Public Hearing to Consider Advanced Clean Cars II Regulations

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

Appendix B
Summary of Comments to the Low-Emission Vehicle Regulation and Agency Response

Public Hearing Date: August 25, 2022
Agenda Item No.: 22-10-1

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Summary of Comments on Low-Emission Vehicle Regulation and Agency Responses

As noted in the main body of the Final Statement of Reasons (FSOR), the CARB has summarized and responded to written and oral comments on the Advanced Clean Cars II (ACC II) regulations and the process by which they were adopted. These comment summaries and responses are contained in multiple appendices to the FSOR, sorted by subject matter. This appendix contains the summaries of and responses to comments related to the Low-Emission Vehicle (LEV) regulations, including the light-duty vehicle (LDV) exhaust emission standards, medium-duty vehicle (MDV) exhaust emission standards, evaporative emission standards, and test procedures.

The following notes about the comments and responses will help with understanding how the comments are structured and labeled:

- Each comment has a unique code, as identified in Tables 1-7 of the FSOR. Each code indicates the comment period or context of the submission, followed by a unique number for each comment submitted within that comment period or context. For example, comment "OP-1" indicates a comment received during the original (45-day) comment period ("OP" standing for "original period"), and 1 is the unique number identifying the specific comment. Certain lengthy or complex comments have been given additional code information identifying sections of the comment. For example, comment OP-155-1 would indicate a comment received during the original (45-day) comment period, unique comment identifier 155, and the first substantive portion of the comment. These additional sub-comment codes are shown in the copies of the comments included in the rulemaking file.
- Comments are grouped thematically by section and subsection. Repetitive comments are listed under the same comment number and responded to holistically. Each individual comment excerpt is preceded by "Comment:" and followed by its comment identification code, allowing readers to distinguish among repetitive individual comment excerpts that are bundled under the same comment number.
- Comments are excerpted verbatim unless otherwise noted. In some instances, comment excerpts are preceded by the statement, "Commenter says," with the comment excerpt in quotation marks. In other instances, the verbatim excerpt is presented without any preface or quotation marks. Comments that have been summarized, rather than quoted, are indicated by a preface such as "Commenter says that . . ." and are not followed by quotation marks.
- In verbatim comment excerpts, CARB has not corrected or noted errors in the original (for example, by adding "[sic]"). Comment excerpts' formatting may differ from the formatting of the original comment.
- Footnotes in comments generally have been omitted, though the footnote numbers may remain in the text of the comment excerpt.
- In general, CARB has noted where it made changes in response to the comment. Where it is not noted, no changes were made in response to the comment.

A. Light-Duty Vehicle Exhaust Emission Proposals

Non-Methane Organic Gases plus Nitrogen Oxides (NMOG+NOx) Fleet Average

1. Comment: Commenters support phase-out of zero-emission vehicles (ZEVs) from the NMOG+NOx fleet average. [OP-94, OP-155, incorporated by reference into comments B1-20, OP-124, T1-8, T1-9, OP-57, OP-98, OP-150, OP-95, T2-34]

   Comment: Commenter supports CARB's proposal to transition to a non-ZEV NMOG+NOx fleet average emission standard with the proposed phase-in period in MYs 2026-2027 tapering down the percentage of ZEVs calculated in the fleet average. [OP-139]

   Comment: Commenter supports the proposed changes to the LEV criteria emissions standards. As new vehicles sales transition to higher fractions of ZEVs, it will be important to prevent backsliding from combustion engine-powered vehicles by applying fleet emission standards exclusively to internal combustion engine vehicles. [OP-170, OP-172]

   Comment: Commenter supports tailpipe pollution standards that will reduce harm from new gasoline vehicles and will also prevent backsliding by manufacturers [OP-166]

   Comment: Commenter fully supports the diminishing levels (50%, 25% and 0%) of ZEVs in 2026, 2027 and 2028 respectively in the NMOG+NOx Fleet Average. [B1-1]

   Agency Response: CARB thanks the commenters for supporting the phase-out of ZEVs from the nonmethane organic gas plus oxides of nitrogen (NMOG+NOx) fleet average, which will prevent backsliding from combustion engine-powered vehicles as the ZEV requirements increase, and which has been adopted in the final ACC II regulations. CARB notes that the original proposal and the adopted ACC II regulations allow 60%, 30%, and 15% ZEVs in 2026, 2027, and 2028 in the NMOG+NOx fleet average respectively.

2. Comment: Commenters support the proposed 0.030 g/mile NMOG+NOx fleet average standard for non-ZEVs. [OP-139, B1-1]

   Agency Response: CARB thanks the commenters for supporting the 0.030 g/mile NMOG+NOx fleet average standard for non-ZEVs, which has been adopted in the final ACC II regulations.

3. Comment: Commenters support the proposed addition of new emission certification bins. [OP-94, B1-1]

   Comment: Commenter supports the proposed vehicles included in the combined fleet average (passenger cars, light-duty trucks, and medium-duty passenger vehicles), the proposed new emissions bins, and the elimination of bins. [OP-139]

   Comment: Commenters support lower maximum emission limits by removal of higher level emission certification bins. [OP-170, OP-172, B1-1]

Comment: Commenter supports CARB's introduction of certification bins below the current lowest level. [B1-1]

Agency Response: CARB thanks the commenters for supporting the combined fleet average and the changes to the emission certification bins, all of which have been adopted in the final ACC II regulations.

4. Comment: Commenter encourages CARB to continue to consider a lower non-ZEV NMOG+NOx fleet average standard as emission control technologies evolve and improve. [OP-139]

   Agency Response: CARB considered whether the NMOG+NOx fleet average should be reduced below 0.030 g/mile and concluded that lowering the fleet average below 0.030 g/mile was not appropriate. Using CARB's Emission Factors (EMFAC) model, staff estimated the total statewide emissions of hydrocarbons (HC) and NOx that would be saved by further lowering the NMOG+NOx fleet average to 0.020 g/mile for the non-ZEV fleet. The EMFAC results estimated that statewide HC and NOx reductions were relatively low, reaching no higher than 0.11 tons per day in 2035, and less than 0.16 tons per day in 2050. For context, the carrying capacity for NOx that South Coast Air Quality Management District (AQMD) projects as necessary for 2037 ozone attainment is estimated to be 55 to 85 tons per day. Staff's analysis indicated that the near-zero emission benefits from lowering the non-ZEV fleet average was primarily driven by the diminishing fleet share of combustion engine vehicles beyond 2025 (as a consequence of increased ZEV sales). Due to the near-zero emission impact and non-zero cost, the final ACC II regulations did not include further lowering the non-ZEV fleet average below 0.030 g/mile.

High-Altitude Federal Test Procedure (FTP) Standards

5. Comment: Commenter suggests a 2x multiplier for all high-altitude standards for emission bins below SULEV30. Commenter realizes this would be inconsistent with the current EPA rule, which requires SULEV20 vehicles to meet a high-altitude standard of 30 mg/mile, and intends to propose a similar suggestion to the EPA in its upcoming rulemaking. [OP-155, incorporated by reference into comments B1-20, OP-124, T1-8, T1-9, OP-57, OP-98, OP-150, OP-95, T2-34]

   Agency Response: CARB considered the commenter's suggestion to use a 2x multiplier for all high-altitude standards for emission bins below SULEV30 and determined that the SULEV15 and SULEV25 bins already used a 2x multiplier while the SULEV20 high-altitude standard was modified to a 1.5x multiplier to harmonize with the corresponding U.S. Environmental Protection Agency (U.S. EPA) standard. Existing LEV III and the proposed LEV IV regulations included high-altitude standards for NMOG+NOx for the FTP test cycle. The high-altitude standards are slightly less stringent than the low-altitude standards to account for the effect of high-altitude atmospheric conditions on a vehicle's emission control system. Stakeholder comments during the rulemaking process and during the 45-day comment period suggested changes to the high-altitude standards for emission bins ranging from SULEV15 to SULEV25. In response to these comments, staff reviewed the proposed high-altitude standards for the SULEV15 to SULEV25 bins and found that SULEV15 and SULEV25

bins already have a 2x multiplier for the high-altitude standards. Only the SULEV20 bin did not have a 2x multiplier. For the SULEV20 bin, staff found that the proposed SULEV20 high-altitude standard of 0.050 g/mile was higher than U.S. EPA's standard of 0.030 g/mile. As a result, CARB's 15-day proposal,[1] which was adopted, revised the SULEV20 high-altitude standard from 0.050 to 0.030 g/mile to harmonize with the corresponding U.S. EPA Tier 3 standard. The revised SULEV20 high-altitude standard is not a 2x multiplier as the commenter requested, but a 1.5x multiplier, because CARB concluded that a 2x multiplier would not be appropriate for the SULEV20 bin as it would result in a less stringent standard than U.S. EPA's requirement.

US06 and SC03 Stand-Alone Standards

6. Comment: Commenters support the proposed US06/SC03/SFTP stand-alone standards for NMOG+NOx for all vehicles. [OP-94, OP-139, B1-1]

   Comment: Commenter supports setting the US06 NMOG+NOx standards equivalent to the FTP standards down to the SULEV30 bin with lower bins remaining at 30 mg/mile [B1-1].

   Agency Response: CARB thanks the commenters for supporting the proposed changes to the US06, SC03, and SFTP stand-alone standards for NMOG+NOx, all of which have been adopted in the final ACC II regulations.

7. Comment: Commenter is concerned that CARB has chosen to require 100% of test groups to comply with the stand-alone SFTP requirements in 2026 MY because it will result in significantly increased levels of investment in internal combustion engines over the next four years and presents substantial workload challenges. Instead of requiring 100% phase-in of stand-alone SFTP requirements in 2026 MY, the commenter recommends that CARB phase-in the stand-alone SFTP requirements over a three-year period (2026-2028 MY); as was done for the new cold-start test procedures. [OP-94]

   Agency Response: The proposed SFTP stand-alone standards require vehicles to meet FTP emission levels on the US06 and SC03 test cycles. The commenter's suggestion includes two separate parts: (1) phase-in the stand-alone SFTP requirements over a three-year period (2026-2028 model year (MY)) and (2) requiring 100% of test groups to comply with the stand-alone SFTP requirements in 2026 MY will result in significantly increased levels of investment in internal combustion engines. Regarding the first part of the comment, CARB noted that the proposal already included a 2026-2028 phase-in period that allows automakers to certify 2026 and 2027 model year vehicles to interim US06 stand-alone standards that are 20% higher than FTP emission levels. During the rulemaking process, CARB had also considered allowing the LEV III SFTP composite method to be used instead of the interim US06 stand-alone standards during the phase-in period but found that it would be difficult to implement because

[1] *See* Notice of Public Availability of Modified Text and Availability of Additional Documents and Information Proposed Advanced Clean Cars II Regulations, July 12, 2022, as amended by Errata and Comment Period Extension, July 13, 2022, (collectively, First 15-Day Notice).

the LEV III composite SFTP method includes a fleet average standard. If automakers were allowed to certify vehicles using the LEV III composite SFTP method during the three-year phase-in period then it would force every automaker to bifurcate their fleet into vehicles that meet the LEV IV stand-alone standards and remaining vehicles that certify to the LEV III composite SFTP method and have to meet the LEV III composite SFTP fleet average. Planning for, and keeping track of, which vehicles are allowed and which are not allowed to be counted in the LEV III composite SFTP fleet average would add unnecessary complexity to certification and compliance, especially considering the dynamic nature of the changing phase-in requirements that would require significant changes to the bifurcated fleet every year during the three-year phase-in period. To avoid these complexities, the final ACC II regulations do not continue the use of the LEV III composite SFTP standard beyond the 2025 model year. Instead, the final ACC II regulations include a three-year phase-in period with the interim US06 stand-alone standards as included in the original proposal.

