

Notice of Public Availability of Modified Text and Availability of Additional Documents

Proposed Amendments to the Heavy-Duty Engine and Vehicle Omnibus Regulation and Associated Amendments:

**Proposed Amendments to the Exhaust Emissions Standards and Test Procedures for
2024 and Subsequent Model Year Heavy-Duty Engines and Vehicles,
Heavy-Duty On-Board Diagnostic System Requirements,
Heavy-Duty In-Use Testing Program,
Emissions Warranty Period and Useful Life Requirements,
Emissions Warranty Information and Reporting Requirements, and
Corrective Action Procedures,
In-Use Emissions Data Reporting Requirements, and
Phase 2 Heavy-Duty Greenhouse Gas Regulations, and
Powertrain Test Procedures**

Public Hearing Date: August 27, 2020
Public Availability Date: May 5, 2021
Deadline for Public Comment: June 4, 2021

At its August 27, 2020, public hearing, the California Air Resources Board (CARB or Board) approved for adoption proposed amendments to sections 1900, 1956.8, 1961.2, 1965, 1968.2, 1971.1, 2035, 2036, 2111, 2112, 2113, 2114, 2115, 2116, 2117, 2118, 2119, 2121, 2123, 2125, 2126, 2127, 2128, 2129, 2130, 2131, 2133, 2137, 2139, 2140, 2141, 2142, 2143, 2144, 2145, 2146, 2147, 2148, 2149, 2166, 2166.1, 2167, 2168, 2169, 2170, 2423, and 2485 of the California Code of Regulations (CCR), title 13; sections 95662 and 95663, CCR, title 17; and proposed adoption of sections: 2139.5, 2169.1, 2169.2, 2169.3, 2169.4, 2169.5, 2169.6, 2169.7, and 2169.8, CCR, title 13, which primarily: establish exhaust emission standards and associated test procedures for 2024 and subsequent model year (MY) heavy-duty engines and vehicles, amend on-board diagnostic (OBD) system requirements, amend the heavy-duty in-use testing program, amend the emissions warranty period and useful life requirements, amend the emissions warranty information and reporting requirements and corrective action procedures, establish in-use emissions data reporting requirements, amend portions of California's Phase 2 Heavy-Duty Greenhouse Gas (GHG) regulations, and establish powertrain test procedures for heavy-duty hybrid vehicles.

At the hearing, CARB staff presented, and the Board approved for adoption, the proposed amendments, as initially released with the Notice of Public Hearing for this rulemaking action, along with additional proposed amendments that CARB staff had developed in response to comments received since the time that the Notice of Public Hearing was posted on June 23, 2020.¹ CARB staff's additional proposed amendments included:

- Limited exemption for 2024 through 2026 MY heavy-duty engines rated at or above 525 brake horsepower (bhp) maximum power;
- Revisions to the cycle-validation criteria for operation over the low load cycle (LLC) for alternative-fueled engines;
- Additional options to the mileage and service accumulation procedures for durability demonstration;
- Modifications to the California averaging, banking and trading (CA-ABT) program;
- Modifications to the heavy-duty in-use testing program;
- Modifications to the emissions warranty information reporting and scheduled maintenance requirements;
- Modifications to the OBD requirements for 2022 to 2023 MY gasoline-fueled heavy-duty engines;
- Modifications to correct the tractor sub-category in the GHG test procedures;
- Other definitions and clarifications of various elements in the regulation, and
- Cost scenarios for optional elements in the Heavy-Duty Omnibus Regulation such as the optional 50-state-directed engine emission standards program, optional low NOx standards, and optional powertrain certification procedures in the Initial Statement of Reasons (ISOR or Staff Report) for informational purposes.

In addition, in response to oral and written comments presented at the hearing, the Board recommended and directed CARB staff to consider additional modifications including:

- Modifications to retain or remove the optional 50-state-directed engine emission standards, and
- Developing a process to allow qualifying transit agencies to request compliance flexibility or assistance in complying with the proposed amendments.

The Board directed the Executive Officer to make the modified regulatory language, and any additional conforming modifications, available for public comment, with any additional supporting documents and information, for a period of at least 15 days as required by Government Code section 11346.8. The Board further directed the Executive Officer to consider written comments submitted during the public review period and make any further modifications that are appropriate available for public

¹ Resolution 20-23: Attachment A: Staff's Suggested Modifications to the Original Proposal, September 29, 2020. (<https://ww3.arb.ca.gov/regact/2020/hdomnibuslownox/res20-23atta.pdf> - accessed 3/22/2021)

comment for at least 15 days, and present the regulation to the Board for further consideration if warranted, or take final action to adopt the regulation after addressing all appropriate modifications.

The resolution and all other regulatory documents for this rulemaking are available online at the following CARB website:

<https://ww2.arb.ca.gov/rulemaking/2020/hdomnibuslownox>

The text of the modified regulatory language for sections 1956.8, 1961.2, 1968.2, 1971.1, 1971.5, 2035, 2036, 2112, 2139.5, 2140, 2141, 2145, 2166.1, 2168, 2169, 2169.1, 2169.7, and 2169.8 of title 13, CCR is shown in Appendix A-1. The text of the modified regulatory language for section 95663 of title 17, CCR is shown in Appendix A-2. The text of the modified regulatory language for the test procedures incorporated in the regulations by reference is shown in Appendices B-1, B-2, B-3, B-4, and B-6. No changes have been made to Appendix B-5 and therefore, it is not included in this notice of proposed changes. In addition, CARB staff has also added to the rulemaking record additional references to serve as an addendum to the Staff Report released on June 23, 2020.

The originally proposed regulatory language is shown in ~~striketrough~~ to indicate deletions and underline to indicate additions. New deletions and additions to the proposed language that are made public with this notice are shown in ~~double striketrough~~ and double underline format, respectively.

In the Final Statement of Reasons, CARB staff will respond to all comments received on the record during the comment periods. The Administrative Procedure Act requires that CARB staff respond to comments received regarding all noticed changes. Therefore, CARB staff will only address comments received during this 30-day comment period that are responsive to this notice, documents added to the record, or the changes detailed in the attachments.

Summary of Proposed Modifications

The following summary does not include all modifications to correct typographical or grammatical errors, changes in numbering or formatting, nor does it include all of the non-substantive revisions made to improve clarity and readability.

I. Proposed Modifications to Title 13, CCR (Appendix A-1)

**Proposed Modifications to Section 1956.8, Title 13, CCR
Exhaust Emissions Standards and Test Procedures - 1985 and Subsequent
Model Heavy-Duty Engines and Vehicles, 2021 and Subsequent Zero-
Emission Powertrains, and 2022 and Subsequent Model Heavy-Duty Hybrid
Powertrains**

1. Subsection 1956.8(a)(2)(A)

The 60-day proposal included an optional low NO_x standard for 2024 and subsequent MY engines. Recognizing the air quality benefits that are already achieved from engines certified to the 0.02 g/bhp-hr optional low NO_x standard since 2016, the South Coast Air Quality Management District (SCAQMD) and the San Joaquin Valley Air Pollution Control District (SJAPCD) recommended that CARB also consider establishing optional low NO_x standards of 0.01 g/bhp-hr starting as early as MY 2022. In response to these comments, in subsection 1956.8(a)(2)(A), CARB staff proposed a new optional low NO_x standard of 0.01 g/bhp-hr NO_x as measured on the Federal Test Procedure (FTP) and Ramped Modal Cycle (RMC), that is 95 percent below the current mandatory standard, for 2022 and 2023 MY heavy-duty diesel engines. The proposed modification is necessary to provide manufacturers with a mechanism to certify engines to NO_x standards that are significantly lower than required for the MY. It is also necessary to encourage manufacturers to further develop technologies that would provide NO_x emission benefits earlier than the Board adopted timeline for the mandatory standards. CARB staff believes that engines that are likely to achieve this level of optional NO_x standard in the 2022 to 2023 timeframe to be spark-ignited stoichiometric engines similar to those currently certified to the optional NO_x standard of 0.02 g/bhp-hr. Further improvements in aftertreatment systems, including catalyst formulations, improvements in air-fuel ratio controls, and other engine calibration strategies could potentially reduce emissions further to achieve certification levels of 0.01 g/bhp-hr NO_x standards.

In addition, the proposed optional low NO_x standard is also added to footnote N to indicate that a manufacturer may not include an engine family certified to the optional NO_x emission standards in the Averaging, Banking, and Trading (ABT) programs for NO_x but may include it for particulates. This is consistent with the current optional low NO_x program that prohibits the generation of NO_x ABT credits. Certifying under the optional low NO_x standards allows eligibility for incentive funding, such as the Carl Moyer program that limits funding to programs that provide additional emission reduction benefits beyond those required by mandatory standards.

2. Subsection 1956.8(a)(2)(C)

In subsection 1956.8(a)(2)(C)1, CARB staff proposes to add the phrase “Except as provided in subsection (a)(2)(C)2 and (a)(2)(F) below,” to the introductory paragraph. This is necessary to indicate that there are proposed exceptions to the requirements provided in subsection (a)(2)(C)1 and those exceptions are provided in new subsections (a)(2)(C)2 and (a)(2)(F). In addition, CARB staff proposes to remove the optional NO_x standards from the table of emission standards of subsection (a)(2)(C)1 and add them in a new subsection (a)(2)(E) to improve clarity and readability.

In new subsection(a)(2)(C)2, CARB staff proposes an amendment to provide a limited exemption for 2024 through 2026 MY heavy-duty diesel engines rated at or above 525 bhp maximum power from the exhaust emission standards for 2024 and subsequent MY heavy-duty diesel engines. The proposed change is necessary since these engines have relatively few sales in California and manufacturers may find it difficult to allocate resources to redesign them while also investing resources and managing design changes to their other more popular engine families and future zero emission engines. Thus, the proposal would provide manufacturers the flexibility to continue to certify and make products available for California businesses and consumers which otherwise may not have been possible without this exemption.

Manufacturers utilizing this exemption would need to meet applicable federal exhaust emission standards, in-use testing, OBD, durability demonstration, and other federal requirements applicable for the MY. However, they would also have to comply with California’s pre-2024 MY idling requirements specified in 13 CCR 1956.8(a)(6) and the California warranty period requirements for the MY specified in 13 CCR 2036. This provision would only be available to manufacturers who had previously certified and sold in California heavy-duty engines meeting the horsepower rating criteria in any MY between 2018 and 2019. Furthermore, the number of qualifying engines that a manufacturer may certify and sell in California would be limited to 110 percent of the manufacturers’ 2018 or 2019 MY California sales volume, whichever is greater.

3. Subsection 1956.8(a)(2)(D)

In subsection 1956.8(a)(2)(D), CARB staff proposes to add the phrase “Except as provided in subsection (a)(2)(F) below,” to the introductory paragraph. This is necessary to indicate that there are certain exceptions to the requirements provided in subsection (a)(2)(D) and those exceptions are provided in new subsection (a)(2)(F).

In addition, to improve clarity and readability, the optional low NO_x standards and footnote A in the table of exhaust emission standards of subsection (a)(2)(D) are moved to a new subsection 1956.8(a)(2)(E). Furthermore, the footnote that defines

intermediate useful life is deleted and added as a new definition in subsection 1956.8(k) (renumbered 1956.8(j)).

4. Subsection 1956.8(a)(2)(E)

The 60-day proposal included an optional low NOx standard for 2024 and subsequent MY engines. CARB staff proposes to create a new subsection 1956.8(a)(2)(E) to consolidate in one subsection the optional low NOx standards for 2024 and subsequent MY heavy-duty diesel engines. The change is necessary to provide clarity and readability. In addition, for the same reasons discussed in section I.A.1 above, CARB staff proposes a new set of optional low NOx standards of 0.010 g/bhp-hr on the FTP and RMC and 0.040 g/bhp-hr NOx on the LLC for MYs 2024 through 2026 heavy-duty diesel engines. The proposed modification is necessary to provide manufacturers with a mechanism to certify engines to NOx standards that are significantly lower than the primary NOx standards. Furthermore, as discussed in section I.A.1. above, further improvements in aftertreatment systems, including catalyst formulations as well as improvements in air-fuel ratio controls and other engine calibration strategies could potentially reduce emissions further to achieve the proposed optional low NOx standards.

5. Subsection 1956.8(a)(2)(F)

In new subsection 1956.8(a)(2)(F), to implement the Board's Resolution 20-23, CARB staff proposes adding "Transit Agency Diesel-Fueled Bus and Engine Exemption Request" to provide flexibility to transit agencies that are experiencing difficulty in purchasing diesel-fueled buses because the only manufacturer of diesel-fueled urban bus engines recently expressed its intent to no longer produce diesel urban bus engines in California, starting in 2024. The announcement created an obstacle for transit agencies, which are not entirely prohibited in coming years from purchasing diesel-fueled buses by the Innovative Clean Transit (ICT) Regulation. In addition, the same manufacturer recently expressed its intent to substantially increase the prices of its MY 2022 and 2023 diesel-fueled urban bus engines. Furthermore, COVID-19 has taken a particularly large financial toll on transit agencies caused by low ridership that has resulted in service cuts, affecting vulnerable groups in the greatest need of transit services. Without additional compliance flexibility, transit agencies would need to further reduce services and jeopardize their ability to meet future ICT requirements.

In the proposed Transit Agency Diesel-Fueled Bus and Engine Exemption Request, qualifying transit agencies may request exemptions to purchase, rent, or lease exempt buses, contract for service with bus service providers to operate exempt buses, or re-power buses with engines that are certified to federal emission standards under certain conditions for 2022 and subsequent model diesel-fueled medium heavy-duty or heavy heavy-duty engines used in urban buses. Limiting the exemption to the medium and the heavy heavy-duty engine classifications is needed to ensure that the exemption is narrowly tailored to only include the

classes of engines primarily used to power urban buses owned or operated by transit agencies that would be directly affected by above mentioned announcement – the only manufacturer of diesel-fueled urban bus engines indicating its intent to no longer produce such engines in California. The buses powered by such engines would be exempted from California Phase 2 GHG vehicle standards and California vehicle emissions warranty requirements. Exempting the vehicles is necessary because although both the federal and the California Phase 2 GHG regulations’ vehicle requirements require vehicles to be powered by Phase 2 GHG compliant engines, requiring new California buses to demonstrate compliance with the California Phase 2 standards based on the use of federally certified engines could be impractical and hence affect transit fleets’ abilities to qualify for the proposed exemption. The exemption would not affect GHG emissions benefits from transit fleets or the California Phase 2 GHG standards because qualifying transit fleets are already subject to the ICT regulation, and the exemption would not affect transit fleets’ obligations under that regulation. Moreover, the California GHG emissions warranty provisions for vehicles are harmonized with their corresponding federal warranty provisions for vehicles. To be eligible, transit agencies must be subject to the ICT regulation, completed specified ICT regulation reporting requirements, purchased or been exempted from purchasing zero-emission buses, and if they have alternative-fueled buses in their fleets, the agencies must consider expanding the number of alternative-fueled buses in their fleets or explain why it is cost prohibitive to do so. The exemption process is summarized in the flow chart shown in Figure 1 below.

The proposal would revoke a previously granted exemption request if any of the requirements, conditions or criteria warranting that exemption request are not met after the exemption request is granted. A transit agency could request a hearing to review the revocation of a previously granted exemption request.

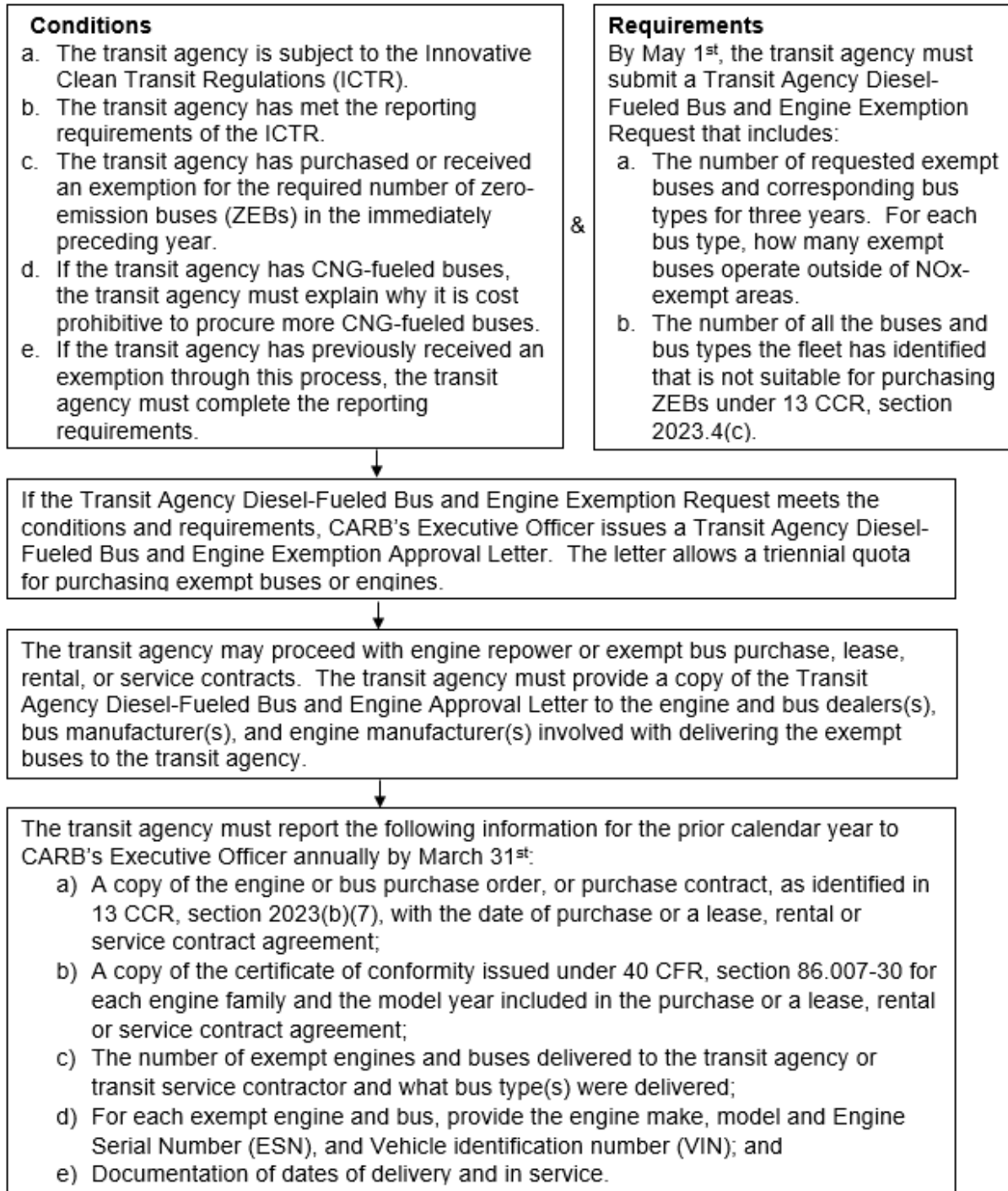


Figure 1. A flow chart summarizing the exemption process

6. Subsection 1956.8(a)(6)(C)

As discussed in 2 above, CARB staff proposes to amend subsection 1956.8(a)(6)(C)1 to provide a limited exemption for 2024 through 2026 MY heavy-duty diesel engines rated at or above 525 bhp maximum power from the more stringent clean idle NOx standards for 2024 through 2026 MY heavy-duty diesel engines. However, they would still have to continue to certify to the existing clean idle requirements applicable to pre-2024 MY engines. The proposed change is necessary to provide manufacturers the flexibility to continue to certify and make products that meet the power rating criteria available for California businesses and consumers, which otherwise would not be possible without this exemption.

7. Subsection 1956.8(a)(9)

In subsection 1956.8(a)(9), CARB staff proposes the following two changes:

Allow diesel hybrid powertrains used in incomplete vehicles with a gross vehicle weight rating (GVWR) from 10,001 to 14,000 pounds to be eligible to use the hybrid powertrain test procedure to certify to criteria pollutants and GHG emission standards. This change is necessary to be consistent with the existing procedures, where some engines used in incomplete vehicles with a GVWR from 10,001 to 14,000 pounds could be certified separately using the engine certification procedure, by allowing manufacturers the option to use the hybrid powertrain test procedure to certify engines to be installed in these incomplete vehicles.

- a. Replace the reference to 1956.8(a) with 1956.8. Section 1956.8(a) only provides emission standards for heavy-duty diesel engines and does not provide emission standards for diesel engines that could be used in incomplete vehicles from 10,001 to 14,000 pounds GVWR, and thus, CARB staff proposes to change the reference to section 1956.8 to make it inclusive of all applicable emission standards.

8. Subsection 1956.8(b)

In subsection 1956.8(b), CARB staff proposes adding the phrase “2022 and subsequent model diesel hybrid powertrains.” This is necessary to update this subsection to include the recently adopted hybrid powertrain certification test procedure.

9. Subsection 1956.8(c)(1)(B)

CARB staff proposes to modify subsection 1956.8(c)(1)(B) as follows:

- a. In subsection 1956.8(c)(1)(B), end the MY applicability of the existing optional low NOx standards in MY 2021.

- b. For the same reasons discussed in section I.A.1 above, add new optional low NOx standards that includes a new optional NOx standard of 0.01 g/bhp-hr NOx, and the existing optional low NOx standards of 0.02, 0.05, and 0.10 g/bhp-hr NOx applicable to 2022 and 2023 MY heavy-duty Otto-cycle engines used in heavy-duty vehicles over 14,000 pounds GVWR. The proposed modification is necessary to provide manufacturers with a mechanism to certify Otto-cycle engines to NOx standards that are significantly lower than required for the MY. It is also necessary to encourage manufacturers to further develop technologies that would reduce NOx emissions beyond the mandatory standards. As discussed in section I.A.1 above, the proposed optional NOx standard of 0.01 g/bhp-hr is feasible with further improvements in three-way catalyst (TWC) formulations and improvements in air-fuel ratio controls and other engine calibration strategies.
- c. Add the proposed new optional low NOx standard that is 95 percent below the current standard applicable to MYs 2022 and 2023 to footnote H to inform that a manufacturer may not include an engine family certified to the optional low NOx emission standards in the ABT programs for NOx but may include it for non-methane hydrocarbons (NMHC). As discussed in section I.A.1 above, engine families that are certified to the optional low NOx standards would not be eligible to generate NOx ABT credits.

10. Subsection 1956.8(c)(1)(C) and new subsection 1956.8(c)(1)(D)

- a. In subsection 1956.8(c)(1)(C), CARB staff proposes to remove the optional low NOx standards and footnote B from the table of exhaust emission standards for 2024 and subsequent model Otto-cycle heavy-duty engines used in heavy-duty vehicles over 14,000 pounds GVWR, and add them in new subsection 1956.8(c)(1)(D). Note that the text in former footnote B is now included in footnote A in new subsection 1956.8(c)(1)(D). The proposed changes are necessary to improve clarity and readability.
- b. In addition, CARB staff proposes a new optional low NOx standard of 0.010 g/bhp-hr for MYs 2024 through 2026 Otto-cycle heavy-duty engines. The proposed modification is necessary to provide manufacturers with a mechanism to certify engines to NOx standards that are significantly lower than required for the MY. It is also necessary to encourage manufacturers to further develop technologies that would reduce NOx emissions beyond the mandatory standards. As discussed in section I.A.1 above, the proposed optional NOx standard of 0.01 g/bhp-hr is feasible with further improvements in TWC systems and improvements in air-fuel ratio controls and other engine calibration strategies. In addition, a footnote is added, to clarify that a manufacturer cannot include engine families certified to the optional low NOx emission standards in the federal or CA-ABT programs for NOx but may include it for NMHC. This is consistent with the current

optional low NOx program that prohibits the generation of NOx ABT credits. Certifying under the optional low NOx standards allows eligibility for incentive funding, such as the Carl Moyer program that limits funding to programs that provide additional emission reduction benefits.

- c. In subsection (c)(1)(C) and (c)(1)(D), CARB staff proposes to remove the merged cells in the first row of each table of exhaust emissions standards and keep the title text of each table outside the table. These non-substantive changes are necessary to improve accessibility/readability of the regulatory document.

11. Subsection 1956.8(c)(4)(A)3

CARB staff proposes to rephrase the introductory sentence to provide greater consistency with the definition of a heavy heavy-duty engine in subsection (j). This modification is necessary for clarification of the California regulations.

12. Subsection 1956.8(c)(5)

In subsection 1956.8(c)(5), CARB staff proposes the following two changes:

- a. Modify the regulatory language of this subsection to include Otto-cycle hybrid powertrains used in incomplete vehicles with a GVWR from 10,001 to 14,000 pounds. This is necessary since Otto-cycle hybrid powertrains used in incomplete vehicles with a GVWR from 10,001 to 14,000 pounds are proposed to be eligible to use the hybrid powertrain test procedure to certify to criteria pollutants and GHG emission standards.
- b. Replace the reference to 1956.8(c) with 1956.8. This is necessary for completeness and to properly reference the emission standards that Otto-cycle hybrid powertrains used in heavy-duty vehicles over 14,000 pounds GVWR or used in incomplete vehicles from 10,001 to 14,000 pounds GVWR would need to comply with. Section 1956.8(c) only provides emission standards for heavy-duty Otto-cycle engines and does not provide emission standards for Otto-cycle engines that could be used in incomplete vehicles from 10,001 to 14,000 pounds GVWR.

13. Subsection 1956.8(d)

In subsection 1956.8(d), CARB staff proposes adding the phrase “and 2022 and subsequent model Otto-cycle hybrid powertrains.” This is necessary to update this subsection to include the recently adopted hybrid powertrain certification test procedure.

14. Subsection 1956.8(h)(7)

In subsection (h)(7), CARB staff proposes to remove the merged cells in the first row of each table of exhaust emissions standards and keep the title text of each table outside the table. These non-substantive changes are necessary to improve accessibility/readability of the regulatory document.

15. Subsection 1956.8(i)

CARB staff proposes to delete former subsection 1956.8(i), which would have provided manufacturers the option to certify engines to an optional 50-state-directed engine emission standard for NO_x emissions for 2024 through 2026 MY medium- and heavy-duty diesel and Otto-cycle engines (hereinafter “50-state optional standards”). As discussed in the Staff Report, the proposed 50-state optional standards would be 50 percent less stringent than the primary proposed NO_x standards (0.1 g NO_x/bhp-hr), but were intended to provide manufacturers the flexibility to comply with California’s requirements at a much lower per engine cost, since the optional standards were less stringent than the primary proposed standards and accordingly, the technologies and strategies needed to meet the 50-state optional standards would be less complex than the corresponding technologies and strategies needed to comply with the proposed primary NO_x emission standards.

At the August 27 board hearing, stakeholders expressed concerns regarding the proposed 50-state optional standards, including: the optional standards should either be eliminated or set at more stringent levels, since several compliance pathways based on conventional aftertreatment technologies have demonstrated a capability of reducing NO_x emissions to much lower levels – essentially the proposed 2024 MY primary NO_x standards; that the technology for meeting a more stringent (0.05 gram NO_x) standard is already available so the option provides an unneeded concession to industry; that the proposed primary NO_x standard is already incentivized by the existing federal program and section 177 of the Clean Air Act; that California should instead adopt a more stringent standard that other states can consider adopting; the option potentially infringes upon the rights of other states to adopt California’s emission standards via Section 177 of the Clean Air Act; the optional standards do not ensure aggressive compliance with low NO_x technology throughout all phases of the rule; the optional standards would undermine the development of advanced emissions control technology needed to control emissions of NO_x; manufacturers are unlikely to utilize this option; and the optional standards are not needed because two major manufacturers of heavy-duty manufacturers are planning to introduce engines that are certified to the primary 2024 MY standards, and one of those manufacturers expressed that the option would add unnecessary complexity and regulatory uncertainty. No commenters expressed strong support for the proposed 50-state optional standards. After hearing comments from the various stakeholders, the

Board in its Resolution 20-23 directed CARB staff to either retain or to remove the provision.

After reviewing and analyzing all the comments from the various stakeholders, CARB staff has determined that all of the above mentioned comments support a proposal to remove the proposed 50-state optional standards from this rulemaking action. CARB staff notes that: (1) the commitments by two major manufacturers of heavy-duty engines to certify engines to the proposed primary NOx emission standards beginning in 2024 both provides assurance that compliant engines will be available in California, and supports CARB's determination that the requisite compliance technologies needed to meet the proposed standards will be available to engine manufacturers in the lead time provided, (2) retaining the 50-state optional standards could result in regulatory uncertainty by allowing other manufacturers to certify to the less stringent 50-state optional standards (at a presumably lower compliance cost), which would undercut the commitments of manufacturers that plan to comply with the proposed primary NOx emission standards, (3) retaining the 50-state optional standards, even if the stringency of the standards were increased, would not require manufacturers to develop and apply advanced emissions control technologies at the same rate as required by the primary proposed NOx standards, which would likely hinder manufacturers' rate of progress in developing technologies needed to comply with the more stringent proposed primary NOx standards for 2027 and subsequent MY engines, and 4) no manufacturers have yet committed to, or even indicated that they intend to certify engines to the proposed 50-state optional standards.

In addition, in subsections (i)(1)(A), (B) and (C), CARB staff proposes to remove the merged cells in the first row of each table of exhaust emissions standards and keep the title text of each table outside the table. These non-substantive changes are necessary to improve accessibility/readability of the regulatory document.

16. Subsection 1956.8(j)

CARB staff proposes to renumber former subsection 1956.8(j) to 1956.8(i). The change is necessary to maintain continuity in the numbering sequence.

17. Subsection 1956.8(k)

CARB staff proposes to renumber former subsection 1956.8(k) to 1956.8(j) and renumber the definitions to take into account newly added definitions as well as the removal of existing definitions. These changes are necessary to maintain continuity in the numbering sequence.

In addition, in renumbered subsection 1956.8(j), CARB staff proposes to make the following changes to the definitions that apply to section 1956.8.

- a. "CARB staff proposes new definitions for the terms "active bus," "bus," "bus purchase," or "purchase," "exempt bus," "NOx exempt areas," "transit agency," and "urban bus". These terms are needed to clarify the scope and applicability of the proposed "Diesel-Fueled Bus Exemption Process" specified in subsection 1956.8(a)(2)(F) by defining which entities are eligible for the proposed exemption, which categories of vehicles are eligible for the proposed exemption, and the scope of activities that eligible entities are afforded by the proposed exemption.
- b. "Heavy heavy-duty engine." In renumbered subsection 1956.8(j)(9), CARB staff proposes to modify the definition of a heavy heavy-duty engine to exclude gasoline-fueled Otto-cycle engines from being classified as heavy heavy-duty engines, which is consistent with current federal requirements and heavy heavy-duty engine definition. The existing California certification test procedures already exclude gasoline-fueled Otto-cycle engines from being classified as heavy heavy-duty engines, and thus, the proposed modification aligns the definition in section 1956.8 of a heavy heavy-duty engine and the exclusion of gasoline-fueled engines with the existing provisions in the certification test procedures and the federal requirements. This modification is necessary for consistency between the California regulations and certification test procedures and to harmonize with federal requirements.
- c. "Hybrid powertrain or optionally certified hybrid powertrain." In renumbered subsection 1956.8(j)(6), CARB staff proposes to modify the definition of "Hybrid powertrain or optionally certified hybrid powertrain" by adding a sentence, "Note other examples of systems that qualify as hybrid engines or powertrains are systems that recover kinetic energy and use it to power an electric heater in the aftertreatment." This is necessary to harmonize with the revised definition from the United States Environmental Protection Agency (U.S. EPA) as used in the Phase 2 GHG technical amendments final rule to expand the definition of hybrid powertrain to include systems that recover kinetic energy and use it to power an electric heater in the aftertreatment.
- d. "Intermediate useful life." The definition for intermediate useful life was initially included as a footnote to the table of emission standards in subsection 1956.8(a)(2)(D). For clarity and improved readability, CARB staff proposes to remove the footnote and create a new definition in this section as well as in Section 2.B. of the California Exhaust Emission Standards and Test Procedures for 2004 and Subsequent Model Heavy-Duty Diesel Engines and Vehicles. In addition, CARB staff also proposes to modify the intermediate useful life from 10 years to 8 years. In the 60-day Notice proposal, CARB staff proposed NOx emission standards for heavy heavy-duty diesel engines to include 0.020 g/bhp-hr NOx at an intermediate useful life of 435,000 miles or 10 years (whichever occurs first) for 2027 and

subsequent MY engines; 0.035 g/bhp-hr at the full useful life of 600,000 miles or 11 years (whichever comes first) for 2027 through 2030 MY engines; and 0.040 g/bhp-hr NO_x at the full useful life of 800,000 miles for 2031 and subsequent MY engines. As a ratio of the full useful life (600,000 miles and 11 years), the intermediate useful life is 73 percent in miles and 90 percent in years.

Line-haul tractors could reach the intermediate useful life of 435,000 miles in 2 to 5 years depending on whether the vehicle is operated with team drivers or a single driver. However, vocational vehicles would take many more years than tractors to reach the intermediate useful life in miles since they are not driven as many miles per year as tractors. For example, a vocational vehicle that accrues 43,000 miles per year would take 10 years to reach the intermediate useful life in miles. Such a vehicle would be subject to the 0.020 g/bhp-hr NO_x standard-based in-use testing program for 10 years. Since the full useful life is 11 years, the same vehicle would be subject to the 0.035 g/bhp-hr NO_x standard-based in-use testing program for only one year. Thus, the burden of compliance with the in-use testing requirements would be more stringent for vocational vehicles compared to tractors. To mitigate this, CARB staff proposes to reduce the intermediate useful life in years to 8 years, which would equate to 73 percent of the full useful life in years for 2027 through 2030 MY engines. This modification is necessary in order to keep the ratio of intermediate useful life to the full useful life in years the same as in miles, at 73 percent.

