

**Appendix F-B-3**

**Purpose and Rationale for  
Proposed Amendments to the Greenhouse Gas Test  
Procedures**

**CALIFORNIA GREENHOUSE GAS EXHAUST  
EMISSION STANDARDS AND TEST PROCEDURES  
FOR 2014 AND SUBSEQUENT MODEL HEAVY-DUTY  
VEHICLES**

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## **Proposed Amendments to the “California Greenhouse Gas Exhaust Emission Standards and Test Procedures for 2014 and Subsequent Model Heavy-Duty Vehicles”**

### **List of Documents to be used in Conjunction with this Document**

#### **Purpose**

Warranty requirements specified in 13 CCR 2035 are added and incorporated by reference in this section. See Chapter III, Section A.11 of this Staff Report, for further details on the requirements for warranty, in-use compliance, and recall.

#### **Rationale**

It is necessary to include the warranty requirements to indicate that these requirements are to be incorporated by reference in to, and used in conjunction with, these test procedures for the certification of heavy-duty vehicles (including trailers). Hence, trailer manufacturers are subject to California-specific warranty requirements.

The current requirements related to California Phase 2 GHG regulation clean-up items are described in Chapter I, Section B.11 of this Staff Report; the need for clarifications and amendments related to California Phase 2 GHG regulation is described in Chapter II, Section C.11; and the description of proposed California Phase 2 GHG regulation clean-up items amendments is included in Chapter III, Section A.11.

## **PART 1037 – CONTROL OF EMISSIONS FROM NEW HEAVY-DUTY MOTOR VEHICLES**

### **Subpart A – Overview and Applicability**

#### **Section 1037.5. Excluded vehicles.**

##### **Subsection 1037.5(h)(4)**

#### **Purpose**

This section indicates the vehicles that are excluded from the provisions of 40 CFR Part 1037. The proposed amendment in subsection (h)(4) corrects a typographical error in the regulation by updating the applicable California date of the regulation for excluded trailers. It also updates subsection numbering. See Chapter III, Section A.11 of this Staff Report, for the trailer-specific amendments.

#### **Rationale**

This proposed amendment in subsection (h)(4) is necessary to correct inadvertent errors, and align the trailer requirements with the GHG emission standards as set forth in the California Phase 2 standards. In addition, the proposed amendment is necessary to make clear that trailers manufactured prior to January 1, 2020, are excluded from these requirements.

The current requirements related to California Phase 2 GHG regulation clean-up items are described in Chapter I, Section B.11 of this Staff Report; the need for clarifications and amendments related to California Phase 2 GHG regulation is described in Chapter II, Section C.11; and the description of proposed California Phase 2 GHG regulation clean-up items amendments is included in Chapter III, Section A.11.

## **Subpart B – Emission Standards and Related Requirements**

### **Section 1037.106. Exhaust emission standards for tractors above 26,000 pounds GVWR.**

#### **Subsections 1037.106(g)(1) and (g)(2)**

##### **Purpose**

This section provides the emission standards for tractors above 26,000 pounds GVWR. It was previously incorporated into these test procedures in 2018 without change. The proposed amendments modify only subsections (g)(1) and (g)(2); no changes to this existing section are proposed for subsections (a) through (f) and (g)(3). Subsections (g)(1) and (g)(2) provide the particulate matter emission standards of auxiliary-power-unit engines for 2021 through 2023 model years and 2024 and subsequent model years, respectively, which are used in tractors above 26,000 pounds GVWR. In these subsections, all of the underlined text is existing CFR language that was already adopted in 2018, except for the references to the CCR sections and minor corrections, as described below.

In subsection (g)(1), the existing language refers to “40 CFR” when indicating the regulatory reference for certification; the proposed amendment modifies this to “title 13, CCR, sections 2420 to 2427,” which are the California references for the auxiliary power unit certification. In addition, the proposed amendment to this section spells out “auxiliary-power-unit engine” instead of the existing language “APU engine.” No change is made to the existing particulate matter standard that will apply to 2021 through 2023 model year engines.