Regarding the second part of the comment that the interim SFTP stand-alone standards for 2026 and 2027 model year vehicles will result in significant levels of investment, staff reviewed certification data to ensure that the proposed interim standards would have minimal levels of investment. The interim US06 stand-alone standards are based on certification data collected and analyzed by staff during the rulemaking process. Staff analyzed 2020 certification data and found that 94.5% of test groups were already below the interim standard. Analysis of 2021 data showed that 96.4% of test groups were already below the interim standard. Staff expects that this pattern will continue, and staff expects that nearly 100% of the fleet will be below the interim standards by the 2026 model year, meaning that minimal investments would be needed to comply with the new LEV IV interim US06 stand-alone standards. It is also important to note that the stringency of the interim standards, which is 20% higher than FTP emission levels, was originally suggested to staff in September 2021 by the Alliance for Automotive Innovation, which is a trade association representing nearly all automakers. Therefore, CARB concluded that the interim US06 stand-alone standards were appropriate and included them unchanged in the final ACC II regulations. CARB also concluded that the proposed rules and phase-in period for the SC03 stand-alone standards were appropriate, as described in the response to comment 8 below.

8. Comment: Commenter suggests adding a phase-in period for the proposed stand-alone SC03 standards similar to the proposed phase-in for the stand-alone US06 standards, which will require establishing higher interim standards and alternative phase-in schedule. [OP-133, OP-155, incorporated by reference into comments B1-20, OP-124, T1-8, T1-9, OP-57, OP-98, OP-150, OP-95, T2-34]

   Agency Response: CARB considered the commenter's suggestion to add a phase-in period for the stand-alone SC03 standards similar to the phase-in period for the stand-alone US06 standards and determined that a phase-in period for the stand-alone SC03 standards was not necessary. Staff's analysis of 2020 certification data found that over 97% of the test groups in the 2020 fleet exhibited emission levels that were below the proposed stand-alone SC03 standards, even when including durability factors that account for full useful life emission levels. Staff expects that this percentage will

continue to inch towards 100% by the 2026 model year. Staff is also aware that future vehicles may need to recalibrate emission controls to meet the new partial soak and quick drive-away cold-start emission standards, but these calibration changes for cold-start emissions are not expected to have an impact on SC03 emissions, which are measured in hot-start conditions. As a result, CARB's final ACC II regulations did not include a separate phase-in period, interim standards, or alternative phase-in for the stand-alone SC03 standards since nearly 100% of the fleet is expected to comply with the adopted SC03 stand-alone standards by the 2026 model year and staff do not expect that other ACC II criteria emission requirements will affect this percentage.

Particulate Matter (PM) Standards

9. Comment: Commenter supports the phase-in period for the LEV III 1 mg/mile FTP PM standard. [OP-94]

   Agency Response: CARB thanks the commenter for supporting the phase-in period for the LEV III 1 mg/mile FTP PM standard.

10. Comment: Commenter suggests that measuring 1 mg/mile PM may present measurement repeatability challenges for testing facilities. [OP-94]

    Agency Response: The commenter's concerns regarding PM measurement capabilities of testing facilities have been raised in previous rulemakings and have been previously addressed during the LEV III mid-term review (MTR) process that culminated in the Mid-Term Review report, January 18, 2017. As a part of the MTR, staff conducted a technical review to determine if the gravimetric PM mass measurement method was appropriate for the 1 mg/mile standard. The technical review was conducted by CARB in collaboration with U.S. EPA, industry, and other stakeholders. The review process included extensive studies, testing, and laboratory evaluation of PM emissions at 1 mg/mile and below. The results of the technical review of the PM standards were presented by staff to the Board in October 2015.[2] As a result of these studies, CARB concluded that the gravimetric method prescribed for the FTP driving cycle, in conjunction with appropriate laboratory practices, was sufficient for precise measurement of PM emissions at and below 1 mg/mile. Subsequently, there has been no new evidence presented that would suggest measuring 1 mg/mile poses an insurmountable challenge for testing facilities. Therefore, CARB determined that no changes are necessary to the ACC II regulations because PM measurement concerns have been previously investigated and addressed.

11. Comment: Commenter supports the more stringent requirements on PM emissions. [OP-107]

    Comment: Commenter supports the proposed 3 mg/mile PM standard for the US06 test cycle with full phase-in in MY 2030. [OP-139]

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[2] CARB. Advanced Clean Cars PM Measurement Feasibility. October 2015. *https://ww2.arb.ca.gov/sites/default/files/barcu/board/books/2015/102215/15-8-9pres.pdf.*

Agency Response: CARB thanks the commenters for supporting the proposed 3 mg/mile PM standard for the US06 test cycle and its phase-in, which will set more stringent PM emission requirements to protect public health, and which have been adopted in the final ACC II regulations.

12. Comment: Commenters suggest setting a more stringent PM standard for the US06 test cycle based on best-in-class technology, including gasoline particulate filters that have been adopted in Europe and China. Commenters urge global alignment of emission control solutions and suggest lowering US06 PM standards to align with the 1 mg/mile FTP PM standards or setting a 0.5 mg/mile PM standard for both FTP and US06 test cycles. [OP-139, T1-19, T1-20, B1-1]

    Agency Response: During the rulemaking process, CARB considered more stringent PM standards for the US06 test cycle based on best-in-class technology, which includes gasoline particulate filters (GPFs) that would align with requirements in Europe and China as requested by the commenter. Staff reviewed PM emission standards and benefits in past rulemakings, estimated potential emission benefits of best-in-class technology standards, and concluded that the emission benefits of PM standards based on best-in-class technology were negligible, and that a 3 mg/mile PM standard was a more appropriate and cost-effective target for the US06 test cycle. During the mid-term review analysis, staff estimated that the emission impact of reducing the FTP PM standard from 3 to 1 milligram per mile, a reduction of 2 mg/mile, was 0.33 tons per day statewide in 2035. Using this information, staff estimated that the emission impact of reducing the PM standard from 1 mg/mile to 0.5 mg/mile based on best-in-class technology, as requested by the commenters' most aggressive PM target, was less than 0.1 tons per day in 2035, statewide. These estimated PM reductions from the light-duty sector (below 0.1 tons per day) were negligible compared to a projected statewide PM inventory of over 300 tons per day from all sectors in 2035. As a result of these negligible emission impacts, CARB did not target aggressive PM reductions from light-duty combustion vehicles in ACC II, but instead focused on cleaning up the worst-emitting vehicles. To set the US06 PM standard, staff followed the same methodology that was used to develop the proposed US06 NMOG+NOx standard, namely, staff analyzed 2020 model year certification data to identify the worst performers and conducted vehicle testing to supplement certification data. Analysis of certification data identified the worst performers as those exhibiting US06 PM emissions above 3 mg/mile, which amounted to 14% of vehicle test groups. Further data from emission testing showed a similar trend where a majority of the test vehicles had average PM emissions below 3 mg/mile, although some exhibited high test-to-test variations that will require further improvements to ensure compliance with a 3 mg/mile standard. Therefore, based on the certification data and test results, CARB considered that a 3 mg/mile US06 PM standard was appropriate to ensure that the dirtiest vehicles in the fleet will be cleaner and that all vehicles will have consistently low PM emissions, meaning low test-to-test variations. In addition, the projected costs of the proposed rule will be negligible since it will only affect a relatively small portion of the fleet. In similar rulemakings in the past, more ambitious PM standards were considered to be practical and cost-effective since combustion engine vehicles dominated the light-duty fleet. However, in the timeframe during which ACC II rules will be in effect, sales of combustion

vehicles are expected to substantially diminish and further lowering PM emission standards for the entire fleet of combustion engine vehicles does not prove to be cost-effective. In addition, widespread adoption of zero-emission vehicles will significantly reduce emissions from vehicles, including PM, and this will especially be important to reducing emission exposure for disadvantaged communities that reside in closer proximity to busy roads. Projections indicate that the transition to ZEVs will provide a much larger PM emission benefit compared to lower PM targets for combustion vehicles. ACC II projections indicate that widespread adoption of ZEVs will reduce statewide PM by 1.27 tons per day by 2040, a benefit that is magnitudes larger than reductions of the 1 mg/mile FTP PM standard or the 3 mg/mile US06 PM standard. Considering these factors and the costs associated with the potential approaches, CARB declined to reduce the standards as suggested.

13. Comment: Commenter suggests that CARB harmonize the timing of the phase-in of the proposed LEV IV 3 mg/mile US06 PM standard to coincide with the 2025 to 2028 phase-in of the LEV III 1 mg/mile FTP standard. [T1-19, T1-20, B1-1]

    Agency Response: CARB considered the commenters' suggestion to harmonize the timing of the phase-in schedules for the US06 and FTP PM standards and determined that harmonization of phase-in schedules was not appropriate. The proposed phase-in for the LEV IV 3 mg/mile US06 PM standard is from 2027 to 2030. This phase-in is two years later than the existing LEV III 1 mg/mile FTP PM standard that begins in 2025 and ends in 2028. There are several reasons that CARB did not align the phase-in for the LEV IV US06 PM standard with the phase-in for the LEV III FTP PM standard. First, the 1 mg/mile FTP PM standard is an existing LEV III standard that was originally adopted during the ACC I rulemaking in 2012. As such, automakers have already had more than a decade of lead time to develop plans to meet the 1 mg/mile standard. Conversely, the 3 mg/mile US06 PM standard is a new LEV IV standard that is being adopted in 2022 and automakers have not had any previous lead time to prepare to meet this new target. Second, given that vehicle redesign cycles typically take 3 to 5 years, a vehicle that is released in 2025 may not be due for a redesign until 2030. Therefore, in a situation where a 2025 model year vehicle cannot meet the 3 mg/mile US06 standard, the proposed phase-in will give enough lead time to improve US06 PM emission control as a part of its normal redesign process. This will reduce compliance costs while having minimal impact on emissions. Finally, the widespread adoption of ZEVs will achieve significant emission reductions from light-duty vehicles, including of PM, and more effectively than aligned or lower PM targets for combustion vehicles. As outlined in a previous comment, the transition to ZEVs will provide PM emission reductions that is orders of magnitude larger than any changes to the PM standards or phase-ins. In summary, CARB's proposed phase-in is estimated to have negligible effect on PM emissions compared to the commenters' suggested phase-in, while limiting costs and resources by allowing automakers to redesign vehicles for compliance during their normal vehicle redesign schedule. Therefore, the final ACC II regulations included the US06 PM phase-in as originally proposed by staff.

14. Comment: Commenter suggests changing the language for the alternative phase-in for the FTP PM 1 mg/mile standards. Commenter points out that in LEV III regulations, the alternative phase-in language allowed early compliance in any model

year before the 2025 model year, but in LEV IV the language only allows early compliance in the 2024 model year. Commenter suggests that the alternative phase-in language for 1 mg/mile FTP PM in LEV IV should be changed to allow early compliance for vehicles introduced "before or in the 2024 model year", as originally allowed in LEV III. [OP-155, incorporated by reference into comments B1-20, OP-124, T1-8, T1-9, OP-57, OP-98, OP-150, OP-95, T2-34]

Agency Response: Staff reviewed the relevant text in LEV III and LEV IV for the FTP 1 mg/mile PM standard alternative phase-in schedule and found that the commenter's observation was accurate. Therefore, as a part of the 15-day changes, CARB revised the LEV IV language for the alternative phase-in schedule and the final ACC II regulations will allow early compliance with the 1 mg/mile FTP PM standard for vehicles introduced in 2024 or earlier model years. This change was necessary to ensure that phase-in rules for the 1 mg/mile FTP standard are consistent in LEV III and LEV IV.

15. Comment: Commenter suggests that the interim in-use FTP PM standard of 2 mg/mile in 1961.2 (a)(8)(B)1 should be extended to apply to model years before 2025. Commenter recognizes that the language in 1961.2 has not changed but believes it was an oversight when the rules were originally adopted in the ACC I rulemaking. [15-24]

    Agency Response: Even though the commenter may be correct, the suggested changes are beyond the scope of the current rulemaking because, as recognized by the commenter, the ACC II rulemaking did not amend 1961.2, beyond changes necessary to accommodate section 1961.4. Instead, CARB intends to resolve this issue in the future and encourages the commenter to follow up on this topic after adoption of the ACC II regulations.