- e. *"Intermediate useful life NO_x standard."* A new definition for intermediate useful life NO_x standard is added to describe and provide clarity to the intermediate useful life period and associated NO_x emission standards specified in subsection 1956.8(a)(2)(D).
- f. *"50-state-directed engines."* CARB staff proposes to remove the definition for the 50-state-directed engines in Section 2.B. The change is necessary since the proposed 50-state-directed engine emission standards are being removed, as discussed in section I.A.14 above.

B. Proposed Modifications to Title 13, CCR, Section 1961.2.

1. Subsection 1961.2(b)(3)(A)2

In subsection 1961.2(b)(3)(A)2, footnote 1 provided the option to certify 2024 through 2026 MY Otto-cycle engines used in incomplete medium-duty vehicles from 10,001 to 14,000 pounds GVWR and diesel engines used in medium-duty vehicles from 10,001 to 14,000 pounds GVWR to the optional 50-state-directed engine emission standards. CARB staff proposes to delete the footnote from

subsection 1961.2(b)(3)(A)2 since the provision to certify to the 50-state-directed engine emission standards is being removed, as discussed in section I.A.14 above.

C. Proposed Modifications to Title 13, CCR, Section 1968.2

1. Subsection 1968.2(e)(17.1)

In subsection (e)(17.1), the proposed 60-day regulation language “(e)(17.1.4)(B) through (C)” was modified to “(e)(17.1.4)(B)” to account for the proposed renumbering of subsection (e)(17.1.4)(C) to (e)(17.1.4)(B)(iii).

2. Subsections 1968.2(e)(17.1.4)(B)(i) and (f)(17.1.3)(B)(i)

Subsections (e)(17.1.4)(B)(i) and (f)(17.1.3)(B)(i) were added to allow qualifying 2022 and 2023 MY gasoline and diesel vehicles to use alternate relaxed NOx and particulate matter (PM) malfunction criteria if certain criteria were met. A similar allowance was proposed for heavy-duty diesel engines in section 1971.1 as part of the 60-day notice at the request of engine manufacturers, who wanted the ability to use the relaxed OBD thresholds for engines certified to lower NOx and PM standards in the 2022 and 2023 MYs. However, CARB staff mistakenly did not add this allowance for medium-duty vehicles using gasoline or diesel engines that are certified to specified NOx and PM emission standards, and is therefore adding this allowance in subsections (e)(17.1.4)(B)(i) and (f)(17.1.3)(B)(i).

3. Subsection 1968.2(e)(17.1.4)(B)

In subsection (e)(17.1.4)(B), the title “Alternate malfunction criteria” was added, the language proposed as part of subsection (e)(17.1.4)(B) in the 60-day notice was renumbered to subsection (e)(17.1.4)(B)(ii), and former subsection (e)(17.1.4)(C) is proposed to be renumbered to (e)(17.1.4)(B)(iii) so that all the alternate NOx and PM malfunction criteria are housed under subsection (e)(17.1.4)(B). The regulation language in subsections (e)(17.1.4)(B)(ii) and (e)(17.1.4)(B)(iii) is proposed to be modified to correct some errors. Specifically, the OBD II regulation currently contains malfunction criteria for emission threshold monitors that are based on chassis-certified vehicles (i.e., uses grams-per-mile (g/mile) thresholds). For medium-duty gasoline vehicles certified to an engine dynamometer tailpipe emission standard, subsection (e)(17.1.4) currently requires manufacturers of these vehicles to propose malfunction criteria for Executive Officer approval that are equivalent to those malfunction criteria contained in section (e), so there are currently no specific malfunction criteria set forth in section (e) that apply to these vehicles. Consequently, the 60-day notice regulation text indicating that the proposed alternate malfunction criteria apply “in lieu of” the thresholds set forth in section (e) and language indicating that a malfunction is required to be detected before emissions exceed the alternate proposed thresholds “rather than” before other specific thresholds is not entirely accurate. CARB staff is accordingly proposing to delete that text. The proposed alternate NOx malfunction criteria in

subsection (e)(17.1.4)(B)(ii)a. was modified to apply to monitors in section (e) except for the catalyst monitor, since those monitors require a malfunction criteria of 1.5 times the non-methane organic gases plus NO_x (NMOG+NO_x) standard for chassis-certified medium-duty vehicles, and the criteria in subsection (e)(17.1.4)(B)(ii)b. was modified to apply to the catalyst monitor in section (e)(1), since that monitor requires a malfunction criteria of 1.75 times the NMOG+NO_x standard for chassis-certified medium-duty vehicles. Finally, the alternate NO_x malfunction criteria that were proposed in subsection (e)(17.1.4)(B)(iii) as part of the 60-day notice was deleted, since there currently are no monitors in section (e) that require malfunction criteria of 3.0 times the applicable NO_x standard.

4. Subsections 1968.2(e)(17.1.4)(C) and (f)(17.1.3)(C)

In subsections (e)(17.1.4)(C) and (f)(17.1.3)(C), alternate malfunction criteria for the engine cooling system thermostat monitor on gasoline and diesel medium-duty vehicles certified to an engine dynamometer tailpipe emission standard were added. Specifically, subsections (e)(10.2.1)(A)(ii) and (f)(11.2.1)(A)(ii) allow manufacturers to lower the malfunction temperature threshold if the manufacturer demonstrates that fuel, spark timing, injection timing, and/or other coolant temperature-based modifications to the engine control strategies would not cause emissions to increase by 50 percent or more of the applicable standards. The proposed subsections (e)(17.1.4)(C) and (f)(17.1.3)(C) would allow 2022 and 2023 MY vehicles using engines that meet the criteria under subsections (e)(17.1.4)(B)(i) (for gasoline) or (f)(17.1.3)(B)(i) (for diesel) and 2024 and subsequent MY engines certified to a NO_x standard of 0.10 g/bhp-hr or lower or PM standard of 0.005 g/bhp-hr or lower to use alternate values for the “applicable standards.” Specifically, engines certified to a NO_x standard of 0.10 g-bhp-hr or lower would use 0.20 g/bhp-hr for the applicable NO_x standard, and engines certified to a PM standard of 0.005 g/bhp-hr or lower would use 0.01 g/bhp-hr for the applicable PM standard. Similar to the rationale behind the alternate relaxed malfunction thresholds proposed in subsections (e)(17.1.4) and (f)(17.1.3) as part of the 60-day notice, CARB staff has not yet fully evaluated the capability of OBD monitors to robustly detect failures at lower emission levels. While CARB staff proposed relaxed malfunction criteria for the emission threshold monitors as part of the 60-day notice, requiring future engines certified to these lower NO_x and PM standards to detect malfunctions at the same absolute emission levels as engines currently certified to the 0.20 g/bhp-hr NO_x standard and 0.01 g/bhp-hr PM standard, CARB staff mistakenly did not make similar changes to these subsections. Therefore, CARB staff is proposing changes to allow manufacturers to use these same standards for the thermostat monitor. CARB staff will evaluate the use of lower standards for the thermostat monitor in a future OBD rulemaking update.

5. Subsection 1968.2(f)(17.1.3)(A)

In subsection (f)(17.1.3)(A), the phrase “Except as provided below in sections (f)(17.1.3)(B) and (C),” which was proposed as part of the 60-day notice, was

modified to “Except as provided below in section (f)(17.1.3)(B)(iii)” to address a mistake and to account for the proposed renumbering of subsection (f)(17.1.3)(C) to subsection (f)(17.1.3)(B)(iii). Subsection (f)(17.1.3)(A) describes the alternate malfunction criteria for PM that medium-duty diesel vehicles (including medium-duty passenger vehicles) certified to an engine dynamometer tailpipe emission standard are currently allowed to use. However, the language that was proposed as part of the 60-day notice in subsection (f)(17.1.3)(B) (which has been renumbered to subsection (f)(17.1.3)(B)(ii)) described alternate NO_x malfunction criteria, which would not affect the alternate PM malfunction criteria in subsection (f)(17.1.3)(A).

6. Subsection 1968.2(f)(17.1.3)(B)

In subsection (f)(17.1.3)(B), the title “Alternate malfunction criteria” was added, the language proposed as part of subsection (f)(17.1.3)(B) in the 60-day notice was renumbered to subsection (f)(17.1.3)(B)(ii), and subsection (f)(17.1.3)(C) was renumbered to subsection (f)(17.1.3)(B)(iii) in order to house all malfunction criteria under one subsection, subsection (f)(17.1.3)(B). The text “applicable for 2024 and subsequent model year engines and at” in (f)(17.1.3)(B)(ii) and (iii) was deleted as it was surplusage (because the phrase “For 2024 and subsequent model year” is proposed to be added to the beginning of those subsections).

7. Subsection 1968.2(f)(17.1.3)(B)(ii)

In subsection (f)(17.1.3)(B)(ii), “sections (f)(1), (f)(2), (f)(4) through (f)(9)” was modified to “sections (f)(1) through (f)(9)” to add reference to subsection (f)(3), which was mistakenly left out. Specifically, subsection (f)(17.1.3)(B)(ii) states that the alternate proposed NO_x threshold of 0.40 g/bhp-hr would apply in lieu of the NO_x thresholds stated in the listed subsections. However, subsection (f)(3.2.5) for the diesel misfire monitor indicates that the manufacturer may modify the 5 percent misfire malfunction criterion to a higher misfire percentage if specific NO_x thresholds are not exceeded. The proposed alternate malfunction criteria of 0.40 g/bhp-hr should apply to this requirement as well.

8. Subsection 1968.2(f)(17.1.3)(B)(iii)

Subsection (f)(17.1.3)(B)(iii) was modified to more accurately indicate the current PM malfunction criteria being addressed. Specifically, the language proposed as part of the 60-day notice allowed engines certified to an FTP engine PM standard of 0.005 g/bhp-hr or lower to use a PM threshold of 0.03 g/bhp-hr “in lieu of the PM thresholds set forth in sections (f)(1), (f)(2), (f)(4) through (f)(9), and (f)(12) through (f)(14).” These subsections in section (f), however, currently already require a PM threshold of 0.03 g/bhp-hr. However, the current language in subsection (f)(17.1.3) (now renumbered to subsection (f)(17.1.3)(A)) indicates the manufacturer may use malfunction criteria of “the applicable PM standard plus 0.02 g/bhp-hr” in lieu of the 0.03 g/bhp-hr PM threshold in section (f). Therefore, subsection

(f)(17.1.3)(B)(iii) was modified to indicate that the alternate PM threshold of 0.03 g/bhp-hr would apply to those engines using the “the applicable PM standard plus 0.02 g/bhp-hr” threshold.

9. Subsection 1968.2(f)(17.1.3)(D)

In subsection (f)(17.1.3)(D), alternate criteria for diesel engines were added to account for the monitoring “test-out” criteria in subsections (f)(1.2.3)(B), (f)(1.2.3)(D), (f)(6.2.6)(C), (f)(9.2.4), and (f)(15.2.2)(F)(ii) for diesel vehicles. Similar to the rationale behind the alternate relaxed malfunction thresholds proposed in subsection (f)(17.1.3) as part of the 60-day notice, CARB staff has not yet fully evaluated the capability of OBD monitors to robustly detect failures at lower emission levels. Therefore, until this evaluation is performed, CARB staff proposed relaxed malfunction criteria for the emission threshold monitors as part of the 60-day notice, requiring future low NOx and PM certified engines to detect malfunctions at the same absolute emission levels as engines currently certified to the 0.20 g/bhp-hr NOx standard and 0.01 g/bhp-hr PM standard. However, CARB staff mistakenly did not make similar changes that apply to these “test-out” criteria, which are currently based on the NOx and PM standard the engine is certified to. Therefore, CARB staff is proposing changes to allow manufacturers to use these same standards for the “test-out” criteria. Proposed subsection (f)(17.1.3)(D)(ii) would allow 2024 and subsequent MY engines certified to an FTP NOx standard of 0.10 g/bhp-hr to base the test-out criteria on a NOx standard of 0.20 g/bhp-hr, not the proposed lower NOx standard the engine is certified to. For example, a criterion of “15 percent or more of the FTP NOx standard” would now be “15 percent or more of a 0.20 g/bhp-hr NOx standard,” which is “0.03 g/bhp-hr or more NOx.” Subsection (f)(17.1.3)(D)(iii) would also allow 2024 and subsequent MY engines certified to a FTP PM standard of 0.005 g/bhp-hr or lower to base the test-out criteria on a PM standard of 0.01 g/bhp-hr, not the proposed lower PM standard the engine is certified to. Additionally, to accommodate manufacturers that want to utilize these relaxed test-out criteria for engines certified to lower NOx and PM standards during the 2022 and 2023 MYs, subsection (f)(17.1.3)(D)(i) was added to allow manufacturers to use the same relaxed FTP test-out criteria if the engines met certain conditions, the same as those proposed under subsection (f)(17.1.3)(B)(i) for the alternate malfunction criteria. CARB staff will evaluate the use of lower standards to apply to the “test-out” criteria in a future OBD rulemaking update.

D. Proposed Modifications to Title 13, CCR, Section 1971.1

1. Subsection 1971.1(g)(5.2)

In subsection (g)(5.2), the title “Alternate Malfunction Criteria” was modified to add “and Monitoring Test-Out Criteria” to account for the proposed alternate monitoring test-out criteria described below.

2. Subsection 1971.1(g)(5.2.1)

In subsection (g)(5.2.1), the phrase “compression-ignition” was added to “diesel engines” to match the title used in section (f), which describes the monitoring requirements (and therefore malfunction criteria) for “diesel/compression-ignition engines.” The word “diesel” was deleted throughout subsection (g)(5.2.1) since the title in subsection (g)(5.2.1) already indicates which engines the requirements apply to. The proposed requirements of former subsection (g)(5.2.1)(E) were moved to current subsection (g)(5.2.1)(C) so that the proposed alternate malfunction criteria under subsection (g)(5.2.1) are listed in chronological order of the MYs the criteria apply to, which makes the requirements easier to follow.

3. Subsections 1971.1(g)(5.2.1)(B) through (E)

In subsections (g)(5.2.1)(B) through (E), “sections (e)(1) or (e)(3) through (e)(11)” was modified to “sections (e)(1) through (e)(11)” to add reference to subsection (e)(2), which was mistakenly left out. Specifically, these subsections state that the alternate NO_x and PM thresholds would apply in lieu of the NO_x and PM thresholds stated in “sections (e)(1) or (e)(3) through (e)(11).” However, subsection (e)(2.2.5) for the diesel misfire monitor indicates that the manufacturer may modify the 5 percent misfire malfunction criterion to a higher misfire percentage if specific NO_x and PM thresholds are not exceeded. The proposed alternate malfunction criteria should apply to this requirement as well.

4. Subsection 1971.1(g)(5.2.2)

In subsection (g)(5.2.2), the phrase “spark-ignited” was added to “gasoline engines” to match the title used in section (e), which describes the monitoring requirements (and therefore malfunction criteria) for “gasoline/spark-ignited engines.” The word “gasoline” was deleted throughout subsection (g)(5.2.2) since the title in subsection (g)(5.2.2) already indicates which engines the requirements apply to. Subsection (g)(5.2.2)(B) was added to allow 2022 and 2023 MY engines to use alternate relaxed NO_x and PM malfunction thresholds only if certain conditions were met. A similar allowance was proposed for diesel engines in subsection (g)(5.2.1) as part of the 60-day notice at the request of engine manufacturers, who wanted the ability to use the relaxed OBD thresholds for engines certified to lower NO_x and PM standards in the 2022 and 2023 MYs. CARB staff believes the similar allowances should be made for gasoline engines. Subsection (g)(5.2.2)(C)(iii) (which was originally proposed as (g)(5.2.2)(B)(iii) as part of the 60-day notice) was deleted, since there is currently no NO_x threshold of “3.0 times the applicable NO_x standard” in the regulation for 2024 and subsequent MY engines.

5. Subsection 1971.1(g)(5.2.3)

In subsection (g)(5.2.3), alternate malfunction criteria for the engine cooling system thermostat monitor were added. Specifically, subsection (g)(1.2.1)(A)(ii) allows manufacturers to lower the malfunction temperature threshold if the manufacturer demonstrates that fuel, sparking timing, and/or other coolant temperature-based modifications to the engine control strategies would not cause emissions to increase by 50 percent or more of the applicable standards. The proposed subsection (g)(5.2.3) would allow 2024 and subsequent MY engines certified to a NO_x standard of 0.10 g/bhp-hr or lower to use 0.20 g/bhp-hr for the applicable NO_x standard and engines certified to a PM standard of 0.005 g/bhp-hr or lower to use 0.01 g/bhp-hr for the applicable PM standard. The provisions would also be allowed for 2022 and 2023 MY engines that either are certified to the Optional Low NO_x emission standards or meet the criteria under subsections (g)(5.2.1)(C) (for diesel) or (g)(5.2.2)(B) (for gasoline). Similar to the rationale behind the alternate relaxed malfunction thresholds proposed in subsections (g)(5.2.1) and (g)(5.2.2) as part of the 60-day notice, CARB staff has not yet fully evaluated the capability of OBD monitors to robustly detect failures at lower emission levels. While CARB staff proposed relaxed malfunction criteria for the emission threshold monitors as part of the 60-day notice, requiring future low NO_x and PM certified engines to detect malfunctions at the same absolute emission levels as engines currently certified to the 0.20 g/bhp-hr NO_x standard and 0.01 g/bhp-hr PM standard, CARB staff mistakenly did not make similar changes to this subsection. Therefore, CARB staff is proposing changes to allow manufacturers to use these same standards for the thermostat monitor. CARB staff will evaluate the use of lower standards for the thermostat monitor in a future OBD rulemaking update.

6. Subsection 1971.1(g)(5.2.4)

In subsection (g)(5.2.4), alternate criteria for diesel/compression-ignition engines were added to account for the monitoring "test-out" criteria (i.e., criteria used to determine exemption from the monitoring requirements) in subsections (e)(3.2.6)(B), (e)(5.2.3)(B)(i), (e)(8.2.4)(A)(iii), (e)(8.2.4)(B)(i), and (g)(3.2.2)(F)(ii). Similar to the rationale behind the alternate relaxed malfunction thresholds proposed in subsection (g)(5.2.1) as part of the 60-day notice, CARB staff has not yet fully evaluated the capability of OBD monitors to robustly detect failures at lower emission levels. Therefore, until this evaluation is performed, CARB staff proposed relaxed malfunction criteria for the emission threshold monitors as part of the 60-day notice, requiring future low NO_x and PM certified engines to detect malfunctions at the same absolute emission levels as engines currently certified to the 0.20 g/bhp-hr NO_x standard and 0.01 g/bhp-hr PM standard. However, CARB staff mistakenly did not make similar changes that apply to these "test-out" criteria, which are currently based on the NO_x and PM standard the engine is certified to. Therefore, CARB staff is proposing changes to allow manufacturers to use these same standards for the "test-out" criteria. Proposed subsection (g)(5.2.4) would allow engines certified to a NO_x standard of 0.010 g/bhp-hr or lower to

base the test-out criteria on a NO_x standard of 0.20 g/bhp-hr, not the proposed lower NO_x standard the engine is certified to. For example, a criterion of “15 percent or more of the FTP NO_x standard” would now be “15 percent or more of a 0.20 g/bhp-hr NO_x standard,” which is “0.03 g/bhp-hr or more NO_x.” This would apply to 2022 and 2023 MY engines certified to the Optional Low NO_x emission standards and 2024 and subsequent MY engines. Further, for 2024 and subsequent MY engines certified to a PM standard of 0.005 g/bhp-hr or lower, engines would base the test-out criteria on a PM standard of 0.01 g/bhp-hr, not the proposed lower PM standard the engine is certified to. Additionally, to accommodate manufacturers that want to utilize these relaxed test-out criteria for engines certified to lower NO_x and PM standards during the 2022 and 2023 MYs, subsection (g)(5.2.4)(B) was added to allow manufacturers to use the same relaxed test-out criteria if the engines met certain conditions, the same as those proposed under subsection (g)(5.2.1)(C) for the alternate malfunction criteria. CARB staff will evaluate the use of lower standards to apply to the “test-out” criteria in a future OBD rulemaking update.

E. Proposed Modifications to Title 13, CCR, Section 1971.5

1. Subsections 1971.5(b)(6)(A)(iii)c.3., (b)(6)(A)(iv)c., and (b)(6)(A)(v)b.3.

In subsections (b)(6)(A)(iii)c.3., (b)(6)(A)(iv)c., and (b)(6)(A)(v)b.3., the nonconformance criteria related to deficient emission threshold monitors were relaxed for engines certified to an FTP NO_x emission standard of 0.10 g/bhp-hr or lower. Currently, deficient emission threshold monitors would be considered nonconforming if testing found that the monitor could not illuminate the malfunction indicator light (MIL) when emissions exceeded 20 percent of the emission standard above the emission level at which a malfunction was detected when the OBD system was approved by the Executive Officer. These nonconformance criteria were added to the Heavy-Duty OBD enforcement regulation in a 2018 OBD rulemaking update to address an issue. Specifically, emission threshold monitors can be granted deficiencies and the OBD system certified if the monitor cannot detect a malfunction before emissions exceeded the malfunction criteria but can detect a malfunction before emissions exceeded the mandatory recall emission level. If these new nonconformance criteria were not added in 2018, a deficient emission threshold monitor would have been inappropriately considered nonconforming and potentially subject to remedial action since the previous criteria considered a monitor nonconforming if emissions exceeded the malfunction criteria when a malfunction was detected. When these new nonconformance criteria were added, however, CARB staff did not take into account engines that were certified to lower NO_x standards such as the Optional Low NO_x emission standards. Specifically, for these engines, the “20 percent of the emission standard” nonconformance criteria for NO_x (e.g., 20 percent of 0.10 g/bhp-hr, or 0.020 g/bhp-hr) would not provide enough margin from the emission level at which the monitor was granted a deficiency. Given that the new proposed

low NOx standards are also in the 0.10 g/bhp-hr and lower range, CARB staff believes some extra margin should be provided for these engines. While CARB staff determined in 2018 that the “20 percent of the emission standard” criteria was appropriate based on data indicating the test-to-test variability scales with the current, higher NOx standards, CARB staff has not yet determined what the appropriate percentage should be for engines certified to the lower NOx standards of 0.10 g/bhp-hr or lower. Therefore, until then, CARB staff is proposing that for engines certified to a NOx standard of 0.10 g/bhp-hr or lower, the “20 percent” would be based on a NOx standard of 0.2 g/bhp-hr. So the deficient emission threshold monitor would be considered nonconforming if the MIL is not properly illuminated when NOx emissions exceed 0.04 g/bhp-hr above the emission level at which a malfunction was detected when the OBD system was approved by the Executive Officer. CARB staff will evaluate the use of lower nonconformance criteria at a later rulemaking update.

F. Proposed Modifications to Title 13, CCR, Section 2035

1. Subsection 2035(b)(1)(D)

In subsection 2035(b)(1)(D), CARB staff proposes the following changes:

- a. Modify the regulatory language to delete “and subsequent” from “2022 and subsequent” and replace with “through 2026” to now read “2022 through 2026” and delete the word “year” from “model year” to now read “model.” These changes are necessary to be consistent with the requirements for non-hybrid heavy-duty vehicles pursuant to subsection 2035(b)(1)(B).
- b. Modify the regulatory language to add “s” to “14,000 pound GVWR” to now read “14,000 pounds GVWR.” This change is necessary for proper grammar to have the word be plural, and not be singular.
- c. Modify the regulatory language to add “, or 2022 through 2026 model incomplete hybrid vehicles from 10,001 to 14,000 pounds GVWR,”. This change is necessary since hybrid powertrains used in incomplete vehicles with a GVWR from 10,001 to 14,000 pounds are now proposed in the 30-day changes to be eligible to use the hybrid powertrain test procedure to certify to criteria pollutants and greenhouse gas emission standards, and should, therefore, be subject to the emissions warranty requirements.
- d. Modify the regulatory language to delete “2022 and subsequent model year.” This change is necessary to be consistent with the regulatory language pursuant to this subsection.
- e. Modify the regulatory language to add “, registered in California, regardless of their original point of registration” to specify the emissions warranty in this subsection (D) applies only to California-certified 2022 through 2026

model hybrid vehicles which are equipped with optionally certified hybrid powertrains that are registered in California, regardless of their original point of registration. This change is necessary to be consistent with the requirements for non-hybrid heavy-duty vehicles pursuant to subsection 2035(b)(1)(B).

- f. Modify the regulatory language to delete the word “and” at the end of this subsection. This change is necessary for proper format since a new subsection (E) is added following this subsection (D).

2. New Subsection 2035(b)(1)(E)

CARB staff proposes adding new subsection 2035(b)(1)(E) to specify the emissions warranty applicability for California-certified 2027 and subsequent model heavy-duty hybrid vehicles greater than 14,000 pounds GVWR and incomplete hybrid vehicles from 10,001 to 14,000 pounds GVWR, which are equipped with hybrid powertrains optionally certified pursuant to title 13, CCR, section 1956.8. This change is necessary to be consistent with the requirements for non-hybrid heavy-duty vehicles pursuant to subsection 2035(b)(1)(C).

3. Subsection 2035(c)(3)(C)

In subsection 2035(c)(3)(C), CARB staff proposes modifying the incorrect reference of “40 CFR 1037.102,” to be changed to “40 CFR 1037.120.” This change is necessary to ensure that the correct regulation is being referenced.

4. Subsection 2035(c)(3)(F)

In subsection 2035(c)(3)(F), CARB staff proposes modifying this subsection to add “or 2022 and subsequent MY incomplete hybrid vehicles from 10,001 to 14,000 pounds GVWR.” This is necessary since hybrid powertrains used in incomplete vehicles with a GVWR from 10,001 to 14,000 pounds are now proposed in the 30-day changes to be eligible to use the hybrid powertrain test procedure to certify to criteria pollutants and GHG emission standards, and should therefore be subject to the emissions warranty requirements.

G. Proposed Modifications to Title 13, CCR, Section 2036

The change to title 13, CCR, section 2036 is to correct an error in the originally proposed language. The change consists of an edit to add back language that was erroneously removed.

1. Subsection 2036(a)

In subsection 2036(a), CARB staff proposes the following two changes:

- a. Add the word “year” to the existing phrase “and 2022 and subsequent model heavy-duty hybrid vehicles” to now read “and 2022 and subsequent MY heavy-duty hybrid vehicles.” This change is necessary to be consistent with the existing language as used in this subsection.
- b. Add “or 2022 and subsequent MY incomplete hybrid vehicles from 10,001 to 14,000 pounds GVWR.” This is necessary since hybrid powertrains used in incomplete vehicles with a GVWR from 10,001 to 14,000 pounds are now proposed in the 30-day changes to be eligible to use the hybrid powertrain test procedure to certify to criteria pollutants and GHG emission standards, and should therefore be subject to the defects emissions warranty requirements.

2. Subsection 2036(b)(2)(C)

In subsection 2036(b)(2)(C), CARB staff proposes modifying this subsection to add “or 2022 and subsequent MY incomplete hybrid vehicles from 10,001 to 14,000 pounds GVWR.” This is necessary since hybrid powertrains used in incomplete vehicles with a GVWR from 10,001 to 14,000 pounds are proposed in the 30-day changes to be eligible to use the hybrid powertrain test procedure to certify to criteria pollutants and GHG emission standards, and should therefore be subject to the defects emissions warranty requirements.

3. Subsection 2036(c)(4)(B)

In subsection 2036(c)(4)(B), CARB staff proposes adding the language, “with engines certified for use in hybrid vehicles exclusively.” This change is necessary to effectively reinsert text which was erroneously removed in the initial proposal. This amendment clarifies that the pre-step 1 warranty periods (i.e., 100,000 miles/5 years/3000 hours) apply to the 2022 through 2026 MY diesel engines that are used exclusively in hybrid vehicles.

4. Subsections 2036(c)(10)(A), (B), and (C)

In subsections 2036(c)(10)(A), (B), and (C), CARB staff proposes adding the word, “primarily.” This change is necessary to be consistent with how engines are currently being treated and clarifies that the warranty period and implementation schedules for optionally certified diesel hybrid powertrains used primarily in vehicles with a specified GVWR range are the same as for the heavy-duty diesel engines that are certified for use in that same vehicle GVWR range.

5. Subsection 2036(c)(10)(E)

In subsection 2036(c)(10)(E), CARB staff proposes adding new regulatory language to define the warranty period and MY implementation schedules for diesel hybrid powertrains used in incomplete vehicles with a GVWR from 10,001 to 14,000 pounds. This is necessary since diesel hybrid powertrains used in incomplete vehicles with a GVWR from 10,001 to 14,000 pounds are now proposed in the 30-day changes to be eligible to use the hybrid powertrain test procedure to certify to criteria pollutants and GHG emission standards, and should therefore be subject to the defects emissions warranty requirements.

6. Subsection 2036(c)(10)(F)

In subsection 2036(c)(10)(F), CARB staff proposes adding new regulatory language to define the warranty period and MY implementation schedules for Otto-cycle hybrid powertrains used in incomplete vehicles with a GVWR from 10,001 to 14,000 pounds. This is necessary since Otto-cycle hybrid powertrains used in incomplete vehicles with a GVWR from 10,001 to 14,000 pounds are now proposed in the 30-day changes to be eligible to use the hybrid powertrain test procedure to certify to criteria pollutants and GHG emission standards, and should therefore be subject to the defects emissions warranty requirements.

7. Subsection 2036(d)(2)(D)

In subsection 2036(d)(2)(D), CARB staff proposes modifying this subsection to add "or 2022 and subsequent MY incomplete hybrid vehicles from 10,001 to 14,000 pounds GVWR." This is necessary since hybrid powertrains used in incomplete vehicles with a GVWR from 10,001 to 14,000 pounds are now proposed in the 30-day changes to be eligible to use the hybrid powertrain test procedure to certify to criteria pollutants and GHG emission standards.

8. Subsection 2036(d)(3)(D)

In subsection 2036(d)(3)(D), CARB staff proposes modifying this subsection to add "or 2022 and subsequent MY incomplete hybrid vehicles from 10,001 to 14,000 pounds GVWR." This is necessary since hybrid powertrains used in incomplete vehicles with a GVWR from 10,001 to 14,000 pounds are now proposed in the 30-day changes to be eligible to use the hybrid powertrain test procedure to certify to criteria pollutants and GHG emission standards.

9. Subsection 2036(f)(1)(D)

In subsection 2036(f)(1)(D), CARB staff proposes modifying this subsection to add "or 2022 and subsequent MY incomplete hybrid vehicles from 10,001 to 14,000 pounds GVWR." This is necessary since hybrid powertrains used in incomplete vehicles with a GVWR from 10,001 to 14,000 pounds are now proposed in the

30-day changes to be eligible to use the hybrid powertrain test procedure to certify to criteria pollutants and GHG emission standards.

H. Proposed Modifications to Title 13, CCR, Section 2112

1. Subsection 2112(l)(9), (18), and (19)

In subsections 2112(l)(9), (18), and (19), CARB staff proposes to modify the MY applicability of the useful life requirements for 2023 and subsequent MY engines certified to the standards in section 1956.8 for use in medium-duty vehicles with a GVWR from 10,001 to 14,000 pounds. The proposed modification would start the applicability of the 150,000 miles or 15-year useful life with the 2024 MY engines rather than with the 2023 MY. The proposed change is necessary to better align this change with other proposed regulatory changes and product development timelines. Thus, in subsection 2112(l)(9), the MY is changed from 2022 to 2023 to indicate the MY applicability of existing useful life requirements and in subsections 2112(l)(18) and (19), the MY is changed from 2023 to 2024 to indicate the start of the applicability of the 150,000 miles or 15-year useful life requirements for engines certified to the standards in section 1956.8 for use in medium-duty vehicles with a GVWR from 10,001 to 14,000 pounds.

2. Subsections 2112(l)(23)(A), (B), and (C)

In subsections 2112(l)(23)(A), (B), and (C), CARB staff proposes adding the word, “primarily.” This change is necessary to be consistent with how engines are currently being treated and clarifies that the periods of use and MY implementation schedules for optionally certified diesel hybrid powertrains used primarily in vehicles with a specified GVWR range are the same as for the heavy-duty diesel engines that are certified for use in that same vehicle GVWR range.

3. Subsection 2112(l)(23)(E)

In subsection 2112(l)(23)(E), CARB staff proposes adding new regulatory language to define the periods of use and MY implementation schedules for diesel hybrid powertrains used in incomplete vehicles with a GVWR from 10,001 to 14,000 pounds. This is necessary since diesel hybrid powertrains used in incomplete vehicles with a GVWR from 10,001 to 14,000 pounds are now proposed in the 30-day changes to be eligible to use the hybrid powertrain test procedure to certify to criteria pollutants and GHG emission standards.

4. Subsection 2112(l)(23)(F)

In subsection 2112(l)(23) (F), CARB staff proposes adding new regulatory language to define the periods of use and MY implementation schedules for Otto-cycle hybrid powertrains used in incomplete vehicles with a GVWR from 10,001 to 14,000 pounds. This is necessary since Otto-cycle hybrid powertrains used in incomplete vehicles with a GVWR from 10,001 to 14,000 pounds are now proposed

in the 30-day changes to be eligible to use the hybrid powertrain test procedure to certify to criteria pollutants and GHG emission standards.