In subsection (g)(2), the existing language refers to “40 CFR 1039.699” when indicating the federal regulatory reference for certification; the proposed amendment modifies this to “title 13, CCR, 2421 and must comply with the requirements of title 13, CCR, sections 2420 to 2427,” which are the California regulations pertaining to auxiliary power unit certification. The last sentence of the existing federal language is not included in the proposed text since these requirements apply federally, and the cited California regulations provide the needed protection against non-compliance. No change is made to the existing particulate matter standard that will apply to 2024 and subsequent model year engines.

## **Rationale**

The proposed amendments are necessary to cite California regulations that pertain to the certification of auxiliary power units rather than referencing federal regulations in the existing text. California's authority to conduct in-use compliance testing to ensure emission benefits is tied to California's certification. Thus, the proposed amendments allow for both California certification and enforcement of auxiliary power units to the 2021 and subsequent model year particulate matter standards. The background related to auxiliary power unit certification amendments is described in Chapter I, Section B.10 of this Staff Report; the need for amendments related to auxiliary power unit certification is described in Chapter II, Section C.10; and the description of proposed auxiliary power unit certification amendments is included in Chapter III, Section A.10.

## **Section 1037.107. Emission standards for trailers.**

### **Subsections 1037.107(a)(2), (a)(3), and (a)(5)**

#### **Purpose**

This section provides the emission standards for trailers. Subsections (a)(2) and (a)(3) provide CO<sub>2</sub> emission standards for full- and partial-aero box vans trailers, respectively. All of the underlined text was existing CFR language that was already adopted in 2018. The tables indicate existing provisions applicable to 2018 and later trailers. CARB staff's proposed amendments make them applicable to 2020 and later trailers. Specifically, the only amendments to the existing CFR provisions are the addition of footnote 1 to limit applicability to 2020 and later trailers, and in the table itself to specify the model year "2020<sup>1</sup>" instead of the existing CFR wording of the range of model years "2018-2020." Hence, the proposed amendments serve to indicate that the standards beginning in the 2020 model year are specifically applicable to trailers produced on and after January 1, 2020. See Chapter III, Section A.11 of this Staff Report, for the trailer-specific amendments.

Subsection (a)(5) describes the averaging provisions for trailer certification including the applicability and restrictions on the use of credits. The proposed amendment restricts the Family Emission Limit to not be greater than the appropriate standard for model year 2020 trailers. It also updates subsection numbering.

#### **Rationale**

These proposed amendments are necessary to correct inadvertent errors, and to correctly specify the implementation start date of the CO<sub>2</sub> emission standards for these trailers, as set forth in the California Phase 2 standards.

The current requirements related to California Phase 2 GHG regulation clean-up items are described in Chapter I, Section B.11 of this Staff Report; the need for clarifications and amendments related to California Phase 2 GHG regulation is described in Chapter II, Section C.11; and the description of proposed California Phase 2 GHG regulation clean-up items amendments is included in Chapter III, Section A.11.

**Section 1037.150. Interim provisions.**

**New Subsection 1037.150(ab)**

**Purpose**

This section addresses the interim provisions for Phase 1 and Phase 2 vehicles, such as issues of limiting carryover data from Phase 1 to Phase 2, a transitional allowance for trailers, etc. Further, the proposed amendment includes an exemption for certain trailers in the new subsection (ab):

1. The Executive Officer has the ability to exempt specific trailer configurations from meeting the required emission standards when it is determined that the technology is not available to meet the standard.

See Chapter III, Section A.11 of this Staff Report, for the trailer-specific amendments.

**Rationale**

Although in general the trailer emission standards are readily attainable, this proposed amendment is necessary for a few specialty trailer types that have unique design specifications. These unique design specifications may make it difficult for these trailer manufacturers to meet the applicable emissions standards in the early years of the program's implementation. CARB staff believes that these difficulties would be overcome with time, and expects that this exemption provision would rarely be used. However, as the program is implemented, it is likely CARB staff would be asked to certify these specialty trailers, and accordingly does not want to unreasonably hinder the availability of them to end users.

The current requirements related to California Phase 2 GHG regulation clean-up items are described in Chapter I, Section B.11 of this Staff Report; the need for clarifications and amendments related to California Phase 2 GHG regulation is described in Chapter II, Section C.11; and the description of proposed California Phase 2 GHG regulation clean-up items amendments is included in Chapter III, Section A.11.

