Attachment 2
3rd 15-Day Modifications

THIRD 15-DAY PROPOSED MODIFICATIONS TO THE PROPOSED TEST PROCEDURE FOR DETERMINING EVAPORATIVE EMISSIONS FROM OFF-HIGHWAY RECREATIONAL VEHICLES (TP-933)

Shown on the following pages are the proposed modifications to the original proposed test procedure set forth in Attachment B of the Staff Report: "Adoption of Evaporative Emission Control Requirements for Off-Highway Recreational Vehicles," released June 5, 2013. The proposed adoption of new sections in the 45-day notice is shown in plain text. The first 15-day proposed changes released on January 14, 2012, are shown in single underline to indicate additions and ~~single strikeout~~ to indicate deletions from the originally proposed regulatory text. The second 15-day proposed changes, released on April 28, 2014, are shown in double underline and ~~double~~ ~~strikeout,~~ respectively. Changes proposed in this third 15-day notice are shown in ***double underline bold italics*** and ~~***double strikeout bold italics***~~, respectively. The symbol "*****" means that intervening text not proposed for modification is not shown.

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TP-933

Test Procedure for Determining Evaporative Emissions from Off-Highway Recreational Vehicles (OHRVs)

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1.1 Terms and Definitions

~~This test procedure incorporates by reference~~ In addition to the following definitions, the definitions set forth in the incorporated "California Evaporative Emission Standards and Test Procedures for 2001 and Subsequent Model Motor Vehicles" as last amended ~~March 22, 2012~~December 6, 2012, and ~~T~~title 13, California Code of Regulations (CCR), section 2417~~.~~. ~~In addition, the following definitions~~ apply:

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1.1.3 For the purpose of this procedure, the term “Deterioration factor” means the ratio of emissions after and before durability testing or the value of any positive increase in emissions from before or after durability testing.

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~~1.1.9 For the purpose of this procedure, the term “useful life” shall mean the time required for half the number of vehicles sold in a model year to no longer be in use.~~

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1.4 Test Fuel Specification

The test fuel used for all parts of this procedure, unless otherwise specified, shall be California certification gasoline as specified in “California 2015 and Subsequent Model Criteria Pollutant Exhaust Emission Standards and Test Procedures and 2017 and Subsequent Model Greenhouse Gas Exhaust Emission Standards and Test Procedures for Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles” Section II.A.100.3.1.2 ~~as~~ adopted March 22, 2012, as last amended December 6, 2012, ***which*** ~~as~~ is incorporated ~~here~~ by reference herein.

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3 INSTRUMENTATION

Equipment used during this testing shall, at a minimum, meet the requirements set forth in this section. This document incorporates by reference Title 40, Code of Federal Regulations (CFR), Part 86 – CONTROL OF EMISSIONS FROM NEW AND IN-USE HIGHWAY VEHICLES AND ENGINES, Subpart 107-96, 108-79, 108-00, and 508-78 (2012).

3.1 Vehicle Test Enclosure

This test procedure incorporates by reference “CALIFORNIA EVAPORATIVE EMISSION STANDARDS AND TEST PROCEDURES FOR 2001 AND SUBSEQUENT MODEL

MOTOR VEHICLES" as last amended ~~March 22, 2012~~December 6, 2012, Parts III.A and III.B, for evaporative emission measurement enclosure requirements and calibrations with the following exceptions:

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4 DURABILITY TESTING

Certification of an OHRV evaporative emission control system requires a manufacturer to first demonstrate the durability of each evaporative emission control system family. This is required prior to performing the evaporative emissions test described in Section 6 to ensure the vehicle will meet evaporative emissions standards over the useful life of the vehicle. The evaporative emission control system must satisfy durability requirements as prescribed in "TP-901 – Test Procedure for Determining Permeation Emissions from Small Off-Road Engines and Equipment Fuel Tanks," as ~~amended, July 16, 2007~~ adopted July 26, 2004, and incorporated ~~here~~ by reference herein. This must be done before proceeding to the durability testing section of this procedure, unless each evaporative emissions-related part has undergone durability testing for exhaust in another model of the same vehicle as specified in *California Exhaust Emissions Standards And Test Procedures For 1997 And Later Off-Highway Recreational Vehicles And Engines*, California Environmental Protection Agency, Air Resources Board, El Monte, CA, October 25, 2012 ~~August 15, 2007 and~~ which is incorporated ~~here~~ by reference herein.