I. Proposed Modifications to Title 13, CCR, Section 2139.5

In section 2139.5, CARB staff proposes to add back into the rulemaking language the title, "*§ 2139.5. "CARB Authority to Test for Heavy-Duty In-Use Compliance,"*" which was inadvertently left out from being underlined in the 60-day notice rulemaking language. In addition, CARB staff proposes to add the citations to statutory provisions that grant CARB the authority to propose the subject provision. The proposed modifications rectify this oversight.

J. Proposed Modifications to Title 13, CCR, Section 2140

1. Subsection 2140(c)

CARB staff proposes clarifying that an engine family fails the test procedures specified in title 13, CCR, section 2139.5 if any one of the four conditions listed in the subsection occur (i.e., that it is not necessary for all conditions to occur in order to cause a failure). CARB staff also proposes clarifying that the "arithmetic mean" of the Sum-over-Sum emissions will be compared to the in-use threshold to determine if an engine family fails. CARB staff also proposes clarifying that Sum-over-Sum emissions are defined in subsection "*§86.1370.B.6.6*" for diesel engines and subsections "*§86.1370.B.1.4* and *§86.1370.B.1.5* " for Otto-cycle engines.

K. Proposed Modifications to Title 13, CCR, Sections 2141 and 2145

1. Subsections 2141(f)(1) and 2145(b)(5)

In subsections 2141(f)(1) and 2145(b)(5), CARB staff proposes to eliminate the parts storage provision of the Emission Warranty Information and Reporting amendments. The originally proposed language required manufacturers to store parts that were analyzed to determine the valid failure rate reported in the field information report for a period of two years and submit such parts to CARB upon request. Based on industry feedback, it was determined that physically storing parts for two years may be overly costly and burdensome and may cause logistical problems.

The newly proposed language would no longer require manufacturers to physically store parts. Instead, manufacturers would be required to store failure mode and part analyses and identifying information during the time period corresponding to the time component of the useful life period of the engine family or test group and provide such information to CARB upon request. This change would address manufacturers' concerns with being required to physically store parts, while still

providing CARB with an increased ability to verify information provided in warranty reports and evaluate failure mode analysis methodology used by manufacturers.

In addition, in subsection 2145(b)(5), CARB staff proposes to indent subsection (b)(5) for format consistency with the other subsections. This change is non-substantive and will not impact the intent of the regulations.

L. Proposed Modifications to Title 13, CCR, Section 2166.1

1. Subsection 2166.1(d)(3)

In subsection 2166.1(d)(3), CARB staff proposes to correct an inadvertent error. The word "certified" was erroneously omitted from the initially proposed language. The subsection states that emission control components are components that are part of the "configuration" of an engine or vehicle. The proposed amendments would modify the language to clarify that emission control components are part of the "certified configuration" of an engine or vehicle. The proposed amendment clarifies which components are considered to be emission control components. This change is non-substantive and will not impact the intent of the regulations.

In addition, CARB staff proposes a change to correct formatting errors. In the 60-day regulatory language for section 2166.1, several subsection headings were not underlined to indicate that they were newly created text. The proposed amendment is necessary to fix the error by underlining the newly created subsection headings. This change is non-substantive and will not impact the intent of the regulations.

M. Proposed Modifications to Title 13, CCR, Section 2168

1. Subsection 2168(b)

In subsection 2168(b), CARB staff proposes to correct an inadvertent error. The subsection contains a grammatical error which states that a recall must be submitted within 90 days of exceeding a certain corrective action threshold. The proposed amendments would correct the error by stating that a recall plan must be submitted within 90 days. The proposed amendment clarifies that it is the recall plan that must be submitted. This change is non-substantive and will not impact the intent of the regulations.

In addition, CARB staff proposes a change to correct formatting errors. In the 60-day regulatory language for subsection 2168(a), the subsection heading was not underlined to indicate that it was newly created text. The proposed amendment is necessary to fix the error by underlining the newly created subsection heading. This change is non-substantive and will not impact the intent of the regulations.

N. Proposed Modifications to Title 13, CCR, Section 2169

1. Subsection 2169(a)

In subsection 2169(a), CARB staff proposes to remove language that states that a manufacturer may receive an extension for the deadline for submitting a recall or corrective action plan. This language is not necessary because it is redundant as the language in section 2169.8 already states that the deadline may be extended. This change is non-substantive and will not impact the intent of the regulations.

In addition, CARB staff proposes a change to correct formatting errors. In the 60-day regulatory language for section 2169, several subsection headings were not underlined to indicate that they were newly created text. The proposed amendment is necessary to fix the error by underlining the newly created subsection headings. This change is non-substantive and will not impact the intent of the regulations.

O. Proposed Modifications to Title 13, CCR, Section 2169.1

In section 2169.1, CARB staff proposes to remove language that states that the Executive Officer may extend the deadline to implement corrective action if good cause is shown. This language is not necessary because it is redundant as the language in 2169.8 already states that the deadline may be extended. This change is non-substantive and will not impact the intent of the regulations.

P. Proposed Modifications to Title 13, CCR, Section 2169.7

1. Subsection 2169.7(a)(3)

In subsection 2169.7(a)(3), CARB staff proposes to correct an inadvertent error. The subsection contains a grammatical error which states that the number of vehicles or engines involved in a voluntary or influenced recall must be reported as part of the recordkeeping requirements for recalls. The proposed amendments would remove the references to voluntary and influenced recalls and refer to required recalls. The proposed amendments clarify that these recordkeeping requirements do not apply to voluntary or influenced recalls. This change is non-substantive and will not impact the intent of the regulations.

In addition, CARB staff proposes a change to correct a referencing error. Two sets of statutory authority and reference sections were inadvertently cited in subsection 2169.7(d) when only one should have been cited. The proposed amendment is necessary to fix the error by deleting the incorrect set of references.

Q. Proposed Modifications to Title 13, CCR, Section 2169.8

In section 2169.8, CARB staff proposes to clarify the criteria for when the Executive Officer may grant an extension for deadlines for recall and corrective action requirements. This subsection states that manufacturers may be granted an extension if they show good cause. The proposed amendments now state that the Executive Officer may grant an extension, not to exceed 180 days, if the manufacturer submits information that shows that a deadline cannot be met. The proposed amendments address manufacturers' concerns about not being able to meet deadlines as they would have the ability to obtain an extension if they demonstrate that an extension is necessary.

**II. Proposed Modifications to Title 17, CCR Section 95663
Greenhouse Gas Emission Requirements for New 2014 and Subsequent
Model Heavy-Duty Vehicles (Appendix A-2)**

A. Proposed Modifications to Title 17, CCR, Section 95663

1. Subsection 95663(a)(2)(B)

In subsection 95663(a)(2)(B), CARB staff is proposing to correct the tractor sub-category in subsection (a)(2)(B). The proposed amendment is necessary to fix an inadvertent error by moving the "Heavy haul tractor" from the GVWR column to the sub-category column to be consistent with other sub-categories. In addition, CARB staff proposes to reorganize the table by merging split cells in the header row and filling empty cells in the first with the appropriate GVWR. This non-substantive modification is necessary to improve accessibility and readability of the regulatory document.

III. Proposed Modifications to California Exhaust Emission Standards and Test Procedures for 2004 and Subsequent Model Heavy-Duty Diesel Engines and Vehicles (Appendix B-1)

The following sections discuss CARB staff's proposed modifications to the California Exhaust Emissions Standards and Test Procedures for 2004 and Subsequent Model Heavy-Duty Engines and Vehicles. In addition to the proposed modifications discussed below, a number of non-substantive changes to formatting (such as indentations, alignment of paragraphs, removing extra spaces, etc.) have been made for clarity and improved readability.

A. Part 86, Subpart A – General Provisions for Heavy-Duty Engines and Heavy-Duty Vehicles

1. Section 2. Definitions. [§86.xxx-2]

- a. In subsections 2.A.1.2.2(4)(i)(A) and (D), CARB staff proposes to modify the MY applicability of the useful life requirements for 2023 and subsequent MY engines used in medium-duty vehicles with GVWR from 10,001 to 14,000 pounds. The proposed modification would start the applicability of the 150,000 miles or 15-year useful life with the 2024 MY engines rather than with the 2023 MY. The proposed change is necessary to better align this change with other proposed regulatory changes and product development timelines.
- b. In subsection 2.A.1.2.4(6), CARB staff proposes adding a new subsection (i) to define the useful life periods and MY implementation schedules for diesel hybrid powertrains used in incomplete vehicles with a GVWR from 10,001 to 14,000 pounds. This is necessary since diesel hybrid powertrains used in incomplete vehicles with a GVWR from 10,001 to 14,000 pounds are now proposed in the 30-day changes to be eligible to use the hybrid powertrain test procedure to certify to criteria pollutants and GHG emission standards.
- c. In renumbered subsections 2.A.1.2.4(6)(ii), (iii) and (iv), changes were made to renumber the existing subsections. This is necessary to have the proper numbering sequence since a new subsection 2.A.1.2.4(6)(i) was added. CARB staff also proposes adding the word, "primarily" to these subsections. This change is necessary to be consistent with how engines are currently being treated and clarifies that the useful life periods and implementation schedules for optionally certified diesel hybrid powertrains used primarily in vehicles with a specified GVWR range are the same as for the heavy-duty diesel engines that are certified for use in that same vehicle GVWR range.

- d. In subsection 2.B, California Provisions, CARB staff proposes to add new definitions as well as modify or remove existing definitions as follows:
- i. *"50-state-directed engines."* CARB staff proposes to remove the definition for the 50-state-directed engines in Subsection 2.B. The change is necessary since the proposed 50-state-directed engine emission standards are being removed, as discussed in section I.A.14 above.
 - ii. *"Automatic active regeneration"* and *"Manual active regeneration."* CARB staff proposes to add definitions for the terms *"automatic active regeneration"* and *"manual active regeneration"* to clarify the two types of operation to use the provisions provided in 86.1370. Automatic active regeneration will be accounted for in in-use testing methods for 2027 and later MY engines. For 2024 through 2026 MY engines both automatic and manual active regeneration modes will be excluded from in-use analysis with the Three-Bin Moving Average Window (3B-MAW).
 - iii. *"California sales volume."* During the 60-day comment period, commenters requested clarification on the definition of California sales volume. This modification is necessary to provide clarity to the California sales volume definition since this definition is used in the CA-ABT program as well as in other heavy-duty engine requirements.
 - iv. *"Class 3."* This definition was added since a reference to class 3 vehicles is made in the CA-ABT program.
 - v. *"Greenhouse gas Emissions Model (GEM)."* The definition for greenhouse gas emissions model was updated to the newest versions of GEM, from the existing version 3.0, as released by U.S. EPA. For powertrain testing specified in 40 CFR §1037.550(a), GEM means GEM's MATLAB/Simulink Hardware-in-Loop model, version 3.8, December 2020 ("GEM HIL model"), last amended March 10, 2021 (Pre-publication). For non-powertrain testing, GEM means GEM Phase 2, version 3.5.1, November 2020. This modification is necessary to update the GEM to the latest version published by U.S. EPA and to harmonize with federal regulations. Furthermore, the web-link to the U.S. EPA website was removed since it is no longer valid.
 - vi. *"Intermediate useful life."* The definition for intermediate useful life was initially included as a footnote to the table of emission standards in subsection 11.B.5.3.3. For clarity and improved readability, CARB staff proposes to remove the footnote and create a new definition in subsection 2.B. In addition, as discussed in section I.A.16.d above, CARB staff also proposes to modify the intermediate useful life from 10 years to 8 years. This modification is necessary in order to keep the ratio of

intermediate useful life to the full useful life in years the same as in miles, at 73 percent.

- vii. *“Intermediate useful life NOx standard.”* A definition for a new intermediate useful life NOx standard is added to describe and provide clarity to the intermediate useful life period and associated NOx emission standards specified in subsection 11.B.5.3.3.
- viii. *“Optionally certified hybrid powertrain or hybrid powertrain or heavy-duty hybrid powertrain.”* CARB staff proposes modifying the definition of “Optionally certified hybrid powertrain or hybrid powertrain or heavy-duty hybrid powertrain” by adding a sentence “Note other examples of systems that qualify as hybrid engines or powertrains are systems that recover kinetic energy and use it to power an electric heater in the aftertreatment.” This is necessary to harmonize with the revised definition from the U.S. EPA as used in the Phase 2 GHG technical amendments final rule to expand the definition of hybrid powertrain to include systems that recover kinetic energy and use it to power an electric heater in the aftertreatment.
- ix. *“Ramped Modal Cycle (RMC).”* CARB is providing additional flexibility to engine manufacturers. Starting with the 2024 MY, certifying engine manufacturers would have the option to perform emissions testing using either of the duty cycles defined in sections 86.1362 or 1036.505 of the test procedures to demonstrate compliance with the emissions standards. The reason for providing the additional flexibility is twofold. First, during the development of the Phase 2 GHG regulations, U.S. EPA proposed a revised RMC similar to the duty cycle defined in 1036.505 of these test procedures because studies indicated that it is more representative of real-world truck operations. Second, emissions testing results from the SwRI Stage 3 program² indicate minimal differences in the tailpipe NOx emissions from the two RMC cycles (86.1362 and 1036.505). As such, CARB staff believes that the additional flexibility could help the manufacturers by allowing them to conduct a single emissions test to satisfy both criteria and GHG emissions testing requirements without any impacts on the stringency of the regulations.
- x. *“Telematics.”* CARB staff introduces the definition for the term telematics in order to specify new requirements for certifying engine and

² (Sharp, 2021c) “Further Development and Validation of Technologies to Lower Oxides of Nitrogen Emissions from Heavy-Duty Vehicles, Low NOx Demonstration Program – Stage 3,” Sharp, Christopher, Southwest Research Institute, ARB Contract 16MSC010, SwRI® Project Number 03.23379, Final Report, April 16, 2021.

vehicle manufacturers that rely on the technology to submit in-use emission data reports.

- x. *“Vehicle family.”* In order to harmonize with the most recent version of the federal regulations, CARB staff has updated the reference to 40 CFR 1037.801 to reflect the publication date for the Phase 2 GHG technical amendments.
- xi. *“Vehicle family.”* In order to harmonize with the most recent version of the federal regulations, CARB staff has updated the reference to 40 CFR 1037.801 to reflect the publication date for the Phase 2 GHG technical amendments.
- xii. *“Vehicle-RMC.”* CARB is providing additional flexibility to hybrid powertrain manufacturers. Starting with the 2024 MY, certifying diesel hybrid powertrain manufacturers would have the option to perform emissions testing using either of the duty cycles defined in sections 86.1362 or 1036.505 of the test procedures to demonstrate compliance with the emissions standards. The rationale for providing the flexibility is similar to the rationale used in the definition of the RMC cycle.

2. Section 3. Abbreviations. [86.xxx-3]

- a. In subsection 3.B, California Provisions, CARB staff proposes to revise some of the abbreviations as follows:
 - i. *“55-cruise.”* In order to harmonize with the most recent version of the federal regulations, CARB staff has updated the reference to 40 CFR 1037.510 to reflect the publication date for the Phase 2 GHG technical amendments.
 - ii. *“65-cruise.”* In order to harmonize with the most recent version of the federal regulations, CARB staff has updated the reference to 40 CFR 1037.510 to reflect the publication date for the Phase 2 GHG technical amendments.
 - iii. *“HDTT.”* In order to harmonize with the most recent version of the federal regulations, CARB staff has updated the reference to 40 CFR 1037.510 to reflect the publication date for the Phase 2 GHG technical amendments.

3. Section 11. Emission standards for diesel heavy-duty engines and vehicles. [§86.xxx-11]

- a. In subsections 11.B.1.2, 11.B.1.3, 11.B.2, 11.B.5.3.1, 11.B.5.3.2, 11.B.5.3.3, 11.B.5.5.1, and 11.B.7.1, CARB staff proposes to remove the merged cells in the first row of each table and keep the title text for each table outside the table. These modifications are non-substantive and are proposed to improve accessibility and readability of the regulatory document.
- b. In subsection 11.B.5.3.3, CARB staff proposes to add the phrase *“Except as provided in subparagraph 5.3.4 below.”* This modification is necessary to

- indicate that manufacturers also have the option to certify a limited number of 2024 through 2026 MY engines rated at or above 525 bhp to federal standards, as provided in subsection 5.3.4. In addition, CARB staff proposes to delete footnote A in the standards table that defines the intermediate useful life NO_x standard and add it as a new definition in subsection 2.B to improve clarity of the requirements.
- c. In subsection 11.B., CARB staff proposes to add a new subsection 5.3.4 to provide manufacturers the option to certify 2024 through 2026 MY heavy-duty diesel engines rated at or above 525 bhp to federal requirements. This modification is necessary because these engines have relatively few sales in California and manufacturers may find it difficult to spend resources to redesign these engines while also managing design changes to their other more popular engine families. CARB staff also proposes to set a limit on the number of such engines certified to the federal standards that a manufacturer would be able to sell in California at 1.10 times the manufacturer's sales volume of engines rated at or above 525 bhp for the 2018 or 2019 MY, whichever is greater. To be eligible for this option, manufacturers must meet a set of criteria including among others, (i) the manufacturer must have certified and sold in California engines that meet the engine power rating criteria for the 2018 or 2019 MY; (ii) the manufacturer must comply with the Heavy-Duty Diesel Engine Idling Requirements for pre-2023 MY heavy-duty diesel engines and California's emissions warranty requirements for the MY; and the manufacturer must submit to CARB all certification data that it submitted to the U.S. EPA.
 - d. In subsection 11.B, CARB staff proposes to remove subsection 5.5. This change is necessary since the option to certify engines to the optional 50-state-directed engine emission standards for NO_x emissions for 2024 through 2026 MY engines are being removed, as discussed in section I.A.14 above.
 - e. In subsection 11.B, CARB staff proposes to correct an inadvertent error in subsection 6. The incorrect reference 11.B.5.2 is now replaced with 11.B.6.2 that correctly references vehicle applications exempted from the idling requirements. This change is necessary to ensure that the correct section of the regulation is referenced. In addition, in several places the word "subsection" was replaced with the word "subparagraph" to provide consistency throughout the regulatory language.
 - f. In subsection 11.B, CARB staff proposes to modify subparagraphs 6.3.1.1 and 6.3.1.2, to exempt 2024 through 2026 MY heavy-duty diesel engines rated at or above 525 bhp from the more stringent idling standards for 2024 through 2026 MY engines. The proposed modification would provide manufacturers the flexibility to certify to less stringent idling NO_x standards and enable them to sell these engines in California. This flexibility is

necessary since these engines have relatively few sales in California and manufacturers may find it difficult to spend resources to redesign these engines while also managing design changes to their other more popular engine families.

- g. In subsection 11.B.6.3.2.2, CARB staff proposes to delete the provision for 2024 and subsequent MY heavy-duty engines that requires manufacturers to use the carbon monoxide (CO), PM, or NMHC emission test results from the longest idle segment of the low-load certification cycle to compare them with CO, PM, or NMHC emissions from the idling test procedure. CARB staff did not intend to propose this requirement during the initial 60-day notice proposal. The requirements were initially introduced as concepts for discussion purposes with stakeholders in versions of the regulatory documents (13 CCR 1956.8 and these test procedures) that were released to the Low NOx Workgroup members. CARB staff realized that the existing procedures in the regulation are sufficient to demonstrate compliance with CO, PM, and NMHC requirements of the idling regulation, and recognized that adding new procedures would add unnecessary complexity without any additional benefits, and accordingly removed these provisions from 13 CCR 1956.8 prior to the issuance of the 60-day notice regulatory package. However, the same text was inadvertently retained in the test procedures. Thus, the proposed changes are necessary to rectify this oversight and make both 13 CCR 1956.8 and the test procedures consistent with each other. In addition, CARB staff is proposing to make grammatical and renumbering changes to improve clarity and readability.
- h. In subsection 11.B, CARB staff proposes to modify subsection 7.1 to limit the MY applicability of the current optional low NOx standards from 2015 through 2021, and move the existing optional low NOx standards for 2022 and 2023 MY engines to the table in subsection 7.2. Since CARB staff is also proposing a new optional low NOx standard of 0.01 g/bhp-hr applicable to the 2022 and 2023 MY engines, it is appropriate for clarity purposes to move the existing MY 2022 and 2023 optional NOx standards to the new table of optional low NOx standards in subsection 7.2. As discussed in section I.A.1 above, the proposed optional NOx of 0.01 g/bhp-hr is feasible with further improvements in aftertreatment systems and improvements to engine calibration strategies.
- i. In subsection 11.B, CARB staff proposes the following changes in subsection 7.2:
 - i. Replace 2024 with 2022 MY in the introductory paragraph of subsection 7.2. This modification is necessary to adjust the MY applicability since the optional NOx standards for 2022 and 2023 MY are now added to subsection 7.2.

- ii. Add a new optional NO_x standard of 0.01 g/bhp-hr applicable for MYs 2022 and 2023. The proposal also moves the existing optional low NO_x standards for MY 2022 and 2023 from subsection 7.1 to 7.2. This modification is necessary to keep the new and existing optional low NO_x standards together in subsection 7.2 to provide clarity and enhance the readability of the requirements.
- iii. Add a new optional low NO_x standard of 0.010 g/bhp-hr NO_x on the FTP and 0.080 g/bhp-hr NO_x on the LLC for MY 2024 through 2026 heavy-duty engines. The proposed new optional low NO_x standards are necessary to provide manufacturers the mechanism to certify to significantly lower NO_x emissions than currently required.
- iv. Reorganize the table of standards to provide clarity and enhance readability.
- j. In subsection 11.B.8, CARB staff proposes to delete the reference 11.B.5.5. and add a new reference 11.B.7.2. As discussed in section I.A.14 above, the modification to delete subsection 11.B.5.5 is necessary since it references the optional 50-state-directed engine emission standards which are proposed to be removed from the existing requirements. The modification to reference subsection 11.B.7.2 is necessary to indicate the applicable NO_x emission standards for the LLC.
- k. In subsection 11.B.9, CARB staff proposes the following two changes:
 - i. Modify the title of this section to include “or Used in Incomplete Vehicles from 10,001 to 14,000 Pounds GVWR.” This is necessary since diesel hybrid powertrains used in incomplete vehicles with a GVWR from 10,001 to 14,000 pounds are now proposed in the 30-day changes to be eligible to use the hybrid powertrain test procedure to certify to criteria pollutants and GHG emission standards.
 - ii. Add new regulatory language to specify the exhaust emissions and MY implementation schedules for heavy-duty diesel engines used in hybrid powertrains installed in incomplete vehicles with a GVWR from 10,001 to 14,000 pounds. This is necessary since diesel hybrid powertrains used in incomplete vehicles with a GVWR from 10,001 to 14,000 pounds are now proposed in the 30-day changes to be eligible to use the hybrid powertrain test procedure to certify to criteria pollutants and GHG emission standards.

4. Section 12. Alternative certification procedures. [§86.080-12]

In subparagraph 12.B.1.2(a)(5) of this test procedure, CARB staff proposes to modify the amended date of the referenced 40 CFR, part 1036, subpart F and 40 CFR §1037.550, to March 10, 2021 (Pre-publication) from May 12, 2020. This is

necessary to update and incorporate the most recent changes to harmonize with federal regulations.

5. Section 15. NO_x plus NMHC and particulate averaging, trading, and banking for heavy-duty engines. [§86.xxx-15]

In subsection 15.B of this test procedure, CARB staff proposes to modify the CA-ABT program in subsection 3 for the following elements:

- a. In subsection 15.B.3, additional changes are made with regard to the CA-ABT program. Manufacturers that certify products in California have the option to begin participating in the CA-ABT program as early as the 2022 MY. This option would enable them to generate CA-ABT credits as early as the 2022 MY. Starting with the 2024 MY, the California and U.S. EPA emissions standards would be different. Therefore, for 2024 and subsequent MYs, all California-certified products must participate in the CA-ABT program for ABT. Also subsection 15.B.3 clarifies that the credit calculations must be done based on the full useful life emissions. Furthermore, heavy-duty zero-emission NO_x credits would be assigned to powertrains instead of vehicles. This change would ensure that credits would be allocated to the original equipment manufacturers of zero-emission products.
- b. The applicability of heavy-duty zero-emission NO_x credits is proposed to apply to certified heavy-duty powertrains rather than to certified heavy-duty vehicles. This change is necessary to ensure that zero-emission NO_x credits can be generated and used by original equipment manufacturers, who would be producing heavy-duty zero-emission powertrains. This change is shown by replacing the word "vehicle" with the word "powertrain" in subsections 15.B.3, 15.B.3.(j), 15.B.3.(j)(2), 15.B.3.(k), 15.B.3.(k)(2), 15.B.3.(k)(4), and 15.B.4.(e).
- c. In subsection 15.B, CARB staff proposes adding the word, "primarily" to subsection 3(a)(1)(iii). This change is necessary to be consistent with how engines are currently being treated. It clarifies that the averaging set for optionally certified light heavy-duty diesel hybrid powertrains for use primarily in class 4 and 5 vehicles is the same as for the heavy-duty diesel engines that are certified for use in those same vehicle classes.
- d. In subsection 15.B, CARB staff proposes adding the word, "primarily" to subsection 3(a)(2)(ii). This change is necessary to be consistent with how engines are currently being treated. It clarifies that the averaging set for optionally certified medium heavy-duty diesel hybrid powertrains for use primarily in class 6 and 7 vehicles is the same as for the heavy-duty diesel engines that are certified for use in those same vehicle classes.

- e. In subsection 15.B, CARB staff proposes adding the word, “primarily” to subsection 3(a)(3)(ii). This change is necessary to be consistent with how engines are currently being treated. It clarifies that the averaging set for optionally certified heavy heavy-duty diesel hybrid powertrains for use primarily in class 8 vehicles is the same as for the heavy-duty diesel engines that are certified for use in that same vehicle class.
- f. In subsection 15.B, CARB staff proposes adding a new subsection 3(a)(1)(iv) to include diesel hybrid powertrains used in incomplete vehicles with a GVWR from 10,001 to 14,000 pounds in the light heavy-duty diesel averaging set. This is necessary since diesel hybrid powertrains used in incomplete vehicles with a GVWR from 10,001 to 14,000 pounds are now proposed in the 30-day changes to be eligible to use the hybrid powertrain test procedure to certify to criteria pollutants and GHG emission standards.
- g. CARB staff proposes to add the word “diesel” in subsections 15.B.3.(a)(2)(i) and 15.B.3.(a)(3)(i). This modification is necessary to clarify that only diesel engines are categorized as medium heavy-duty and heavy heavy-duty engines.
- h. In subsection 15.B.3.(a)(4), the term “only” is removed to provide further clarity. Additionally, CARB staff proposes to correct the reference B.3.j that was incorrectly represented without adding parentheses to the letter “j.” The modified reference would read as B.3.(j). The proposed change is necessary to ensure that the correct section is being referenced.
- i. In subsection 15.B.3.(e), CARB staff proposes to correct the reference B.3.f that was incorrectly represented without adding parentheses to the letter “f.” The modified reference would read as B.3.(f). The proposed change is necessary to ensure that the correct section is being referenced. Furthermore, CARB staff proposes to add new language to indicate that manufacturers that choose to delay their enrollment into the CA-ABT program until the 2023 or 2024 MY would not be eligible to transfer any banked federal-ABT credits to the CA-ABT program. Manufacturers that delay enrollment in the CA-ABT program would probably do so in order to continue producing higher emitting engines (with family emission limits (FEL) above the applicable 0.20 g/bhp-hr NO_x standard during the 2022 to 2023 MYs); therefore, CARB staff believes that these manufacturers should not be eligible to transfer any remaining federal-credits into the CA-ABT program.
- j. In subsection 15.B.3.(f), CARB staff proposes to correct the reference B.3.a that was incorrectly represented without adding parentheses to the letter “a.” The modified reference would read as B.3.(a). The proposed change is necessary to ensure that the correct section is being referenced.

- k. In subsection 15.B.3.(g), CARB staff proposes to adjust the emission credit calculation by accounting for differences in the useful life requirements between the engine family or hybrid powertrain family that is generating the credit and the currently applicable useful life of that engine family or hybrid powertrain family. The adjustment would allow manufacturers that comply with future MY standards and requirements to accrue proportionally larger amounts of credits by accounting for increases in the useful life requirements.
- l. In subsection 15.B.3.(i)(1), CARB staff proposes to correct the reference B.3.g that was incorrectly represented without adding parentheses to the letter "g." The modified reference would read as B.3.(g). The proposed change is necessary to ensure that the correct section is being referenced.
- m. In subsection 15.B.3.(i)(3)(A), staff has added an extra decimal point to specify the correct LLC NOx FEL cap at 0.300 g/bhp-hr.
- n. In subsection 15.B.3.(i)(4), CARB staff proposes to allow adjustments to the NOx FEL at intermediate useful life (i.e., 435,000 miles) when manufacturers choose to certify to a FEL. The original proposal would have required all engines to meet the intermediate useful life NOx emission standard of 0.020 g/bhp-hr regardless of whether a manufacturer chose to certify to a higher FEL and use ABT credits. This amendment would provide manufacturers additional flexibility by providing the ability to adjust an intermediate useful life FEL above the 0.020 g/bhp-hr intermediate useful life standard if the manufacturer chooses to certify an engine family to a full useful life FEL that is above the emission standards using ABT credits.
- o. In subsection 15.B.3.(j), the use of zero-emission NOx credits is proposed to expire by the end of the 2026 MY. This is necessary to provide a balance between incentivizing the early development of heavy-duty zero-emission technologies while also recognizing that allowing the generation of excessive NOx credits allows manufacturers to delay and/or reduce the emissions reductions attributable to this rulemaking action by effectively inhibiting the technology forcing requirements applicable to internal combustion engine powered engines. Allowing zero emission NOx credits to persist beyond 2026 could unduly delay the industry's development of clean engine combustion control technologies needed to meet the proposed 2027 MY emission standards. Additionally, zero-emission credits were allocated to powertrains instead of vehicles. Clarification was also added to ensure that zero-emission credits would not be allowed for class 3 or lower vehicle classes. In order to harmonize with the most recent version of the federal regulations, CARB staff updated the references for 40 CFR 1037.105 and 1037.106 to reflect the most recent applicable publication dates.

- p. In subsection 15.B.3.(k)(1), CARB staff proposes to allow more time for reporting. During the 60-day comment period, engine manufacturers requested an extension of the deadline for submitting the end-of-year CA-ABT report from 90 days to 180 days after the end of the MY. This modification would provide additional time to generate the end-of-year reports to calculate the credits and deficits generated in the CA-ABT program using California sales information.
- q. In subsection 15.B.3.(k)(2), CARB staff further clarifies the data requirements for the CA-ABT reports to include all parameters and corresponding values needed to calculate credits.
- r. In subsection 15.B.3.(k)(3), the deadline for submitting corrections to the end-of-year reports was changed from 180 days to 90 days. Currently, manufacturers have 90 days to submit the end-of-year report and then 180 days after that to submit any corrections. Under the proposed revisions, they will have 180 days to submit the end-of-year report and then 90 more days to submit any corrections. Given that manufacturers would have more time to submit the end-of-year reports, the time window for submitting corrections has been reduced. The final CA-ABT report with any corrections would remain due 270 days after the end of the MY.
- s. In subsection 15.B.4.(b), the references B.3.d and B.3.e were corrected to B.4.(d) and B.4.(e). The proposed changes are necessary to ensure that the correct sections are being referenced.
- t. In subsection 15.B.4.(d), CARB staff proposes to split merged cells in the first column of the table representing the engine or powertrain family MY so that each column of the table has the same number of rows. The empty cells created after splitting the merged cells are filled with the appropriate MY for that row. The proposed change is non-substantive and is necessary to improve accessibility and readability of the regulatory document.

6. Section 21. Application for certification. [§86.xxx-21]

In subsection 21.B, CARB staff proposes to remove subsection 3. This provision is no longer needed since the proposed 50-state-directed engine emission standards are being removed, as discussed in section I.A.14 above.

7. Section 25. Maintenance. [§86.xxx-25]

Most of the changes to subsection 25.A expand on the existing maintenance provision that allows manufacturers to request new scheduled maintenance. They include edits to give manufacturers an option for more flexibility in scheduling more frequent maintenance for emission-related components and systems and also add the applicability of the requirements of subsection 25.A.1.9 to diesel hybrid

powertrains used in incomplete vehicles with a GVWR from 10,001 to 14,000 pounds.