**Subpart C – Certifying Vehicle Families**

**Section 1037.231. Powertrain families.**

**Subsection 1037.231(a)**

**Purpose**

The purpose of this subsection is to give guidance to a manufacturer in how to divide its product line into powertrain families. The purpose of the proposed amendment adds criteria pollutant emissions as an additional factor in determining the appropriate powertrain families for certification.

**Rationale**

This amendment is necessary since existing regulatory language only provides guidance for including fuel consumption and CO2 emission characteristics as factors to be considered when determining powertrain families for certification. This was sufficient since the existing powertrain testing procedure only allows certification testing for complying with GHG emissions standards. Since staff's proposed regulatory action would extend the optional powertrain testing to allow optionally certified Diesel- or Otto-cycle engine hybrid powertrains to be certified to criteria pollutants emission standards, the emission characteristics of criteria pollutant emissions need to be considered in the determination of powertrain families. The proposed regulatory language is needed to ensure any Diesel- or Otto-cycle engine hybrid powertrain that is certified pursuant to title 13 CCR section 1956.8 would have to account for the level of criteria pollutant emissions throughout the useful life.

The current powertrain certification requirements are described in Chapter I, Section B.9 of this Staff Report; the need for amendments related to powertrain certification is described in Chapter II, Section C.9; and the description of proposed powertrain certification amendments and their feasibility is included in Chapter III, Section A.9.

### **Section 1037.235. Testing requirements for certification.**

#### **Purpose**

The purpose of this section is to specify the emission testing that must be performed for compliance with GHG emission standards. The purpose of the proposed amendment adds criteria pollutant emissions as an additional factor when using the optional powertrain testing for certifying Diesel- or Otto-cycle engine hybrid powertrains to criteria pollutant emissions standards. The proposed amendment also updates the amended date to the adoption date of the U.S. EPA Phase 2 technical amendments.

#### **Rationale**

This amendment is necessary since existing regulatory language requires the emission testing that must be performed to show compliance with respect to GHG emission standards. This was sufficient since the existing powertrain testing procedure only allows certification testing for complying with GHG emissions standards. Since staff's proposed regulatory action would extend the optional powertrain testing to allow optionally certified Diesel- or Otto-cycle engine hybrid powertrains to be certified to criteria pollutants emission standards, the existing language on emission testing requirements to demonstrate compliance with applicable emission standards need to be broadened to include applicable criteria pollutant emission standards. The proposed regulatory language is needed to ensure any Diesel- or Otto-cycle engine hybrid powertrain that is certified pursuant to title 13 CCR section 1956.8 for criteria pollutant emission standards would need to conduct emission testing to show compliance with respect to California's emission standards for criteria pollutant emissions.

The amendment to update the amended date to the adoption date of the U.S. EPA Phase 2 technical amendments is also necessary in order to harmonize with federal regulations.

The current powertrain certification requirements are described in Chapter I, Section B.9 of this Staff Report; the need for amendments related to powertrain certification is described in Chapter II, Section C.9; and the description of proposed powertrain certification amendments and their feasibility is included in Chapter III, Section A.9.

### **Section 1037.250. Reporting and recordkeeping.**

#### **Subsection 1037.250(a)**

##### **Purpose**

Subsection (a) specifies the vehicle production volume reporting and recordkeeping submission requirements for manufacturers. In the existing requirements, only total U.S.-directed production volumes are required in the end of the year reports. The proposed amendment requires manufacturers to report the amount of their vehicles produced for sale in California. See Chapter III, Section A.11 of this Staff Report, for the trailer-specific amendments.

##### **Rationale**

This proposed amendment is necessary to ensure a manufacturer's compliance with the applicable California requirements. This amendment also enables CARB staff to collect California-specific data to more effectively improve CARB's heavy-duty vehicle emission inventory model.

The current requirements related to California Phase 2 GHG regulation clean-up items are described in Chapter I, Section B.11 of this Staff Report; the need for clarifications and amendments related to California Phase 2 GHG regulation is described in Chapter II, Section C.11; and the description of proposed California Phase 2 GHG regulation clean-up items amendments is included in Chapter III, Section A.11.

### **Subpart F – Test and Modeling Procedures**

#### **Section 1037.510. Duty-cycle exhaust testing.**

##### **Purpose**

The proposed amendment updates the amended date to the adoption date of the U.S. EPA Phase 2 technical amendments.

