrate that the canister will be purged to within five percent of its working capacity over the time interval. For **20122011** and subsequent model-year off-vehicle charge capable hybrid electric vehicles that are equipped with non-integrated refueling canister-only systems, a manufacturer may satisfy this requirement under the optional provision specified in section II.A.5.4.2.

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