- a. In subsection 25.A.1.8, CARB staff proposes modifying footnote number 1 of the diesel maintenance table that has the incorrect reference of "(b)(7)(i)" to be changed to "86.004-25(i)." This change is necessary to ensure that the correct regulation is being referenced.
- b. In subsection 25.A.1.9, CARB staff proposes amending subsection (b)(4)(vii)(B) to add the word "diesel" to the existing phrase "medium heavy-duty engines" to now read "medium heavy-duty diesel engines." This is necessary to clarify that the requirement in this provision applies specifically to diesel engines and to be consistent with the existing language as used in subsections (b)(4) (vii)(A) and (b)(4) (vii)(C).
- c. In subsection 25.A.1.9, CARB staff proposes adding the word, "primarily" to subsections (A), (B), and (C). This change is necessary to be consistent with existing allowance for engines. It clarifies that the maintenance requirements for optionally certified diesel hybrid powertrains used primarily in vehicles with a specified GVWR range are the same as for the heavy-duty diesel engines that are certified for use in that same vehicle GVWR range.
- d. In subsection 25.A.1.9, CARB staff proposes adding a new subsection (b)(4)(vii)(D) to specify the maintenance requirements for diesel hybrid powertrains used in incomplete vehicles with a GVWR from 10,001 to 14,000 pounds. This is necessary since diesel hybrid powertrains used in incomplete vehicles with a GVWR from 10,001 to 14,000 pounds are now proposed in the 30-day changes to be eligible to use the hybrid powertrain test procedure to certify to criteria pollutants and GHG emission standards.
- e. In subsection 25.A.1.12, CARB staff proposes removing the "s" from "Subparagraphs." This change is necessary for proper grammar to have the word be singular, and not be plural, as a result of the other proposed change in this subsection. CARB staff also proposes removing the wording of "and (b)(7)(ii)" in this subsection. This removal is necessary because subsection (b)(7)(ii) has proposed changes being made, and should therefore no longer be included in subsection 1.12, which has no changes.
- f. In subsection 25.A.1.13, to implement the Board's Resolution 20-23, CARB staff proposes modifying subsection 86.004-25(b)(7)(ii), to add language addressing the consideration of more frequent scheduled maintenance. This addition is necessary to allow for more flexibility for the transitional MYs of 2024, 2027, and 2031, when the emission standards become more stringent, and would give manufacturers time to analyze the components and systems to ensure compliance at the lower standards for the lengthened useful life periods. The added language also excludes the consideration of more

frequent scheduled maintenance provisions from applying to the components or systems designated as “Not Replaceable,” as specified in §86.004-25 (b)(4)(vi) of the “California Exhaust Emission Standards and Test Procedures for 2004 and Subsequent Model Heavy-Duty Diesel Engines and Vehicles.” The exclusions for “Not Replaceable” components are necessary because of their relatively high price and severe emission impact under failure; such components are currently not allowed to be scheduled for repair or replacement during the useful life unless the manufacturer pays for the repair or replacement.

- g. Subsection 25.A.1.14 was renumbered for sequence (previously 1.13).
- h. Subsection 25.A.1.15 was renumbered for sequence (previously 1.14).
- i. Subsection 25.A.1.16 was renumbered for sequence (previously 1.15).

8. Section 26. Mileage and service accumulation; emission measurements. [§86.004-26]

The proposed modifications to the engine-aftertreatment system (EAS) mileage and service accumulation or durability aging requirements of subsection 26.B, include additional mileage and service accumulation options that provide flexibilities to manufacturers; renumbering paragraphs to adjust for the additional provisions; correcting references; and adding requirements to diesel hybrid powertrain families used in incomplete vehicles from 10,001 to 14,000 pounds GVWR.

- a. CARB staff proposes to modify subsection 1.1.1.3 to indicate that there is more than one option of service accumulation procedures from which manufacturer may choose to demonstrate the durability of medium heavy-duty diesel engines.
- b. CARB staff proposes to add a new subsection 1.1.1.3.2 that provides a new additional EAS durability aging option for 2024 through 2026 MY medium heavy-duty diesel engines. This modification is necessary to provide manufacturers an alternative option that would reduce the total hours for aging the EAS by allowing them to use accelerated aftertreatment aging for 50 percent of the useful life. Manufacturers that select this option would be required to commit at time of certification to submit in-use emissions data for three years.
- c. In subsection 1.1.1.4.2, text is added that would require manufacturers to submit in-use data reports in order to use the alternative durability demonstration program specified in the same subsection. This requirement was originally specified in subsection 1.1.1.4.2.2 and moved to this subsection for clarity purposes.

- d. Additionally, CARB staff proposes to add new subsections 1.1.1.4.3 (applicable to 2024 through 2026 MYs) and 1.1.1.4.4 (applicable to 2024 MY only) that provide new additional EAS aging options for heavy heavy-duty diesel engines.
 - i. In subsection 1.1.1.4.3, CARB staff proposes an option that would reduce the total durability service accumulation of the EAS by allowing manufacturers to use accelerated aftertreatment aging for 31 percent of the useful life. This option would require the manufacturer to run EAS durability aging on an engine dynamometer for 3,000 hours. The full service accumulation process for this option is schematically provided in Figure CA26-1.
 - ii. In subsection 1.1.1.4.4, which would apply only to certification of 2024 and 2025 MY heavy heavy-duty diesel engines, CARB staff proposes an option that would allow aging to be accomplished in one process and on one EAS over two MYs (2024 and 2025). In this option, manufacturers would be allowed during the first year to perform accelerated aftertreatment aging for 69 percent of the useful life followed by EAS aging on an engine dynamometer for 1500 hours. Manufacturers would then extrapolate the test results collected at the end of the 1,500-hour EAS durability aging to full useful life to determine the deterioration factor for the 2024 MY engine

Manufacturers would then continue to perform EAS service accumulation for the remaining 1,500 hours of the useful life to determine the deterioration factor for the 2025 MY certification. The final test results together with the test results from the 2024 MY certification would then be used to determine the final deterioration factor of the engine. The manufacturer would then use either the deterioration factor used to certify the 2024 MY engine or the final deterioration factor determined from all the test results, whichever is greater, to certify the 2025 MY heavy heavy-duty diesel engine as a carryover product. The full service accumulation process for this option is schematically provided in Figure CA26-2.

New Figure CA26-2 is added to clarify the EAS service accumulation process for this option applicable only to 2024 and 2025 MY heavy heavy-duty diesel engines. Existing Figures CA26-2, 3, and 4 have been renumbered to CA26-3, 4, and 5 to accommodate the numbering of the newly added Figure CA26-2.

- iii. In addition, CARB staff proposes to delete subsections 1.1.1.4.2.1 through 1.1.1.4.2.4 and move them to new subsections 1.5.1 to 1.5.4.

These proposed modifications are necessary to provide manufacturers the flexibility to accomplish aging of the EAS for 2024 through 2026 MY heavy-duty diesel engines in a shorter period of time by allowing accelerated aftertreatment aging to be performed for a portion of the useful life. The proposal also requires that manufacturers commit at time of certification to submit in-use emissions data for three years.

- e. In subsections 1.1.1.5.1, 1.1.1.5.2, 1.1.2, and 1.3, CARB staff proposes to correct the numbering of references to Figures CA26-2, 3, and 4 to Figures 3, 4, and 5 to reflect the change in the numbering of the figures due to the addition of new Figure CA26-2.
- f. In subsection 1.1.1.5.2, CARB staff has revised the referencing to 40 CFR 1037.230 in order to harmonize with the most recent version of the federal regulations. Additionally, the referencing for the GEM model has been removed since it is already provided in section 86.xxx-2.B.
- g. In subsection 1.1.1.7, CARB staff proposes to add parentheses to “a.1” in 1065.530.a.1 and change it to 1065.530(a)(1). This is necessary to reference the correct section of the regulation.
- h. In subsections 1.1.2.1.5 and 1.1.2.2.5, CARB staff proposes to modify the phrase “more than 50%” to “50% or more” to clearly define the minimum amount of in-use data to be submitted in order to use accelerated durability aging of aftertreatment systems. Additional clarifying language was added to describe the example in more detail.
- i. In subsection 1.1.3.1.1, CARB staff proposes to add “medium heavy-duty diesel engines” to the engine service classes subject to the in-use emissions reporting requirements for 2024 MY heavy-duty diesel engines. Also, “medium heavy-duty diesel engines” was removed from subsection 1.1.3.1.2. These changes are necessary since the proposed changes include options to utilize an accelerated aftertreatment aging option for 2024 and subsequent MY medium heavy-duty diesel engines and manufacturers that utilize this option are required to report in-use emissions data.
- j. In subsection 1.1.3.8, CARB staff proposes to provide manufacturers additional flexibility to meet the minimum percentage-of-California-sales reporting requirements. The flexibility would assist manufacturers in case they are unable to collect sufficient data from California trucks to satisfy the percentage-of-California-sales reporting requirements. Under the revised regulatory language, manufacturers would be allowed, for any 50-State certified engine family that initially fails to meet the minimum percentage, to submit the data from all in-use vehicle/engine emissions data it collected for that family on a nationwide basis.

- k. In subsection 1.1.3.9, CARB staff has revised the referencing to 40 CFR 1037.801 in order to harmonize with the most recent version of the federal regulations.
- l. In subsection 1.1.3.10, CARB staff proposes new prohibitions on tampering or disabling the engine or vehicle telematics systems. Since the submittal of in-use emission data reports is the responsibility of engine manufacturers, vehicle manufacturers may not disable the engine telematics system unless there is an established agreement in which the vehicle manufacturer assumes the responsibility of submitting the required data to the engine manufacturer. Other parties are prohibited from tampering with the telematics system without prior authorization from the engine or vehicle manufacturers. This proposal ensures that certifying engine manufacturers that are required to submit in-use data to CARB would have an effective way to access the required in-use emissions data.
- m. In subsection 1.3, references to the figures were updated to correspond to the revised language.
- n. In subsection 1.5, CARB staff proposes requirements for manufacturers that utilize accelerated aftertreatment aging options. These requirements were originally proposed in the 60-day notice in currently deleted subsections 1.1.1.4.2.1 through 1.1.1.4.2.4.
- o. CARB staff proposes adding a new subsection 2.2 to define the durability demonstration and MY implementation schedules for diesel hybrid powertrains used in incomplete vehicles with a GVWR from 10,001 to 14,000 pounds. This is necessary since diesel hybrid powertrains used in incomplete vehicles with a GVWR from 10,001 to 14,000 pounds are now proposed in the 30-day changes to be eligible to use the hybrid powertrain test procedure to certify to criteria pollutants and GHG emission standards.
- p. In renumbered subsections 2.3, 2.4, and 2.5, changes were made to renumber the existing subsections. This is necessary to have the proper numbering sequence since a new subsection 2.2 was added. CARB staff also proposes adding the word, "primarily" to these subsections. This change is necessary to be consistent with how engines are currently being treated. It clarifies that the durability demonstration and MY implementation schedules for optionally certified light heavy-duty diesel hybrid powertrains for use primarily in class 4 and 5 vehicles, class 6 and 7 vehicles, and class 8 vehicles are the same as for the heavy-duty diesel engines that are certified for use in those same vehicle classes.

- q. In renumbered subsection 2.6, CARB staff proposes the following two changes:
- i. A change was made to renumber the existing subsection. This is necessary to have a proper numbering sequence.
 - ii. A modification was made to add the phrase "medium-duty diesel engines or" into the existing language. This change is needed to ensure that the durability demonstration requirements for medium-duty engines would apply if those engines are used with hybrid powertrains for installation in incomplete vehicles with GVWR from 10,001 to 14,000 pounds.
- r. In renumbered subsection 2.7, CARB staff proposes the following three changes:
- i. A change was made to renumber the existing subsection. This is necessary to have a proper numbering sequence.
 - ii. A modification was made to provide limited durability demonstration allowance for MY 2024 through 2026 optionally certified diesel hybrid powertrain families using on-road heavy-duty engines other than California-certified on-road heavy-duty diesel engines. The proposed modification would allow a manufacturer to use one of the durability demonstration options for MY 2024 through 2026 engines as provided in section I.26.B.1.1.1. of these test procedures. These are the same durability demonstration options for MY 2024 through 2026 conventional engines. Durability demonstration for hybrid-related components is also included in the proposed 30-day change modification and is the same as previously required for optionally certified hybrid powertrains. These changes are needed to ensure that hybrid powertrain manufacturers have additional flexibility to demonstrate durability for hybrid powertrains manufactured for MY 2024 through 2026 and to ensure consistency with durability demonstration requirements for hybrid components.

A modification was made to add the word "California" into the phrase "For optionally certified diesel hybrid powertrain families using engines other than California certified on-road..." This change is needed to provide clarity that the requirements as provided in this section are applicable to only hybrid powertrains using non California-certified on-road engines.

A modification was made to add "medium-duty diesel engines or" into this section since the proposed 30-day change would allow hybrid powertrains using medium-duty engines for use in incomplete medium-

duty vehicles with GVWR from 10,001 to 14,000 pounds to be optionally certified using the hybrid powertrain certification test procedure. This change is needed to ensure that these medium-duty engines used in hybrid powertrains are also subject to durability demonstration requirements.

- iii. A modification was made to add the phrase “medium-duty diesel engines or” into the existing language. This change is needed to ensure that the durability demonstration requirements for medium-duty engines would apply if those engines are used with hybrid powertrains for installation in incomplete vehicles from 10,001 to 14,000 pounds GVWR.

9. Section 30. Certification. [§86.xxx-30]

- a. CARB staff proposes to modify an incorrect numbering sequence in subsection 30.A.2. The numbering sequence has been corrected to start with the number 2 rather with the number 1. The correction renumbers the subsections as 2.1. through 2.14.
- b. In subsection 30.B, CARB staff proposes to modify the requirement that would have prevented manufacturers from being able to request a carryover or carry across application based on data from an engine family or test group that is equipped with an emission control component that exceeds the thresholds specified in title 13, CCR, section 2143 that has not been improved for the MY for which the application is for. Engine manufacturers expressed concern about possible disruption to business practices and potential delays in production if emission control components exceed thresholds specified in title 13, CCR, section 2143. The proposed change would allow manufacturers to request a carryover or carry across application based on data from an engine family or test group that is equipped with such an emissions control component only if they extend the emissions warranty coverage for that component to the full useful life period of the engine or test group for which certification is sought. The proposed change would address manufacturers’ concerns while ensuring that emission control components with known defects will be functioning as intended throughout the useful life period because they will be repaired or replaced if a failure occurs. Grammatical edits are also proposed to more clearly describe this requirement.

Additionally, CARB staff proposes an amendment to clarify that manufacturers must redesign, recalibrate, or manufacture a component differently in order to demonstrate that it will not experience failures as it did for the previous MY. This may be achieved through modifications of hardware or software. The proposed amendment clarifies that improvements to the component should address known defects from the previous MY.

10. Section 35. Labeling. [§86.xxx-35]

- a. CARB staff proposes to delete the labeling requirements in subsections 35.B.6.1 and 35.B.7. The changes are necessary since the provision to certify to the optional 50-state-directed engine emission standards is also being removed, as discussed in section I.A.14 above.
- b. CARB staff proposes to add the word “primarily” in subsection 6. This change is necessary to be consistent with how engines are currently being treated and clarifies the labeling requirements for optionally certified diesel hybrid powertrains.
- c. CARB staff proposes to add a new subsection 7 that requires manufacturers of MY 2024 through 2026 heavy-duty diesel engines rated at or above 525 bhp, and certify their engines according to the provisions in 13 CCR 1956.8(a)(2)(C)2, to label their engines such that they indicate they conform to the 525 bhp and above exemption specified in 13 CCR 1956.8(a)(2)(C)2. This is necessary to identify such engines for inspection and compliance determination purposes.

B. Part 86, Subpart N – Exhaust Test Procedures for Heavy-Duty Engines

1. Section 86.1362. Steady-state testing with a ramped-modal cycle.

- a. CARB staff proposes to adopt the changes in the Phase 2 technical amendments for this section. The revisions in the Phase 2 technical amendments include the powertrain test cycle for the Vehicle-RMC cycle. This new cycle is needed to ensure that hybrid powertrains could be certified in the 2024 and subsequent MY timeframe.
- b. In subsection 86.1362.A.2, CARB staff proposes to modify the vehicle speed and road grade coefficients for the RMC duty cycle from the current three coefficients to a total of eight road grade coefficients. This modification improves the accuracy for testing optionally certified hybrid powertrains.

2. Section 86.1370. Not-To-Exceed test procedures.

- a. CARB staff proposes to modify subsection 86.1370.B.6 to provide clarification to the in-use 3B-MAW procedure.
- b. The introductory paragraph of the 3B-MAW method was changed to clarify that this test procedure only applies to 2024 and later MY engines. A typographical error was corrected by moving “Part 86” to before “Subpart T.”
- c. Hyphens were added for the phrases “shift-day” to parallel CFR language.

- d. CARB staff proposes to add language for provisions for cold start testing requirements by providing flexibility when ambient and logistical conditions may make cold start infeasible. Testing may be conducted if situations are identified in the test plan approval and approved by the Executive Officer as part of the test plan approval process in 86.1920.B.3.2.

As indicated below, CARB staff is also proposing amendments to 86.1920.B.3.2 specifying that CARB's Executive Officer will approve requests to not conduct cold start testing if he or she determines that the identified circumstances will not allow the manufacturer to meet the cold start test requirements, and explain that in assessing the request, the Executive Officer will reply on information provided by the manufacturer and his or her engineering judgment.

- e. Clarifying language was added to subsection 6.1 to define a window initiating from every valid second of the data set. A typographical error of using brackets for the list of pollutants was changed to parentheses. Additionally, text was modified in subsection 6.1 to replace the word "period" with "rate" for consistency with the sampling rate in the regulations. The "greater than or equal to" symbol and "1 Hz" was removed to clarify the sampling rate of 1 second for data storage and calculations. Also, language was added to clarify that windows start when there is valid test data.
- f. Text was modified in 6.2 to clarify the handling of invalid data to accommodate small gaps of invalid data in calculating valid windows. Modified text also clarifies that long sequences, greater than 600 seconds, of invalid data would terminate the continuous window generation and require the creation of a new windows sequence. CARB staff also clarified that data generated during instrument zero drift check or conditioning of the PEMS may be considered invalid data and revised the subsection numbering to include this change.
- g. In subsection 6.2.1, "Portable Emissions Measurement System" was changed to the abbreviation "PEMS" because it was defined earlier in the document.
- h. In subsection 6.2.5, the temperature invalidation with respect to altitude was clarified by stating data generated when temperatures are greater than specified at altitude, h, are invalid. In the variable definitions, "A" was corrected to "h." The units for "h" were also added for clarity.
- i. Previously proposed subsection 6.2.6 defined cold start provisions at the beginning of a test. CARB staff proposes to broaden this provision to cover any starts during the test that fall within the cold start definition. Also, the

- cold start provision was modified to provide more clarity, which resulted in removing subsection 6.2.6.1 and 6.2.6.2.
- j. CARB staff proposes to invalidate data generated during manual active regeneration and automatic active regeneration events in subsection 6.2.7.
 - k. In subsection 6.2.8, CARB staff proposes to invalidate data generated while engine is shut-off or keyed off during in-use testing.
 - l. In subsection 6.3.1, CARB staff proposes to allow circumstances to be identified at time of test plan approval where cold starts may be infeasible. Language was added to clarify testing may be conducted with the absence of cold start conditions with advance Executive Officer approval. Also, a reference to the test plan approval process in "86.1920.B.3.2" was added to provide additional clarity. As indicated below, CARB staff is also proposing amendments to 86.1920.B.3.2 specifying that CARB's Executive Officer will approve requests to not conduct cold start testing if he or she determines that the identified circumstances will not allow the manufacturer to meet the cold start test requirements, and explain that in assessing the request, the Executive Officer will reply on information provided by the manufacturer and his or her engineering judgment.
 - m. CARB staff proposes to change the valid test requirements to a minimum of 2,400 valid windows in each of the bins (idle, low, and medium/high) instead of the 3 hours of non-idle operation requirement of the NTE methods in subsection 6.3.2. This would provide a minimum of 40 minutes of valid engine operation to be used in evaluating compliance in each of the three bins. Clarifying language was added to indicate additional testing will be required until the minimum required windows per bin is achieved. In addition, if the 2,400 valid windows are achieved for the low load and the medium/high load bins, but not in the idle bin, then the manufacturers may request the fleet to idle their engines at the end of the shift-day for a minimum of 40 minutes to a maximum of 60 minutes to satisfy the 2,400 valid window requirement for the idle bin.
 - n. CARB staff proposes to modify subsection 6.3.3 to clarify that the average engine power over the test must be at least 10 percent of the engine's peak power or else the manufacturer will be required to retest the engine until a valid test is completed.
 - o. CARB staff proposes to remove subsection 6.4 because the definitions were redundant and previously described in more detail in subsection 6.1. Subsequent subsections were renumbered to accommodate for the removal of subsection 6.4.

- p. CARB staff proposes several changes for clarity in renumbered sections 6.4 to 6.6 as follows:
- i. The phrase "Windows Emissions Normalized Average CO₂ rate: was replaced with the phrase "Percent engine load" in the heading for subsection 6.4 to clarify that the binning metric is based on engine load.
 - ii. The phrase "Window Emissions normalized average CO₂ rate" was replaced with the phrase "percent engine load." This change makes the label and the intent of the binning metric clearer.
 - iii. The number "2" is changed to a subscript for "CO₂."
 - iv. The phrase "sum-over-sum" is abbreviated to SOS for simplicity.
- q. CARB staff proposes changes to the renumbered section 6.4. The equation was edited to reflect the change to "Percent Engine Load_{window}" and the calculation of the average CO₂ emissions over the window. The units of second abbreviated "sec" were added to "300" in the equation. The variable definition was added to show that the percent engine load_{window} is dependent on the average of the CO₂ mass emission rate over the window, maximum horsepower, and the family certification level (FCL). "Percent Engine Load_{window}" was added to the variable definitions. The definition for \dot{m}_{CO_2} was revised to be the mass emission rate in grams per second. The definition was modified to indicate the FCL used in the equation stems from the FTP certification cycle. Finally, a definition for the sampling rate, Δt , is equal to 1 second was added.
- r. CARB staff proposes new language to renumbered subsection 6.5 and to clarify that windows are binned based on the percent engine load over 300 seconds of operation, and not on vehicle operation.
- s. CARB staff proposes changes in subsection B.6.6 as follows:
- i. The equations for the SOS calculations for the low load and medium/high load bins were modified for clarification based on input from industry stakeholders. The subscripts, "a" and "b," were moved to be defined with the $e_{s_{os\ a,b}}$ variable.
 - ii. The term "emission rate" was added to the definitions of \dot{m}_a and \dot{m}_{CO_2} to clarify the units.
 - iii. The term " $e_{CO_2,FTP,FCL}$ " was deleted and replaced with "FCL" to improve clarity of the equation. FCL was removed because it was already defined in subsection 6.4.

- iv. Variable “ n ” was redefined as “ n_b ” the number of windows, not seconds, in a bin for clarity based on industry stakeholder comments.
- v. The definition of the sampling rate, Δt , was added to clarify the time step should be 1 second.
- vi. The equation for the SOS calculations for the idle bin was corrected based on input from industry stakeholders.
- vii. The term “emission rate” was added to the definition of \dot{m}_a to clarify the units.
- viii. Variable definition n_{idle} was added to provide clarification to the updated equation.
- ix. The units “[1 second]” were added to the definition of the sampling rate, Δt .
- x. A clarifying sentence was added identifying NO_x as the only criteria pollutant with an idle standard, so the subscript “a” represents NO_x in that bin.
- xi. The in-use threshold equation was clarified to be the in-use threshold equal to the conformity factor, CF, multiplied by the standard. The 1.5 was removed because the value of the CF will change depending on the engine MY.
- xii. For 2024 through 2029 MY engines where the conformity factor was proposed to be 1.5, manufacturers voiced concerns for meeting the emission thresholds for new technology required to meet the proposed 2024 and 2027 standards. To address their concern, CARB staff proposes to change the conformity factor from 1.5 to 2.0 for 3 years after the introduction of new NO_x standards (i.e., for model year 2024 to 2026 and then again for model year 2027 to 2029). This change would provide the manufacturers an additional compliance margin during the introduction of more stringent NO_x standards.
- xiii. The phrase “sum-over-sum” was abbreviated to “SOS” for simplicity throughout section 6.6.

C. Part 86, Subpart T – Manufacturer-Run In-Use Testing Program for Heavy-Duty Diesel Engines

1. Section 86.1905. How does this program work?

In section 86.1905, subparagraph 2, CARB staff proposes to delete the word “vehicle.” This modification is necessary to update the title of the CARB contact for the submission of electronic reports by the manufacturer.

2. Section 86.1910. How must I prepare and test my in-use engines?

CARB staff proposes modifications to subsection 86.1910.A.6 to clarify the requirements for minimum data collection in the in-use program. Language is added to clarify that the requirement for 3 hours of non-idle operation would apply only to 2005 through 2023 MY engines. For 2024 and subsequent MY engines, the minimum idle time requirement is replaced with a minimum windows per bin requirement from section 86.1370.B.3.2. This change would act as a safeguard for manufacturers, ensuring that a significant amount of data per bin is collected before determining if a test passes or fails. Similar to the existing language, additional testing may be required if the minimum data requirements are not met on a single day.

3. Section 86.1912. How do I determine whether an engine meets the vehicle-pass criteria?

CARB staff proposes changes to subsection B.2 to clarify minimum data requirements for 2024 and subsequent MY engines. For 2024 and subsequent MY engines the minimum idle time requirement is replaced with a minimum windows per bin requirement from section 86.1370.B.3.2. This change would act as a safeguard for manufacturers, ensuring that a significant amount of data per bin is collected before determining if a test passes or fails. Similar to the existing language, additional testing may be required if the minimum data requirements are not met on a single day.

4. Section 86.1915. What are the requirements for Phase 1 and Phase 2 testing?

- a. In subsection A.2, CARB staff proposes to add the term “section” to clarify the reference for 86.1912.
- b. In subsection A.3, CARB staff proposes to add clarifying language to the engine family testing procedure by adding new subsections 86.1915.A.4 through 7. The modifications are necessary for the following reasons:
 - i. The new subsection A.4 clarifies the process for testing four additional vehicles to a total of ten in cases where there were two or more failed tests from testing conducted in (a)(1) or (a)(2). The new subsection also

allows manufacturers the option to terminate testing at any time if noncompliance is determined by the manufacturer.

- ii. The new subsection A.5 was added to indicate there is no change to subparagraph (a)(4) to (b)(3).
- iii. The new subsection A.6 allows sunsets the provisions for Phase 2 testing for 2023 and earlier MY engines because compliance determinations for 2024 and newer MY engines with the 3B-MAW will not require additional testing to determine compliance.
- iv. The new subsection A.7 was added to indicate there is no change to subparagraph (c).
- v. In subsection 86.1915.B.1, CARB staff proposes to change the required time period to report to CARB's Executive Officer from 72 hours to 15 days. This modification is necessary to provide more time for manufacturers to report the results of Phase 1 testing.
- c. In subsection 86.1915.B.2, CARB staff proposes to add clarifying language that points to the federal provisions of "86.1912.A of these test procedures."
- d. In subsection B.3, CARB staff proposes changes to fix a typographical error by capitalizing the word "Phase."
- e. In subsection B.3.1, CARB staff proposes to fix a typographical error by removing the word "window."
- f. In subsection B.3.2, CARB staff proposes adding the phrase "arithmetic mean of" to clarify the methods for averaging the 10 vehicle tests to determine compliance. Additionally, the closing sentence of the paragraph is moved to the first sentence of the paragraph for clarity.
- g. Subsection B.4, CARB staff proposes clarifying text to reference the federal provisions specifically in 86.1915.A(a)(1) and (2). CARB staff also corrected a typographical error with a misplaced comma.
- h. In new subsection B.5, CARB staff proposes text to clarify the requirements for fulfilling Phase 1 testing requirements. For 2024 and subsequent MY engines, Phase 1 testing is considered complete if any of the following conditions are met:
 - i. A total of five valid vehicle tests were analyzed with the methods in 86.1370.B.6. and all five vehicles pass.

- ii. A total of six valid vehicle tests were analyzed with the methods in 86.1370.B.6. and five of the six vehicles pass.
- iii. A total of ten valid vehicle tests were analyzed with the methods in 86.1370.B.6, and the arithmetic mean of the ten engines' sum-over-sum values in §86.1370.B.6.6. are less than the in-use thresholds for each bin and pollutant.
- iv. The engine manufacturer declares engine family noncompliance and begins discussions for corrective actions.

5. Section 86.1920. What in-use testing information must I report to ARB?

- a. In section 86.1920, CARB staff proposes to add the subtitle "A. Federal Provisions." This change is necessary to indicate that the following subparagraphs are federal or amended federal provisions and to maintain consistency with the structure of the other sections of the test procedures.
- b. In subsection 86.1920.A.1, CARB staff proposes to delete the word "vehicle." This modification is necessary to update the title of the CARB contact for the submission of electronic reports by the manufacturer.
- c. In subsection 86.1920.A.9.(i), CARB staff proposes to fix a typographical error changing section 86.1370.B.6.7 to 86.1370.B.6.6 for reference to the in-use thresholds.
- d. In subsection 86.1920.B.3, CARB staff proposes to add language to clarify that CARB's Executive Officer will be pre-approving manufacturers' test plans, and that manufacturers must notify CARB's Executive Officer if a subsequent shift-day is necessary. CARB staff further proposes to specify that test plans, notifications, and communications related to this subsection must be sent to CARB's Executive Officer, and provides both a mailing address and an email address that manufacturers can use.
- e. In subsection 86.1920.B.3.1, CARB staff proposes to add clarifying language to indicate not all items in the table may be known at the time of sending a test plan for approval. In cases where the exact conditions are unknown, they may be forecasted indicating forecasted on the test plan. This change is based on feedback from industry stakeholders.
- f. In subsection 86.1920.B.3.2, CARB staff proposes to add clarifying language to indicate weather or logistical circumstances making cold start requirements infeasible for this particular test. This change is based on feedback from industry stakeholders. CARB staff further proposes adding language specifying that CARB's Executive Officer will approve requests to not conduct cold start testing if he or she determines that the identified

circumstances will not allow the manufacturer to meet the cold start test requirements. In assessing the request, the Executive Officer will reply on information provided by the manufacturer and his or her engineering judgment.

- g. In subsection 86.1920.B.3.3, CARB staff proposes restructuring the sentence to clarify that manufacturers must electronically submit test plans, a contact email and contact phone number at least 30 days prior to scheduled testing. CARB staff also proposes adding language specifying that CARB's Executive Officer will be reviewing the test plan submissions, and that CARB's Executive Officer will approve a submitted test plan if he or she determines the plan will enable the manufacturer to collect a sufficient number of data stream values specified in 86.1920.B.1 and B.2 of these procedures that are needed to determine if an engine meets the vehicle pass criterion in 86.1912. CARB staff proposes clarifying that if CARB's Executive Officer does not provide comments on the submitted test plan no later than 14 days after the test plan is submitted, the manufacturer may then proceed with testing the vehicle.

D. Part 1036, Subpart A – Overview and Applicability

1. Section 1036.1. Does this part apply for my engines?

- a. In section 1036.1, CARB staff proposes to align with the federal Phase 2 GHG technical amendments pre-publication date, March 10, 2021. This section that CARB adopted in 2018 without modification describes the applicability of engines to the provisions of this part. The Phase 2 GHG technical amendments add a new paragraph (b)(3) to clarify that the provisions of §1036.501(h)(1) is applicable. The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.
- b. In section 1036.1, CARB staff proposes to add "2022 and subsequent model year diesel hybrid powertrains optionally certifying to criteria pollutants emission standards pursuant to title 13, CCR, 1956.8 that will be installed in incomplete vehicles from 10,001 to 14,000 pounds GVWR." This is necessary since diesel hybrid powertrains used in incomplete vehicles with a GVWR from 10,001 to 14,000 pounds are now proposed in the 30-day changes to be eligible to use the hybrid powertrain test procedure to certify to criteria pollutants and GHG emission standards.

E. Part 1036, Subpart B – Emission Standards and Related Requirements

In subsection 1036.108.3, CARB staff proposes to remove the merged cells in the first row of the table for the optional low-CO₂ emissions standards and keep the title text of the table outside the table. This modification is non-

substantive and is necessary to improve accessibility and readability of the regulatory document.

F. Part 1036, Subpart C – Certifying Engine Families

1. Section 1036.225. Amending my application for certification.

In section 1036.225, CARB staff proposes to align with the federal Phase 2 GHG technical amendments pre-publication date, March 10, 2021. This section that CARB adopted in 2018 without modification contains the procedures for amending an application for certification once it has been submitted for certification. The Phase 2 GHG technical amendments clarify the start date of the amended application and explain that the engine family FEL can be modified before the end of the MY. The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

2. Section 1036.230. Selecting engine families.

In section 1036.230, CARB staff proposes to align with the federal Phase 2 GHG technical amendments pre-publication date, March 10, 2021. This section that CARB adopted in 2018 without modification describes the information required in selecting engine families. The Phase 2 GHG technical amendments allow engine families to be divided into subfamilies with respect to compliance with carbon dioxide (CO₂) standards. The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

3. Section 1036.255. What decisions may ARB make regarding my certificate of conformity?

In section 1036.255, CARB staff proposes to align with the federal Phase 2 GHG technical amendments pre-publication date, March 10, 2021. This section that CARB adopted in 2018 without modification describes the decisions that CARB may make regarding certification and issuing a certificate of conformity (or Executive Order). The Phase 2 GHG technical amendments simply and clarify the requirements of this section. The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

G. Part 1036, Subpart D – Testing Production Engines and Hybrid Powertrains

This Subpart D revises the heading to include hybrid powertrains. This modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

1. Section 1036.301. Measurements related to GEM inputs in a selective enforcement audit.

In section 1036.301, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from October 25, 2016 to align with the federal Phase 2 GHG technical amendments pre-publication date. This section that CARB adopted in 2018 without modification provides an overview of performing audits and selective enforcement testing of any GEM inputs used in certification. In the Phase 2 GHG technical amendments, the only change was a minor modification to spell out "Heavy-Duty Vehicles" for the acronym "HDV" for clarification. The modification is necessary for clarification and for harmonization with the federal Phase 2 GHG technical amendments.