##### **Rationale**

This amendment is necessary to update the amended date to the adoption date of the U.S. EPA Phase 2 technical amendments in order to harmonize with federal regulations.



**Subsection 1037.510(a)(2)**

**Purpose**

The purpose of this subsection is to describe how to perform testing of GHG modeling inputs for powertrain testing or cycle-average engine fuel mapping. The proposed amendment requires powertrain testing to also generate exhaust emissions, along with the currently-required GHG modeling inputs, for each simulated vehicle configuration.

**Rationale**

This amendment is necessary to allow exhaust emissions from powertrain testing to be generated, which are needed to determine the levels of criteria pollutant emissions from the Diesel- and Otto-cycle engine hybrid powertrains that are being tested.

The current powertrain certification requirements are described in Chapter I, Section B.9 of this Staff Report; the need for amendments related to powertrain certification is described in Chapter II, Section C.9; and the description of proposed powertrain certification amendments and their feasibility is included in Chapter III, Section A.9.

**Subsection 1037.510(b)**

**Purpose**

The purpose of this subsection is to specify the calculation of the official CO<sub>2</sub> emission results. The proposed amendment adds the calculation of official criteria pollutant results pursuant to 40 CFR part 1036 Subpart F.

**Rationale**

This amendment is necessary since the existing language of this subsection only specifies how to calculate the official CO<sub>2</sub> emission result. Manufacturers of Diesel- and Otto-cycle engine hybrid powertrains need to know the procedure for calculating the official criteria pollutant emission results to determine the emission compliance with criteria pollutants emission standards.

The current powertrain certification requirements are described in Chapter I, Section B.9 of this Staff Report; the need for amendments related to powertrain certification is described in Chapter II, Section C.9; and the description of proposed powertrain certification amendments and their feasibility is included in Chapter III, Section A.9.

**Section 1037.515 Determining CO<sub>2</sub> emissions to show compliance for trailers.**

**Subsection 1037.515(c) Table 2**

**Purpose**

This section provides the compliance determination modeling procedures for trailers. The subsection (c) table was already adopted in 2018. However, Table 2 has a typographical error. The proposed amendment corrects the mathematical “greater than” symbol to be a “greater than or equal” symbol for a trailer’s measured change in aerodynamic drag area (delta CdA) of 1.80 in Table 2. See Chapter III, Section A.11, of this Staff Report, for the trailer-specific amendments.

**Rationale**

This proposed amendment is necessary to correct an inadvertent error with the GHG trailer emission standards used for CARB certification, specifically with the bin determination for trailers based on their measured aerodynamic test results.

The current requirements related to California Phase 2 GHG regulation clean-up items are described in Chapter I, Section B.11 of this Staff Report; the need for clarifications and amendments related to California Phase 2 GHG regulation is described in Chapter II, Section C.11; and the description of proposed California Phase 2 GHG regulation clean-up items amendments is included in Chapter III, Section A.11.

**Section 1037.550 Powertrain testing.**

**Purpose**

The proposed amendment updates the amended date to the adoption date of the U.S. EPA Phase 2 technical amendments.

**Rationale**

This amendment is necessary to update the amended date to the adoption date of the U.S. EPA Phase 2 technical amendments in order to harmonize with federal regulations.

**Subsection 1037.550(a)**

**Purpose**

The purpose of this subsection is to describe a measurement procedure to determine engine fuel maps for diesel and Otto-cycle engine hybrid systems. The proposed amendment adds exhaust emissions to the measurement procedure.

**Rationale**

This amendment is necessary to allow exhaust emissions to be generated for powertrain testing, which are needed to determine the levels of criteria pollutant emissions from the Diesel- and Otto-cycle engine hybrid powertrains that are being tested.

The current powertrain certification requirements are described in Chapter I, Section B.9 of this Staff Report; the need for amendments related to powertrain certification is

described in Chapter II, Section C.9; and the description of proposed powertrain certification amendments and their feasibility is included in Chapter III, Section A.9.

**Subsection 1037.550(b)**

**Purpose**

The purpose of this subsection is to specify that powertrain testing could be used to establish fuel-consumption rates and exhaust emissions over applicable duty cycles to demonstrate compliance with applicable requirements. Such requirements include the Phase 2 GHG emission standards. The proposed amendment adds optionally certified Diesel- and Otto-cycle engine hybrid powertrains certifying to criteria pollutant emission standards.