Cold-Start Emissions

16. Comment: Commenters support the proposed 3-year phase-in for light-duty cold-start emission proposals (quick-drive away, partial soak, and PHEV high-power cold-start standards). [OP-94, B1-1]

    Agency Response: CARB appreciates the commenters' support of the phase-in periods for the quick-drive away, partial soak, and plug-in hybrid electric vehicle (PHEV) high-power cold-start standards, which have all been adopted in the final ACC II regulations.

17. Comment: Commenters support the proposed 8-second initial idle for quick drive-away test. [OP-94, OP-139, B1-1]

    Agency Response: CARB appreciates the commenters' support of the 8-second initial idle for the new quick drive-away test, which has been adopted in the final ACC II regulations.

18. Comment: Commenters suggest that the exemption for the proposed high-power cold-start emission standard should be based only on whether a PHEV can meet the US06 requirements in 1962.4, without requiring PHEVs to meet other criteria in 1962.4

such as minimum certification range and extended warranty. [OP-133, OP-155, incorporated by reference into comments B1-20, OP-124, T1-8, T1-9, OP-57, OP-98, OP-150, OP-95, T2-34]

Agency Response: CARB agrees with the commenters' request to limit the exemption requirements for the US06 high-power cold-start test to PHEVs that can meet the US06 requirements in 1962.4 and has included corresponding revisions in the final ACC II regulations. The regulatory language proposed in the 45-day package included a new US06 high-power cold-start emission test for PHEVs to determine compliance with the proposed PHEV high-power cold-start emission standards. The 45-day proposal also included an exemption for certain PHEVs from the US06 cold-start emission test. The intention of this exemption was to avoid unnecessary emission testing of PHEVs that are US06 capable, meaning they can drive the US06 test cycle using only electric power and without using the combustion engine. By avoiding the use of the combustion engine, these PHEVs inherently exhibit zero emissions on the US06 high-power cold-start test cycle. Therefore, the 45-day package included an exemption for US06 capable PHEVs to avoid unnecessary testing burden. A couple of stakeholder comments during the 45-day comment period presented an issue with the proposed exemption. As written in the 45-day package, the exemption required PHEVs to fulfill all the requirements given in section 1962.4 (e)(1)(A) or (e)(1)(B). The commenters noted that staff's intent, as presented at workshops and stakeholder discussions, was to allow an exemption based on whether a PHEV was US06 capable, but the requirements given in section 1962.4(e)(1)(A) and (e)(1)(B) included several additional provisions, such as requiring extended warranty, meeting battery labeling and service information requirements, and others, which did not have any bearing on a PHEVs emission performance or all-electric capability on the US06 test cycle. Staff reviewed the relevant sections in section 1962.4 and agreed with the commenters' observations. Therefore, CARB has refined the regulatory language in the final ACC II regulations to reduce the scope of requirements and allow an exemption for PHEVs that meet the 40-mile US06 all-electric range requirements in section 1962.4(e)(1)(A)9 or the 10-mile US06 all-electric range requirement in (e)(1)(B)2.

19. Comment: Commenters support the proposed requirements for new NMOG+NOx standards for partial soaks and quick drive-away FTP tests. [OP-139, B1-1]

    Agency Response: CARB appreciates the commenters' support of the proposed requirements for new NMOG+NOx standards for partial soaks and quick drive-away FTP tests, which have been adopted in the final ACC II regulations.

20. Comment: Commenters support the proposed PHEV high-power cold-start testing and standards. [OP-107, OP-139, B1-1]

    Agency Response: CARB thanks the commenters for their support of the PHEV high-power cold-start test procedures and emission standards, which have both been adopted in the final ACC II regulations.

21. Comment: Commenter supports the proposed exemption from the US06 cold-start emission test for PHEVs that are all-electric capable on the US06 cycle. [OP-139]

Agency Response: CARB appreciates the commenter's support of the proposed exemption from the US06 cold-start emission test for PHEVs that are all-electric capable on the US06 cycle. CARB agrees that the exemption from the US06 cold-start emission test should be based on the all-electric capability of PHEVs on the US06 cycle. However, as other commenters pointed out, previous language unintentionally required PHEVs to meet additional provisions to receive the exemption, such as extended warranty, meeting battery labeling and service information requirements, and others, which did not have any bearing on a PHEVs emission performance or all-electric capability on the US06 test cycle. Therefore, CARB has revised the regulatory language in the final ACC II regulations to streamline the scope of requirements for the exemption to PHEVs that meet the 40-mile US06 all-electric range requirements in section 1962.4 (e)(1)(A)9 or the 10-mile US06 all-electric range requirement in (e)(1)(B)2.

22. Comment: Commenter suggested a sales volume phase-in for PHEV high-power cold-start phase-in. [OP-139]

    Agency Response: CARB considered the commenter's suggested sales volume phase-in for the PHEV high-power cold-start standard but determined that a test group phase-in was more appropriate. Considering that some automakers may only have one or two PHEV test groups, CARB concluded that a sales volume phase-in approach would not be practical to implement because compliance would completely depend on whether or not those one or two test groups can meet the emission standard while the actual sales volume targets would be inconsequential. For example, any non-zero sales volume requirement, regardless if it is 1% or 99%, would immediately require an automaker with only one PHEV test group to certify 100% of its PHEVs to meet the required emission standard. Therefore, a sales volume phase-in is not practical due to the limited number of PHEV test groups that automakers may have and a phase-in approach that is based on the number of test groups is more appropriate, and has been adopted in the final ACC II regulations.

23. Comment: Commenters support the proposed regulations that will help improve control of cold-start emissions via new partial soak, quick drive-away, and PHEV high-power cold-start standards. [OP-170, OP-172, OP-155, incorporated by reference into comments B1-20, OP-124, T1-8, T1-9, OP-57, OP-98, OP-150, OP-95, T2-34]

    Agency Response: CARB thanks the commenters for their support of the proposed partial soak, quick drive-away, and PHEV high-power cold-start standards, all of which have been adopted in the final ACC II regulations.

Light-Duty Test Procedures (LDTP)

24. Comment: Commenter suggests that there is a typo in the LDTP Part I Section G.2.2.2 where the phrase "…unless the manufacturer produces less than three test groups…" should be changed to "…unless the manufacturer produces less than nine test groups…". [OP-155, incorporated by reference into comments B1-20, OP-124, T1-8, T1-9, OP-57, OP-98, OP-150, OP-95, T2-34]

    Agency Response: Staff reviewed the LDTP Part I Section G.2.2.2 and found that the language was inaccurate as suggested by the commenter. Section G.2.2.1 requires a

manufacturer to select at least three vehicle test groups each year for collecting emission data, whereas section G.2.2.2 requires that the same test group shall not be selected again in the succeeding two years "unless the manufacturer produces fewer than three test groups." However, it is obvious that the use of the number "three" is a mistake because if a manufacturer produces four to eight total test groups, then repeat testing of at least one test group will be needed within the two succeeding years to satisfy the requirement in G.2.2.1. Simple math indicates that nine is the minimum number of test groups to satisfy the requirements in G.2.2.1 *and* the requirement in G.2.2.2 "that the same test group shall not be selected again in the succeeding two years". Therefore, the phrase "unless the manufacturer produces fewer than three test groups" in G.2.2.2 has been corrected to "unless the manufacturer produces fewer than nine test groups" in the final ACC II regulations.

25. Comment: Commenter states that LDTP Part II Section B.9.1.4.3 allows repeated partial soak test cycles and notes that it does not provide an opportunity to refuel. The commenter recommends adding an allowance for refueling if fuel tank level drops below 20%. [OP-155, incorporated by reference into comments B1-20, OP-124, T1-8, T1-9, OP-57, OP-98, OP-150, OP-95, T2-34]

    Agency Response: Staff reviewed the language in LDTP Part II Section B.9.1.4.3 and also reviewed vehicle refueling procedures for other exhaust emission tests to determine if refueling should be allowed in-between partial soak tests as suggested by the commenter. Based on this information, CARB determined that refueling was not appropriate in-between partial soak tests and did not make any changes to the final ACC II regulations in this regard. Staff found that refueling procedures for other emission tests required a subsequent vehicle soak of at least 6 hours. An example of this is found in LDTP Part II section I.2.2.3, which states "Following the initial fuel drain and fill, the vehicle shall complete an initial soak period of a minimum of 6 hours". Furthermore, staff also noted that current emission testing required a vehicle soak of at least 12 to 36 hours after refueling. Considering that partial soak emission testing requires much shorter vehicle soak periods, in the range of 10 minutes to 12 hours, CARB was concerned that allowing refueling between partial soak tests could affect the emission measurement due to the fuel vapor emissions that are released during vehicle refueling. To prevent fuel vapors from affecting partial soak emission measurements, CARB concluded that refueling should not be allowed in LDTP Part II section B.9.1.4.3 as suggested by the commenter, and that refueling should be limited to section B.9.1.4.1.1, as currently allowed. Therefore, the final ACC II regulations did not implement any changes regarding refueling during the partial soak test procedure.

26. Comment: Commenter suggests that there is a typo in the LDTP Part II Section B.9.1.4.3. and that the reference should be to 9.1.4.1.4. [OP-155, incorporated by reference into comments B1-20, OP-124, T1-8, T1-9, OP-57, OP-98, OP-150, OP-95, T2-34]

    Agency Response: Staff reviewed the text in LDTP Part II Section B.9.1.4.3. CARB determined that the reference to sections "B.9.1.4.1.2 to B.9.1.4.3" in the 45-day version of the document should be changed to "B.9.1.4.1.2 to B.9.1.4.1.4" as suggested by the commenter. This change was necessary because staff found that the partial soak test sequence that was to be repeated was fully contained within sections

B.9.1.4.1.2 to B.9.1.4.1.4. This change was made as a 15-day revision and was adopted in the final ACC II regulations.

27. Comment: Commenter suggests that the speed tolerance for the quick drive-away test procedure in the LDTP Part II Section I.8.2.4.1.2 should be changed to 0.3 miles per hour for the first 7 seconds of the drive cycle to ensure that the vehicle is fully stopped during this time period. [OP-155, incorporated by reference into comments B1-20, OP-124, T1-8, T1-9, OP-57, OP-98, OP-150, OP-95, T2-34]

    Agency Response: Staff reviewed existing light-duty vehicle test procedures and did not find a precedent for changing the speed trace tolerance to 0.3 miles per hour as suggested by the commenter. As a result, CARB concluded that the commenter's suggested changes to speed trace tolerances were not appropriate. Staff found that changing the speed trace tolerance to 0.3 miles per hour, as suggested by the commenter, would be inconsistent with all other exhaust emission tests. Furthermore, the commenter's suggestion was to use a 0.3 miles per hour tolerance only for the first 7 seconds of the quick drive-away emission test, which would create two separate speed trace tolerances for one test cycle. Staff did not find any precedent where two different speed trace tolerances were used for other emission test cycles. Therefore, CARB was concerned about setting a new precedent where different speed trace tolerances can be cherry-picked to apply to different segments of an emission test, especially when doing so may create more favorable circumstances for vehicles to pass emission test standards. As a result, CARB concluded that the existing speed trace tolerance for the quick drive-away emission test was consistent with other emission tests and that a change, as suggested by the commenter, was not appropriate.

28. Comment: Commenter notes that section 1961.4 appears to have a different definitions of the term "total number of passenger cars and light-duty trucks produced and delivered for sale in California" compared to section 1962.4. The commenter notes that 1961.4 excludes all ZEVs by phasing them out from 2026-2028, but that 1962.4 will include ZEVs in the "total number of passenger cars and light-duty trucks". The commenter notes that 1962.4 points to 1961.4 for determining "total number of passengers and light-duty trucks," and believes that these two regulations are tied together. Additionally, the commenter notes that 1962.4 regulations specify that "a vehicle is counted in the production of the manufacturer that marketed it in California regardless of whether it is produced by a different manufacturer." but 1961.4 is silent on this. The commenter recommend CARB provide a single definition of "total number of passenger cars and light duty trucks", probably in 1961.4 to clarify the requirements. [15-24]

    Agency Response: CARB considered the commenter's concern regarding the consistency of the definition for "total number of passenger cars and light-duty trucks produced and delivered for sale in California" in sections 1961.4 and 1962.4 and found that existing definitions were accurate and appropriate. First, neither 1961.4 nor 1962.4 regulations actually include the quoted terms described by the commenter as a defined term. Instead, where necessary, both regulations define specific terms to be used in calculating various provisions and, within those calculations, they explicitly describe what each term of the calculation specifically requires. The quoted language is actually part of that explicit description, such as in subsection 1962.4 (c)(1)(C).