H. Part 1036, Subpart F – Test Procedures

1. Section 1036.501. How do I run a valid emission test?

- a. In section 1036.501, CARB staff proposes to align with the federal Phase 2 GHG technical amendments pre-publication date, March 10, 2021. This section that CARB adopted in 2018 without modification describes the procedure for running a valid emission test. The Phase 2 GHG technical amendments provide a new paragraph (g) to specify duty cycles for testing MY 2016 – 2020 engines, including additional clarifications to the proposed amendment to refer to the steady-state duty cycle as the Supplemental Emission Test ("SET") rather than the Ramped Modal Cycle ("RMC") the requirements of this section, as well as modify paragraph (h)(1) to address restarting the engine during dynamometer testing for engines with stop-start technologies, and add paragraph (h)(3) (shown as (h)(2) in the proposed rule) to cross-reference transient test cycle specifications. The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.
- b. In 1036.501 subparagraph (h), CARB staff proposes modifying numbering citations from "subparagraph (h)(1)" to "subparagraphs (h)(1) through (h)(2)," including adding "s" to "subparagraph" to now read "subparagraphs." These changes are necessary to follow corresponding changes that were made in the federal regulation and for proper grammar, as a result of the proposed change in this subparagraph. CARB staff is also proposing a wording change in section (h)(3) replacing "using" with "over," and to add a reference citation for §1036.510. These changes are necessary to align with the changes made in the recently adopted federal regulation.
- c. CARB staff proposes changing "subparagraphs (h)(3) through (h)(4)" to "subparagraph (h)(4)," including removing "s" from "subparagraphs" to now read "subparagraph." These changes are necessary to follow corresponding

changes that were made in the federal regulation and for proper grammar, as a result of the proposed change in this subparagraph.

- d. In new subparagraph (h)(6)(d), CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from May 12, 2020. This change is necessary to update to the most recently adopted federal regulation.
- e. In new subparagraph (h)(6)(e), CARB staff proposes adding the sentence “Apply the curb idle transmission torque, CITT, according to section 1037.550(f)(2) of these test procedures.” to the beginning paragraph of this subsection. This change is necessary to align with recently adopted federal regulatory language describing how to apply the CITT for powertrain testing for driveline model with a simulated transmission. The proposed change would allow this approach to be used in applying accessory loads for the LLC.

2. Section 1036.503. Engine data and information for vehicle certification.

In section 1036.503, CARB staff proposes to align with the federal Phase 2 GHG technical amendments pre-publication date, March 10, 2021. This section that CARB adopted in 2018 without modification describes the requirements for engine data and information that are needed for certifying vehicles. The Phase 2 GHG technical amendments migrate section 1036.510 to new section 1036.503, update existing paragraph (c) and add a new (c)(4) and (d)(4). The new text specifies that the engine manufacturer must provide idle speed and torque to the vehicle manufacturer. Additional direction is given on handling data points for a low-speed governor where the governor is active. The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

3. Section 1036.505. Supplemental emission test.

- a. In section 1036.505, CARB staff proposes to align with the federal Phase 2 GHG technical amendments pre-publication date, March 10, 2021. This section that CARB adopted in 2018 without modification describes the procedures performing supplemental emission test, which was formerly named “ramped-modal testing procedures.” The Phase 2 GHG technical amendments change the section title to “Supplemental emission test” from “Ramped-modal testing procedures” and add a new paragraph (b) and modifies paragraph (c), renumbered from paragraph (b), to give direction on both engine and powertrain testing, modifies Table 1 to include vehicle speed and grade parameters to facilitate the hybrid powertrain testing option. The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

- b. In 1036.505 subparagraph (a), CARB staff proposes to replace “ramped modal” with “SET duty” at two locations in this subsection. These changes are necessary to align with revised terminology used in the recently adopted federal regulation. Furthermore, references were changed from CFR to the existing CARB test procedures. Additionally, starting with the 2024 MY, CARB staff proposes to give the engine and hybrid powertrain manufacturers the option to use either the cycle in this section or the duty cycle in 86.1362 to measure criteria pollutant emissions. These additional changes are necessary to correctly reference the test procedures to be used for the SET duty cycle and to provide hybrid powertrain manufacturers with two options for measuring criteria pollutant emissions starting with the 2024 MY hybrid powertrains, which would result in a more efficient process for testing hybrid powertrains. The rationale for providing this flexibility was described in the rationale for the definition of the RMC cycle.
- c. In 1036.505 subparagraph (b)(2), CARB staff proposes two section citation numbering changes, to “(b)(2)(ix)” from “(b)(2)(viii)” and to “40 CFR 1037.550(a)(3)(ii)” from “40 CFR 1037.550(b)(3)(ii).” Staff also proposes to replace the acronym “RMC” with “SET” at two locations in this subsection. These changes are necessary to align with numbering and terminology changes in the recently adopted federal regulation.

4. Section 1036.510. Transient Testing Procedures.

In section 1036.510, CARB staff proposes to align with the federal Phase 2 GHG technical amendments pre-publication date, March 10, 2021. CARB staff proposes to adopt this newly added section without modification, which describes the procedures performing transient testing procedures for the testing of engines and hybrids to facilitate hybrid certification for both GHG and criteria pollutants. The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

5. Section 1036.525. Hybrid engines.

In section 1036.525, CARB staff proposes to align with the federal Phase 2 GHG technical amendments pre-publication date, March 10, 2021. This section that CARB adopted in 2018 without modification describes the testing and emissions measurements procedures for hybrid engines. The Phase 2 GHG technical amendments revise paragraphs (a), (d) introductory text, and (d)(4) to clarify in the final rule that the hybrid engine testing procedure in this section applies only for MY 2014 to 2020 hybrid engines since the new hybrid powertrain and hybrid engine test procedure in the final rule will apply for MY 2021 and later engines. The technical amendments also include editorial revisions to equation and the

addition of example calculations. The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

6. Section 1036.527. Powertrain system rated power determination.

In section 1036.527, CARB staff proposes to align with the federal Phase 2 GHG technical amendments pre-publication date, March 10, 2021. CARB staff proposes to adopt this newly added section without modification, which describes the procedures for determining the peak and continuous rated power of conventional and hybrid powertrain systems and the vehicle speed for carrying out testing according to §1036.505, §1036.510, and 40 CFR §1037.550 to facilitate the hybrid and conventional powertrain testing options. This test procedure is applicable for powertrain testing defined in 40 CFR §1037.550 for both the engine and vehicle standards. Additional updates include further modification to the proposed language, including modifying how the test is carried out by reducing the number of test intervals from 9 to 1, paragraph (e) to address the determination of P_{sys} for speed and torque measurements at different locations, with new paragraphs (g) and (h) to provide an improved method for determining continuous rated power and vehicle C_{speed} , and addressed typographical errors. The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

7. Section 1036.530. Calculating greenhouse gas emission rates.

In section 1036.530, CARB staff proposes to align with the federal Phase 2 GHG technical amendments pre-publication date, March 10, 2021. This section that CARB adopted in 2018 without modification describes how to calculate official emission results for CO₂, CH₄, and N₂O. The Phase 2 GHG technical amendments update sections (b)(1)(i) and (2) to require test fuel mass-specific energy content to be analyzed by three different labs and the arithmetic mean to be used in the calculation, update carbon mass fraction determination to allow analysis by a single lab only, update to add ASTM method for determination of test fuel mass-specific energy content for natural gas and update the footnote format in Table 1. The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

8. Section 1036.535. Determining steady-state engine fuel maps and fuel consumption at idle.

In section 1036.535, CARB staff proposes to align with the federal Phase 2 GHG technical amendments pre-publication date, March 10, 2021. This section that CARB adopted in 2018 without modification describes how to determine an engine's steady-state fuel map and fuel consumption at idle for MY 2021 and later vehicles. Vehicle manufacturers may need these values to demonstrate compliance with emission standards under 40 CFR, part 1037, as described in §1036.510. The Phase 2 GHG technical amendments provide a general update to improve the engine fuel mapping test procedures. Additional updates include adding

paragraph (h) to describe how U.S. EPA will determine the official fuel consumption rate during a confirmatory test, based on carbon balance results, updating paragraph (b)(7)(iv) to require validation of test intervals that were complete prior to a lab equipment or engine malfunction, updating the variable description for wCmeas in paragraph (b)(8) to make clear that manufacturers may not account for the contribution to α , β , γ , and δ of diesel exhaust fluid or other non-fuel fluids injected into the exhaust, and clarifying regulatory text and correcting paragraph references. The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

9. Section 1036.540. Determining cycle-average engine fuel maps.

In section 1036.540, CARB staff proposes to align with the federal Phase 2 GHG technical amendments pre-publication date, March 10, 2021. This section that CARB adopted in 2018 without modification describes how to determine an engine's cycle-average fuel maps for MY 2021 and later vehicles with transient cycles. The Phase 2 GHG technical amendments provide a general update to improve the cycle-average engine fuel mapping test procedure. Additional updates include modification of the proposed language by adding paragraph (b)(4) to address the ability of gaseous-fueled engines with single point fuel injection to pass alternate cycle statistics to validate the transient duty cycle in 40 CFR part 1037, Appendix I, by adding paragraph (e)(2) to describe how U.S. EPA will determine the official fuel consumption rate during a confirmatory test, based on 8 carbon balance results, by deleting the requirement for U.S. EPA to use an average of indirect measurement of fuel flow with dilute sampling and direct sampling for fuel mapping as U.S. EPA will now perform the carbon balance verification in 40 CFR §1065.543, and by generally adding some clarifying text. The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

10. Section 1036.543. Carbon balance error verification.

In section 1036.543, CARB staff proposes to align with the federal Phase 2 GHG technical amendments pre-publication date, March 10, 2021. CARB staff proposes to adopt this newly added section without modification, which was added to the Notice of Proposed Rulemaking (NPRM) and is carried over unchanged to the final rule, which addresses carbon balance error verification. The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

I. Part 1036, Subpart G – Special Compliance Provisions

1. Section 1036.620. Alternate CO₂ standards based on model year 2011 compression-ignition engines.

In section 1036.620, CARB staff proposes to align with the federal Phase 2 GHG technical amendments pre-publication date, March 10, 2021. This section that

CARB adopted in 2018 without modification describes how to determine the measured emission rate of the test engine and calculate the CO₂ emission rate of the baseline test engine. The Phase 2 GHG technical amendments revise paragraphs (a) and (b)(1)(iii) to replace “ramped modal” with “SET duty.” The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

J. Part 1036, Subpart H – Averaging, Banking, and Trading for Certification

1. Section 1036.705. Generating and calculating emission credits.

In section 1036.705, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from October 25, 2016. This section that CARB adopted in 2018 without modification describes how to calculate emission credits. The Phase 2 GHG technical amendments replace the term, “ramped modal,” to “SET duty” cycle for tractor engines in subsection (b)(2) and clarify the engine type, non-gasoline engines, in subsection (b)(5). The modification is necessary for clarification and for harmonization with the federal Phase 2 GHG technical amendments.

K. Part 1036, Subpart I – Definitions and Other Reference Information

1. Section 1036.801. Definitions.

- a. In section 1036.801, CARB staff proposes to align with the federal Phase 2 GHG technical amendments pre-publication date, March 10, 2021. This section that CARB adopted in 2018 without modification describes how to define the terminologies found in this part. The Phase 2 GHG technical amendments add and revise various definitions. The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.
- b. In subsection 1036.801.B, CARB staff proposes modifying the definition of “Hybrid powertrain” by adding a sentence “Note other examples of systems that qualify as hybrid engines or powertrains are systems that recover kinetic energy and use it to power an electric heater in the aftertreatment.” This is necessary to harmonize with the revised definition from the U.S. EPA as used in the Phase 2 GHG technical amendments final rule to expand the definition of hybrid powertrain to include systems that recover kinetic energy and use it to power an electric heater in the aftertreatment.
- c. In subsection 1036.801 B, CARB staff proposes modifying the definition of “Hybrid vehicle” by adding a sentence, “Note other examples of systems that qualify as hybrid engines or powertrains are systems that recover kinetic energy and use it to power an electric heater in the aftertreatment.” This is

necessary to harmonize with the revised definition from the U.S. EPA as used in the Phase 2 GHG technical amendments final rule to expand the definition of hybrid powertrain to include systems that recover kinetic energy and use it to power an electric heater in the aftertreatment.

2. Section 1036.810. Incorporation by reference.

In section 1036.810, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from October 25, 2016. The section describes the material that is incorporated by reference in Part 1036. The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

L. Appendix I to Part 1036 – Summary of Previous Emission Standards

In Appendix I to part 1036, CARB staff proposes to align with the federal Phase 2 GHG technical amendments pre-publication date, March 10, 2021. CARB staff proposes to adopt this newly added Appendix I without modification, which was added to the NPRM and is carried over unchanged to the final rule, which provide a historic summary of previous emission standards which U.S. EPA originally adopted under 40 CFR, part 85 or part 86, that apply to compression-ignition engines produced before MY 2007 and to spark-ignition engines produced before MY 2008. The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

M. Appendix II to Part 1036 – Transient Duty Cycles

In Appendix II to part 1036, CARB staff proposes to align with the federal Phase 2 GHG technical amendments pre-publication date, March 10, 2021. CARB staff proposes to adopt this newly added Appendix II without modification, which specifies transient duty cycles for the engine and powertrain testing. The Phase 2 GHG technical amendments add a new paragraph (a) to specify transient duty cycles for the engine and powertrain testing described in §1036.510, add a new paragraph (b) to migrate over the spark-ignition FTP duty cycle from part 86, add a new paragraph (c) to migrate over the compression-ignition FTP duty cycle from part 86, and update the transient duty cycles to include road grade coefficients for powertrain testing. The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

N. Appendix III to Part 1036 – Default Engine Fuel Maps for 40 CFR §1036.540

In Appendix III to part 1036, CARB staff proposes to align with the federal Phase 2 GHG technical amendments pre-publication date, March 10, 2021. CARB staff proposes to adopt this renumbered Appendix III, from Appendix I, without modification, which specifies default engine fuel maps for the engine and powertrain

testing 40 CFR §1036.540. The Phase 2 GHG technical amendments redesignate Appendix I to Appendix III without modification. The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

O. Appendix IV to Part 1036 – Low-load cycle for optionally certified diesel engine hybrid powertrain families

1. California Provisions

In Appendix IV to Part 1036, CARB staff proposes to update the vehicle speed and the road grade coefficients for the vehicle low-load cycle. This modification is needed for improved accuracy for testing optionally certified diesel hybrid powertrains. CARB staff also proposes to add 40 CFR Part 1036.527 adopted on March 10, 2021 (Pre-publication) to these test procedures. This modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

P. Part 1065, Subpart B – Equipment Specifications

1. Section 1065.130. Engine exhaust.

In section 1065.130, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from April 28, 2014. The section describes how to use the exhaust system installed with the engine or one that represents a typical in-use configuration. The change in the Phase 2 GHG technical amendments denotes that a carbon balance procedure should be performed to verify exhaust system integrity in place of a chemical balance procedure. The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

2. Section 1065.140. Dilution for gaseous and PM constituents.

In section 1065.140, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from October 25, 2016. The section that CARB adopted in 2018 without modification describes the dilution for gaseous and particulate matter constituents. In the Phase 2 GHG technical amendments, the change in subsection (e)(2) clarifies how to determine the minimum dilution ratio for discrete mode testing. The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

3. Section 1065.145. Gaseous and PM probes, transfer lines, and sampling system components.

In section 1065.145, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from April 28, 2014. The section determines the total mass of each constituent with continuous or batch sampling. In the Phase 2 GHG technical amendments, the change in subsection (e)(3)(i) removes the

requirement to heat a sample pump if it is located upstream of a NO_x converter or chiller and replaces it with a requirement to design the sample system to prevent aqueous condensation to better address concerns with the loss of nitrogen dioxide (NO₂) in the sampling system where methods other than heating the pump can be used to prevent condensation. The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

4. Section 1065.170. Batch sampling for gaseous and PM constituents.

In section 1065.170, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from October 25, 2016. The section that CARB adopted in 2018 without modification describes the batch sampling for gaseous and PM constituents. In the Phase 2 GHG technical amendments, the change allows sampling to stop during hybrid tests when the engine is off, allows exclusion of the sampling off portions of the test from the proportional sampling verification, and adds a provision for hybrid testing to allow supplemental dilution air to be added to the bag in the event that sampled volumes are too low for emission analysis. The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

Q. Part 1065, Subpart C – Measurement Instruments

1. Section 1065.205. Performance specifications for measurement instruments.

In section 1065.205, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from April 28, 2014. The section describes the performance specifications for measurement instruments. In the Phase 2 GHG technical amendments, the changes to the introductory text and Table 1 revise and add recommended performance specifications for fuel and diesel exhaust fluid (DEF) mass scales and flow meters to reduce fuel flow measurement error. The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

2. Section 1065.220. Fuel flow meter.

In section 1065.220, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from October 25, 2016. The section that CARB adopted in 2018 without modification describes how to use fuel flow in combination with a chemical balance of fuel, inlet air, and raw exhaust to calculate raw exhaust flow. In the Phase 2 GHG technical amendments, changes in subsection (a) update the application of fuel flow meters to more correctly reflect how and what they are used for in Part 1065. The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

3. Section 1065.225. Intake-air flow meter.

In section 1065.225, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from October 25, 2016. The section that CARB adopted in 2018 without modification describes how to use an intake-air flow meter in combination with a chemical balance of fuel, inlet air, and exhaust to calculate raw exhaust flow. The Phase 2 GHG technical amendments in subsection (a) update the application of intake flow meters to more correctly reflect how and what they are used for in Part 1065. The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

4. Section 1065.247. Diesel exhaust fluid flow rate.

In section 1065.247, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from October 25, 2016. The section that CARB adopted in 2018 without modification describes diesel exhaust fluid flow rate over a test interval for batch or continuous emission sampling. The Phase 2 GHG technical amendments add the acronym "DEF" throughout the section in place of "diesel exhaust fluid" and account for any fluid that bypasses or returns from the dosing unit to the fluid storage tank in subsection (c)(2). The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

5. Section 1065.275. N₂O measurement devices.

In section 1065.275, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from October 25, 2016. The section that CARB adopted in 2018 without modification describes the nitrous oxide (N₂O) measurement devices. In the Phase 2 GHG technical amendments, the change deletes a URL for EPA Test Method 320 and replaces it with a reference to section 1065.266(b). The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

6. Section 1065.280. Paramagnetic and magnetopneumatic O₂ detection analyzers.

In section 1065.280, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from April 28, 2014. The section allows a paramagnetic detection or magnetopneumatic detection analyzer to measure oxygen (O₂) concentration in raw or diluted exhaust for batch or continuous sampling. In the Phase 2 GHG technical amendments, the change in subsection (a) clarifies that there is no method in section 1065.650 for determining O₂ balance and that a method using good engineering judgment may be developed. The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

R. Part 1065, Subpart D – Calibrations and Verifications

1. Section 1065.303. Summary of required calibration and verifications.

In section 1065.303, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from October 25, 2016. The section that CARB adopted in 2018 without modification summarizes required calibration and verifications. The Phase 2 GHG technical amendments update the formatting and entries in Table 1 to reflect revised requirements, including adding fuel mass scale and DEF mass scale to the linearity verifications in section 1065.307; update the verification in section 1065.341 to replace “batch sampler” with “partial-flow dilution (PFD)”; update one footnote to include the PFD flow verification (propane check) as not being required for measurement systems that are verified by a carbon balance error verification as described section 1065.341(h) and add two footnotes excluding linearity verification for DEF flow if the electronic control module (ECM) is used and for intake air, dilution air, diluted exhaust, batch sampler, and raw exhaust flow rates flow if propane checks or carbon balance is performed. These amendments are not new exemptions; they are simply relocated to the footnotes. The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

2. Section 1065.307. Linearity verification.

In section 1065.307, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from April 28, 2014. The section describes the linearity verification on each measurement system. The Phase 2 GHG technical amendments include revisions to include DEF mass flow rate and to correct or account for buoyancy effects and flow disturbances to improve the flow measurement, and expanding the subsection to include fuel and DEF mass scales and requirements for performing the linearity verification on these scales in subsection (d). The modifications also include defining maximum flowrate for fuel and DEF mass scales and flow meters as well as maximum molar flowrate for intake air and exhaust flow meters and defining maximum for electrical power, current, and voltage measurement, and providing additional information surrounding requirements for using a propane check or carbon balance verification in place of a flow meter linearity verification in subsection (e). The change is necessary for harmonization with the federal Phase 2 GHG technical amendments.

3. Section 1065.309. Continuous gas analyzer system-response and updating-recording verification – for gas analyzers continuously compensated for other gas species.

In section 1065.309, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from April 28, 2014. The section describes a verification procedure for system response and updating-recording frequency for continuous gas analyzers that output a single gas species mole fraction based on a

continuous combination of multiple gas species measured with multiple detectors. In the Phase 2 GHG technical amendments, the change allows the use of water vapor injection for humidification of gases in subsection (d)(2). The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

4. Section 1065.342. Sample dryer verification.

In section 1065.342, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from April 30, 2010. The section describes sample dryer verification. In the Phase 2 GHG technical amendments, the change allows the use of water vapor injection for humidification of gases in subsection (d)(2). The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

5. Section 1065.350. H₂O interference verification for CO₂ NDIR analyzers.

In section 1065.350, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from April 28, 2014. The section describes water (H₂O) interference verification for CO₂ nondispersive infrared (NDIR) analyzers. In the Phase 2 GHG technical amendments, the change allows the use of water vapor injection for humidification of gases in subsection (d)(2). The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

6. Section 1065.355. H₂O and CO₂ interference verification for CO NDIR analyzers.

In section 1065.355, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from April 28, 2014. The section describes H₂O and CO₂ interference verification for CO NDIR analyzers. In the Phase 2 GHG technical amendments, the change allows the use of water vapor injection for humidification of gases in subsection (d)(2). The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

7. Section 1065.365. Nonmethane cutter penetration fractions.

In section 1065.365, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from October 25, 2016. The section that CARB adopted in 2018 without modification describes the non-methane cutter (NMC) penetration fractions. In the Phase 2 GHG technical amendments, the change includes adding a requirement to determine NMC flame-ionization detector (FID) methane penetration fraction and ethane response factor as a function of exhaust molar water content when measuring emissions from a gaseous-fueled engine in subsection (d). This is to account for the effect water has on NMCs. The modification also includes adding methane (CH₄) before "penetration fraction" to clarify that this is the methane penetration fraction. The modification is necessary

for harmonization with the federal Phase 2 GHG technical amendments.

8. Section 1065.370. CLD CO₂ and H₂O quench verification.

In section 1065.370, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from October 25, 2016. The section that CARB adopted in 2018 without modification describes a chemiluminescent detector (CLD) analyzer to measure NO_x, and requires verification of the amount of H₂O and CO₂ quench after installing the CLD analyzer and after major maintenance. In the Phase 2 GHG technical amendments, the change allows the use of water vapor injection for humidification of gases. The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

9. Section 1065.375. Interference verification for N₂O analyzers.

In section 1065.375, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from October 25, 2016. The section that CARB adopted in 2018 without modification describes the interference verification for N₂O analyzers. In the Phase 2 GHG technical amendments, the change allows the use of water vapor injection for humidification of gases. The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

S. Part 1065, Subpart E – Engine Selection, Preparation, and Maintenance

1. Section 1065.410. Maintenance limits for stabilized test engines.

In section 1065.410, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from February 19, 2015. The section describes the maintenance limits for stabilized test engines. The Phase 2 GHG technical amendments replace “bad engine” with “malfunctioning” in relation to engine components in subsection (c), and update to state that a test engine may be repaired without prior approval if the parts are unrelated to emissions in subsection (d). The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

T. Part 1065, Subpart F – Performing an Emission Test in the Laboratory

1. Section 1065.510. Engine mapping.

In section 1065.510, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from October 25, 2016. The section that CARB adopted in 2018 without modification describes the engine mapping. The Phase 2 GHG technical amendments include moving the provision for engine stabilization during mapping from subsection (a) to subsection (b)(5)(i), and adding allowance in subsection (f)(4)(i) to specify CITT as a function of idle speed in cases where an

engine has an adjustable warm idle or enhanced idle. The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

2. Section 1065.512. Duty cycle generation.

In section 1065.512, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from April 28, 2014. The section describes the duty cycle generation. In the Phase 2 GHG technical amendments, the change updates the procedures on how to operate the engine and validate the duty-cycle when an engine utilizes enhanced-idle speed. The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

3. Section 1065.514. Cycle-validation criteria for operation over specified duty cycles.

- a. In section 1065.514, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from May 12, 2020. The section describes the cycle-validation criteria for operation over specified duty cycles. In the Phase 2 GHG technical amendments, the change in subsection (e) clarifies that a floating intercept is used to calculate the regression statistics and further modifies subsection (e)(3) to change "standard estimates of errors" to "standard error of the estimate" for consistency. The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.
- b. In subsection 1065.514.A, CARB staff proposes to add a new subparagraph (f)(4) to provide revised regression limits for gaseous-fueled engines with a "single-point" injection system. This modification is necessary since gaseous-fueled engines with throttle body or single-point fuel injection systems cannot meet the default cycle-validation criteria specified in subsection 1065.514 when running the engine on the LLC. This is because, for gaseous-fueled engines with a single-point injection system, the engine's air-fuel ratio must be controlled at stoichiometric conditions in order to meet emissions and avoid misfire, which results in delayed torque response on this highly transient LLC. As a result, less-stringent transient cycle validation criteria are justified and necessary.

4. Section 1065.518. Engine Preconditioning.

- a. CARB staff proposes to modify subsection 1065.518.B.1 to clarify that the new infrequent regeneration adjustment factors (IRAF) calculations would only be required if the manufacturer requests extra preconditioning cycles (i.e., more than two preconditioning cycles).
- b. CARB staff proposes to modify subsection 1065.518.B.2 to clarify that engines are required to be compliant with emission standards after the approved preconditioning cycles.

5. Section 1065.530. Emission test sequence.

In section 1065.530, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from April 28, 2014. The section describes the emission test sequence. In the Phase 2 GHG technical amendments, the change in subsection (a) adds instructions on how to determine that the engine temperature has stabilized for air cooled engines. The change in subsection (g) adds a new paragraph on carbon balance error verification if it is performed as part of the test sequence. The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

6. Section 1065.545. Verification of proportional flow control for batch sampling.

In section 1065.545, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from April 28, 2014. The section describes the verification of proportional flow control for batch sampling. In the Phase 2 GHG technical amendments, the change in subsection (a) clarifies that forcing the intercept through zero is used to calculate the standard error of the estimate (SEE). The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

U. Part 1065, Subpart G – Calculations and Data Requirements

1. Section 1065.602. Statistics.

In section 1065.602, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from October 25, 2016. The section that CARB adopted in 2018 without modification describes the calculations and data requirements for statistics. The Phase 2 GHG technical amendments include making editorial changes to the equations; defining the existing Equation 1065.602-9 as a least squares regression slope calculation where the intercept floats, i.e., is not forced through zero; designating this subsection as (h)(1) and adding a new subsection (h)(2) for Equation 1065-602-10, a least squares regression slope calculation where the intercept is forced through zero. The modifications also include editing to state that the intercept calculation Equation 1065.602-11 is for a floating intercept; defining the existing Equation 1065.602-12 (renumbered from 1065.602-11) as a SEE calculation where the intercept floats, i.e., is not forced through zero; designating this subsection as (j)(1); adding a new subsection (j)(2) for Equation 1065.602-13, a SEE calculation where the intercept is forced through zero; and further modifying subsection (j) to change “Standard estimate of error” to “Standard error of the estimate” for consistency. The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

2. Section 1065.610. Duty cycle generation.

In section 1065.610, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from October 25, 2016. The section that CARB adopted in 2018 without modification describes the duty cycle generation. The Phase 2 GHG technical amendments include clarifying that the alternate maximum test speed determined is for all duty-cycles in subsection (a)(2) and adding provision to use good engineering judgment to develop an alternate procedure for adjusting CITT as a function of speed in subsection (d)(3). The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

3. Section 1065.640. Flow meter calibration calculations.

In section 1065.640, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from October 25, 2016. The section that CARB adopted in 2018 without modification describes the flow meter calibration calculations. The Phase 2 GHG technical amendments include specifying that the least square regression calculation in subsection (b)(3) is with a floating intercept; providing a conversion to kilogram per mole (kg/mol) for molar mass of the flow rate (M_{mix}) in the example for subsection (d)(1); correcting an error in the example problem in applying Equation 1065.640-10 where M_{mix} was used with the wrong units; and providing additional guidance on how to calculate SEE in subsection (d)(3). The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

4. Section 1065.642. SSV, CFV, and PDP molar flow rate calculations.

In section 1065.642, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from October 25, 2016. The section that CARB adopted in 2018 without modification describes the subsonic venture (SSV), critical flow venturi (CFV), and positive-displacement pump (PDP) molar flow rate calculations. The Phase 2 GHG technical amendments include correcting a cross-reference in subsection (b) and defining flow coefficient (C_f) in subsection (c)(1). The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

5. Section 1065.665. THCE and NMHCE determination.

In section 1065.665, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from October 25, 2016. The section that CARB adopted in 2018 without modification describes the calculation for total hydrocarbon equivalent (THCE) and non-methane hydrocarbon equivalent (NMHCE). In the Phase 2 GHG technical amendments, the change includes deleting the variable and description for $C_{\#}$ as it is not used in any calculation in this subsection 1065.665(a). The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

6. Section 1065.667. Dilution air background emission correction.

In section 1065.667, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from October 25, 2016. The section that CARB adopted in 2018 without modification describes the dilution air background emission correction. In the Phase 2 GHG technical amendments, the change includes adding DEF to clarify what is needed for chemical balance description in subsection (d). The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

7. Section 1065.675. CLD quench verification calculations.

In section 1065.675, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from October 25, 2016. The section that CARB adopted in 2018 without modification describes the CLD quench verification calculations. In the Phase 2 GHG technical amendments, the change includes correcting the term “bubbler” with “humidity generator” in subsection (d). The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

8. Section 1065.680. Adjusting emission levels to account for infrequently regenerating aftertreatment devices.

CARB staff proposes to modify subsection 1065.680.B.1 to clarify that the new IRAF calculations are required for 2024 MY and subsequent and for those engines using extra preconditioning cycles. CARB staff also provided language to allow manufacturers to propose IRAF calculations for the LLC based on good engineering judgment.

9. Section 1065.695. Data requirements.

In section 1065.695, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from April 28, 2014. The section describes the data requirements. In the Phase 2 GHG technical amendments, the change in subsection (c) adds carbon balance verification. The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

V. Part 1065, Subpart H – Engine Fluids, Test Fuels, Analytical Gases and Other Calibration Standards

1. Section 1065.701. General requirements for test fuels.

In section 1065.701, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from April 28, 2014. The section describes the general requirements for test fuels. In the Phase 2 GHG technical amendments, the change in subsection (b) updates the name of California gasoline type. The

modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

2. Section 1065.790. Mass standards.

In section 1065.790, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from September 15, 2011. The section specifies the mass standards. In the Phase 2 GHG technical amendments, the change in subsection (b) adds a NIST traceability requirement for calibration weights for dynamometer, fuel mass scale, and DEF mass scale. The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

W. Part 1065, Subpart J – Field Testing and Portable Emission Measurement Systems

1. Section 1065.910. PEMS auxiliary equipment for field testing.

In section 1065.910, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from April 30, 2010. The section describes the PEMS auxiliary equipment for field testing. In the Phase 2 GHG technical amendments, the change in subsection (a) changes the requirement to use 300 series stainless steel tubing to connect the PEMS exhaust and/or intake air flow meters into a recommendation because there are other materials that are equally suitable for in-use testing other than stainless steel tubing. The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

2. Section 1065.935. Emission test sequence for field testing.

Subsection B.2 regarding drift was revised. CARB staff proposes language to limit the NO, NO₂ and NO_x variability to +/-2.5 ppm instead of the drift validation criteria in 1065.550. The drift corrected values will be used for the SOS evaluation of the test.

IV. Proposed Modifications to California Exhaust Emission Standards and Test Procedures for 2004 and Subsequent Model Heavy-Duty Otto-Cycle Engines and Vehicles (Appendix B-2)

The following sections discuss CARB staff's proposed modifications to the California Exhaust Emission Standards and Test Procedures for 2004 and Subsequent Model Heavy-Duty Engines and Vehicles. In addition to the proposed modifications discussed below, a number of non-substantive changes to formatting (such as indentations, alignment of paragraphs, removing extra spaces, etc.) have been made for clarity and improved readability.