**Rationale**

This amendment is necessary since the existing language in this subsection only allows powertrain testing to be used to optionally certify to GHG emission standards. Without this amendment, Diesel- and Otto-cycle engine hybrid powertrains would not be able to certify to criteria pollutant emissions standards.

The current powertrain certification requirements are described in Chapter I, Section B.9 of this Staff Report; the need for amendments related to powertrain certification is described in Chapter II, Section C.9; and the description of proposed powertrain certification amendments and their feasibility is included in Chapter III, Section A.9.

**Subsection 1037.550(b)(1)**

**Purpose**

The purpose of the proposed amendment is to specify the collection and measurement of all required criteria pollutant exhaust emissions for optionally certified Diesel- and Otto-cycle engine hybrid powertrains certifying to criteria pollutants emission standards.

**Rationale**

This amendment is necessary since the existing language in this subsection only specifies the collection and inclusion of NOx emissions that were collected as part of the powertrain testing for compliance with GHG emission standards. The existing language also allows a manufacturer to omit submitting NOx emission results under certain conditions. The existing language is inadequate if optionally certified Diesel- and Otto-cycle engine hybrid powertrains are to be tested for compliance with criteria pollutant emission standards. The proposed amendment is necessary as it requires manufacturers to submit criteria pollutant emissions constituents as described in 40 CFR 1037.550(k) that would be used to determine the emission levels of criteria pollutants. Without this amendment, Diesel- and Otto-cycle engine hybrid powertrains would not be able to certify to criteria pollutant emissions standards.

The current powertrain certification requirements are described in Chapter I, Section B.9 of this Staff Report; the need for amendments related to powertrain certification is

described in Chapter II, Section C.9; and the description of proposed powertrain certification amendments and their feasibility is included in Chapter III, Section A.9.

## **Subpart G – Special Compliance Provisions**

### **Section 1037.620. Responsibilities for multiple manufacturers.**

#### **Subsection 1037.620(c)**

##### **Purpose**

This section describes certain circumstances in which multiple manufacturers share responsibilities for vehicles they produce together. Subsection (c) describes circumstances in which aerodynamic device manufacturers perform aerodynamic testing, and submit that data for verification. The verified data would establish a delta CdA input parameter for use by trailer manufacturers when certifying their trailers. This subsection was already adopted in 2018. The proposed amendment is to specify that aerodynamic device manufacturers are required to submit aerodynamic device testing data for verification to CARB rather than to U.S. EPA. See Chapter III, Section A.11 of this Staff Report, for the trailer-specific amendments.

The proposed amendments also update section numbering, and correct regulatory text that inadvertently references federal recall provisions instead of California-specific recall provisions.

##### **Rationale**

These proposed amendments are necessary to correct an inadvertent error, and thereby correctly specify the requirement for submitting aerodynamic testing data to CARB rather than U.S. EPA, and align these requirements with all other existing California trailer programs.

The current requirements related to California Phase 2 GHG regulation clean-up items are described in Chapter I, Section B.11 of this Staff Report; the need for clarifications and amendments related to California Phase 2 GHG regulation is described in Chapter II, Section C.11; and the description of proposed California Phase 2 GHG regulation clean-up items amendments is included in Chapter III, Section A.11.

## **Subpart I – Definitions and Other Reference Information**

### **Section 1037.801. Definitions.**

##### **Purpose**

The proposed amendment updates the amended date to the adoption date of the U.S. EPA Phase 2 technical amendments.

**Rationale**

This amendment is necessary to update the amended date to the adoption date of the U.S. EPA Phase 2 technical amendments in order to harmonize with federal regulations.

**“Hybrid engine or hybrid powertrain”**

**Purpose**

The purpose of this definition is to describe a “Hybrid engine or hybrid powertrain.”

**Rationale**

This amendment is necessary since the existing definition does not include additional components that would be required to be grouped as a Diesel- or Otto-cycle engine hybrid powertrain family for certification testing, which would be subject to all certification conditions and requirements.

The current powertrain certification requirements are described in Chapter I, Section B.9 of this Staff Report; the need for amendments related to powertrain certification is described in Chapter II, Section C.9; and the description of proposed powertrain certification amendments and their feasibility is included in Chapter III, Section A.9.