In addition, OHRV manufacturers must comply with the durability requirements in Sections 4.1 through 4.3 of this test procedure or get approval ***~~for~~ from*** ARB for an alternative durability procedure. Carry-over and carry-across of deterioration factors may be allowed for systems using components that have successfully completed durability testing. Applicants shall be allowed to proceed to Section 5 of this test procedure if ***their products ~~they~~*** remain free of defects after the durability tests prescribed below. An applicant may propose modifications to the durability tests in this section if they can clearly demonstrate that the alternative durability test procedures are representative of end of useful life. Durability testing shall include the steps outlined in Figure 2.

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4.3 Carbon Canister Protection - Tip Test

The carbon canister protection tip test can be conducted with a vehicle or with a test rig that represents the actual position and orientation of the fuel system components. The fuel tank must be filled to 100 percent of nominal capacity with ***~~certification~~test*** fuel.

4.3.1 In less than 2 seconds, ~~O~~orient the vehicle such that the travel axis is tilted X degrees above and below the horizontal plane. See Figure 3 for a schematic. Hold the vehicle for 60 to 70 seconds, ~~at least 1 minute,~~ or such longer period of time as a manufacturer may choose, in both the positive and the negative position. X shall be as defined as follows:

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4.3.2 In less than 2 seconds, orient the vehicle such that the upright axis is tilted Y degrees from the vertical axis with rotation being about the travel axis. See Figure 4 for a schematic. Hold this position in both the positive and the negative position

for 60 to 70 seconds, ~~at least 1 minute,~~ or such longer period of time as a manufacturer may choose. Y shall be as defined as follows:

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5 EVAPORATIVE EMISSIONS SYSTEM PRECONDITIONING

The purpose of the preconditioning period is to introduce test fuel into the fuel system and condition all fuel system components to in-use conditions. Evaporative system preconditioning can be done in conjunction with mileage accumulation for exhaust testing as long as the fuel system has continuously held evaporative test fuel E10 (Commercial Pump Fuel containing 10 percent ethanol) for a total 140 days. E10 pump fuel may only be used for the portion of the soaking period; however, fuel must be switched to E10 ~~***certification***~~***test*** fuel for a minimum of 30 days prior to testing. The preconditioning procedure shall include the steps outlined in Figure 5.

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5.1 Soak Fuel System Components

Precondition the tank and other fuel delivery system components by filling the tank to its nominal capacity with fresh test fuel. Cap the tank within one minute of filling. After filling the tank, start the vehicle engine and allow it to idle for approximately fifteen minutes. Soak the tank and other components continuously for a total of 3,360 hours while maintaining an ambient temperature between 68ºF and 86ºF. Alternatively, components may be preconditioned using a fuel system test rig. The test rig must include all the components of the fuel and evaporative emissions control system connected and oriented as they would be installed in the vehicle. The tank and fuel lines must be filled with ~~***certification***~~***test*** fuel at the beginning of the test. A fuel system may be soaked for less than 3,360 hours if data is provided using one of the following two documents incorporated by reference: "TP-901 - Test Procedure for Determining Permeation Emissions from Small Off-Road Engines and Equipment Fuel Tanks" adopted July 26, 2004 or 40 CFR §1060.520 (2012) ~~***which was adopted on October 8, 2008***~~ that shows steady state permeation has been reached. If slosh testing is required, the slosh time may be considered part of the preconditioning period, provided all fuel system components tested remain filled with fuel, and are never empty for more than one hour over the entire preconditioning period.

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6.1 Fuel System Leakage Tip Test

The fuel system leakage tip test shall be performed during the soak specified in Subsection 6.2.1.5. The fuel tank must be filled to 50 percent with ~~***certification***~~***test*** fuel. During the test the vehicle is tipped to inspect for visible signs of liquid leakage. If any test fuel leakage is observed, then the vehicle fails the test. See Figure 7 for a summary of the steps in the fuel system leakage tip test.

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6.1.1 In less than 2 seconds, ~~O~~orient the vehicle such that the travel axis is tilted X degrees above and below the horizontal plane. See Figure 3 for a schematic. Hold the vehicle for 60 to 70 seconds, ~~at least 1 minute,~~ or such longer period of time as a manufacturer may choose, in both the positive and the negative position. Note any visible signs of fuel leakage. X shall be as defined as follows:

a) 30° ±2° for off-road motorcycles.
b) 30° ±2° for all other OHRVs.