A. Part 86, Subpart A – General Provisions for Heavy-Duty Engines and Heavy-Duty Vehicles

1. Section 2. Definitions. [§86.xxx-2]

- a. In subsection 2.A.1.2.2, CARB staff proposes to modify the MY applicability of the useful life requirements for 2023 and subsequent MY engines used in medium-duty vehicles with GVWR from 10,001 to 14,000 pounds. The proposed modification would start the applicability of the 150,000 miles or 15-year useful life with the 2024 MY engines rather than with the 2023 MY. The proposed change is necessary to better align this change with other proposed regulatory changes and product development timelines.
- b. In subsection 2.A.1.2.5, CARB staff proposes modifying subsection (6) to incorporate the requirements for useful life periods and MY implementation schedules for Otto-cycle hybrid powertrains used in incomplete vehicles with a GVWR from 10,001 to 14,000 pounds. This is necessary since Otto-cycle hybrid powertrains used in incomplete vehicles with a GVWR from 10,001 to 14,000 pounds are now proposed in the 30-day changes to be eligible to use the hybrid powertrain test procedure to certify to criteria pollutants and GHG emission standards.
- c. In subsection 2.B. California Provisions, CARB staff proposes to modify or remove existing definitions as follows:
 - i. *"50-state-directed engines."* CARB staff proposes to remove the definition for 50-state-directed engines. The changes are necessary since the provision to certify to the optional 50-state-directed engine emission standards is being removed, as discussed in section I.A.14 above.
 - ii. *"California sales volume."* During the 60-day comment period, commenters requested clarification to the definition of California sales volume, and CARB staff proposes modifications to this definition. This modification is necessary to provide clarity to the California sales volume

definition since this definition is used in the CA-ABT program as well as in other heavy-duty engine requirements.

- iii. *"Class 3."* This definition was added since a reference to class 3 vehicles is made in the CA-ABT program.
- iv. *"Optionally certified hybrid powertrain or hybrid powertrain or heavy-duty hybrid powertrain."* CARB staff proposes modifying the definition of "Optionally certified hybrid powertrain or hybrid powertrain or heavy-duty hybrid powertrain" by adding a sentence "Note other examples of systems that qualify as hybrid engines or powertrains are systems that recover kinetic energy and use it to power an electric heater in the aftertreatment." This is necessary to harmonize with the revised definition from the U.S. EPA as used in the Phase 2 GHG technical amendments final rule to expand the definition of hybrid powertrain to include systems that recover kinetic energy and use it to power an electric heater in the aftertreatment.
- v. *"Optionally certified Otto-cycle hybrid powertrain or Otto-cycle hybrid powertrain or heavy-duty Otto-cycle hybrid powertrain."* CARB staff proposes to add the word "Otto-cycle" to the term heavy-duty hybrid powertrain to clarify and make it consistent with the other terminologies such as "Optionally certified Otto-cycle hybrid powertrain or Otto-cycle hybrid powertrain."
- vi. *"Vehicle family."* In order to harmonize with the most recent version of the federal regulations, CARB staff has updated the reference to 40 CFR 1037.801 to reflect the publication date for the Phase 2 GHG technical amendments.

2. Section 10. Emission standards for Otto-cycle heavy-duty engines and vehicles. [§86.xxx-10]

- a. In subsections 10.B.3.1, 10.B.3.2, 10.B.3.3, CARB staff proposes to remove the merged cells in the first row of the tables for the exhaust emission standards and keep the title text of each table outside the table. This modification is non-substantive and is necessary to improve accessibility and readability of the regulatory document.
- b. In subsection 10.B.1, CARB staff proposes a new optional low NO_x standard of 0.01 g/bhp-hr NO_x on the FTP, that is 95 percent below the current standard, for 2022 and 2023 MY heavy-duty diesel engines. The proposed modification is necessary to provide manufacturers with a mechanism to certify engines to NO_x standards that are significantly lower than required for the MY. It is also necessary to encourage manufacturers to further develop technologies that would reduce NO_x emissions beyond the

mandatory standards. In addition, CARB staff is proposing to split the optional standards in the table into two rows, one for the 2015 through 2021 MY engine standards and one for MYs 2022 and 2023. This change is necessary to accommodate the proposed new optional low NO_x standard of 0.01 g/bhp-hr.

- c. In addition, in subsection 10.B.3.2, CARB staff proposes a new optional low NO_x standard of 0.01 g/bhp-hr NO_x on the FTP, that is 95 percent below the current standard, for 2024 through 2026 MY heavy-duty diesel engines.
- d. CARB staff proposes to delete subsection 10.B.3.3 which would have provided manufacturers the option to certify engines to the optional 50-state-directed engine emission standards for NO_x emissions for 2024 through 2026 MY medium- and heavy-duty Otto-cycle engines. The change is necessary for the same reasons discussed in section I.A.14 above.
- e. In subsection 10.B.4, CARB staff proposes modifying subsection B.4 to specify the exhaust emissions and MY implementation schedules for heavy-duty Otto-cycle engines used in hybrid powertrains installed in incomplete vehicles with a GVWR from 10,001 to 14,000 pounds. This is necessary since Otto-cycle hybrid powertrains used in incomplete vehicles with a GVWR from 10,001 to 14,000 pounds are now proposed in the 30-day changes to be eligible to use the hybrid powertrain test procedure to certify to criteria pollutants and GHG emission standards.

3. Section 12. Alternative certification procedures. [§86.080-12]

In subparagraph 12.B.1.2(a)(5) of this test procedures, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from May 12, 2020. This is necessary to update and incorporate the most recent changes to harmonize with federal regulations.

4. Section 15. NO_x and particulate averaging, trading, and banking for heavy-duty engines. [§86.xxx-15]

In subsection 15.B, CARB staff proposes to modify the CA-ABT program for the following elements:

- a. In subsection B.2., additional changes are made with regard to the CA-ABT program. Manufacturers that certify products in California have the option to begin participating in the CA-ABT program as early as the 2022 MY. This option would enable them to generate CA-ABT credits as early as the 2022 MY. Starting with the 2024 MY, the California and U.S. EPA emissions standards would be different. Therefore, for 2024 and subsequent MYs, all California-certified products must participate in the CA-ABT program for ABT. Furthermore, heavy-duty zero-emission NO_x credits would be assigned to powertrains instead of vehicles. This change would ensure that credits

- would be allocated to the original equipment manufacturers of zero-emission products.
- b. In subsection B.2.(a)(1)(iv), CARB staff proposes to define the averaging set for Otto-cycle hybrid powertrains used in incomplete vehicles with a GVWR from 10,001 to 14,000 pounds. This is necessary since Otto-cycle hybrid powertrains used in incomplete vehicles with a GVWR from 10,001 to 14,000 pounds are now proposed in the 30-day changes to be eligible to use the hybrid powertrain test procedure to certify to criteria pollutants and GHG emission standards.
 - c. In subsection B.2.(a)(2), clarifications were made to the regulatory language in B.2.(a)(2) by removing the term “only.”
 - d. In subsection B.2.(d), referencing to specific citation was updated by adding parentheses for B.2.(e). Furthermore, CARB staff proposes to add new language to indicate that manufacturers that choose to delay their enrollment into the CA-ABT program until the 2023 or 2024 MY would not be eligible to transfer any banked federal-ABT credits to the CA-ABT program. Manufacturers that delay enrollment in the CA-ABT program would probably do so in order to continue producing higher emitting engines (with FELs above the applicable 0.20 g/bhp-hr NO_x standard during the 2022 to 2023 MYs); therefore, CARB staff believes that these manufacturers should not be eligible to transfer any remaining federal-credits into the CA-ABT program.
 - e. In subsection B.2.(e), referencing to specific citation was updated by adding parentheses to B.2.(a).
 - f. In subsection B.2.(f), CARB staff proposes to adjust the emission credit calculation by accounting for differences in the useful life requirements between the engine family or hybrid powertrain family that is generating the credit and the currently applicable useful life of that engine family or hybrid powertrain family. The adjustment would allow manufacturers that comply with future MY standards and requirements to accrue proportionally larger amounts of credits by accounting for increases in the useful life requirements.
 - g. In subsection B.2.(i), the usage of zero-emission NO_x credits is proposed to expire by the end of the 2026 MY. This is necessary to provide a balance between incentivizing the early development of heavy-duty zero-emission technologies while also recognizing that allowing the generation of excessive NO_x credits allows manufacturers to delay and/or reduce the emissions reductions attributable to this rulemaking action by effectively inhibiting the technology forcing requirements applicable to internal combustion engines. Allowing zero emission NO_x credits to persist beyond

- 2026 could unduly delay the industry's development of clean engine combustion control technologies needed to meet the proposed 2027 MY emission standards. Clarification was made to ensure that credits would only be allocated to zero-emission powertrains used in class 4 through 8 vehicles.
- h. In subsection B.2.(i)(1), credit life provisions were modified to reflect the expiration date for zero-emission NO_x credits.
 - i. In subsection B.2.(i)(2), zero-emission NO_x credits were reallocated to powertrains instead of vehicles. Credits would still be calculated based on the useful life of the vehicle in which the powertrain is installed in. In order to harmonize with the most recent version of the federal regulations, CARB staff updated the references for 40 CFR 1037.105 and 1037.106 to reflect the most recent applicable publication dates.
 - j. In subsection B.2.(i)(3), the expiration date for the zero-emission NO_x ABT program was modified from 2030 to the 2026 MY.
 - k. In subsection B.2.(j), reference to vehicle was changed to powertrain.
 - l. In subsection B.2.(j)(1), during the 60-day comment period, engine manufacturers requested an increase of the time required to submit the CA-ABT report from 90 days to 180 days after the end of the MY. This modification of subsection B.2.(j)(1) provides additional time for manufacturers to generate the end-of-year report to calculate the credits and deficits generated in the CA-ABT program using California sales information.
 - m. In subsection B.2.(j)(2), CARB staff further clarifies the data requirements for the CA-ABT reports to include all parameters and corresponding values needed to calculate credits.
 - n. In subsection B.2.(j)(3), the deadline for submitting corrections to the end-of-year reports was changed from 180 days to 90 days. Given that manufacturers would have more time to submit the end-of-year reports, the time window for submitting corrections has been reduced. The final CA-ABT report would still be due 270 days after the end of the MY.
 - o. In subsection B.2.(j)(4), reference to vehicle was changed to powertrain.
 - p. In subsection B.3.(b) and B.3.(c), some of the references were corrected by adding parenthesis where needed. The proposed changes are necessary to ensure that the correct sections are being referenced.
 - q. In subsection 15.B.3.(d), CARB staff proposes to split merged cells in the first column of the table representing the engine or powertrain family MY so that each column of the table has the same number of rows. The empty cells

created after splitting the merged cells are filled with the appropriate MY for that row. The proposed change is non-substantive and is necessary to improve accessibility and readability of the regulatory document.

- r. In subsection B.3.(e), reference to vehicle was changed to powertrain.

5. Section 21. Application for certification. [§86.xxx-21]

In subsection 21.B.2, CARB staff proposes to remove the requirement that manufacturers submit a statement in the application for certification that all new Otto-cycle and diesel heavy-duty engines produced by the manufacturer and intended for sale in the United States in a given MY are certified to the Optional 50-state-directed engine emission standards and conform with all the requirements in subsection I.10.B.3.1 or I.10.B.3.2 or I.10.B.3.3 of the California Exhaust Emission Standards and Test Procedures for 2004 And Subsequent Model Heavy-Duty Otto-Cycle Engines and Vehicles. This modification is necessary since the provision to certify to the optional 50-state-directed engine emission standards is being removed, as discussed in section I.A.14 above.

6. Section 25. Maintenance. [§86.xxx-25]

Most of the changes to sections 86.xxx-25 expand on the existing maintenance provisions that allow manufacturers to request new scheduled maintenance. They include edits to give manufacturers an option for more flexibility in scheduling more frequent maintenance for emission-related components and systems in years when emission standards become more stringent.

- a. In subsection A.1.7, CARB staff proposes modifying footnote number 2 of the Otto-cycle maintenance table that has the incorrect reference of "(b)(7)(i)" to be changed to "86.004-25(i)." This change is necessary to ensure that the correct regulation is being referenced. In addition, CARB staff proposes to merge the two cells in the upper right corner of the table so that the headers, "Minimum Repair / Replacement Interval" and "Heavy-Duty Otto-Cycle Engine," are shown in one cell. This modification is non-substantive and is necessary to improve accessibility and readability of the regulatory document.
- b. In subsection A.1.10, CARB staff proposes removing the "s" from "Subparagraphs." This change is necessary for proper grammar to have the word be singular, and not be plural, as a result of the other proposed change in this subparagraph. CARB staff also proposes removing the wording of "and (b)(7)(ii)" in this subparagraph. This removal is necessary because section (b)(7)(ii) has proposed changes being made, and should therefore no longer be included in subparagraph 1.10, which has no changes.

- c. In subsection A.1.11, to implement the Board’s Resolution 20-23, CARB staff proposes modifying (b)(7)(ii), to add language addressing the consideration of more frequent scheduled maintenance. This addition is necessary to allow for more flexibility for the transitional MYs of 2024, 2027, and 2031, when the emission standards become more stringent, and would give manufacturers time to analyze the components and systems to ensure compliance at the lower standards for the lengthened useful life periods. The added language also excludes the consideration of more frequent scheduled maintenance provisions from applying to the components or systems designated as “Not Replaceable,” as specified in §86.004-25 (b)(4)(vi) of the “California Exhaust Emission Standards and Test Procedures for 2004 and Subsequent Model Heavy-Duty Otto-Cycle Engines and Vehicles.” The exclusions for “Not Replaceable” components are necessary because of their relatively high price and severe emission impact under failure; such components are currently not allowed to be scheduled for repair or replacement during the useful life unless the manufacturer pays for the repair or replacement.
- d. Subsection 1.12 was renumbered for sequence (previously 1.11).
- e. Subsection 1.13 was renumbered for sequence (previously 1.12).
- f. Subsection 1.14 was renumbered for sequence (previously 1.13).

7. Section 30. Certification. [§86.xxx-30]

In subsection 30.B. CARB staff proposes to modify the requirement that prevents manufacturers from being able to request a carryover or carry across application based on data from an engine family or test group that is equipped with an emission control component that exceeds the thresholds specified in title 13, CCR, section 2143 that has not been improved for the MY for which the application is for. Engine manufacturers have expressed concern about possible disruption to business practices and potential delays in production if emission control components exceed thresholds specified in title 13, CCR, section 2143. The proposed change would allow manufacturers to request a carryover or carry across application based on data from an engine family or test group that is equipped with such an emissions control component only if they extend the emissions warranty coverage for that component to the full useful life period of the engine or test group for which certification is sought. The proposed change would address manufacturers’ concerns while ensuring that emission control components with known defects will be functioning as intended throughout the useful life period because they will be repaired or replaced if a failure occurs. Grammatical edits are also proposed to more clearly describe this requirement.

Additionally, CARB staff proposes an amendment to clarify that manufacturers must redesign, recalibrate, or manufacture a component differently in order to

demonstrate that it will not experience failures as it did for the previous MY. This may be achieved through modifications of hardware or software. The proposed amendment clarifies that improvements to the component should address known defects from the previous MY.

8. Section 35. Labeling. [§86.xxx-35].

CARB staff proposes to delete the labeling requirements in subsections 35.B.3 and 35.B.4.1. The changes are necessary since the provision to certify to the optional 50-state-directed engine emission standards is being removed, as discussed in section I.A.14 above. Also, subsection 35.B.4 is now renumbered to 35.B.3. CARB staff also proposes to add the word “primarily” in renumbered subsection 35.B.3. This change is necessary to be consistent with how engines are currently being treated and clarifies the labeling requirements for optionally certified diesel hybrid powertrains.

B. Part 86, Subpart N – Exhaust Test Procedures for Heavy-Duty Engines

1. Section 86.1370. In-Use Test Procedures: Moving Average Window.

In section 86.1370.B California Provisions, CARB staff proposes the following modifications:

- a. In subsection B.1, the cold start temperature conditions were modified to the units of Fahrenheit to match the diesel test procedures.
- b. Text was modified in 1.1 to replace the word “period” with “rate” for consistency with the sampling rate in the regulations. The “greater than or equal to” symbol and “1 Hz” was removed to clarify the sampling rate of 1 second for data storage and calculations. Also, language was added to clarify that windows start when there is valid test data.
- c. Text was modified in 1.2 to clarify the handling of invalid data to accommodate small gaps of invalid data in calculating valid windows. Modified text also clarifies that long sequences, greater than 600 seconds, of invalid data would terminate the continuous window generation and require the creation of a new windows sequence. CARB staff also clarified that data generated during instrument zero drift check or conditioning of the PEMS may be considered invalid data and revised the subsection numbering to include this change.
- d. In subsection 1.2.5, the temperature invalidation with respect to altitude was clarified by stating data generated when temperatures are greater than specified at altitude, h, are invalid. In the variable definitions, “A” was corrected to “h.” The units for “h” were also added for clarity.

- e. Subsections B.1.2.6.1 through B.1.2.6.2 were removed and combined in B.1.2.6. The text was modified to specify that for 2024 through 2026 engines, data collected during specified low temperature test conditions will be considered invalid data.
- f. In subsection B.1.2.7, language was added to specify that data collected during engine-off operation will be considered invalid data.
- g. In subsection B.1.3.2, CARB staff proposes to change the valid test requirements to a minimum of 2,400 valid windows per test instead of the 3 hours of non-idle operation requirement. This would provide a minimum of 40 minutes of valid engine operation to be used in evaluating compliance in each of the three bins.
- h. CARB staff proposes to modify subsection B.1.3.3 to clarify that the average engine power over the test must be at least 10 percent of the engine's peak power or else the manufacturer will be required to retest the engine until a valid test is completed.
- i. CARB staff proposes to delete subsection B.1.4 because the window sizing is already described in the introductory paragraph 86.1370.B. There are numbering modifications to the subsequent sections due to the deletion of B.1.4.
- j. CARB staff proposes several changes for clarity in renumbered section B.1.4 and provides manufacturers with an additional compliance margin during the transition to more stringent NOx standards. These changes are as follows:
 - i. Subsection 86.1370.B.1.5 was renumbered to 86.1370.B.1.4 due to deletion of the previous subsection.
 - ii. The phrase "sum-over-sum" is abbreviated to "SOS."
 - iii. The equations for the SOS calculations were modified for clarification. The units of $e_{\text{SOS } a}$ were added and the subscript definition for "a" was moved.
 - iv. The term "emission rate" was added to the definitions of \dot{m}_a and \dot{m}_{CO_2} to clarify the units.
 - v. The term " $e_{CO_2,FTP,FCL}$ " was deleted and replaced with "FCL" to improve clarity of the equation and the definition of FCL was added.
 - vi. Variable "n" was redefined as " n_b " the number of windows, not seconds, in a bin for clarity based on industry stakeholder comments.

- vii. The definition of the sampling rate, Δt , was added to clarify the time step should be 1 second.
 - viii. The conformity factor was changed from 1.5 to 2.0 for 2024 through 2029 MY engines to provide an additional compliance margin with the first 3 years after the introduction of new NO_x emission standards that occurs with the 2024 and 2027 MYs.
- k. CARB staff proposes a new subsection 1.5 to provide for a limited engine protection fuel enrichment exemption during in-use testing for 2024 through 2026 MY engines if the engine fails the in-use test. Engine protection fuel enrichment operations are required to be approved at time of certification and are required to be tracked. This section provides adjustment for calculating the SOS emissions based on the frequency of fuel enrichment during the in-use test.
- i. Subsection 1.5.1 provides the methods to be used for conducting the provisions for fuel enrichment exclusion.
 - (1) Up to 5 percent of test time may be omitted based on cumulative fuel enrichment by the J1979 fuel enrichment EI-AECD tracking method.
 - (2) Limit the omitted data based on observed fuel enrichment operation time based on the J1979 tracker. Up to 5 percent of the total test time could be excluded.
 - ii. Subsection 1.5.2 specifies how to invalidate enrichment data based on the highest CO emission rates, up to the maximum limit in subsection 1.5.1(c)
 - iii. Subsection 1.5.3 allows recalculation of the SOS emissions in section 1.4 and comparison to the pollutant emissions thresholds to determine whether the engine passes or fails the in-use test.
- l. In addition, the text “Table of Applicable Standards and In-Use thresholds” that was inadvertently added at the end of subsection 1.5 is removed from this subsection.

C. Part 1036, Subpart A – Overview and Applicability

1. Section 1036.1. Does this part apply for my engines?

- a. In section 1036.1, CARB staff proposes to align with the federal Phase 2 GHG technical amendments pre-publication date, March 10, 2021. This section that CARB adopted in 2018 without modification describes the

applicability of engines to the provisions of this part. The Phase 2 GHG technical amendments add a new paragraph (b)(3) to clarify that the provisions of §1036.501(h)(1) is applicable. The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

- b. In subsection 1036.1 A.1, CARB staff proposes to add “2022 and subsequent model year Otto-cycle hybrid powertrains optionally certifying to criteria pollutants emission standards pursuant to title 13, CCR, 1956.8 that will be installed in incomplete vehicles from 10,001 to 14,000 pounds GVWR.” This is necessary since Otto-cycle hybrid powertrains used in incomplete vehicles with a GVWR from 10,001 to 14,000 pounds are now proposed in the 30-day changes to be eligible to use the hybrid powertrain test procedure to certify to criteria pollutants and GHG emission standards.

D. Part 1036, Subpart C – Certifying Engine Families

1. Section 1036.225. Amending my application for certification.

In section 1036.225, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from October 25, 2016. This section that CARB adopted in 2018 without modification contains the procedures for amending an application for certification once it has been submitted for certification. The Phase 2 GHG technical amendments clarify the start date of the amended application and explain that the engine family FEL can be modified before the end of the MY. The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

2. Section 1036.230. Selecting engine families.

In section 1036.230, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from October 25, 2016. This section that CARB adopted in 2018 without modification describes the information required in selecting engine families. The Phase 2 GHG technical amendments allow engine families to be divided into subfamilies with respect to compliance with CO₂ standards. The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

3. Section 1036.255. What decisions may ARB make regarding my certificate of conformity?

In section 1036.255, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from October 25, 2016. This section that CARB adopted in 2018 without modification describes the decisions that CARB may make regarding certification and issuing a certificate of conformity (or Executive Order). The Phase 2 GHG technical amendments simplify and clarify the requirements of

this section. The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

E. Part 1036, Subpart D - Testing Production Engines and Hybrid Powertrains

This Subpart D revises the heading to include hybrid powertrains. This modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

1. Section 1036.301. Measurements related to GEM inputs in a selective enforcement audit.

In section 1036.301, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from October 25, 2016. This section that CARB adopted in 2018 without modification provides an overview of performing audits and selective enforcement testing of any GEM inputs used in certification. In the Phase 2 GHG technical amendments, the only change was a minor modification to spell out "Heavy-Duty Vehicles" for the acronym "HDV" for clarification. The modification is necessary for clarification and for harmonization with the federal Phase 2 GHG technical amendments.

F. Part 1036, Subpart F – Test Procedures

1. Section 1036.501. How do I run a valid emission test?

- a. In section 1036.501, CARB staff proposes to align with the federal Phase 2 GHG technical amendments pre-publication date, March 10, 2021. This section that CARB adopted in 2018 without modification describes the procedure for running a valid emission test. The Phase 2 GHG technical amendments provide a new paragraph (g) to specify duty cycles for testing MY 2016 – 2020 engines, including additional clarifications to the proposed amendment to refer to the steady-state duty cycle as the Supplemental Emission Test ("SET") rather than the Ramped Modal Cycle ("RMC") the requirements of this section, as well as modify paragraph (h)(1) to address restarting the engine during dynamometer testing for engines with stop-start technologies, and add paragraph (h)(3) (shown as (h)(2) in the proposed rule) to cross-reference transient test cycle specifications. The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.
- b. In 1036.501 subparagraph (h), CARB staff proposes modifying numbering citations from "subparagraph (h)(1)" to "subparagraphs (h)(1) through (h)(2)." These changes are necessary to follow corresponding changes that were made in the federal regulation and for proper grammar. CARB staff is also proposing a wording change in section (h)(3) replacing "using" with "over," and to add a reference citation for §1036.510. These changes are

necessary to align with the changes made in the recently adopted federal regulation.

- c. CARB staff proposes changing “subparagraphs (h)(3) through (h)(4)” to “subparagraph (h)(4).” These changes are necessary to follow corresponding changes that were made in the federal regulation and for proper grammar.

2. Section 1036.503. Engine data and information for vehicle certification.

In section 1036.503, CARB staff proposes to align with the federal Phase 2 GHG technical amendments pre-publication date, March 10, 2021. This section that CARB adopted in 2018 without modification describes the requirements for engine data and information that are needed for certifying vehicles. The Phase 2 GHG technical amendments migrate section 1036.510 to new section 1036.503, update existing paragraph (c) and add a new (c)(4) and (d)(4). The new text specifies that the engine manufacturer must provide idle speed and torque to the vehicle manufacturer. Additional direction is given on handling data points for a low-speed governor where the governor is active. The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

3. Section 1036.510. Transient Testing Procedures.

In section 1036.510, CARB staff proposes to align with the federal Phase 2 GHG technical amendments pre-publication date, March 10, 2021. CARB staff proposes to adopt this newly added section without modification, which describes the procedures performing transient testing procedures for the testing of engines and hybrids to facilitate hybrid certification for both GHG and criteria pollutants. The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

4. Section 1036.525. Hybrid Engines.

In section 1036.525, CARB staff proposes to align with the federal Phase 2 GHG technical amendments pre-publication date, March 10, 2021. This section that CARB adopted in 2018 without modification describes the testing and emissions measurements procedures for hybrid engines. The Phase 2 GHG technical amendments revise paragraphs (a), (d) introductory text, and (d)(4) to clarify in the final rule that the hybrid engine testing procedure in this section applies only for MY 2014 to 2020 hybrid engines since the new hybrid powertrain and hybrid engine test procedure in the final rule will apply for MY 2021 and later engines. The technical amendments also include editorial revisions to equation and the addition of example calculations. The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

5. Section 1036.527. Powertrain system rated power determination.

In section 1036.527, CARB staff proposes to align with the federal Phase 2 GHG technical amendments pre-publication date, March 10, 2021. CARB staff proposes to adopt this newly added section without modification, which describes the procedures for determining the peak and continuous rated power of conventional and hybrid powertrain systems and the vehicle speed for carrying out testing according to §1036.505, §1036.510, and 40 CFR §1037.550 to facilitate the hybrid and conventional powertrain testing options. This test procedure is applicable for powertrain testing defined in 40 CFR §1037.550 for both the engine and vehicle standards. Additional updates include further modification to the proposed language, including modifying how the test is carried out by reducing the number of test intervals from 9 to 1, paragraph (e) to address the determination of P_{sys} for speed and torque measurements at different locations, with new paragraphs (g) and (h) to provide an improved method for determining continuous rated power and vehicle C_{speed} , and addressed typographical errors. The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

6. Section 1036.530. Calculating greenhouse gas emission rates.

In section 1036.530, CARB staff proposes to align with the federal Phase 2 GHG technical amendments pre-publication date, March 10, 2021. This section that CARB adopted in 2018 without modification describes how to calculate official emission results for CO₂, CH₄, and N₂O. The Phase 2 GHG technical amendments update sections (b)(1)(i) and (2) to require test fuel mass-specific energy content to be analyzed by three different labs and the arithmetic mean to be used in the calculation, update carbon mass fraction determination to allow analysis by a single lab only, update to add ASTM method for determination of test fuel mass-specific energy content for natural gas and update the footnote format in Table 1. The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

7. Section 1036.535. Determining steady-state engine fuel maps and fuel consumption at idle.

In section 1036.535, CARB staff proposes to align with the federal Phase 2 GHG technical amendments pre-publication date, March 10, 2021. This section that CARB adopted in 2018 without modification describes how to determine an engine's steady-state fuel map and fuel consumption at idle for MY 2021 and later vehicles. Vehicle manufacturers may need these values to demonstrate compliance with emission standards under 40 CFR part 1037 as described in §1036.510. The Phase 2 GHG technical amendments provide general update to improve the engine fuel mapping test procedures. Additional updates include adding paragraph (h) to describe how U.S. EPA will determine the official fuel consumption rate during a confirmatory test, based on carbon balance results, updating paragraph (b)(7)(iv) to require validation of test intervals that were complete prior

to a lab equipment or engine malfunction, updating the variable description for wC_{meas} in paragraph (b)(8) to make clear that manufacturers may not account for the contribution to α , β , γ , and δ of diesel exhaust fluid or other non-fuel fluids injected into the exhaust, and clarifying regulatory text and correcting paragraph references. The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

8. Section 1036.540. Determining cycle-average engine fuel maps.

In section 1036.540, CARB staff proposes to align with the federal Phase 2 GHG technical amendments pre-publication date, March 10, 2021. This section that CARB adopted in 2018 without modification describes how to determine an engine's cycle-average fuel maps for MY 2021 and later vehicles with transient cycles. The Phase 2 GHG technical amendments provide general update to improve These changes include updating to improve the cycle-average engine fuel mapping test procedure. Additional updates include modification of the proposed language by adding paragraph (b)(4) to address the ability of gaseous-fueled engines with single point fuel injection to pass alternate cycle statistics to validate the transient duty cycle in 40 CFR part 1037, Appendix I, by adding paragraph (e)(2) to describe how U.S. EPA will determine the official fuel consumption rate during a confirmatory test, based on 8 carbon balance results, by deleting the requirement for U.S. EPA to use an average of indirect measurement of fuel flow with dilute sampling and direct sampling for fuel mapping as U.S. EPA will now perform the carbon balance verification in 40 CFR §1065.543, and by generally adding some clarifying text. The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

9. Section 1036.543. Carbon balance error verification.

In section 1036.543, CARB staff proposes to align with the federal Phase 2 GHG technical amendments pre-publication date, March 10, 2021. CARB staff proposes to adopt this newly added section without modification, which was added to the NPRM and is carried over unchanged to the final rule, which address carbon balance error verification. The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

G. Part 1036, Subpart H – Averaging, Banking, and Trading for Certification

1. Section 1036.705. Generating and calculating emission credits.

CARB staff proposes changing the amended date of section 1036.705 to March 10, 2021 (Pre-publication) from October 25, 2016. This section that CARB adopted in 2018 without modification describes how to calculate emission credits. The Phase 2 GHG technical amendments replace the term, "ramped modal," to "SET duty" cycle for tractor engines in subsection (b)(2) and clarify the engine type,

non-gasoline engines, in subsection (b)(5). The modifications are necessary for clarification and for harmonization with the federal Phase 2 GHG technical amendments.

H. Part 1036, Subpart I – Definitions and Other Reference Information

1. Section 1036.801. Definitions.

CARB staff proposes changing the amended date of section 1036.801 to March 10, 2021 (Pre-publication) from May 12, 2020. The section describes the definitions in 1036.801. The Phase 2 GHG technical amendments added new definitions for “hybrid engine,” “hybrid powertrain,” and “mild hybrid” as well as modified existing definitions of “auxiliary emission control device,” “heavy-duty vehicle,” “hybrid,” and “steady state.” The modifications amend the definitions for “Hybrid powertrain” and “Hybrid vehicle” in B. California Provisions to incorporate new federal regulatory language and also modify some definitions for clarity. The modifications are necessary for harmonization with the federal Phase 2 GHG technical amendments.

In section 1036.801.B, CARB staff proposes to modify the following definitions:

- a. *“Hybrid Powertrain.”* CARB staff proposes modifying the definition of “Hybrid powertrain” by adding a sentence “Note other examples of systems that qualify as hybrid engines or powertrains are systems that recover kinetic energy and use it to power an electric heater in the aftertreatment.” This is necessary to harmonize with the revised definition from the U.S. EPA as used in the Phase 2 GHG technical amendments final rule to expand the definition of hybrid powertrain to include systems that recover kinetic energy and use it to power an electric heater in the aftertreatment.
- b. *“Hybrid vehicle.”* CARB staff proposes modifying the definition of “Hybrid vehicle” by adding a sentence “Note other examples of systems that qualify as hybrid engines or powertrains are systems that recover kinetic energy and use it to power an electric heater in the aftertreatment.” This is necessary to harmonize with the revised definition from the U.S. EPA as used in the Phase 2 GHG technical amendments final rule to expand the definition of hybrid powertrain to include systems that recover kinetic energy and use it to power an electric heater in the aftertreatment.