**“Hybrid vehicle”**

**Purpose**

The purpose of this definition is to describe a “Hybrid vehicle.” The proposed amendment is to further define hybrid vehicle to include a vehicle that is installed with an optionally certified Diesel- or Otto-cycle engine hybrid powertrain.

**Rationale**

This amendment is necessary since the existing definition does not specifically describe a vehicle installed with a Diesel- or Otto-cycle engine hybrid powertrain optionally certified pursuant to title 13 CCR section 1956.8 to be a “hybrid vehicle.” This amendment would provide clarity to the hybrid vehicle definition.

The current powertrain certification requirements are described in Chapter I, Section B.9 of this Staff Report; the need for amendments related to powertrain certification is described in Chapter II, Section C.9; and the description of proposed powertrain certification amendments and their feasibility is included in Chapter III, Section A.9.

**“Vehicle”**

**Purpose**

This section provides the definitions that apply to the provisions of 40 CFR Part 1037. The current “Vehicle” definition inadvertently states that trailers cannot be considered incomplete vehicles, thus not allowing them to be built by more than one manufacturer through delegated assembly. This definition directly contradicts delegated assembly

rules elsewhere in the regulations, which allow trailers to be passed to a secondary manufacturer as an incomplete vehicle for final assembly. The proposed amendment modifies the “Vehicle” definition in the California Phase 2 standards. See Chapter III, Section A.11 of this Staff Report, for the trailer-specific amendments.

The proposed amendment in subsection B. California Provisions, corrects the definition of “Medium-duty vehicle” to include 2018 and subsequent model year zero-emission vehicles because such vehicles were inadvertently omitted in CARB’s previous rulemaking.

**Rationale**

The proposed amendment to the “Vehicle” definition is necessary to allow for the current practice for trailers to be manufactured by more than one manufacturer, and to remove this contradiction with other regulatory sections.

The proposed amendment in the “Medium-duty vehicle” definition is necessary to align the regulatory text with the original intent of the rule.

The current requirements related to California Phase 2 GHG regulation clean-up items are described in Chapter I, Section B.11 of this Staff Report; the need for clarifications and amendments related to California Phase 2 GHG regulation is described in Chapter II, Section C.11; and the description of proposed California Phase 2 GHG regulation clean-up items amendments is included in Chapter III, Section A.11.

**PART 1066 – VEHICLE TESTING PROCEDURES**

**Subpart F – Electric Vehicles and Hybrid Electric Vehicles**

**B. California Provisions.**

**Section 1066.501. Overview.**

**Subsection 1066.501.B.1.1.4**

**Purpose**

The purpose of this subsection is to allow a manufacturer to test for NOx emissions and all electric range. The proposed amendment includes Diesel- or Otto-cycle engine hybrid powertrains into the allowed uses pertaining to powertrain testing.

**Rationale**

This amendment is necessary since the existing provision of this subsection does not specifically allow manufacturers to use powertrain testing to optionally certify Diesel- or Otto-cycle engine hybrid powertrains to criteria pollutant emission standards pursuant to title 13 CCR section 1956.8.

The current powertrain certification requirements are described in Chapter I, Section B.9 of this Staff Report; the need for amendments related to powertrain certification is described in Chapter II, Section C.9; and the description of proposed powertrain certification amendments and their feasibility is included in Chapter III, Section A.9.

**PART 1068 – GENERAL COMPLIANCE PROVISIONS FOR HIGHWAY, STATIONARY, AND NONROAD PROGRAMS**

**Subpart A – Applicability and Miscellaneous Provisions**

**Section 1068.1. Does this part apply to me?**

**Purpose**

The purpose of this section is to describe the applicability of this Part 1068 in the California regulations. The proposed amendment corrects a minor typographical error by changing the section from 40 CFR section “1068.1.1” to “1068.1” (i.e., the added “.1” should be deleted).

**Rationale**

This minor amendment is necessary to correct the stated section in Part 1068.

**Section 1068.30. Does this part apply to me?**

**Purpose**

This section provides definitions that pertain to Part 1068. The proposed amendment adds numbering to the two existing definitions.

**Rationale**

The proposed amendment is necessary to establish format consistency between definition sections in other parts, such as 40 CFR 1037.801, where numbers are used to list each definition.