Second, the two regulations calculate different things and as such, intentionally use different calculations and different terms. For title 13, CCR section 1961.4, the requirements are transitioning from a fleet average across a manufacturer's entire light-duty vehicle production volume to a fleet average across only the non-ZEVs remaining in the fleet and the calculations are already explicit and clear as to when to include ZEVs and when not to include ZEVs in that calculation. Title 13, CCR section 1962.4, on the other hand, utilizes the manufacturer's entire light-duty vehicle production volume plus medium-duty ZEVs, if the manufacturer has elected to optionally utilize provisions to subject such vehicles to the requirements of section 1962.4. Considering the different usage and different inclusion or exclusions, it would be inappropriate to try to use a common defined term across both regulations. Third, the 1961.4 and 1962.4 regulations use slightly different language (i.e., '…total number…' versus '…production volume…') when explicitly describing what volume to use rather than the exact same phrase to further distinguish that the two are not the same quantity. Lastly, while reviewing the issue raised by the commenter, staff identified that the definition of production volume in 1962.4 was using an outdated name to refer to the one and only annual compliance report required to be submitted by manufacturers in accordance with 1961.4 and its associated test procedures. Therefore, in the final ACC II regulations CARB has updated the reference to this report in 1962.4 from the "NMOG+NOx production report" to be consistent with the more currently used term "end-of-model-year compliance report" in 1961.4 and included the specific test procedure citation for such report. This change is non-substantive as there is only one annual compliance report required to be submitted by manufacturers and it is consistent with the updated name of the annual report.

29. Comment: Commenter requests clarification of the language in Part I subsection I.4.5.1 of the 2026 and subsequent light-duty test procedure. The commenter explains that this section includes a new provision that allows the Executive Officer (EO) to "conduct testing under any operating conditions where the emission standards apply as reasonably necessary to confirm compliance with any regulatory provision" and requests clarification about what is considered an "operating condition where the emission standards apply". [15-24]

    Agency Response: Staff reviewed the language in Part I subsection I.4.5.1 of the 2026 and subsequent light-duty test procedure to provide clarification for the commenter regarding the phrase "operating condition where the emission standards apply." The intent of the quoted language in this section is to allow in-use compliance testing to be conducted at any operating condition where a particular emission standard actually applies, as opposed to restricting in-use testing to the same vehicle operating conditions used during manufacturer testing or certification testing. Staff found that there are various emission standards that cover a broad range of operating conditions. These include, but are not limited to, the partial soak emission standards for light-duty vehicles and in-use moving average window testing for medium-duty vehicles. As an example, the provision in Part I subsection I.4.5.1 would allow in-use compliance testing to be conducted by CARB to verify emission compliance for any partial soak duration, ranging from 10 minutes to 12 hours, regardless of the partial soak testing that was or was not done by the manufacturer to verify emissions. Similarly, the provision in Part I subsection I.4.5.1 would allow in-use compliance testing to be done

at any range of operating conditions allowed by the moving average window test procedures for medium-duty vehicles irrespective of the testing conducted by the manufacturer. Beyond this clarification to the commenter, CARB did not implement any changes to the language in Part I subsection I.4.5.1.

PHEV Test Procedures

30. Comment: Commenter suggests that driver-selectable modes such as "mud" or "sand" should be exempted from worst-case emission testing for HEVs and PHEVs because these modes are meant for special use on unpaved roads and are used infrequently with short-use time. [OP-77]

    Agency Response: CARB understands the commenter's concern regarding the inclusion of "mud" or "sand" driver-selectable modes in worst-case emission testing of HEVs and PHEVs, considering that these modes may be rarely used in real-world operation for some vehicles. However, CARB concluded that a universal exemption for these driver-selectable modes is not appropriate because "mud" or "sand" modes are simply names that may apply to different vehicle operating conditions on different model vehicles. There is not a universal definition of what exactly entails "mud" or "sand" mode operation on a vehicle. The ACC II regulations, as proposed and adopted, include language that allows automakers to request the use of alternative test procedures on a case-by-case basis, including for mud" or "sand" modes, for worst-case emission testing, under the certification process. This requires submitting a demonstration, based on application of good engineering judgment, supporting the alternative procedures. *See* California Test Procedures for 2026 and Subsequent Model Year Zero-Emission Vehicles and Plug-In Hybrid Electric Vehicles, in the Passenger Car, Light-Duty Truck And Medium-Duty Vehicle Classes, § E.3.2.1, incorporated by reference in tit. 13 CCR, § 1962.4.

31. Comment: Commenter requests that the requirement to measure direct current (DC) energy during alternating current (AC) recharge be removed from the Zero Emission and Hybrid Electric Vehicle test procedures (2018 through 2025 and 2026+). Measurement of DC energy during AC recharge introduces additional and unnecessary test burden to laboratories and may require modification of charge monitoring systems and additional intrusive current sensor(s) on the vehicle/powertrain if the recharge cable is separate from the drive cables. Commenter's recommendation is to remove the text "DC energy required to fully charge…" from F.3.3.d., G.3.1.d (CARB Appendix B-8) and also E.1.2.d (CARB Appendix B-9). [OP-98]

    Agency Response: The commenter suggested that the measurement of DC energy during PHEV charging is a time consuming and burdensome process that requires the PHEV to be modified to gain access to the high voltage connection terminals for measuring DC energy. Furthermore, the commenter pointed out that the DC energy measurement is not required for determining compliance with any regulatory standards. Staff reviewed the proposed test procedures for 2026 and subsequent model year ZEVs and PHEVs and determined that the requirement to measure and report alternating current (AC) energy to fully charge the PHEV battery after an all-electric range test or a charge-depleting emission test was sufficient information and that information pertaining to DC energy during charging was not necessary for

evaluating vehicle emissions or determining compliance with any regulatory standards. As a result, CARB's 15-day changes, which were adopted in the final ACC II regulations, removed the requirement for 2026 and subsequent model year PHEVs to report DC energy needed to fully charge the battery after an all-electric range test or a charge-depleting emission test. The removal of this provision will ease the burden of compliance for 2026 and subsequent model year vehicles without sacrificing any required information for evaluating compliance. CARB notes that a corresponding change was not made to the ZEV and PHEV test procedures for 2018 to 2025 model years because the ACC II rulemaking did not amend the ZEV and PHEV test procedures for 2018 to 2025 model years, beyond changes necessary to accommodate the new ZEV and PHEV test procedures for 2026 and subsequent model years. Therefore, the commenter's request to remove the DC energy measurement requirement for 2018 to 2025 ZEVs and PHEVs was outside the scope of the ACC II rulemaking.

32. Comment: Commenter suggests that an additional end-of-test criterion should be added for the proposed US06 all-electric range test in the PHEV test procedures in section E.2.6.3. The commenter suggests to allow ending a test if the vehicle has demonstrated an all-electric range of 40 miles, meaning five US06 test cycles, to match the minimum US06 all-electric range criteria given in 1962.4. The commenter suggests that this additional criterion will reduce testing burden by reducing the risk of invalidating a test after the vehicle has demonstrated 40 miles of all-electric range. The commenter further suggests that if this additional end-of-test criterion is not included then the definition for the "Continuous US06 Test Schedule" should be changed to include a 30-minute break for the driver as allowed in the "Continuous Highway Test Cycle" definition. [OP-155, incorporated by reference into comments B1-20, OP-124, T1-8, T1-9, OP-57, OP-98, OP-150, OP-95, T2-34]

    Agency Response: The 45-day regulatory package included PHEV test procedures for US06 all-electric range testing to determine compliance with all-electric range requirements given in 1962.4 subsections (e)(1)(A)9 and (e)(1)(B)2. As a part of the PHEV test procedures, two criteria were included for determining the end of the US06 all-electric range test: (1) auxiliary power unit (combustion engine) starts; or (2) the PHEV can no longer keep up with the US06 speed trace tolerance limits. These two criteria were the same as the criteria used for US06 all-electric range testing in LEV III PHEV test procedures. The commenter suggested that a third end-of-test criterion should be added in LEV IV for the US06 all-electric range test due to new requirements that were added in 1962.4 for US06 all-electric range. The commenter explained that completion of five full US06 drive cycles, of 8 miles per cycle, will be enough to demonstrate compliance with the new 40-mile US06 all-electric range requirement in 1962.4 subsection (e)(1)(A)9 and that completion of five full US06 drive cycles should be added as a third end-of-test criterion. Staff reviewed vehicle test data for the US06 test cycle and found that, although the nominal distance for the US06 test cycle was 8 miles, there were instances where less than 8 miles were driven during an actual US06 test, such as 7.99 miles. These slight differences are due to human driver variations when following speed trace limits. Due to these variations, five US06 drive cycles may not be sufficient to demonstrate compliance with the new 40-mile all-electric range requirement in 1962.4 subsection (e)(1)(A)9. In addition,

CARB determined that it would be valuable information to know whether a PHEV is barely meeting the 40-mile requirement and this information would not be available if only five US06 drive cycles were completed. Therefore, CARB's 15-day changes, which were adopted in the final ACC II regulations, include an additional (third) end-of-test criterion for the US06 all-electric range test whereby the test can be ended if the PHEV completes six full US06 drive cycles using only electric power and without use of the combustion engine. Utilizing six US06 drive cycles, rather than the stakeholder's suggestion of five, ensures that the PHEV will complete at least 40 miles of driving, regardless of human driver variations, that are needed to demonstrate compliance with the 40-mile all-electric range requirement in 1962.4 while also reducing testing burden for automakers by not requiring all-electric range testing to continue beyond the necessary six US06 test cycles.

Standards for Small Volume Manufacturers (SVMs)

33. Comment: Commenter supports the proposed availability of the ULEV125 bin for SVMs through the 2024* model year (*appears to be a typo by the commenter since the ULEV125 bin is available until the 2034 model year for SVMs). [OP-56]

    Agency Response: CARB thanks the commenter for supporting the proposed availability of the ULEV125 bin for small volume manufacturers, which has been adopted in the final ACC II regulations.

34. Comment: Commenter supports allowing SVMs to include ZEVs in their NMOG+NOx fleet average. [OP-56]

    Agency Response: CARB thanks the commenter for supporting the proposal to allow SVMs to include ZEVs in their NMOG+NOx fleet average, which has been adopted in the final ACC II regulations.

35. Comment: Commenter supports CARB's decision to provide additional lead-time for SVMs, until model year 2030, as regards the following ACC II ICE provisions: partial soak requirements, quick drive-away requirements, PHEV high-power cold-start requirements, US06 stand-alone NMOG+NOx requirements in 1961.4 (c)(9)(A)1, and 3 mg/mile US06 PM standards. [OP-56]

    Agency Response: CARB thanks the commenter for supporting the proposed phase-in schedule (which will provide additional lead-time) for SVMs to meet the partial soak, quick drive-away, PHEV high-power cold-start, US06 stand-alone NMOG+NOx, and US06 PM standard, which have all been adopted in the final ACC II regulations.