6.1.2 In less than 2 seconds, orient the vehicle such that the upright axis is tilted Y degrees from the vertical axis with rotation being about the travel axis. See Figure 4 for a schematic. Hold this position in both the positive and the negative position for 60 to 70 seconds, or such longer period of time as a manufacturer may choose. Y shall be as defined as follows:

a) Unsupported position on either side for off-road motorcycles (i.e., vehicle lying on its side).
b) 15° ±2° for all other OHRVs.

6.2 Running Loss Conditioning

The running loss test is designed to simulate vehicle operation and canister purging during operation. Follow the dynamometer schedules in 40 CFR §86.515-78 (2012), which is hereby incorporated by reference. For the purpose of this running loss conditioning, all soak and test temperatures are 86° ±3°F.

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6.2.1.8 The speed profile is the ~~United States~~U.S. Environmental Protection Agency (U.S. EPA) UDDS as specified in 40 CFR §86.515-78 (2012). The same cycle (Class I or Class II) must be used as is required for exhaust emissions certification. The steady state engine test for All-Terrain Vehicles (ATV) is not allowed for this test procedure.

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6.3 Hot Soak Preconditioning

The hot soak evaporative emission preconditioning is designed to soak the OHRV after operation. The test temperature for the hot soak is 86° ±3°F.

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6.3.5 If the Calculation Method is to be used for the diurnal test, the carbon canister must be removed immediately following the hot soak test and the butane working capacity must be determined by loading the canister to 2 grams breakthrough with a 50/50 mixture by volume of butane and nitrogen, at a rate of 15 ±2 grams butane per hour per liter of canister volume.

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6.4 Diurnal Test

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6.4.1 72-Hour Diurnal Test - Begin the 3-day diurnal test by lowering the temperature of the enclosure in which the diurnal test will be performed to 72° ±3°F within 60 minutes of completing the hot soak test. Diurnal soak period is 6 to 36 hours at 72° ±3°F. Perform the diurnal test procedure described in 40 CFR §86.133-96 (2012), which is hereby incorporated by reference with the following exceptions.

6.4.1.1 When the word "methanol" or the term C_{CH3OH} (methanol concentration) is used, it shall be replaced by ethanol or the term C_{C2H5OH} (ethanol concentration).

6.4.1.2 All references to the hot soak test performed in 40 CFR §86.138-96 (2012) shall mean the hot soak conditioning previously described in Section 0 of this procedure.

6.4.1.3 All references to the calculations performed in 40 CFR §86.143 (2012) shall be replaced with the calculations performed in Section 7 of this procedure.

6.4.1.4 Omit the following language from Section (a)(1), “The diurnal emission test may be conducted as part of either the three-diurnal test sequence or the supplemental two-diurnal test sequence, as described in 40 CFR §86.130-96 (2012).”

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6.4.2 Steady State Diurnal Test

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6.4.2.2 Attach vent line(s) to air-port(s) of carbon canister(s), if so equipped, that will direct any air/vapor exiting the canister to the exterior of the test enclosure. This air/vapor need not be measured.

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6.4.2.5 Compliance is shown if the emissions measured in this section are lower than the standard and ~~either~~one of the following can be shown:

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7 CALCULATIONS: EVAPORATIVE EMISSIONS

Total mass emissions from Subsection 6.4.1 must be calculated using the measurements of initial and final concentrations to determine the mass of hydrocarbons and ethanol emitted pursuant to "California Evaporative Emission Standards and Test Procedures for 2001 and Subsequent Model Motor Vehicles" as last amended~~, March 22, 2012~~ December 6, 2012, Parts III.D.11. Alternatively, ethanol measurements may be omitted if the calculated mass of hydrocarbon emissions is multiplied by a percentage adjustment factor equal to:

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9 DOCUMENTS INCORPORATED BY REFERENCE

California 2015 and Subsequent Model Criteria Pollutant Exhaust Emission Standards and Test Procedures and 2017 and Subsequent Model Greenhouse Gas Exhaust Emission Standards and Test Procedures for Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles, California Environmental Protection Agency, Air Resources Board, El Monte, CA, adopted March 22, 2012, as last amended December 6, 2012.

California Evaporative Emission Standards and Test Procedures for 2001 and Subsequent Model Motor Vehicles, California Environmental Protection Agency, Air Resources Board, El Monte, CA, ~~March 22, 2012~~ adopted August 5, 1999, as last amended December 6, 2012.