2. Section 1036.810. Incorporation by reference.

CARB staff proposes changing the amended date of section 1036.810 to March 10, 2021 (Pre-publication) from October 25, 2016. The section describes the material that is incorporated by reference in Part 1036. The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

I. Appendix I to Part 1036 – Summary of Previous Emission Standards

In Appendix I to part 1036, CARB staff proposes to align with the federal Phase 2 GHG technical amendments pre-publication date, March 10, 2021. CARB staff proposes to adopt this newly added Appendix I without modification, which was added to the NPRM and is carried over unchanged to the final rule, which provide a historic summary of previous emission standards which EPA originally adopted under 40 CFR, part 85 or part 86, that apply to compression-ignition engines produced before MY 2007 and to spark-ignition engines produced before MY 2008. The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

J. Appendix II to Part 1036 – Transient Duty Cycles.

In Appendix II to part 1036, CARB staff proposes to align with the federal Phase 2 GHG technical amendments pre-publication date, March 10, 2021. CARB staff proposes to adopt this newly added Appendix II without modification, which specifies transient duty cycles for the engine and powertrain testing. The Phase 2 GHG technical amendments add a new paragraph (a) to specify transient duty cycles for the engine and powertrain testing described in §1036.510, add a new paragraph (b) to migrate over the spark-ignition FTP duty cycle from part 86, add a new paragraph (c) to migrate over the compression-ignition FTP duty cycle from part 86, and update the transient duty cycles to include road grade coefficients for powertrain testing. The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

K. Appendix III to Part 1036 – Default Engine Fuel Maps for 40 CFR §1036.540.

In Appendix III to part 1036, CARB staff proposes to align with the federal Phase 2 GHG technical amendments pre-publication date, March 10, 2021. CARB staff proposes to adopt this renumbered Appendix III, from Appendix I, without modification, which specifies default engine fuel maps for the engine and powertrain testing 40 CFR §1036.540. The Phase 2 GHG technical amendments redesignate Appendix I to Appendix III without modification. The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

L. Part 1065, Subpart B – Equipment Specifications

1. Section 1065.130. Engine exhaust.

In section 1065.130, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from April 28, 2014. The section describes how to use the exhaust system installed with the engine or one that represents a typical in-use configuration. The change in the Phase 2 GHG technical amendments

denotes that a carbon balance procedure should be performed to verify exhaust system integrity in place of a chemical balance procedure. The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

2. Section 1065.140. Dilution for gaseous and PM constituents.

In section 1065.140, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from October 25, 2016. The section that CARB adopted in 2018 without modification describes the dilution for gaseous and particulate matter constituents. In the Phase 2 GHG technical amendments, the change in subsection (e)(2) clarifies how to determine the minimum dilution ratio for discrete mode testing. The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

3. Section 1065.145. Gaseous and PM probes, transfer lines, and sampling system components.

In section 1065.145, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from April 28, 2014. The section determines the total mass of each constituent with continuous or batch sampling. In the Phase 2 GHG technical amendments, the change in subsection (e)(3)(i) removes the requirement to heat a sample pump if it is located upstream of a NO_x converter or chiller and replaces it with a requirement to design the sample system to prevent aqueous condensation to better address concerns with the loss of NO₂ in the sampling system where methods other than heating the pump can be used to prevent condensation. The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

4. Section 1065.170. Batch sampling for gaseous and PM constituents.

In section 1065.170, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from October 25, 2016. The section that CARB adopted in 2018 without modification describes the batch sampling for gaseous and PM constituents. In the Phase 2 GHG technical amendments, the change allows sampling to stop during hybrid tests when the engine is off, allows exclusion of the sampling off portions of the test from the proportional sampling verification, and adds a provision for hybrid testing to allow supplemental dilution air to be added to the bag in the event that sampled volumes are too low for emission analysis. The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

M. Part 1065, Subpart C – Measurement Instruments

1. Section 1065.205. Performance specifications for measurement instruments.

In section 1065.205, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from April 28, 2014. The section describes the performance specifications for measurement instruments. In the Phase 2 GHG technical amendments, the changes to the introductory text and Table 1 revise and add recommended performance specifications for fuel and DEF mass scales and flow meters to reduce fuel flow measurement error. The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

2. Section 1065.220. Fuel flow meter.

In section 1065.220, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from October 25, 2016. The section that CARB adopted in 2018 without modification describes how to use fuel flow in combination with a chemical balance of fuel, inlet air, and raw exhaust to calculate raw exhaust flow. In the Phase 2 GHG technical amendments, changes in subsection (a) update the application of fuel flow meters to more correctly reflect how and what they are used for in Part 1065. The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

3. Section 1065.225. Intake-air flow meter.

In section 1065.225, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from October 25, 2016. The section that CARB adopted in 2018 without modification describes how to use an intake-air flow meter in combination with a chemical balance of fuel, inlet air, and exhaust to calculate raw exhaust flow. The Phase 2 GHG technical amendments in subsection (a) update the application of intake flow meters to more correctly reflect how and what they are used for in Part 1065. The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

4. Section 1065.247. Diesel exhaust fluid flow rate.

In section 1065.247, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from October 25, 2016. The section that CARB adopted in 2018 without modification describes diesel exhaust fluid flow rate over a test interval for batch or continuous emission sampling. The Phase 2 GHG technical amendments add the acronym “DEF” throughout the section in place of “diesel exhaust fluid” and account for any fluid that bypasses or returns from the dosing unit to the fluid storage tank in subsection (c)(2). The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

5. Section 1065.275. N₂O measurement devices.

In section 1065.275, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from October 25, 2016. The section that CARB adopted in 2018 without modification describes the N₂O measurement devices. In the Phase 2 GHG technical amendments, the change deletes a URL for EPA Test Method 320 and replaces it with a reference to section 1065.266(b). The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

6. Section 1065.280. Paramagnetic and magnetopneumatic O₂ detection analyzers.

In section 1065.280, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from April 28, 2014. The section allows a paramagnetic detection or magnetopneumatic detection analyzer to measure O₂ concentration in raw or diluted exhaust for batch or continuous sampling. In the Phase 2 GHG technical amendments, the change in subsection (a) clarifies that there is no method in section 1065.650 for determining O₂ balance and that a method using good engineering judgment may be developed. The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

N. Part 1065, Subpart D – Calibrations and Verifications

1. Section 1065.303. Summary of required calibration and verifications.

In section 1065.303, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from October 25, 2016. The section that CARB adopted in 2018 without modification describes the summary of required calibration and verifications. The Phase 2 GHG technical amendments update the formatting and entries in Table 1 to reflect revised requirements, including adding fuel mass scale and DEF mass scale to the linearity verifications in section 1065.307; update the verification in section 1065.341 to replace “batch sampler” with “PFD”; update one footnote to include the PFD flow verification (propane check) as not being required for measurement systems that are verified by a carbon balance error verification as described in section 1065.341(h); and add two footnotes excluding linearity verification for DEF flow if the ECM is used and for intake air, dilution air, diluted exhaust, batch sampler, and raw exhaust flow rates flow if propane checks or carbon balance is performed. These amendments are not new exemptions; they are simply relocated to the footnotes. The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

2. Section 1065.307. Linearity verification.

In section 1065.307, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from April 28, 2014. The section describes the linearity verification on each measurement system. The Phase 2 GHG technical amendments include revisions to include DEF mass flow rate and to correct or account for buoyancy effects and flow disturbances to improve the flow measurement; and expand the subsection to include fuel and DEF mass scales and requirements for performing the linearity verification on these scales in subsection (d). The modifications also include defining maximum flowrate for fuel and DEF mass scales and flow meters as well as maximum molar flowrate for intake air and exhaust flow meters; defining maximum for electrical power, current, and voltage measurement; and providing additional information surrounding requirements for using a propane check or carbon balance verification in place of a flow meter linearity verification in subsection (e). The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

3. Section 1065.309. Continuous gas analyzer system-response and updating-recording verification – for gas analyzers continuously compensated for other gas species.

In section 1065.309, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from April 28, 2014. The section describes a verification procedure for system response and updating recording frequency for continuous gas analyzers that output a single gas species mole fraction based on a continuous combination of multiple gas species measured with multiple detectors. In the Phase 2 GHG technical amendments, the change allows the use of water vapor injection for humidification of gases in subsection (d)(2). The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

4. Section 1065.342. Sample dryer verification.

In section 1065.342, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from April 30, 2010. The section describes sample dryer verification. In the Phase 2 GHG technical amendments, the change allows the use of water vapor injection for humidification of gases in subsection (d)(2). The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

5. Section 1065.350. H₂O interference verification for CO₂ NDIR analyzers.

In section 1065.350, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from April 28, 2014. The section describes H₂O interference verification for CO₂ NDIR analyzers. In the Phase 2 GHG technical amendments, the change allows the use of water vapor injection for humidification

of gases in subsection (d)(2). The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

6. Section 1065.355. H₂O and CO₂ interference verification for CO NDIR analyzers.

In section 1065.355, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from April 28, 2014. The section describes H₂O and CO₂ interference verification for CO NDIR analyzers. In the Phase 2 GHG technical amendments, the change allows the use of water vapor injection for humidification of gases in subsection (d)(2). The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

7. Section 1065.365. Nonmethane cutter penetration fractions.

In section 1065.365, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from October 25, 2016. The section that CARB adopted in 2018 without modification describes the NMC penetration fractions. In the Phase 2 GHG technical amendments, the change includes adding a requirement to determine NMC FID methane penetration fraction and ethane response factor as a function of exhaust molar water content when measuring emissions from a gaseous-fueled engine in subsection (d). This is to account for the effect water has on NMCs. The modification also includes adding CH₄ before “penetration fraction” to clarify that this is the methane penetration fraction. The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

8. Section 1065.370. CLD CO₂ and H₂O quench verification.

In section 1065.370, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from October 25, 2016. The section that CARB adopted in 2018 without modification describes a CLD analyzer to measure NO_x, verify the amount of H₂O and CO₂ quench after installing the CLD analyzer and after major maintenance. In the Phase 2 GHG technical amendments, the change allows the use of water vapor injection for humidification of gases. The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

9. Section 1065.375. Interference verification for N₂O analyzers.

In section 1065.375, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from October 25, 2016. The section that CARB adopted in 2018 without modification describes the interference verification for N₂O analyzers. In the Phase 2 GHG technical amendments, the change allows the use of water vapor injection for humidification of gases. The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

O. Part 1065, Subpart E – Engine Selection, Preparation, and Maintenance

1. Section 1065.410. Maintenance limits for stabilized test engines.

In section 1065.410, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from February 10, 2015. The section describes the maintenance limits for stabilized test engines. The Phase 2 GHG technical amendments replace “bad engine” with “malfunctioning” in relation to engine components in subsection (c), and update to state that a test engine may be repaired without prior approval if the parts are unrelated to emissions in subsection (d). The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

P. Part 1065, Subpart F – Performing an Emission Test in the Laboratory

1. Section 1065.510. Engine mapping.

In section 1065.510, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from October 25, 2016. The section that CARB adopted in 2018 without modification describes the engine mapping. The Phase 2 GHG technical amendments include moving the provision for engine stabilization during mapping from subsection (a) to subsection (b)(5)(i), adding allowance in subsection (f)(4)(i) to specify CITT as a function of idle speed in cases where an engine has an adjustable warm idle or enhanced idle. The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

2. Section 1065.512. Duty cycle generation.

In section 1065.512, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from April 28, 2014. The section describes the duty cycle generation. In the Phase 2 GHG technical amendments, the change updates the procedures on how to operate the engine and validate the duty-cycle when an engine utilizes enhanced-idle speed. The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

3. Section 1065.514. Cycle-validation criteria for operation over specified duty cycles.

In section 1065.514, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from May 12, 2020. The section describes the cycle-validation criteria for operation over specified duty cycles. In the Phase 2 GHG technical amendments, the change in subsection (e) clarifies that a floating intercept is used to calculate the regression statistics and further modifies subsection (e)(3) to change “standard estimates of errors” to “standard error of the estimate” for consistency. The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

4. Section 1065.530. Emission test sequence.

In section 1065.530, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from April 28, 2014. The section describes the emission test sequence. In the Phase 2 GHG technical amendments, the change in subsection (a) adds instructions on how to determine that the engine temperature has stabilized for air cooled engines and modifies subsection (g) by adding a new paragraph on carbon balance error verification if it is performed as part of the test sequence. The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

5. Section 1065.545. Verification of proportional flow control for batch sampling.

In section 1065.545, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from April 28, 2014. The section describes the verification of proportional flow control for batch sampling. In the Phase 2 GHG technical amendments, the change in subsection (a) clarifies that a forcing the intercept through zero is used to calculate the SEE. The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

Q. Part 1065, Subpart G – Calculations and Data Requirements

1. Section 1065.602. Statistics.

In section 1065.602, the proposed modification updates the section amended date to the federal Phase 2 GHG technical amendments pre-publication date of March 10, 2021 from October 25, 2016. The section that CARB adopted in 2018 without modification describes the calculations and data requirements for statistics. The Phase 2 GHG technical amendments include editorial changes in the equations; defining the existing Equation 1065.602-9 as a least squares regression slope calculation where the intercept floats, i.e., is not forced through zero; designating this subsection as (h)(1); and adding a new subsection (h)(2) for Equation 1065-602-10, a least squares regression slope calculation where the intercept is forced through zero. The modifications also include editing to state that the intercept calculation Equation 1065.602-11 is for a floating intercept, and defining the existing Equation 1065.602-12 (renumbered from 1065.602-11) as a SEE calculation where the intercept floats, i.e., is not forced through zero; designating this subsection as (j)(1); adding a new subsection (j)(2) for Equation 1065.602-13, a SEE calculation where the intercept is forced through zero; and further modifying subsection (j) to change "Standard estimate of error" to "Standard error of the estimate" for consistency. The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

2. Section 1065.610. Duty cycle generation.

In section 1065.610, the proposed modification updates the section amended date to the federal Phase 2 GHG technical amendments pre-publication date of March 10, 2021 from October 25, 2016. The section that CARB adopted in 2018 without modification describes the duty cycle generation. The Phase 2 GHG technical amendments include clarifying that the alternate maximum test speed determined is for all duty-cycles in subsection (a)(2) and adding a provision to use good engineering judgment to develop an alternate procedure for adjusting CITT as a function of speed in subsection (d)(3). The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

3. Section 1065.640. Flow meter calibration calculations.

In section 1065.640, the proposed modification updates the section amended date to the federal Phase 2 GHG technical amendments pre-publication date of March 10, 2021 from October 25, 2016. The section that CARB adopted in 2018 without modification describes the flow meter calibration calculations. The Phase 2 GHG technical amendments include specifying that the least square regression calculation in subsection (b)(3) is with a floating intercept, providing a conversion to kg/mol for M_{mix} in the example problem for subsection (d)(1), correcting an error in the example problem in applying Equation 1065.640-10 where M_{mix} was used with the wrong units, and providing additional guidance on how to calculate SEE in subsection (d)(3). The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

4. Section 1065.642. SSV, CFV, and PDP molar flow rate calculations.

In section 1065.642, the proposed modification updates the section amended date to the federal Phase 2 GHG technical amendments pre-publication date of March 10, 2021 from October 25, 2016. The section that CARB adopted in 2018 without modification describes the SSV, CFV, and PDP molar flow rate calculations. The Phase 2 GHG technical amendments include correcting a cross-reference in subsection (b) and defining C_f in subsection (c)(1). The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

5. Section 1065.665. THCE and NMHCE determination.

In section 1065.665, the proposed modification updates the section amended date to the federal Phase 2 GHG technical amendments pre-publication date of March 10, 2021 from October 25, 2016. The section that CARB adopted in 2018 without modification describes the calculation for THCE and NMHCE. In the Phase 2 GHG technical amendments, the change includes deleting the variable and description for $C_{\#}$ as it is not used in any calculation in this subsection 1065.665(a). The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

6. Section 1065.667. Dilution air background emission correction.

In section 1065.667, the proposed modification updates the section amended date to the federal Phase 2 GHG technical amendments pre-publication date of March 10, 2021 from October 25, 2016. The section that CARB adopted in 2018 without modification describes the dilution air background emission correction. In the Phase 2 GHG technical amendments, the change includes adding DEF to clarify what is needed for chemical balance description in subsection (d). The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

7. Section 1065.675. CLD quench verification calculations.

In section 1065.675, the proposed modification updates the section amended date to the federal Phase 2 GHG technical amendments pre-publication date of March 10, 2021 from October 25, 2016. The section that CARB adopted in 2018 without modification describes the CLD quench verification calculations. In the Phase 2 GHG technical amendments, the change includes correcting the term "bubbler" with "humidity generator" in subsection (d). The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

8. Section 1065.695. Data requirements.

In section 1065.695, the proposed modification updates the section amended date to the federal Phase 2 GHG technical amendments pre-publication date of March 10, 2021 from April 28, 2014. The section describes the data requirements. In the Phase 2 GHG technical amendments, the change in subsection (c) adds carbon balance verification. The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

R. Part 1065, Subpart H – Engine Fluids, Test Fuels, Analytical Gases and Other Calibration Standards

1. Section 1065.701. General requirements for test fuels.

In section 1065.701, the proposed modification updates the section amended date to the federal Phase 2 GHG technical amendments pre-publication date of March 10, 2021 from April 28, 2014. The section describes the general requirements for test fuels. In the Phase 2 GHG technical amendments, the change in subsection (b) updates the name of California gasoline type. The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

2. Section 1065.790. Mass standards.

In section 1065.790, the proposed modification updates the section amended date to the federal Phase 2 GHG technical amendments pre-publication date of

March 10, 2021 from September 15, 2011. The section specifies the mass standards. In the Phase 2 GHG technical amendments, the change in subsection (b) adds a NIST traceability requirement for calibration weights for dynamometer, fuel mass scale, and DEF mass scale. The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

S. Part 1065, Subpart J – Field Testing and Portable Emission Measurement Systems

1. Section 1065.910. PEMS auxiliary equipment for field testing.

In section 1065.910, the proposed modification updates the section amended date to the federal Phase 2 GHG technical amendments pre-publication date of March 10, 2021 from April 30, 2010. The section describes the PEMS auxiliary equipment for field testing. In the Phase 2 GHG technical amendments, the change in subsection (a) changes the requirement to use 300 series stainless steel tubing to connect the PEMS exhaust and/or intake air flow meters into a recommendation because there are other materials that are equally suitable for in-use testing other than stainless steel tubing. The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

V. Proposed Modifications to California Greenhouse Gas Exhaust Emission Standards and Test Procedures for 2014 and Subsequent Model Heavy-Duty Vehicles (Appendix B-3)

A. Part 1037, Subpart A – Overview and Applicability

1. Section 1037.5. Excluded vehicles.

In section 1037.5, CARB staff proposes to add a new subsection (h)(6) to clarify that military tactical support vehicles are excluded from the Phase 2 GHG trailer requirements. Military vehicles are already excluded in 13 CCR 1905 and 17 CCR 95301 (Tractor-Trailer GHG regulation's applicability).

B. Part 1037, Subpart B – Emission Standards and Related Requirements

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

- a. In section 1037.106, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from October 25, 2016. This section provides the emission standards for tractors above 26,000 pounds GVWR. In the Phase 2 GHG technical amendments, the change clarifies that subsection (f)(2)(i) applies for hybrid and electric vehicles. The modification is necessary for clarification and for harmonization with the federal Phase 2 GHG technical amendments.
- b. In subsection 3 of these test procedures, CARB staff proposes to correct a referencing error in the amended requirements for §1037.106 (g)(2), originally posted on June 23, 2020. The current text references title 13, CCR, section 2421 as the location of the newly adopted PM standard for auxiliary power units (APUs) installed on 2024 and subsequent MY tractors. CARB staff's modification corrects the reference to section 2423 (n). This is necessary because section 2421 only provides the emission standards for off-road compression-ignition engines, but not for APUs. The special case requirement for APUs to comply with the more stringent 0.02 grams per kilowatt-hour (g/kW-hr) PM standard when installed on tractors is contained in title 13, CCR, 2423 (n).

2. Section 1037.115. Other requirements.

- a. In subsection 1037.115.B.1, CARB staff proposes to simply remove the mention of refrigerant capacity threshold of 3,000 grams, in order to allow air conditioning (A/C) systems less than 3,000 grams to utilize this provision. During U.S. EPA and CARB Phase 2 rulemakings, both agencies adopted a special provision requiring manufacturers to use alternative means to demonstrate equivalent refrigerant leakage control, if the A/C system has a

refrigerant capacity greater than 3,000 grams and is designed such that a leakage compliance demonstration using SAE J2727 is impossible or impractical. The threshold of 3,000 grams was established based on stakeholder input at that time. During CARB Phase 2 A/C leakage certification, CARB staff came across smaller-capacity A/C systems (less than 3,000 grams) that are also designed such that an SAE J2727-based leakage compliance demonstration is impossible or impractical.

- b. In section 1037.115.B.3.1.5., CARB staff proposes to remove the word “usable” and replace it with the word “rated.” This would correct an error in which the term “usable energy capacity” was inadvertently included in place of the term “rated energy capacity.” It is clear based on the title of the subsection, “Rated Energy Capacity,” that this requirement is intended to refer to the measurement of “rated energy capacity” and not “usable energy capacity.” Additionally, in “Appendix E: Purpose and Rationale for Each Regulatory Provision”³ from the Staff Report: Initial Statement of Reasons for the “Proposed Alternative Certification Requirements and Test Procedures for Heavy-Duty Electric and Fuel-Cell Vehicles and Proposed Standards and Test Procedures for Zero-Emission Powertrains (Zero-Emission Powertrain Certification Regulation),” released on December 31, 2018, it is described that “This requirement is necessary because it would allow vehicle owners to evaluate battery degradation.” The intent of this provision is to evaluate battery degradation, and in order to do so, the most accurate metric is rated energy capacity as a percent of the original rated energy capacity. Usable energy capacity, by definition, can be modified by the manufacturer and thus cannot accurately be used to assess battery degradation.

³ (CARB, 2018) “Appendix E: Purpose and Rationale for Each Regulatory Provision” from the Staff Report: Initial Statement of Reasons for the Proposed Alternative Certification Requirements and Test Procedures for Heavy-Duty Electric and Fuel-Cell Vehicles and Proposed Standards and Test Procedures for Zero-Emission Powertrains (Zero-Emission Powertrain Certification Regulation),” California Air Resources Board, December 31, 2018. <https://www.arb.ca.gov/regact/2019/zepcert/appe.pdf> – accessed 3/11/2021

3. Section 1037.120. Emission-related warranty requirements.

In section 1037.120, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from October 25, 2016. This section provides the emission-related heavy-duty vehicle warranty requirements that the vehicle manufacturer must provide to the ultimate purchaser and the components that would be covered in the warranty. In the Phase 2 GHG technical amendments, the changes clarify that 5 years or 50,000 miles emissions-related components warranty for light heavy-duty vehicles does not include tires and that these requirements apply to medium heavy-duty vehicles for 5 years or 100,000 miles. This later change was added to subsection 2 of section 1037.120 in a previous rulemaking and is no longer needed as a result of the recent Phase 2 GHG technical amendments. Thus, the proposed modification deletes this previous addition since it is no longer needed. The modification is necessary for clarification and for harmonization with the federal Phase 2 GHG technical amendments.

4. Section 1037.140. Classifying vehicles and determining vehicle parameters.

In section 1037.140, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from October 25, 2016. This section that CARB adopted in 2018 without modification specifies how vehicles are classified based on a vehicle's roof height, a trailer's length, GVWR, type of engine, and intended duty cycle, as well how to define vehicle service class. In the Phase 2 GHG technical amendments, the changes pertain to hybrids and include modifying the description of class 8 hybrid and electric vehicles to be considered "Heavy HDV," regardless of the engine's primary intended service class. The modification is necessary for clarification and for harmonization with the federal Phase 2 GHG technical amendments.

5. Section 1037.150. Interim provisions.

In section 1037.150, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from October 25, 2016. This section describes interim provisions for Phase 1 and Phase 2 vehicles, such as subsection (c) small manufacturers and subsection (y) transition to Phase 2 standards. In the Phase 2 technical amendments, the changes encourage small manufacturers to certify their vehicles earlier than required and allow them the ability to certify their vehicles with Phase 1 standards for calendar years 2021 and 2022 (instead of Phase 2 standards). In addition, Phase 1 credits generated from MY 2018 through 2022 could be used through MY 2027 (instead of being subject to the five-year credit life). The proposed amendments regarding small manufacturers are necessary to allow for harmonization with U.S. EPA. CARB staff recommends including the changes now as part of the Omnibus rulemaking in order for small manufacturers to certify their vehicles with Phase 1 in California as soon as possible in order to use those credits for Phase 2 and/or delay their Phase 2 compliance start date from 2022 to 2023.

Note that while both subsections (c) and (y) are existing CFR language from the federal Phase 2 GHG regulation that CARB adopted in 2018 without modification, the modifications in the Phase 2 technical amendments are to reorganize subsection (c), to add a new interim provision in subsection (c)(4) to determine the applicable standards and implementation dates for qualifying small manufacturers, and to add a new interim provision in subsection (y)(4) for small manufacturers to allow the Phase 1 vehicle credits that small manufacturers generate from MY 2018 through 2022 vocational vehicles to be used through MY 2027. CARB staff proposes to modify subsection (c)(1) to indicate the trailers that are excluded from the California provisions of section 1037.150. This proposed amendment is necessary to specify the implementation start date of the CO2 emission standards for these trailers, as set forth in the California Phase 2 standards. CARB staff also proposes to clarify in the required label in subsection (c)(3) that this vehicle is excluded in California interim small business provisions for a specific MY. Manufacturers have an option to clarify in the label that this vehicle is also excluded in the federal interim small business provisions. These modifications are necessary to ensure the label clearly identifies that the vehicle is excluded under the interim small business provisions. In addition, subsection (ab) specifies an exemption for trailers where trailer manufacturers may request to exempt certain trailers from the standards and certification requirements when it is determined that the technology is not available to meet the standards. CARB staff proposes to clarify in the label that this trailer is exempted in California provisions for a specific MY. This modification is necessary to ensure the label clearly identifies that the trailer is exempt under California provisions.”

C. Part 1037, Subpart C – Certifying Vehicle Families

1. Section 1037.201. General requirements for obtaining a certificate of conformity.

In section 1037.201, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from October 25, 2016. This section that CARB adopted in 2018 without modification describes the general requirements for obtaining a certificate of conformity (or Executive Order). In the Phase 2 GHG technical amendments, the change updates the cross-reference in (h) from 40 CFR §1037.245 to §1037.243. The modification is necessary for clarification and for harmonization with the federal Phase 2 GHG technical amendments.

2. Section 1037.225. Amending applications for certification.

In section 1037.225, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from October 25, 2016. This section that CARB adopted in 2018 without modification contains the procedures for amending an application for certification once it has been submitted for certification. The Phase 2 GHG technical amendments clarify the provisions relating to amending a

manufacturer's application. The modification is necessary for clarification and for harmonization with the federal Phase 2 GHG technical amendments.

3. Section 1037.230. Vehicle families, sub-families, and configurations.

In section 1037.230, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from October 25, 2016. This section that CARB adopted in 2018 without modification contains instructions for how to select vehicle families, sub-families, and configurations. The Phase 2 GHG technical amendments clarify the provisions for classifying tractor subcategories. The modification is necessary for clarification and for harmonization with the federal Phase 2 GHG technical amendments.

4. Section 1037.231. Powertrain families.

In section 1037.231, CARB staff proposes to align with the federal Phase 2 GHG technical amendments pre-publication date, March 10, 2021. This section that CARB adopted in 2018 without modification describes how to describe powertrain families. The Phase 2 GHG technical amendments add new language describing the number of available forward gears, and transmission gear ratio for each available forward gear. The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

5. Section 1037.235. Testing requirements for certification.

In section 1037.235, CARB staff proposes to align with the federal Phase 2 GHG technical amendments pre-publication date, March 10, 2021. This section that CARB adopted in 2018 without modification describes the testing requirements for certification. The Phase 2 GHG technical amendments include clarification language describing testing requirements for test hybrid components, test axles and additional instructions on how to test if the powertrain has more than one transmission calibration. Additional updates include clarification on interpreting emission results and a provision on the option of using analytically derived GEM inputs for untested configurations (such as untested axle ratios within an axle family). The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

6. Section 1037.255. What decisions may ARB make regarding my certificate of conformity?

In section 1037.255, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from October 25, 2016. This section that CARB adopted in 2018 without modification describes the decisions that CARB may make regarding certification and issuing a certificate of conformity (or Executive Order). The Phase 2 GHG technical amendments clarify certain requirements, such as restating existing requirements in the third-person point of view instead of second-

person. The modification is necessary for clarification and for harmonization with the federal Phase 2 GHG technical amendments.

D. Part 1037, Subpart D – Testing Production Vehicles and Engines

1. Section 1037.301. Overview of measurements related to GEM inputs in a selective enforcement audit.

In section 1037.301, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from October 25, 2016. This section that CARB adopted in 2018 without modification provides an overview of performing audits and selective enforcement testing of any GEM inputs used in certification. In the Phase 2 GHG technical amendments, the change deletes the phrase “matches or exceeds the efficiency improvement” in the last sentence in subsection (b) to read as follows, “If you report an FEL for the vehicle configuration before the audit, we will instead consider the vehicle passing if the new cycle-weighted emission result is at or below the FEL.” The modification is necessary for clarification and for harmonization with the federal Phase 2 GHG technical amendments.

2. Section 1037.305. Audit procedures for tractors-aerodynamic testing.

In section 1037.305, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from October 25, 2016. This section that CARB adopted in 2018 without modification describes the selective enforcement audit procedures for tractors regarding aerodynamic testing of drag area. The Phase 2 GHG technical amendments add a language for different trailer specifications approval if production configuration cannot be connected to the standard trailer in subsection (a)(1), add a minimum number of pass and fails for coastdown in subsection (a)(5), and correct the typographical errors in the aerodynamic testing audit procedures for tractors. The modification is necessary for clarification and for harmonization with the federal Phase 2 GHG technical amendments.

3. Section 1037.320. Audit procedures for axles and transmissions.

In section 1037.320, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from October 25, 2016. This section that CARB adopted in 2018 without modification describes the selective enforcement audit procedures for axles and transmissions in vehicles. The Phase 2 GHG technical amendments in subsection (b) clarify that the test transmission’s gear ratios and not the default ratios in 40 CFR 1036.540 should be used in GEM and in subsection (c) revise the provision when an axle or transmission does not pass. The modification is necessary for clarification and for harmonization with the federal Phase 2 GHG technical amendments.

E. Part 1037, Subpart F – Test and Modeling Procedures

1. Section 1037.510. Duty-cycle exhaust testing.

In section 1037.510, CARB staff proposes to align with the federal Phase 2 GHG technical amendments pre-publication date, March 10, 2021. This section that CARB adopted in 2018 without modification describes how to perform duty-cycle exhaust testing. The Phase 2 GHG technical amendments include adding paragraph (i) to note that the declared GEM inputs for fuel maps and aerodynamic drag area typically includes compliance margins to account for testing variability; for other measured GEM inputs, the declared values are typically the measured values without adjustment, updating the powertrain testing procedure used to generate GEM inputs to reduce the variability of the emission test results and to improve lab-to-lab measurement variability. Additional updates also include updating footnote format in Table 1, clarification on reference citations, and clarification to specifically state that the use of cruise control is optional. The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

2. Section 1037.515. Determining CO₂ emissions to show compliance for trailers.

- a. There are no changes in the adopted subsection 1037.515(a). In subsection 1037.515(b), CARB staff proposes to clarify that new trailer tires are required in the certification application and upon initial sale. Subparagraph (b) contains existing CFR language except for “new” tires.
- b. In section 1037.515, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from October 25, 2016. This section that CARB adopted in 2018 without modification describes compliance modeling procedures for trailers. The Phase 2 GHG technical amendments update the footnote format in Table 2 from numbers to letters and correct 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. The modification is necessary for clarification and for harmonization with the federal Phase 2 GHG technical amendments.

3. Section 1037.520. Modeling CO₂ emissions to show compliance for vocational vehicles and tractors.

In section 1037.520, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from October 25, 2016. CARB staff proposes to align with U.S. EPA on GEM 3.5.1 version for 2021 MY as finalized in the Phase 2 GHG technical amendments. CARB staff believes that including the change now as part of the Omnibus rulemaking is necessary in order for manufacturers to use the same GEM version for certification in California; otherwise, manufacturers would

need to run two different GEM versions for the same vehicle family in order to certify with both federal and California. Note that, U.S. EPA plans to do another round of GEM updates for 2022 and later MY vehicle certification. U.S. EPA is currently seeking comments of the updated GEM 3.8 version. If U.S. EPA amends GEM further, CARB staff plans to consider proposing aligning with the subsequent amendments in a future rulemaking.

4. Section 1037.525. Aerodynamic measurements for tractors.

In section 1037.525, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from October 25, 2016. This section describes how to determine the aerodynamic drag area of tractors using either coast down testing or an alternate procedure. The Phase 2 technical amendments have several updates to the testing and modeling provisions of 1037 subpart F related to aerodynamic testing including: clarifying that coastdown testing is the "reference method for aerodynamic measurements; separating subsection (b)(1) into a subsection (b)(1) defining $F_{alt-aero}$ and a new paragraph (b)(2) allowing manufacturers to assume $F_{alt-aero}$ is constant for a given alternate method; and deleting the sentence "Where you have test results from multiple vehicles expected to have the same $F_{alt-aero}$, you may either average the $F_{alt-aero}$ values or select any greater value." The modification is necessary for clarification and for harmonization with the federal Phase 2 GHG technical amendments.

5. Section 1037.528. Coastdown procedures for calculating drag area (CdA).

In section 1037.528, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from October 25, 2016. This section describes the coastdown procedures for calculating drag area for tractors, trailers, and vocational vehicles. The Phase 2 technical amendments replace the phrase "primary procedures" with "reference method" for tractors and "alternate procedures" with "an alternate method" for trailers for consistency of the terminologies, clarify that the conditions listed in subsection (c) apply to each run separately, make editorial changes in subsections (e), (g)(3), (h)(3)(i), and (h)(6), and correct a typographical error in the equations. The modification is necessary for clarification and for harmonization with the federal Phase 2 GHG technical amendments.

6. Section 1037.530. Wind-tunnel procedures for calculating drag area (CdA).

In section 1037.530, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from October 25, 2016. This section describes the wind-tunnel procedures for calculating drag area. The Phase 2 technical amendments replace the word "rotational" with "angular" to read, "maximum angular speed" for the fan description. The modification is necessary for clarification and for harmonization with the federal Phase 2 GHG technical

amendments.

7. Section 1037.532. Using computational fluid dynamics to calculate drag area (CdA).

In section 1037.532, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from October 25, 2016. This section describes how to use commercially available computational fluid dynamics software to calculate drag area. The Phase 2 technical amendments replace the incorrect "or" in subsection (a)(1) with "and" to include yaw angles of +4.5° and -4.5°, clarify that the Reynolds number is based on a 102-inch trailer width consistent with our specifications for a "standard trailer," and replace the phrase "the General On-Road Simulation" with "an open-road simulation" to avoid confusion with SAE International's revisions of SAE J2966. The modification is necessary for clarification and for harmonization with the federal Phase 2 GHG technical amendments.