36. Comment: Commenter requests a new regulation that would allow ultra-small-volume Manufacturers (USVMs) to petition, on a case-by-case basis, for an extension of a compliance deadline for bona fide hardship reasons. Commenter defines USVMs as SVMs with California sales not exceeding 300 vehicles per model year, based on the average number of vehicles sold by the manufacturer in the previous three consecutive model years. Commenter states that EPA regulations 40 CFR 86.1811-17(h)(3) and 40 CFR 1068.250 already provide a mechanism for SVMs to request, on the basis of hardship, an extended compliance deadline (commenter notes that this mechanism is available to all SVMs, rather than, as proposed here, just to USVMs). Commenter

urges CARB to adopt a similar rule that will provide USVMs the opportunity to obtain extra lead-time in cases where there were a bona fide exigent need, while at the same time keeping such hardship relief limited to the smallest companies, thereby avoiding a negative environmental impact. [OP-56]

Agency Response: CARB considered the commenter's request to extend compliance deadlines on the basis of economic hardship as allowed under CFR 86.1811-17(h)(3) and CFR 1068.250 and concluded that extending compliance deadlines for USVMs based on economic hardship, as suggested by the commenter, was not appropriate because proposed ACC II regulations already included new compliance flexibilities that will substantially alleviate resource constraints and mitigate potential economic hardships for all SVMs. Staff reviewed the CFR sections cited by the commenter and found that these apply specifically to U.S. EPA's Tier 3 regulations. As such, these CFR provisions fail to consider the new compliance flexibilities that have been given to all SVMs in the proposed ACC II regulations. Staff noted that many extensions of compliance deadlines for SVMs have already been included in ACC II, such as extended 2030 deadlines to comply with the partial soak, quick drive-away, PHEV high-power cold-start, US06 stand-alone NMOG+NOx, and US06 PM standards; extended deadlines for SVMs to use the ULEV125 emission bin until 2034; and extended use of ZEVs to comply with NMOG+NOx fleet average standards. All of these aforementioned compliance flexibilities will provide extended lead time for all SVMs to comply with the proposed ACC II regulations and will substantially alleviate resource constraints and mitigate potential economic hardships SVMs may encounter. Staff observed that none of these flexibilities for SVMs, which were included in the ACC II proposal, are considered in CFR 86.1811-17(h)(3) and CFR 1068.250. Therefore, CARB concluded that additional compliance flexibilities for SVMs, beyond those already granted in the proposed ACC II regulations, and adopted in the final ACC II regulations, are not necessary.

37. Comment: Commenter recommends to specify a separate deterioration factor for SVMs' PHEVs, especially those with high pure electric driving range, because pure electric driving reduces aging of engine and emission control system of PHEVs. [OP-77]

Agency Response: Although CARB agrees that pure electric driving can reduce aging of engine and emission control systems of PHEVs, which can reduce full useful life emissions of a PHEV, CARB determined that allowing SVMs to use a separate deterioration factor for PHEVs was not appropriate. Staff noted that the proposed rules already allowed small volume manufacturers to adjust full useful life emissions for PHEVs to account for pure electric driving by considering the all-electric range of the PHEV and whether the PHEV can drive the US06 cycle using only electric power (US06 capable), both of which directly affect how many miles a PHEV will be driven electrically in real-world use. PHEVs with longer all-electric range and with US06 capability are allowed to use larger emission adjustment factors because they are expected to have a higher fraction of pure electric miles in real-world operation. Therefore, CARB concluded that it is not appropriate to allow SVMs to use a separate deterioration factor for PHEVs to account for pure electric driving, as suggested by the commenter, because the proposed LEV IV rules, which have been adopted in the final

ACC II regulations, already account for PHEV pure electric driving by allowing SVMs to adjust emissions of PHEVs based on their all-electric range and US06 capability.

Considering this comment from an evaporative emission perspective, CARB does not think evaporative emission assigned deterioration factors for PHEVs should be different than for conventional vehicles. Even though the engine is running less on a PHEV, the vapors reside in the canister for a longer time before purging. Confidential industry test data from one manufacturer indicated that there is a small decrease in canister working capacity over the useful life (about 2-3%) for a PHEV versus a conventional vehicle, whereas another manufacturer shows no difference in canister working capacity. In determining a conventional evaporative deterioration factor, the auto industry generally bench ages all the fuel system parts and connections with such inputs as heat and vibration as a function of time and cycles of use, not engine operation. Therefore, CARB believes that PHEV evaporative emission control systems are not likely deteriorating differently than non-PHEVs, even though a PHEV has less engine run time.

General

38. Comment: Commenter recommends that CARB coordinate with federal regulators to ensure the same test procedures, test fuels, vehicle test group definitions, crediting provisions and electric vehicle treatment in criteria pollutant and GHG regulations. [OP-98]

    Comment: Commenter strongly encourages CARB to coordinate and harmonize ACC II regulations (such as new emission bins, new cold-start emission standards, testing procedures) to the extent possible with regulations from the U.S. EPA. Harmonization, consistency, and certainty are critical to suppliers as technology investments become more diversified into a broader spectrum of propulsion technologies. [OP-139]

    Agency Response: To a great degree, CARB's test procedures, test fuels, and test group configurations were harmonized. Additional 15-day changes were made to the proposed regulations, and were subsequently adopted in the final ACC II regulations, to increase harmonization. As discussed in the FSOR Section II., Modifications Made to the Original Proposal, the changes included updates for the super ultra-low-emission vehicle (SULEV) 20 high-altitude emission standard to harmonize with U.S. Environmental Protection Agency (U.S. EPA) rules. Where differences remain, they are reasonably necessary to implement CARB's more stringent and different standards. With respect to treatment of ZEVs in particular, CARB removed ZEVs from the compliance determination for LEV IV criteria standards to ensure that combustion vehicles continue to meet stringent emission standards regardless of whether ZEVs are also produced for sale. Although U.S. EPA's criteria emission standards and related regulations have not yet been updated to allow harmonization with CARB's new ACC II regulations, CARB will continue to monitor and engage with U.S. EPA during its next criteria-pollutant emission rulemaking process to ensure consistency where appropriate between California's ACC II criteria pollutant regulations and future federal regulations for criteria emissions.

39. Comment: Commenter appreciates the proposed emission standards that will continue to drive down pollution from ICE vehicles sold in the state. These cars will be on the road for an average of 11.4 years and, since they are going to be polluting that entire time, it is imperative that they are as clean as possible and their emission controls are long-lasting. [OP-85]

    Comment: Commenter urges CARB to adopt the more stringent proposals for combustion vehicles that ensure real-world emission reductions and eliminate excess credits, averaging and other past program flexibilities that allowed for excess on-road pollution. [OP-116]

    Comment: Commenter supports the proposed changes to the LEV criteria emissions standards. As new vehicles sales transition to higher fractions of ZEVs, it will be important to prevent backsliding from combustion engine-powered vehicles by applying fleet emission standards exclusively to internal combustion engine vehicles. This change, combined with lower maximum emissions limits and changes to cold-start regulations will provide emissions benefits from the shrinking but still significant conventional vehicle fleet. [OP-170, OP-172]

    Comment: Throughout the process, the health and medical community has provided comments urging CARB to ensure real-world emission reductions follow the new standards. The proposal provides strong policies to reduce pollution by setting more stringent emission controls, eliminating the balancing of zero-emission vehicles against higher-polluting combustion vehicles, improvements to test procedures and limiting prior flexibilities in the program that have generated excess emissions. The proposal establishes stronger combustion vehicle standards that will reduce harmful pollution in California communities.

    Comment: Commenter supports the increasingly stringent emission standards for combustion engines. [15-10]

    Comment: Commenter supports the ACC II program which ensures requisite emission reductions from internal combustion engine vehicles. [15-16]

    Comment: Commenter urges the Board to approve ACC II LEV regulations that will establish stronger emission limits and procedures. [15-25]

    Comment: Commenter supports the proposed strengthening of the tailpipe emissions standards [T1-24].

    Agency Response: CARB appreciates the commenters' support of the proposed LEV emission standards, which have been adopted in the final ACC II regulations.

40. Comment: Commenter notes that CARB reformatted the criteria exhaust regulations in 13 CCR §1961.4. Commenter appreciates the thought that went into the reformatting and believe the update will improve the useability and readability of the regulations. [OP-155, incorporated by reference into comments B1-20, OP-124, T1-8, T1-9, OP-57, OP-98, OP-150, OP-95, T2-34]

    Agency Response: CARB appreciates the commenter's support of the reformatted 1961.4 document.

41. Comment: Commenter notes that section 1961.4 (c)(8) requires "a statement signed and dated by an individual, who is employed by a manufacturer and authorized to affirm the attested statement on behalf of the manufacturer, certifying under penalty of perjury under the laws of the State of California that the attested statement is true, accurate, and complete". Commenter believes that this change simply clarifies the current practice and process where attestations are included in the certification documentation, which is signed and dated and includes contact information. Otherwise, the commenter believes this requirement would add complexity in the certification process, the potential for delays, without providing any environmental benefit. [15-24]

    Agency response: CARB agrees with the commenter that the attestation provision in 1961.4(c)(8) is not a new requirement and that it is simply meant to reflect the current practice and process that automakers already take to attest to meet various emission standards where attestations are allowed or required. Given this clarification, no further response is required.

42. Comment: Commenters suggest the proposed changes to criteria emissions requirements could reduce the already limited resources from electrification. While some of the new test procedures may only require calibration changes to comply, the commenters are concerned that others may potentially require additional hardware to achieve. [T1-8, B1-2]

    Agency Response: CARB is aware that automakers contend they will need to dedicate more resources to ZEV technologies. As a result, staff engaged with industry stakeholders throughout the rulemaking process to ensure that the LEV IV regulations would provide emission reduction benefits while not placing undue burden on automakers' resources considering their significant benefits to public health. Staff's engagement with industry stakeholders led to the development of numerous new provisions that will provide a considerable reduction in the resources needed to comply with the new LEV IV emission standards. First, in most instances, the changes to criteria emissions focused on cleaning up the worst-emitting vehicles in the fleet, rather than requiring the entire light-duty fleet to meet standards based on best-in-class technology. For example, the new LEV IV NMOG+NOx and PM stand-alone emission standards for the US06 test cycle were based on emission targets that a large majority of 2020 light-duty vehicles can already meet. In these instances, the projected costs to automakers were determined to be minimal since hardware upgrades would be limited to a very small portion of an automaker's fleet. In addition, the new LEV IV cold-start emission standards (including new standards for partial soaks, quick drive-aways, and PHEV high-power cold-starts) were all based on emission levels that current 2020 model year vehicles can already meet. In these instances, CARB expects that any currently non-compliant vehicles will be able to meet the emission targets through calibration changes and that hardware upgrades will be minimal. Second, CARB has included other compliance flexibilities that will further reduce resource burdens for automakers. These include phase-in periods and alternative phase-in schedules that will allow automakers to gradually implement emission control solutions in the early years of the ACC II program, as well as laxer interim certification standards (for example the new US06 NMOG+NOx requirement

allows automakers to certify 2026 and 2027 model year vehicles to interim standards that are 20% higher) and interim in-use standards for several of the new LEV IV provisions (for example the interim in-use standard for 2026 to 2028 model year vehicles certifying to the quick drive-away standards is 1.2 times the applicable standard). Third, CARB has added new emission certification bins and included a gradual phase-out of ZEVs from the fleet average; both of these provisions will provide automakers with flexibilities to transition to the LEV IV non-ZEV NMOG+NOx fleet average. Fourth, CARB has also provided flexibilities that will allow automakers to reduce their vehicle testing burden, such as allowing exemptions for quick drive-away and PHEV high-power cold-start emission testing, allowing automakers to attest to meeting the partial soak and SC03 emission standards instead of requiring certification testing, and eliminating the PHEV DC energy measurement requirement during vehicle charging. All of these provisions were developed in coordination with industry stakeholders throughout the rulemaking process. Since there are already numerous existing LEV IV provisions that will provide a considerable reduction to the hardware and resources needed for combustion vehicles to comply with the new LEV IV emission standards, CARB concluded that no further changes were necessary in the final ACC II regulations.