California Exhaust Emissions Standards And Test Procedures For 1997 And Later Off-Highway Recreational Vehicles And Engines, California Environmental Protection Agency, Air Resources Board, El Monte, CA, ~~August 15, 2007~~ adopted November 22, 1994, as last amended October 25, 2012.

Control of Emissions from New and In-Use Highway Vehicles and Engines. Title 40, Code of Federal Regulations, Part 86. United States Environmental Protection Agency, ~~Subpart~~ 40 CFR §86.107-96 (2012), 40 CFR §86.108-79 (2012), 40 CFR §86.108-00 (2012), ***40 CFR §86.130-96 (2012),*** 40 CFR §86.133-96 (2012), 40 CFR §86.138-96 (2012), 40 CFR §86.143-96 (2012), ~~and~~ 40 CFR §86.508-78 (2012), and 515-78 (2012).

Control of Evaporative Emissions from New and In-Use Nonroad and Stationary Equipment. Title 40, Code of Federal Regulations, Part 1060. United States Environmental Protection Agency, 40 CFR §1060.520 (2012).

Reddy, S. Raguma. Prediction of Fuel Vapor Generation From a Vehicle Fuel Tank as a Function of Fuel RVP and Temperature. SAE Technical Paper 892089, September ~~***25-29***~~,1989. Copyrighted.

Test Procedure for Determining Permeation Emissions from Small Off-Road Engine Equipment Fuel Tanks, TP-901, California Environmental Protection Agency, Air Resources Board, Sacramento, CA, as adopted July 26, 2004.

10 APPENDICES

10.1 Appendix A - Calculation Method for Demonstrating the Adequacies of the Vented Evaporative Emissions System

The calculations in this section are based on the ideal gas law, and equations generated in *SAE 892089- Prediction of Fuel Vapor Generation from a Vehicle Fuel Tank as a Function of Fuel RVP and Temperature* ***published*** ~~***adopted***~~ September ~~***25-28***~~, 1989 and incorporated here by reference. All final results should be calculated to two significant figures.

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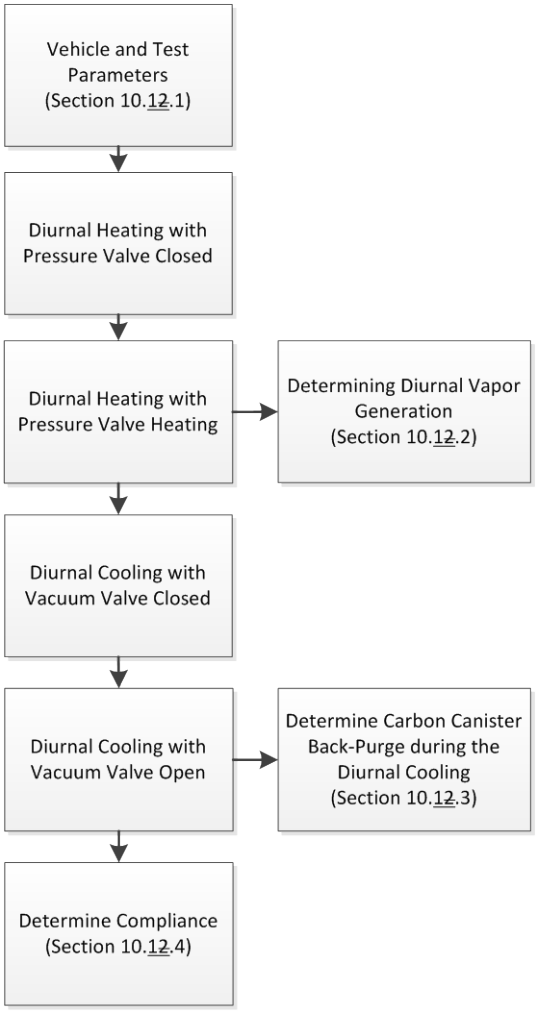
Figure A-1: Calculations Flow Chart



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10.1.1 Vehicle and Test Parameters

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e. Preconditioned Carbon Canister Specifications
The carbon canister must be preconditioned as specified in subsection 5.2. Butane working capacity of a carbon canister must be established at 2 grams breakthrough using “California Evaporative Emission Standards and Test Procedures for 2001 and Subsequent Model Motor Vehicles" as amended ~~***March 22***~~ ***December 6***, 2012, with the flow rates and temperatures specified in subsection 5.2.

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