8. Section 1037.534. Constant-speed procedure for calculating drag area (CdA).

In section 1037.534, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from October 25, 2016. This section describes how to use constant-speed aerodynamic drag testing to calculate drag area. The Phase 2 technical amendments replace the words "rotational" with "angular" and "rpm" with "speed." The modification is necessary for clarification and for harmonization with the federal Phase 2 GHG technical amendments.

9. Section 1037.540. Special procedures for testing vehicles with hybrid power take-off.

In section 1037.540, CARB staff proposes to align with the federal Phase 2 GHG technical amendments pre-publication date, March 10, 2021. This section that CARB adopted in 2018 without modification describes how to describe special procedures for testing vehicles with hybrid power take-off. The Phase 2 GHG technical amendments include updating equations, footnote format in table, a parameter name, removing incorrect cross-reference, and adding reference. The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

10. Section 1037.550. Powertrain testing.

- a. In section 1037.550, CARB staff proposes to align with the federal Phase 2 GHG technical amendments pre-publication date, March 10, 2021. This section that CARB adopted in 2018 without modification describes the procedure to perform powertrain testing. The Phase 2 GHG technical amendments include updating the powertrain testing procedure to reduce the variability of the emission test results and improve lab-to-lab variability

consistent. U.S. EPA further modified this section to include an introduction paragraph and reorganized paragraphs with new paragraph headings to improve navigation. Additional updates to this section in the final rule include clarifying in paragraph (a)(3) options available to create the models for powertrain testing, adding clarifications in several paragraphs to address where the torque and speed are measured based on powertrain setup, adding a new paragraph (f)(2) to address testing of hybrid engines using the transmission model in GEM, modifying paragraph (b) to give additional clarification on how to set the engine idle speed, adding a new paragraph (f)(2) for testing with torque measurement at the engine's crankshaft and how to calculate the transmission output rotational speed, updating paragraph (j)(2) to describe how to transition between duty cycles if the preceding cycle ends at 0 mi/hr, adding a new paragraph (j)(5) to describe how to warm up the powertrain, adding a new paragraph (o)(2) to describe how U.S. EPA will determine the official fuel consumption rate during a confirmatory test, based on carbon balance results, and updating paragraphs (o)(3) through (o)(5) to better define when a vehicle is not moving, moving the text from paragraph (p) into paragraph (o)(1), moving the text of paragraph (q) to the general provisions as a new paragraph (a)(5). The final rule includes additional updates to regulatory text to provide greater clarity and more carefully describe the procedures. The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

- b. CARB staff proposes making two changes in the renumbered subparagraph (a). The first change is to delete and replace "subparagraph (a)" with "the introductory paragraph." This change is necessary to align with formatting changes made in the recently adopted federal regulation. The second change is to revise the regulatory language, including deletions and additions, throughout the introductory paragraph to reflect the changes to the regulatory language made by the U.S. EPA. These changes are necessary to align with the newly adopted federal regulation.
- c. CARB staff proposes to renumber subparagraph "(b)" to subparagraph "(a)." This change is necessary to align with formatting changes made in the recently adopted federal regulation. CARB staff also proposes to add "General provisions" to the beginning of this subparagraph. This change is necessary to align with the newly adopted federal regulation.
- d. CARB staff proposes making two changes in the renumbered subparagraph (b)(1). The first change is to delete and replace subparagraph "(b)(1)" with subparagraph "(a)(1)." This change is necessary to align with formatting changes made in the recently adopted federal regulation. The second change is to revise the regulatory language, including deletions and additions, throughout the introductory paragraph to reflect the changes to

the regulatory language made by the U.S. EPA. These changes are necessary to align with the newly adopted federal regulation.

- e. CARB staff proposes making two changes to these renumbered subparagraphs. The first change is adding "s" to the word "subparagraph" to read "subparagraphs." This change is necessary for proper grammar. The second change is to renumber subparagraphs "(b)(2)" to "(a)(2)" and "(q)" to "(o)." These changes are necessary to align with formatting changes in the newly adopted federal regulation.

11. Section 1037.551. Engine-based simulation of powertrain testing.

In section 1037.551, CARB staff proposes to align with the federal Phase 2 GHG technical amendments pre-publication date, March 10, 2021. This section that CARB adopted in 2018 without modification describes how to perform engine-based simulation of powertrain testing. The Phase 2 GHG technical amendments include includes updating a reference. The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

12. Section 1037.560. Axle efficiency test.

In section 1037.560, CARB staff proposes to align with the federal Phase 2 GHG technical amendments pre-publication date, March 10, 2021. This section that CARB adopted in 2018 without modification describes the procedure for mapping axle efficiency through a determination of axle power loss. The federal Phase 2 GHG technical amendments include clarifying that it is optional to drain gear oil after the break in period is complete, providing the option of an alternative temperature range to provide international harmonization of testing, editing the P_{loss} (i.e., power loss) variable description to improve the readability, and adding subsection (h) to describe how to derive axle power loss maps for untested configurations in a family. The Phase 2 technical amendments also clarify subsection (a) that for tandem axles that can be disconnected, testing both single-drive and tandem axle configurations includes 4x4 axles where one of the axles is disconnectable; add a new subsection (h)(4) and modify (h)(5) with regards to the results when multiple gear ratios are tested and one of the points is above the linear regression line, which could cause the regression values to understate power loss, to clarify that manufacturers must add the difference between the datapoint and the regression line to the intercept values of the regression line to mitigate this effect; and update the use of the term "axle" to "axle assembly" throughout the section to provide consistency. The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

13. Section 1037.565. Transmission efficiency test.

In section 1037.565, CARB staff proposes to align with the federal Phase 2 GHG technical amendments pre-publication date, March 10, 2021. This section that

CARB adopted in 2018 without modification describes the procedure to perform a transmission efficiency test. The Phase 2 GHG technical amendments changes include providing an option to map additional test points to provide international harmonization of testing, including edits to improve the readability of the P_{loss} variable description, and adding paragraph (d)(4) and clarifying paragraphs (e)(6) and (7) regarding the gears the transmission is tested in, updating the torque transducer accuracy requirements in paragraph (c) to link it to the highest transmission input torque or respective output torque; adding additional detail in paragraph (d)(1) on the maximum transmission input shaft speed to test, specifically the maximum rated input shaft speed of the transmission or the maximum test speed of the highest speed engine paired with the transmission, and the minimum idle speed to test, specifically 600 r/min or the minimum idle speed of the engines paired with the transmission; modifying paragraph (d)(2) to optionally allow, in higher gear ratios where output torque may exceed dynamometer torque limits, the use of good engineering judgment to measure loaded test points at input torque values lower than specified (in this case GEM may need to extrapolate values outside of the measured map, however extrapolation time may not exceed 10 percent for any given cycle and you must describe in the application for certification how you adjusted the torque setpoints); modifying paragraph (e)(9) to allow the use of the maximum loss value achieved from all the repeats of the test points to calculate transmission efficiency; adding a new (e)(11) clarifying what needs to be calculated for each point in the test matrix; modifying paragraph (g) and moving part of existing paragraph (g) to a new paragraph (h) to avoid a potentially neverending cycle of repeat testing if repeatability requirements are not achieved. If the repeatability requirement is not met after conducting three or more tests, the maximum loss value may be used to calculate transmission efficiency or can continue to test until the repeatability requirement is passed. The modification is necessary for harmonization with the federal Phase 2 GHG technical amendments.

14. Section 1037.570. Procedures to characterize torque converters.

In section 1037.570, CARB staff proposes to align with the federal Phase 2 GHG technical amendments pre-publication date, March 10, 2021. This is a new section added to determine torque ratios and capacity factors for torque convertors. The procedure describes test conditions and testing points requiring manufacturers to test torque convertors if they choose to do so. The addition of the section is necessary for harmonization with the federal Phase 2 GHG technical amendments.

F. Part 1037, Subpart G – Special Compliance Provisions

1. Section 1037.601. General compliance provisions.

In section 1037.601, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from October 25, 2016. This section contains

general compliance provisions for vehicle manufacturers. The Phase 2 technical amendments in subsection (a)(2) remove the limit of “up to 50” and add a more general statement to limit the number of engines. The modification is necessary for clarification and for harmonization with the federal Phase 2 GHG technical amendments.

2. Section 1037.615. Advanced technologies.

In section 1037.615, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from October 25, 2016. This section describes the requirements for advanced technologies for Phase 1 and Phase 2 vehicles. The Phase 2 technical amendments clarify that fuel cells powered by hydrogen also use an FEL of 0 g/ton-mile when calculating CO₂ credits. The modification is necessary for clarification and for harmonization with the federal Phase 2 GHG technical amendments.

3. Section 1037.621. Delegated assembly.

In section 1037.621, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from October 25, 2016. This section describes provisions that allow certificate holders to sell and ship vehicles that are missing certain emission-related components if those components will be installed by a secondary manufacturer. The Phase 2 technical amendments clarify that certifying vehicle manufacturers could authorize dealers or distributors to recalibrate vehicles after the vehicles have been introduced into commerce if they have not yet been delivered to the ultimate purchaser. The modification is necessary for clarification and for harmonization with the federal Phase 2 GHG technical amendments.

4. Section 1037.665. Production and in-use tractor testing.

In section 1037.665, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from October 25, 2016. This section specifies vehicle modifications that may occur after a vehicle reaches the end of its regulatory useful life. The Phase 2 technical amendments clarify the alternative tests that can be permitted. To qualify, vehicles tested would need to be actual production vehicles rather than custom-built prototype vehicles. Manufacturers would also need to ensure test methods are sufficiently similar from year to year to allow for a meaningful analysis of trends. The modification is necessary for clarification and for harmonization with the federal Phase 2 GHG technical amendments.

5. Section 1037.670. Optional CO₂ emission standards for tractors at or above 120,000 pounds GCWR.

In section 1037.670, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from October 25, 2016. This section specifies the optional CO₂ emission standards for tractors at or above 120,000 pounds gross

combined weight rating (GCWR). The Phase 2 technical amendments replace the standards for 2021 MY and later with phase-in standards beginning with 2021 MY and stringency increases in the 2024 MY, and then in the 2027 MY. The modification is necessary for clarification and for harmonization with the federal Phase 2 GHG technical amendments.

G. Part 1037, Subpart H – Averaging, Banking, and Trading for Certification

1. Section 1037.740. Restrictions for using emission credits.

In section 1037.740, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from October 25, 2016. This section specifies the restrictions for using emission credits, such as defining the averaging sets, credits from advanced technology, and credit life. The Phase 2 technical amendments replace the term “heavy-duty vehicles” with “HDV.” The modification is necessary for clarification and for harmonization with the federal Phase 2 GHG technical amendments.

H. Part 1037, Subpart I – Definitions and Other Reference Information

1. Section 1037.801. Definitions.

- a. In section 1037.801, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from October 25, 2016. The section describes the definitions in Part 1037. The Phase 2 GHG technical amendments added new definitions for “electronic control module,” “high-strength steel,” and “tonne” and modified existing definitions of “auxiliary emission control device,” “electric vehicle,” “gear ratio or transmission gear ratio,” “heavy-duty vehicle,” “hybrid engine or hybrid powertrain,” “hybrid vehicle,” “light-duty vehicle,” “model year,” and “small manufacturer.” The modifications amend the definitions for “Hybrid engine or hybrid powertrain” and “Hybrid vehicle” in A. Federal Provisions to incorporate new federal regulatory language. The modifications are necessary for harmonization with the federal Phase 2 GHG technical amendments.
- b. In subsection 1037.801.A.1, CARB staff proposes modifying the definition of “Hybrid engine or hybrid powertrain” by adding a sentence “Note other examples of systems that qualify as hybrid engines or powertrains are systems that recover kinetic energy and use it to power an electric heater in the aftertreatment.” This is necessary to harmonize with the revised definition from the U.S. EPA as used in the Phase 2 GHG technical amendments final rule to expand the definition of hybrid powertrain to include systems that recover kinetic energy and use it to power an electric heater in the aftertreatment. CARB staff also proposes to add “or hybrid

powertrains” to the final sentence of the paragraph of this definition to be consistent with title of the definition.

- c. In subsection 1037.801.A.2, CARB staff proposes modifying the definition of “Hybrid vehicle” by adding a sentence “Note other examples of systems that qualify as hybrid engines or powertrains are systems that recover kinetic energy and use it to power an electric heater in the aftertreatment.” This is necessary to harmonize with the revised definition from the U.S. EPA as used in the Phase 2 GHG technical amendments final rule to expand the definition of hybrid powertrain to include systems that recover kinetic energy and use it to power an electric heater in the aftertreatment.

2. Section 1037.810. Incorporation by reference.

In section 1037.810, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from October 25, 2016. The section describes the material, including GEM-related references, that is incorporated by reference in Part 1037. The modification is necessary for clarification and for harmonization with the federal Phase 2 GHG technical amendments.

I. Appendix III to Part 1037 – Emission Control Identifiers

In Appendix III to Part 1037, CARB staff proposes to modify the emission control identifier DWSW description from “Dual-wide trailer tires with steel wheel” to “Dual-wide trailer tires with high strength steel wheel” since trailer manufacturers would not achieve any weight reduction value by using dual-wide trailer tires unless they use a high strength steel wheel. Note that while the whole list of emission control identifiers is in existing CFR language from the federal Phase 2 GHG regulation that CARB adopted in 2018 without modification, the list of abbreviations is double under-lined to show that they are new text to these test procedures. The only modification to the CFR language is to add “high strength” to the “Dual-wide trailer tires with steel wheels” as noted above.

J. Part 1066, Subpart B – Equipment, Measurement Instruments, Fuel, and Analytical Gas Specifications

1. Section 1066.135. Linearity verification.

In section 1066.135, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from October 25, 2016. The section describes linearity verification unique to vehicle testing. The Phase 2 GHG technical amendments widen the range for verifications of a gas divider derived analyzer calibration curve to 10 to 60 percent to ease lab burden. The modification is necessary for clarification and for harmonization with the federal Phase 2 GHG technical amendments.

K. Part 1066, Subpart C – Dynamometer Specifications

1. Section 1066.210. Dynamometers.

In section 1066.210, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from October 25, 2016 (which was incorrectly cited as October 22, 2016). The section describes the specifications of the chassis dynamometer, such as accuracy and precision, test cycle simulation ability, and component requirements. The Phase 2 GHG technical amendments change the value for acceleration of Earth's gravity from a calculation under 40 CFR section 1065.630 to a default value of 9.80665 meters per second squared because the track coastdown does not take place in the same location that the dynamometer resides. The modification is necessary for clarification and for harmonization with the federal Phase 2 GHG technical amendments.

2. Section 1066.255. Parasitic loss verification.

In section 1066.255, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from February 19, 2015. The section describes how to verify and correct the dynamometer's parasitic loss upon initial installation, within seven days of testing, and after major maintenance. The Phase 2 GHG technical amendments clarify that the torque transducer zero and span are mathematically done prior to the start of the procedure. The modification is necessary for clarification and for harmonization with the federal Phase 2 GHG technical amendments.

3. Section 1066.260. Parasitic friction compensation evaluation.

In section 1066.260, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from October 25, 2016. The section describes how to verify the accuracy of the dynamometer's friction compensation. The Phase 2 GHG technical amendments correct an error in the example problem result. The modification is necessary for clarification and for harmonization with the federal Phase 2 GHG technical amendments.

4. Section 1066.265. Acceleration and deceleration verification.

In section 1066.265, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from October 25, 2016. The section describes how to verify the dynamometer's ability to achieve targeted acceleration and deceleration rates upon initial installation and after major maintenance. The Phase 2 GHG technical amendments correct the example equation to replace a subtraction sign that was a typographical error with a multiplication sign. The modification is necessary for clarification and for harmonization with the federal Phase 2 GHG technical amendments.

5. Section 1066.270. Unloaded coastdown verification.

In section 1066.270, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from October 25, 2016. The section describes how to use force measurements to verify the dynamometer's settings based on coastdown procedures upon initial installation, within seven days of testing, and after major maintenance. The Phase 2 GHG technical amendments correct units for force in mean force variable description and correcting example problem solution, and include corrections on maximum allowable error. The error values are positive and not a positive and negative range. The modification is necessary for clarification and for harmonization with the federal Phase 2 GHG technical amendments.

6. Section 1066.275. Daily dynamometer readiness verification.

In section 1066.275, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from October 25, 2016. The section describes how to verify that the dynamometer is ready for emission testing. The Phase 2 GHG technical amendments extend the dynamometer readiness verification interval from within one day before testing to an optional seven days prior to testing if historic data from the test site supports an interval of more than one day. The Phase 2 GHG technical amendments also include corrections on maximum allowable error. The modification is necessary for clarification and for harmonization with the federal Phase 2 GHG technical amendments.

L. Part 1066, Subpart E – Preparing Vehicles and Running an Exhaust Emission Test

1. Section 1066.405. Vehicle preparation, preconditioning, and maintenance.

In section 1066.405, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from April 28, 2014. The section states to take steps to prepare the vehicle for testing, as described in the standard-setting part. The Phase 2 GHG technical amendments update the heading to include "maintenance" and also add new subsections (b) and (c) to address test vehicle inspection, maintenance and repair, consistent with section 1065.410, and replace the term "bad engine" with "malfunctioning" in relation to engine components in subsection (b). The modification is necessary for clarification and for harmonization with the federal Phase 2 GHG technical amendments.

2. Section 1066.420. Test preparation.

In section 1066.420, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from February 19, 2015. The section describes the test preparation of the ambient controls, fans, and emission measurement systems.

The Phase 2 GHG technical amendments update the footnote format in Table 1 and clarify that air conditioning driving schedule (SC03) humidity tolerance is an “average” value consistent with section 86.161-00(b)(1) and inadvertently not carried over in part 1066. The modification is necessary for clarification and for harmonization with the federal Phase 2 GHG technical amendments.

M. Part 1066, Subpart G – Calculations

1. Section 1066.605. Mass-based and molar-based exhaust emission calculations.

In section 1066.605, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from October 25, 2016. The section describes how to determine mass-based and molar-based exhaust emission calculations. The Phase 2 GHG technical amendments correct a typographical error in subsection (c)(4) where “NMHC” should read “NMHCE” and edits Equation 1066.605-10 by adding italics for format consistency. The modification is necessary for clarification and for harmonization with the federal Phase 2 GHG technical amendments.

2. Section 1066.610. Dilution air background correction.

In section 1066.610, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from April 28, 2014. The section describes the calculations for dilution air background correction. The Phase 2 GHG technical amendments edit the Equation 1066.610-4 by adding italics for format consistency. The modification is necessary for clarification and for harmonization with the federal Phase 2 GHG technical amendments.

N. Part 1066, Subpart I – Exhaust Emission Test Procedures for Motor Vehicles

1. Section 1066.801. Applicability and general provisions.

In section 1066.801, CARB staff proposes changing the amended date to March 10, 2021 (Pre-publication) from October 25, 2016. The section describes the general provisions of the test procedures for light-duty vehicles, light-duty trucks, and heavy-duty vehicles at or below 14,000 pounds GVWR that are subject to chassis testing for exhaust emissions. The Phase 2 GHG technical amendments update the initial vehicle soak to be a 6-hour minimum and not a range of 6 to 36 hours. The modification is necessary for clarification and for harmonization with the federal Phase 2 GHG technical amendments.

VI. California Environmental Performance Label Specifications for 2021 and Subsequent Model Year Medium-Duty Vehicles, Except Medium-Duty Passenger Vehicles (Appendix B-4)

1. Section 5. Smog Rating (tailpipe only).

In subsection 5.(b), CARB staff proposes to split the merged cells in the right column under the header “Smog Rating” so that each column has the same number of rows. The empty cells created from splitting the cell are filled with appropriate Smog Rating values. This modification is non-substantive and is necessary to improve accessibility and readability of the regulatory document.

2. Section 9. Environmental Performance Label Format Requirements.

In section 9 of the Environmental Performance Label Format Requirements, CARB staff proposes to clarify that the area for “vehicle fuel type” should have a zero radius for all corners in subsection (9)(1) to ensure consistency among all manufacturers’ labels.

VII. 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 (Appendix B-6)

In subsection E.2.31.2, CARB staff proposes to delete the footnote that provided the option to certify 2024 through 2026 MY Otto-cycle engines used in incomplete medium-duty vehicles from 10,001 to 14,000 pounds GVWR and diesel engines used in medium-duty vehicles from 10,001 to 14,000 pounds GVWR to the optional 50-state-directed engine emission standards. The changes are necessary since the provision to certify to the optional 50-state-directed engine emission standards is being removed, as discussed in section I.A.14 above.

VIII. Cost information of the Optional Elements in the Heavy-Duty Omnibus Regulation

One of the proposals included in Attachment A⁴ of Resolution 20-23 is to provide cost information for the proposed optional elements of the regulation for informational purposes. The optional elements of the proposed amendments include the optional 50-state-directed engine emission standards, the optional low NOx standards, and the optional hybrid powertrain certification test procedures.

A. Optional 50-State-Directed Engine Emission Standard

The optional 50-state-directed engine emission standards, as described in Section IX of the ISOR, included an analysis of the cost impacts that may result from implementation of the 50-state-directed engines provision. CARB staff conducted a sensitivity analysis assuming various levels of utilization of the 50-state-directed engines option. CARB staff analyzed situations where manufacturers would utilize the option for 0, 50, and 100 percent of their sales volumes. Below is Table IX-62⁵ from the ISOR, showing the results from this analysis.

Table Error! No text of specified style in document.-1. Summary of Cost-Effectiveness for the Proposed Amendments with Various Levels of Utilization of the 50-State-Directed Option

Percent of Manufacturers Using 50-State-Directed Option	Total Cost of the Regulation	Total Savings of the Regulation	Total NOx Benefits [Tons]	Cost-Effectiveness \$/Ton	Cost-Effectiveness \$/lb
Proposed Amendments (0% of Mfrs)	\$4,494,764,136	\$650,574,767	352,797	\$10,896	\$5.45
(50% of Mfrs)	\$4,477,271,875	\$650,574,767	368,841	\$10,375	\$5.19
(100% of Mfrs)	\$4,459,779,614	\$650,574,767	384,886	\$9,897	\$4.95

As shown in the table, because the total program costs are dominated by the cost in meeting the 2027 standards, the utilization of the optional 50-state-directed engine emission standards makes a relatively small difference in overall cost of the proposed amendments. For example, 50 percent utilization of the optional 50-state-directed engine emission standards would decrease the total costs from 2022 through 2050

⁴ Resolution 20-23: [Attachment A: Staff's Suggested Modifications to the Original Proposal](#), California Air Resources Board, September 29, 2020.

⁵ [Public Hearing to Consider the Proposed Heavy-Duty Engine and Vehicle Omnibus Regulation and Associated Amendments, Staff Report: Initial Statement of Reasons \(ISOR\)](#), California Air Resources Board, June 23, 2020, (Table IX-62, Page IX-82).

calendar years by only \$17 million dollars when compared to the primary standards in the proposed amendments, while full utilization of the optional 50-state-directed engine emission standards would decrease the total costs from 2022 through 2050 calendar years by \$35 million.

The Board, after hearing comments from stakeholders, directed CARB staff to retain or remove the optional 50-state-directed engine emission standards.⁶ As discussed in section I.A.14 above, CARB staff is proposing to remove the 50-state-directed engine emission standards. As a result, the scenario that assumes zero percent utilization of the 50-state-directed engine emission standards in the ISOR (Table IX-62) is representative of the cost impacts of the Heavy-Duty Omnibus Rulemaking impacts.

B. Optional Low NOx Standards

As discussed in the ISOR, in order to continue incentivizing manufacturers to develop and certify engines that are cleaner than required to meet the primary standards, CARB staff had proposed optional low NOx standards that are more stringent than the mandatory standards. A number of natural gas- and propane-fueled Otto-cycle engines have already been certified to the current most stringent optional low NOx standard of 0.02 g/bhp-hr. However, to date, no diesel-fueled engine has been certified to any of the existing optional low NOx standards.

The most stringent proposed optional low NOx emission standards apply to 2027 and subsequent model heavy-duty engines and for diesel certified engines include 0.010 g/bhp-hr NOx on the FTP and RMC and 0.025 g/bhp-hr NOx on the LLC, and for heavy-duty Otto-cycle engines, 0.010 g/bhp-hr NOx on the FTP. Certified Otto-cycle engines currently meeting the 0.02 g/bhp-hr NOx emission standards are using slightly larger TWC and better air-fuel ratio controls. This indicates that with further improvements in calibration strategies, air-fuel ratio controls and improved catalyst formulations, it would be technically and cost-effectively feasible for heavy-duty Otto-cycle engines to meet the proposed 2027 optional low NOx emission standard.

Certifying to the very stringent optional low NOx emission standards will be a business decision for manufacturers based on the incremental cost from a baseline 0.02 g/bhp-hr optional low NOx engine to developing a 0.01 g/bhp-hr optional low NOx engine and the benefits potentially available through incentive funding which may be available to buyers of such engines. As mentioned above, CARB staff believes incremental improvements in calibration and air-fuel ratio controls as well as improvements in TWC formulations would be similar to the design changes used by manufacturers to meet the 0.02 g/bhp-hr optional NOx emission standard. CARB staff assumes the same incremental cost would be needed to meet the 0.01 g/bhp-hr NOx

⁶ Resolution 20-23: Heavy-Duty Engine and Vehicle Omnibus Regulation and Associated Amendments, California Air Resources Board, September 29, 2020. (<https://ww3.arb.ca.gov/regact/2020/hdomnibuslownox/res20-23.pdf> - accessed 3/22/2021))

standard. This incremental cost for these improvements in calibration and TWC formulations is \$411 in 2018 dollars.

C. Optional Heavy-Duty Hybrid Powertrain Certification

The hybrid powertrain certification test procedure amends the existing Phase 2 GHG powertrain testing and is largely to update and expand the scope of the existing powertrain test procedures. The amended hybrid powertrain procedure would allow it to be used as an optional procedure to certify heavy-duty vehicles to criteria pollutants emission standards. The amended procedure would give manufacturers of heavy-duty vehicles an added, voluntary option to certify their vehicles.

To the extent that manufacturers of heavy-duty vehicles elect to use the amended powertrain test procedure to also certify heavy-duty vehicles to criteria pollutants emission standards, at the same time the vehicle is tested to certify to GHG emission standards, there will be some increased incremental cost over the cost to certify only for GHG emission standards, mainly due to additional instrumentation, laboratory setup, and data processing. However, the incremental cost for powertrain criteria pollutants emission standards certification testing, if tested in conjunction with GHG emission certification testing, is projected to be much less than if the manufacturer must utilize an alternate certification procedure, such as chassis dynamometer testing, to separately test their vehicles to criteria pollutants emission standards. In addition, since powertrain testing involves increased use of computerized simulation of different vehicle configurations and operational parameters, there is a potential reduction in costs.

Overall, CARB staff anticipates that the amended powertrain test procedure would not increase overall cost on manufacturers, or the cost of vehicles certified for sale in California. Since the use of the powertrain procedure is optional, CARB staff assumes a manufacturer will only choose to use the procedures if they save the manufacturer money versus existing certification procedures, or if it results in other ancillary benefits. The availability of the amended powertrain procedures could potentially allow some manufacturers to produce and certify heavy-duty hybrid vehicles that they were previously unable to bring to market, due to the unavailability of an appropriate certification test procedure, thus, potentially expanding their customer base and improving their economic earnings. In addition, the amended powertrain test procedure could potentially provide more cost benefits because of the increased production of hybrid vehicles, which could result in lower hybrid vehicle costs due to economies of scale. To be conservative, i.e., to err on the side of estimating higher costs, CARB staff is not taking credit for any cost savings or any benefits due to the amended powertrain test procedures.

Additional Non-Substantive Modifications

In addition to the modifications described above, additional modifications correcting grammar, punctuation and spelling have been made throughout the proposed changes. These changes are non-substantive.

These modifications do not change implementation of the regulation in any way that affects the conclusions of the environmental analysis included in the Staff Report because the modifications consist primarily of revisions to provide more flexibility in complying with the requirements and clarifications and definitions that do not alter the compliance responses, so no additional environmental analysis or recirculation of the analysis is required.

Additional Documents Added to the Record

In the interest of completeness and in accordance with Government Code section 11347.1, subdivision (a), CARB staff has also added to the rulemaking record and invites comments on the following additional documents:

1. (Achates, 2020) "Achates Power Opposed-Piston Heavy-Duty Diesel Engine Demonstration Performance Results – Ultralow NOx without additional hardware," Achates Power, December 17, 2020. <https://achatespower.com/wp-content/uploads/2020/12/Achates-Power-Opposed-Piston-Heavy-Duty-Diesel-Engine-Demonstration-Performance-Results-Ultralow-NOx-without-additional-hardware.pdf> – accessed 3/8/2021
2. (Achates, 2021) Whitepaper "Achates Power Opposed-Piston Engine Oil Consumption & Durability Results," Achates Power, February 18, 2021. <https://achatespower.com/wp-content/uploads/2021/02/Durability-Assessment-of-OP-Engines-Feb.2021.pdf> – accessed 3/8/2021
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4. (Baidar et al., 2015) "Weakening of the weekend ozone effect over California's South Coast Air Basin," Baidar, S., Hardesty, R. M., Kim, S. W., Langford, A. O., Oetjen, H., Senff, C. J., Trainer, M., Volkamer, R., Geophysical Research Letters 2015, 42, (21), 9457-9464.

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7. (CARB, 2021b) Advanced Clean Fleets Program webpage – provides information about the Advanced Clean Fleets Regulation, California Air Resources Board.
<https://ww2.arb.ca.gov/our-work/programs/advanced-clean-fleets> – accessed 3/17/2021
8. (CARB, 2021c) Advanced Clean Trucks Program webpage – provides information about the Advanced Clean Trucks Regulation, California Air Resources Board.
<https://ww2.arb.ca.gov/our-work/programs/advanced-clean-trucks> – accessed 3/17/2021
9. (CARB, 2021d) CARB's The TruckStop webpage – provides more information about incentives and financial assistance, California Air Resources Board.
https://ww3.arb.ca.gov/msprog/truckstop/azregs/fa_resources.htm – accessed 3/17/2021
10. (CARB, 2021e) "Frequently Asked Questions – CARB Truck Rule Compliance Required for DMV Registration," California Air Resources Board.
https://ww3.arb.ca.gov/msprog/truckstop/pdfs/sb1_faqeng.pdf – accessed 3/17/2021
11. (CARB, 2021f) Heavy Duty Inspection and Maintenance Program webpage – provides information about the Heavy-Duty Inspection and Maintenance Regulation, California Air Resources Board. <https://ww2.arb.ca.gov/our-work/programs/heavy-duty-inspection-and-maintenance-program> – accessed 3/17/2021
12. (CARB, 2021g) Low Carbon Transportation Investments and Air Quality Improvement Program webpage – provides information about Clean Transportation Incentives, California Air Resources Board.
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Because of current travel, facility, and staffing restrictions, the California Air Resources Board’s offices have limited public access. Please contact Chris Hopkins, Regulations Coordinator, at chris.hopkins@arb.ca.gov or (916) 445-9564 if you need a physical copy of the document. Pursuant to Government Code section 11347.1, upon request to the aforementioned Regulations Coordinator, the document would be available for inspection at the California Air Resources Board, 1001 I Street, Sacramento, California, 95814, between the hours of 9:00 .a.m. to 4:00 p.m., Monday through Friday (excluding holidays).

Agency Contacts

Inquiries concerning the substance of the proposed regulation may be directed to Daniel Hawelti, Staff Air Pollution Specialist, On-Road Heavy Duty Diesel Section, at

(626) 450-6149 or (designated back-up contact) Paul Adnani, Staff Air Pollution Specialist, at (626) 459-4476.

Public Comments

Written comments will only be accepted on the modifications identified in this Notice. Comments may be submitted by postal mail or by electronic submittal no later than the due date to the following:

Postal mail: Clerks' Office, California Air Resources Board
1001 I Street, Sacramento, California 95814

Electronic submittal: <https://www.arb.ca.gov/lispub/comm/bclist.php>

Please note that under the California Public Records Act (Gov. Code §6250 et seq.), your written and verbal comments, attachments, and associated contact information (e.g., your address, phone, email, etc.) become part of the public record and can be released to the public upon request.

In order to be considered by the Executive Officer, comments must be directed to CARB in one of the two forms described above and received by CARB no later than the deadline date for public comment listed at the beginning of this notice. Only comments relating to the above-described modifications to the text of the regulations shall be considered by the Executive Officer.

If you need this document in an alternate format or another language, please contact the Clerks' Office at (916) 322-5594 or cotb@arb.ca.gov no later than five (5) business days from the release date of this notice. TTY/TDD/Speech to Speech users may dial 711 for the California Relay Service.

Si necesita este documento en un formato alternativo u otro idioma, por favor llame a la oficina del Secretario del Consejo de Recursos Atmosféricos al (916) 322-5594 o cotb@arb.ca.gov no menos de cinco (5) días laborales a partir de la fecha del lanzamiento de este aviso. Para el Servicio Telefónico de California para Personas con Problemas Auditivos, ó de teléfonos TDD pueden marcar al 711.

California Air Resources Board



Richard W. Corey
Executive Officer

Date: May 5, 2021

Attachments

The energy challenge facing California is real. Every Californian needs to take immediate action to reduce energy consumption. For a list of simple ways you can reduce demand and cut your energy costs, see [CARB's website](http://www.ARB.ca.gov) (www.ARB.ca.gov).