B. Medium-Duty Vehicle Exhaust Emission Proposals

PEMS Moving Average Window (MAW) Test Procedures and Standards

1. Comment: However, for MDV with GCWR >14,000 lbs, CARB proposes to also add new Three-Bin Moving Average Window (3B-MAW) in-use testing requirements with emission limits based on the HD Omnibus engine-dynamometer certification standards for model year (MY) 2027 and later HD engines which include a 0.020 grams per brake horsepower-hour (g/hp-hr) NOx standard. Cummins did not support the 0.020 g/hp-hr NOx standard as feasible during the HD Omnibus rulemaking, did not support it when proposed recently by the U.S. Environmental Protection Agency (EPA) as part of their Option 1 standards for HD engines, and does not support its application here in the ACC II rule. The proposed mismatch of applying engine-certification based in-use limits to chassis-certified MDV is not workable for several reasons [OP-92]

   Comment: Commenter believes that CARB's MDV PEMS standards are much more stringent than other standards. The European standards are near 515 mg/bhp-hr and CARB would be between 30-40 mg/bhp-hr. The MAW standards are 4-6 times more ambitious when compared to the SULEV175 standard. [OP-120, 15-17]

   Agency Response: CARB has considered the comments objecting to the feasibility and stringency of the MDV PEMS standards for chassis-certified MDVs and based on the research, testing, and stakeholder comments, CARB stands by its determination that it is technically feasible for all MDVs to meet this standard. The proposed PEMS in-use standard would require manufacturers to perform in-use testing on-road and require their vehicles to robustly control emissions during all engine operations which includes idle, low load, and high load. The HD Low NOx Omnibus rulemaking established the feasibility of and adopted a new PEMS in-use standard for engine-certified MDVs, which predominantly share engines with the chassis-certified MDVs designed for the

identical types and weight classes of trucks and vans. For ACC II, we chose to adopt the same PEMS in-use standards and test procedures to control in-use emissions during engine operating conditions that are not substantially included in the chassis dynamometer emission standards to ensure equivalence in robust in-use emission control regardless of engine or chassis-based certification. The HD Low NO_x Omnibus rulemaking demonstrated the feasibility of meeting the Low NO_x Omnibus standards with a 2017 Cummins X15 engine for full useful life.[3] The engine used for the demonstration was a class 8 engine,[4] and the engine technology and emission control systems used by Southwest Research Institute (SwRI) for the demonstration are scalable and applicable to all diesel engine classes, including class 3 (MDV) engines. CARB analysis has shown that class 2b and class 3 chassis-certified MDVs often utilize the same engine as class 3 engine-certified products, therefore a medium-duty vehicle should be able to use the same emission control technology package as demonstrated in the HD Omnibus rulemaking that is properly sized for a medium-duty engine. Since the feasibility and applicability to engine-certified MDVs was previously demonstrated, CARB has concluded that the same assessment of feasibility for chassis-certified MDVs is appropriate. As cited in the ISOR, testing by staff of several chassis-certified MDVs also confirmed that the better performing vehicles were already meeting the proposed standards in many of the required conditions.

Regarding the comment that the PEMs based standards are more stringent than European standards or more stringent than the existing chassis-based standards, staff agrees. As stated in the ISOR, the intent was to ensure equivalent robust emission control throughout the in-use operating conditions of these vehicles, regardless of whether they are certified as a complete engine and chassis or just a stand-alone engine. To a consumer, the trucks and their capability and usage patterns are identical, and their emission control systems should perform identically. In contrast to past programs where there was an implicit attempt to align the stringency of the chassis-certified standards with the engine-based standards, staff recognized such alignment attempts were flawed given the vast differences in areas of engine operation represented by the two cycles. Accordingly, staff took the opportunity with the in-use based PEMS measurement, that can be equally performed regardless of whether the vehicle was originally chassis-certified or engine-certified, to achieve true equivalence with identical standards and test procedures for the PEMS based standard. While staff recognized that this would likely result in the PEMS standard being more stringent than some of the chassis certification standards, staff wanted to afford manufacturers the flexibility in designing emission control systems that would deliver and overall robust emission solution without overly constraining them to also meet the most stringent low load chassis test cycles. Relative to European standards, staff cannot confirm if the commenter has provided a meaningful comparison or not

[3] CARB. 2020. 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, Staff Report: Initial Statement of Reasons. CARB2020, First 15-Day Notice.

[4] Vehicle classes are defined at 40 C.F.R. § 1037.801.

but acknowledges that CARB establishes standards for California that are feasible, cost-effective, and needed for achieving air quality targets without regard to their relative stringency to European standards.

2. Comment: First, translating the proposed LEV IV distance-based, grams per mile (g/mile) NMOG + NOx certification bin standards to brake specific, g/hp-hr standards using reasonable assumptions for FTP 75 certification cycle work and vehicle test weight, and then comparing to the proposed engine-based in-use NOx limits in units of g/hp-hr, shows a significant misalignment in stringency. The HD engine-based in-use NOx limit of 0.020 g/hp-hr, even with an in-use conformity factor (CF) or multiplier applied, is much more stringent than even the lowest proposed bins available for MDV certification. [OP-92]

   Comment: Additionally, even though CARB's HD engine-based in-use NOx limit adjusts proportionally for HD engines certifying at a Family Emission Limit different from the standard (i.e., credit-using or credit generating engines), CARB has proposed only a single set of 3B-MAW in-use NOx standards for MDV regardless of the NMOG + NOx bin level to which they are certified, effectively eliminating any fleet averaging flexibility. CARB should address these mismatches through MDV in-use limits which are better aligned with the stringency of the proposed MDV certification standards and which adjust according to the certification bin level. [OP-92]

   Comment: However, the weighting of HD FTP cold start emissions (1/7 or ~14% of the cold/hot composite) for HD engine certification is much lower than the 43% cold weighting of the FTP 75 used for MDV certification. MDV manufacturers will need to design for even faster SCR warm-up not considered as part of the HD Omnibus demonstration. [OP-92]

   Comment: Criteria emissions requirements between heavy-duty engine certified and medium-duty chassis certified vehicles are not equivalent. Medium-duty requirements emphasize cold start emissions (higher cold emissions weighting) versus heavy-duty requirements that are focused on higher load operation. As a result, engine and emissions systems for medium-duty chassis certified applications are fundamentally different. [OP-95]

   Agency Response: CARB has considered the comments regarding changing the PEMS in-use standards to align with the FTP certification bins for added flexibility but has determined that reducing the stringency of the PEMS in-use standard proposal for chassis-certified MDVs would not achieve necessary emission reductions nor the intent of aligning stringency with MDV and HD engine certification. The proposed PEMS in-use standard may indeed effectively be at more stringent levels than the current chassis-certification FTP bin standards for NOx but they are based on the newly adopted HD Low NOx PEMS in-use standard that apply to all engines certified for use in HD and MDV applications. Staff had determined that adopting the same standard and test method for chassis-certified MDVs was the best way to align stringency with the engine certified path for MDVs and to improve control of emissions during high

load operation. The need for this was confirmed through test data[5] at CARB, which showed current chassis standards cannot evaluate emissions beyond low load operation due to the limits of certification cycles and test lab capabilities and that vehicles subject to such standards typically had much higher emission levels on-road.

Additionally, manufacturers had previously raised these concerns about simultaneously meeting stringent chassis-certified FTP requirements and in-use PEMS standards given some substantial differences in how cold start emissions are factored in and competing design factors to optimize for good cold start emission control versus good high load warmed up emission control. With these concerns in mind, staff intentionally did not attempt to revise the chassis certification standards to the most stringent possible levels to give manufacturers flexibility in managing both requirements. Given the broader coverage of the PEMS standards of typical in-use operation, the design changes may likely and appropriately be dictated by determining what is needed to meet the in-use PEMS standards. Although manufacturers may claim they are effectively forced to certify to lower chassis standards than the fleet average requirement otherwise would make them, they are still afforded tremendous flexibility by letting the PEMS standards be the primary driver of stringency and less need to focus on further refinements and improvements just to meet the chassis standards. Further, regarding the comment about a lack of flexibility by not having an FEL for chassis-certified MDVs, CARB believes the stringency between the two (chassis and engine) is aligned through the in-use requirement for PEMS testing and that, specifically in the relatively limited number of engines typically used in MDV applications, the usage of separate FELs is uncommon.

3. Comment: Commenter believes ACC II MDV PEMS data did not demonstrate the feasibility of meeting the MAW standards with a vehicle. [OP-92, OP-95]

   Agency Response: CARB has considered the comment on the MDV test data.[6,7] The test data[67] were collected to evaluate the performance of current chassis-certified MDVs using the HD MAW test procedures and standards. The purpose of the test data[67] collected by CARB for the MDV proposal was to show that chassis-certified diesel MDVs emit emissions nearly four to ten times more during high load conditions which are common during towing. Current chassis-certified MDVs clearly have emission control systems optimized to handle emissions during the low load operation for which current chassis certification test cycles cover despite the engines and vehicles being rated to haul and tow at the same capabilities as engine-certified MDVs. The test data[67] support a need for a PEMS in-use standard to cover all engine operations rather than a demonstration of advanced emission controls to establish the feasibility of the adopted standards. The HD Omnibus rulemaking had previously demonstrated feasibility for all HD classes, including engines certified for use in MDVs. Certification data and discussions with the manufacturers identified that the chassis-

[5] CARB. 2022. MDV Chassis Engine Speed and Torque - ACCII. CARB2022e, First 15-Day Notice.
[6] CARB. 2022. MDV Chassis Dyno and PEMS Test Results - ACCII. CARB2022d, First 15-Day Notice.
[7] CARB. 2022. MDV MAW Calculations – ACCII. CARB2022c, First 15-Day Notice.

certified MDVs typically use the same engines as engine-certified, confirming the appropriateness of that prior feasibility assessment.

4. Comment: CARB suggests that hardware changes such as those included in the diesel technology package developed by Southwest Research Institute (SwRI) for CARB's HD Omnibus rulemaking will enable MDV to meet the engine-based 3B-MAW in-use NOx limits. Cummins does not agree the single system tested at SwRI demonstrated capability of the technology package for HD engines to robustly meet a 0.020 g/hp-hr NOx standard given the variability and useful life requirements a manufacturer must address to ensure compliance. In addition, that technology package was evaluated using very different certification requirements on a much larger displacement engine intended for a Class 8 vehicle application, all of which are inconsistent with MDV certification and applications [OP-92]

   Comment: The downstream SCR system in the Omnibus package was intended to address NOx emissions during higher load operation and would be located farther away from the engine. It was sized for the emission flow rates of a 15-liter engine, without consideration of the sizing and packaging constraints associated with a MDV pickup truck. The design tradeoffs and optimization of the overall aftertreatment system are much different for MDV, where manufacturers will need to balance meeting emissions requirements on the FTP 75 chassis-certification cycle and the >70% GCWR in-use towing conditions. Cummins does not agree that CARB has demonstrated feasibility of meeting the HD Omnibus 3B-MAW in-use standards for MDV. [OP-92]

   Agency Response: CARB has considered the comments regarding the SwRI diesel technology package and, based on the research and stakeholder comments, has determined that the original feasibility assessment with a scaled emission control system is still applicable to chassis-certified MDVs. The proposed PEMS in-use standard would require manufacturers to robustly control emissions during all engine operation. CARB testing[6] confirmed that chassis-certified MDVs have emission control systems optimized for low load emissions, but inadequate to equivalently control high load emissions. The SwRI diesel technology package demonstrated that an aftertreatment system for low load and cold start emissions could be used together with an aftertreatment system for high load emissions.[3] Engine and aftertreatment system architecture for medium-duty diesel, light heavy-duty diesel, medium heavy-duty diesel, and heavy heavy-duty diesel engines are essentially identical in concept but scaled in size as appropriate. All diesel classes use a combination of Diesel Oxidation Catalyst (DOC), Diesel Particulate Filter (DPF), and Selective Catalytic Reduction (SCR) aftertreatment systems to reduce exhaust emission levels, therefore the same technology package demonstrated by SwRI is applicable when the identical engines are used in chassis-certified MDVs instead of engine-certified MDVs.[3] The aftertreatment systems would have to be sized correctly for MDV classes to handle the emission flow rates that are specific to that engine size. Manufacturers are already meeting full useful life requirements (150,000 miles) with these aftertreatment technologies, and the Omnibus technology package would only require them to use multiple aftertreatments systems for controlling emissions during different load conditions, which include both low load and high load. SwRI has already demonstrated that their diesel technology package can meet full useful life at the low NOx

standards. Based on the current research, it was determined that no further changes are required for the PEMS in-use standard.

5. Comment: There will be challenges with meeting the chassis FTP standards for low load compared to the MAW standards which require controlling emissions during high load conditions. The solutions for each will be conflicting with one another. [OP-92, OP-95]

   Agency Response: CARB considered the comment on whether meeting both the chassis FTP and PEMS in-use standard was technically infeasible due to conflicting solutions, but CARB has determined based on the research and test data that it is still feasible. For chassis FTP stringency, the most significant changes were made to the class 3 FTP fleet average but staff largely left the chassis standards and procedures untouched to reduce the chance that manufacturers would be unnecessarily constrained in designing a compliant emission control solution. The changes to the chassis dynamometer standards were not as stringent as the MAW standards to allow manufacturers to focus on making changes needed to meet the MAW. The HD Low NO_x Omnibus rulemaking demonstrated the feasibility of meeting the Low NO_x Omnibus MAW standards with a technology package that is applicable to all diesel medium-duty vehicles.[3] The package utilized multiple aftertreatment systems for controlling emissions specifically during high load and low load, therefore manufacturers should be able to apply the technologies to control both cases. Regarding gasoline MDVs, CARB has test data[8, 9, 10] to support that some gasoline vehicles can already meet the MAW standards with the current technology they have available and would require fewer changes than diesel vehicles. Additionally, there are several technologies available, which were stated in the ISOR, that manufacturers could use to further control emissions. We do not agree that the solutions for controlling emissions during both low and high load would be infeasible and note that the HD Low NOx Omnibus rulemaking demonstrated feasibility simultaneously across all three bins of the MAW standards, which cover idle, low-load, and medium/high-load operation. Based on the currently available technology and research, CARB will not make any further changes to the MDV proposals.

6. Comment The infeasibility of the 0.020 g/hp-hr in-use NOx standard for diesel MDV will impact California customers who depend on those new vehicles for critical work. Based on registration data, many of the largest fleet users of Class 2b and 3 diesel pickup trucks currently in operation in California are owned by city, county, or state governments, utilities, or other infrastructure-related entities. There are many more small businesses or individuals who own only one vehicle also doing important work. As noted above, Cummins urges CARB to reconsider the stringency of the MDV in-use

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[8] CARB. 2022. PEMS data of MY2020 Ford F250 class 2b gasoline used for MAW analysis. CARB2022xxx, Second Notice of Public Availability of Additional Documents Proposed Advanced Clean Cars II Regulations, August 8, 2022 (Second 15-Day Notice).

[9] CARB. 2022. PEMS data of MY2021 Silverado 2500 Class 3 gasoline used for MAW analysis. CARB2022yyy, Second 15-Day Notice.

[10] CARB. 2022. Calculations for FCL and MAW data of MY2020 Ford F250 gasoline class 2b. CARB2022zzz, Second 15-Day Notice.

standards and better align them with the stringency of the proposed MDV certification standards to ensure the requirements will be achievable with technologies that customers can readily adopt. [OP-92]

Comment**:** CARB's proposed MDV in-use testing procedure requires at least 50% of non-idle operation during the manufacturer's test to include towing with a combined vehicle weight at a minimum of 70% GCWR. The minimum towing requirement could limit the available customer vehicles from which a manufacturer can select vehicles to fulfill the testing requirement of 5-10 vehicles per test group. For example, depending on trailer weight needed to meet the 70% minimum GCWR, a fifth-wheel hitch would be required. It may be difficult to find customers who have such equipment already installed on their vehicle and who are willing to allow the manufacturer to use their vehicle. Subsection 4.6.5 of the in-use test procedures gives CARB the authority to make changes to the testing requirements if a manufacturer has made a good faith effort to comply. Such flexibility is appreciated and likely needed. [OP-92]

Agency Response: CARB has considered the comment regarding the MDV PEMS requirement and has determined the PEMS regulatory language provides manufacturers flexibility with the testing requirements they have described. Unlike in heavy-duty where manufacturers are required to perform testing on a fleet vehicle while it is in normal service for that fleet, the proposed PEMS in-use testing for chassis-certified MDVs will require manufacturers to procure a customer vehicle but then perform their own self-testing. The manufacturer will be required to properly operate and load the vehicle for such testing rather than be at the mercy of whatever the customer would do in his/her own normal usage. The requirement for a minimum test weight of 70% GCWR is not overly burdensome and is necessary to ensure these vehicles are tested at the weight loadings they are designed to tow or carry. CARB's testing of several MD pickup trucks required additional standard equipment for trailer testing, but the equipment could be used interchangeably from vehicle to vehicle. Procurement of vehicles was not an issue with several private owners willing to participate using a small population size. Manufacturers should not have difficulty finding participants for their in-use testing, finding the proper equipment, or setting up their vehicles for trailer testing when they are designed for this purpose. Additionally, there is flexibility for the manufacturer to request a change in a testing requirement if "the manufacturer makes a good-faith effort to access enough vehicles to complete testing requirements." Based on the available flexibilities in the regulatory language and CARB's own testing, it was decided no further changes are necessary for the PEMS in-use test procedures.

7. Comment: As a certification testing flexibility for determining Medium-Duty Vehicle CO2 FCLs (Family Certification Limits) used for performing Moving Average Window bin determinations and emission calculations, we recommend that CARB allow US06/LA92-based FCLs; in addition to chassis dynamometer FTP- and engine dynamometer FTP-based values. This flexibility will allow manufacturers to certify to a chassis dynamometer-based CO2 FCL that is comparable to the result expected on an engine dynamometer FTP. Without this added flexibility, manufacturers will likely need to perform an engine dynamometer FTP test with a MediumDuty Vehicle engine. It will

be a complex and time-consuming process to adapt a MediumDuty Vehicle engine to run on an engine-dynamometer [OP-94]

Comment: In the HD Omnibus regulation, the 3B-MAW approach uses the engine's HD FTP CO2 Family Certification Level (FCL) with units of g/hp-hr as a surrogate for work in calculations to determine both placement of each window into one of the three bins and the brake specific emissions for a bin. However, using the HD FTP CO2 FCL is not always representative of engine thermal efficiency on other duty cycles such as those encountered during in-use testing. Additionally, CO2 does not always correlate well to power produced, such as when excess fuel is burned for thermal management. Using the FTP CO2 FCL will result in higher emissions calculated for more efficient in-use duty cycles, which penalizes manufacturers with more efficient engines. MDV do not have a CO2 FCL since their CO2 emissions are measured in g/mi on a chassis dynamometer for certification, so CARB proposes for manufacturers to determine one using CO2 emissions and broadcast torque data during the chassis FTP 75 cycle. (CARB also proposes an option for manufacturers to determine the FCL using engine test procedures and the HD FTP cycle, which means running additional testing in an engine dynamometer test cell.) The penalty to manufacturers for using a CO2 FCL derived from the FTP 75 is even greater than what is described above due to the higher cold start weighting of the FTP 75 compared to the HD FTP. During the cold cycles of the FTP 75, fuel must be burned for thermal management of the aftertreatment, which increases CO2 emitted over the cycles. Multiplying this FCL by the pollutant emissions rates measured over in-use cycles (which are likely to have more efficient operation because of the high exhaust temperatures during towing) per CARB's proposed in-use test procedures over-estimates the brake specific in-use emissions. CARB's proposal already makes use of broadcast torque by including it in the method for calculating the FTP 75 CO2 FCL. To address the inaccuracies of using FCL, Cummins recommends using broadcast torque to determine work for bin placement and emissions calculations, instead of normalizing by CO2 and scaling by FCL, and is willing to work with CARB to determine the appropriate validation of this method. [OP-92]

Agency Response: CARB has considered these comments on FCL error and has determined based on the test data,[11] that the error can be small and has provided added flexibility in the ACC II regulations to allow for an FCL to be determined through the chassis test procedures or engine test procedures. The PEMS in-use standards require an FCL value for the test group to calculate the emission levels for the MAW analysis. Reporting of the FCL has been a requirement for engine certification and will be a new requirement for chassis certified MDVs that have to meet the PEMS in-use standard. The intention of requiring chassis-certified MDVs to meet the same PEMS test procedures and standards as engine-certified MDVs and HD is to ensure both certification paths would be equivalent in stringency. CARB has test data to support that an FCL calculated on the chassis certification FTP can be nearly equivalent in value to an engine certified FCL on the engine FTP for a similar engine used in both cases. As chassis manufacturers start to design and calibrate their chassis-

[11] CARB. 2022. MDV FCL Calculations. CARB 2022h, First 15-Day Notice.

certified vehicles for achieving lower FCL values, they should be comparable to their engine certified products. Furthermore, more efficient engines can achieve lower FCL values based on current test data[11] for the chassis FTP test cycle. Additionally, the ACC II regulations allow the manufacturer to determine an FCL using the chassis test procedures or engine test procedures. This gives manufacturers flexibility to choose the best option for their products. Based on the current test data and added regulatory language, no further changes are required for the PEMS in-use test procedures.

8. Comment: The current in-use testing program for HD engines provides measurement allowances for all pollutants, including NOx, based on extensive test programs to quantify the accuracy of the measurement systems. CARB did not conduct any such studies for the new 3B-MAW in-use testing program in the HD Omnibus regulation and removed the existing additive measurement allowances in lieu of providing a conformity factor that is meant to cover not just measurement inaccuracies but also variability due to drivers, random duty cycles, ambient conditions, etc. That approach is carried over into CARB's proposed MDV in-use testing program. PEMS measurement accuracy is not yet quantified at NOx levels targeted by the HD Omnibus or LEV IV rules. However, there is a test program underway by EPA, industry, and other stakeholders at SwRI to assess PEMS measurement accuracy at low NOx levels. CARB should account for the outcomes of that test program by including separate PEMS measurement allowances in the final rule. [OP-92]

   Comment: Manufacturer has provided PEMS in-use data to CARB since 2017, and vehicles are tested near max GVWR on the chassis dyno. Commenter believes PEMS equipment is not capable of meeting the +/- 2.5 ppm zero drift criteria and this will lead to invalid data collection. Commenter request increasing the drift check to 4 ppm. In addition, commenter believes that supply chain issues and manufacturer lead time will affect obtaining new specialized PEMS units that can meet the +/- 2.5 ppm criteria. [OP-120, 15-17]

   Agency Response: CARB has considered the comments on PEMS accuracy and the additional lead time that chassis-certified MDVs will have relative to engine-certified MDVs for the MAW requirement and has determined no further changes are warranted at this time. Staff from the HD Low NOx Omnibus rulemaking recently provided comments to the U.S. EPA on its Notice of Proposed Rulemaking (NPRM) for its HD standards and PEMS accuracy margin.[12] In the comments, staff stated that they agree with the Joint Research Centre (JRC) study which estimates the uncertainty of PEMS measurement to be 10%. The current conformity factor (CF) for the MAW standards already accounts for a 100% and 50% PEMS accuracy margin for NOx for model years 2027-2029 by using a CF of 2 and 1.5 for model years 2030 and later. The technical feasibility of the PEMS equipment to measure at these low NOx levels will continue to be an on-going work in progress for the industry. With these new PEMS

[12] *See* CARB, Comments of the California Air Resources Board in Response to the U.S. Environmental Protection Agency's Request for Comments on Control of Air Pollution from New Motor Vehicles: Heavy-Duty Engine and Vehicle Standards, May 13, 2022, p. 52, 87 Fed. Reg. 17,414, March 28, 2022, Docket ID No.EPA-HQ-OAR-2019-0055-0471.

standards, the need for PEMS accuracy at low NOx levels will further develop over time. The HD Omnibus standards take effect in 2024 and if there are changes required for PEMS accuracy margin regarding the HD MAW standards, then we will take steps to ensure that chassis-certification MDV MAW standards are changed to similarly reflect alignment with the HD changes for PEMS accuracy margin.

9. Comment: Additional research and development are needed, well beyond the scope of calibration or controls changes, to design all-new engines and aftertreatment systems that meet a combination of ACC II regulations and heavy-duty Omnibus Low NOx PEMS requirements for medium-duty vehicles. Stellantis recommends that CARB update the proposed rule to allow the same phase-in approach included in the 24-26MY heavy-duty Omnibus regulation starting in 27MY at 0.050 g/bhp-hr NOx with a Conformity Factor of 2.0 for the first three model years (27- 29MY). We also recommend that CARB include compliance testing "guard-rails" to represent typical use and avoid over-focus on "corner-case" (max engine power / max road grade) testing for the entire PEMS test duration (i.e., ≤ 5% total test time above 90% GCWR and ≥ 5% grade). As proposed, the current PEMS Moving Average Window test procedure and emissions limits will drive significant investment that risks diverting resources that are otherwise focused on electrification efforts. [OP-95]

   Agency Response: CARB has considered the comment for a longer phase-in for the PEMS in-use standards and based on the research and data collected, CARB has determined it is feasible to align with the HD PEMS standards for model year 2027 and still meet the proposed chassis dynamometer standards. The MDV proposals would require manufacturers to meet a more stringent FTP fleet average and standalone SFTP standards in addition to a new PEMS in-use standard. The changes to the chassis standards were necessary to improve emissions for all MDVs. The PEMS in-use standard only applies to the subset of MDVs rated for over 14,000 lbs. GCWR and was meant to control emissions from vehicles designed to operate beyond the limits of the chassis dynamometers, specifically vehicles with a higher tow capability. Class 3 MDVs often have less stringent standards than class 2b, but after staff's analysis of CARB certification data, it was shown that many class 3 MDVs utilize the same engines and emission control systems as their class 2b models. Therefore, it was determined that class 3 MDVs should be capable of meeting similar FTP fleet average standards as their class 2b versions. The most stringent changes for the FTP fleet average were to the class 3 fleet average which was reduced closer to similar levels as the class 2b fleet average. Manufacturers should be able to meet the class 3 fleet average with minimal changes to their emission control systems. The proposed SFTP standalone standard would limit the highest emitters from emitting beyond their FTP standard on the SFTP test cycles, which many test groups have shown they are capable of meeting based on certification data. Therefore, many manufacturers could meet the SFTP standard changes with minimal changes as well. For the PEMS standard proposal, many of the manufacturers that produce chassis-certified MDVs also produce engine-certified products, which will have to meet the HD Omnibus PEMS standards. Manufacturers have stated their engines and research and development for meeting the HD PEMS standards would carry over to their chassis-certified MDVs. Furthermore, SwRI had demonstrated a technology package that HD engines (including class 3) can use to meet the HD PEMS standards.[3] The purpose of the proposed PEMS standard was to

align the stringency with the HD standards, and with manufacturers meeting the HD standards in the earlier years (MY2023-2026), they will not require additional time with chassis-certified MDVs to meet the same standards as HD for MY 2027 when much of their research and development from HD will carry over to their chassis-certified MDVs.

10. Comment: CARB's ISOR states a different phase-in for the Conformity Factor (CF) then what was proposed in the 45-day language for the "California 2026 and Subsequent Model Year Criteria Pollutant Exhaust Emission Standards and Test Procedures for Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles".[OP-120, 15-17]

    Agency Response: CARB has recognized there is a discrepancy between the ISOR and test procedures. CARB's analysis of the data determined that the phase-in years for the test procedures should align with the HD regulations. The ISOR contains the incorrect phase-in years for the PEMS in-use standard conformity factors (CF). The ISOR has a CF of 2 applied over a longer time frame based on the HD regulations, which applies their CF of 2 starting model year 2024 and changes for model year 2030. Since CARB is not applying the MAW standards until model year 2027, and based on analysis as described in the previous comment response (see response to comment B-9, above), it was determined that a CF of 2 should only be applied for model year 2027-2029 in order to align with the HD standards. The California light-duty test procedures for 2026 and subsequent model years have the correct schedule for when the CF of 2 is applicable.

11. Comment: Request compliance guardrail to focus PEMS testing on typical case rather than corner case. Test procedure ambiguity may lead to unrepresentative testing. Commenter raised concerns of testing at max power, max road grade, max elevation, and max GCWR for entire test duration. [OP-95, OP-120, 15-17]

    Agency Response: CARB has considered the comment and has determined that adding limits to the testing conditions or requirements for chassis-certified MDVs would only make the ACC II MDV PEMS in-use standards less stringent than the HD PEMS in-use standards, and the current proposed PEMS test requirements account for this issue. The PEMS in-use standard would require manufacturers to test on-road with a PEMS to evaluate emissions under varying engine operations during real world driving. The intention of the proposed ACC II PEMS test procedures and standards was to ensure that both engine-certified and chassis-certified MDVs would be equivalent in stringency. Adding certain limits as guardrails would change the test procedures for chassis-certified MDVs when engine-certified MDVs are not limited to the same guardrails. Additionally, adding guardrails would often limit the amount of representative data that can be collected, which was an issue with the HD Not-To-Exceed (NTE) method that had restricted data collection to within a certain area of engine operation.[13] The test procedures require the vehicle to be tested under

[13] CARB. 2020. 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,

"normal vehicle operation and use," and this includes consideration of the vehicle's normal routes, loads, and normal ambient conditions. Additionally, there is a minimum data collection requirement for time and windows, therefore the testing should be representative of real-world operations and not specifically focused on the "corner cases" that the industry as a whole is concerned about. CARB in-use testing is often conducted on routes that contain a mix of highway, city, road grade, and altitude changes that are representative of driving in California. However, the adopted ACC II regulations explicitly note that in-use compliance testing may be conducted at any operating condition where a particular emission standard actually applies, as opposed to restricting in-use testing to the same vehicle operating conditions used during the certification process to ensure compliance with the standards and achievement of expected emission reductions. Based on the current test procedures and in order to maintain equivalency with HD, it was determined no further changes are required for the PEMS test procedures.

12. Comment: Commenter believes CARB's workshop and ISOR was focused only on pickup trucks with high GCWR. Several of the commenter's manufacturer van variants will fall above 14,000 pounds GCWR, although they are not the target of CARB's regulation. If the commenter conducts testing at 70% GCWR, that would only be 1.25 times the vehicle's GVWR rather than 2-5 times the GVWR of the pickup trucks. The commenter does not believe vans should be required to meet the PEMS standard as their weight capacity differs from the pickup trucks. [OP-120, 15-17]

    Comment: Commenter's vans that are used with tow hitches operate mainly as recreational vehicles and are used in limited towing application. These vehicles are not operated on paved roads. Most of the commenter's vehicles are mainly used for last mile delivery and vocational use and businesses would be impacted by this regulatory change. [OP-120, 15-17, T1-41]

    Comment: Commenter is requesting an additional requirement for the MDV PEMS standards. Commenter is proposing MDVs with a ratio of GCWR/GVWR greater than 1.5 be required to meet the MAWs in addition to the 14,000 lbs. GCWR limit that was originally proposed. This ratio would ensure only vehicles with a GCWR greater than 50% of their GVWR be required to meet the MAW if they were over 14,000 pounds GCWR. The second proposed request from the commenter was to increase the GCWR threshold requirement for the MAW to 16,000 lbs. [OP-120,15-17, T1-41]

    Comment: Commenter is concerned with the medium-duty PEMS requirement and requests revisions to the tow capacity thresholds to accurately reflect the vehicles with high tow capacity which were the target of the PEMS requirement. [T1-41, B1-36, 15-17]

    Comment: Commenter would appreciate the opportunity to continue to interface with CARB staff on the medium-duty PEMS provisions in ACC II and seek additional

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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, Staff Report: Initial Statement of Reasons, as referenced in the First 15-Day Notice.

amendments in the future, as appropriate, to ensure CARB's regulations properly account for use-cases and vehicle capabilities. [15-17, T2-8, B2-6]

Agency Response: CARB has considered the comments on changing the GCWR threshold and has determined the best solution was to allow vehicles that can conduct in-use testing at 70% GCWR without a trailer to do so. The PEMS in-use test procedures and standards apply to vehicles over 14,000 lbs. GCWR and will require manufacturers to conduct testing at a minimum of 70% GCWR. The PEMS requirement is necessary to ensure that MDVs designed to operate at weight loadings beyond the chassis dynamometer limits of 14,000 lbs. have emission control systems designed to handle the emissions at their higher weight loadings. It was determined that MDVs can operate at much heavier weight loadings when towing.[14, 15, 16] CARB test data revealed when these vehicles were used for towing, their emissions could increase four to ten times more than emissions during non-towing. CARB's workshop and ISOR was focused on pickup trucks because much of their high load operation is not covered by the chassis dynamometers. The intention of the PEMS standard is to control operation that cannot be covered by the chassis dynamometers, and to align stringency with the HD Omnibus regulations that apply to all class 3 engine-certified MDVs. Manufacturers who produce both pickup trucks and vans suggested a cutoff for the PEMS standard at 14,000 lbs. GCWR. CARB determined this cutoff point best ensures that the PEMS standards would apply to all MDVs that are designed to operate at weight loadings beyond the limitations of the chassis dynamometers. Based on stakeholder comments, CARB made 15-day changes to the PEMS test procedures to allow vehicles to perform the PEMS testing at 70% GCWR with the payload in the vehicle. This would allow vehicles, such as some of the commenter's vans, that can operate at 70% GCWR without a trailer to do so to reflect these non-towing, high load operating conditions. In Resolution 22-12, the Board resolved to direct the Executive Officer to continue coordination between the ACC II regulations and the Heavy-Duty Low-NOx Omnibus regulations and return to the Board if needed to ensure alignment between the two regulations on medium-duty vehicle in-use standards.

13. Comment: Commenter proposes to use the SULEV175 FTP standard to set PEMS in-use standard. The manufacturer's new vehicles have engines derived from light-duty engines and request an option for certifying using FTP standard (mg/mile) instead of PEMS MAW standard. The MAW favors higher power engines, which can meet the mg/hp-hr standard more easily. [OP-120, 15-17]

    Agency Response: CARB has considered the comment to set a PEMS NOx standard at the SULEV175 FTP standard but has determined not to make this change because this would make the proposed PEMS standard less stringent and the two certification paths for chassis and engine would not be equivalent. The PEMS in-use requirement will apply to both class 2b and class 3 MDVs that have a GCWR over 14,000 lbs. and

[14] CARB. 2022. MDV Chassis Engine Speed and Torque - ACCII. CARB2022e, First 15-Day Notice.
[15] CARB. 2022. MDV MAW Calculations – ACCII. CARB2022c, First 15-Day Notice.
[16] CARB. 2022. PEMS data of MY2020 Ford F250 class 2b gasoline used for MAW analysis. CARB2022xxx, Second 15-Day Notice.

require manufacturers to conduct PEMS testing at these higher weight loadings. This standard will apply to all MDVs above the GCWR threshold regardless of engine size. In the MDV classes, there are a mix of different engine sizes used ranging from 2-7 liter engines, but they are all certified to operate at the same weight loadings with the higher displacement engines having a higher max GCWR. Although the manufacturer uses a light-duty engine to operate in the medium-duty classes, their vehicle will operate at weight loadings and performing the same amount of work as other MDVs certified in that class. Therefore, there should not be an exception for a smaller engine to meet a different standard from the other MDVs operating at the same weight loadings. CARB test data[7] had shown in this case that the smaller engines were closer to meeting the PEMS standards. The difference between a big engine (320 hp) and small engine (160 hp) may be peak horsepower, but when they operate over their horsepower range, they should still be emitting the same under the PEMS standards. There should not be a disadvantage for a smaller engine. A smaller engine should achieve better efficiency sooner than the larger engine as the smaller engine approaches peak horsepower. Based on the current test data and research, CARB will not be making any further changes to the PEMS test procedures and standards.

14. Comment: We support the Medium-Duty Vehicle Moving-Average Window (MAW) in-use testing requirements applying only to vehicles with a Gross Combined Weight Rating (GCWR) ≥ 14,000 lbs. The in-use emissions for vehicles < 14,000 lbs GCWR are properly characterized from in-use FTP and US06/LA92 testing on the chassis dynamometer. We thank CARB for accepting our recommendation to start the MAW in-use testing in 2027 MY instead of the initially proposed 2026 MY. Starting in 2027 MY will allow lessons learned from 2024-2026 MY heavy-duty engine MAW in-use testing to be applied to Medium-Duty vehicles. [OP-94]

    Comment: Supports CARB aligning stringency of MD chassis certification and MD engine certification. [OP-139]

    Agency Response: Thank you for your comment. We appreciate your support for the proposals.

15. Comment: Finally, we request that CARB work with manufacturers to perform a technical review in 2030 CY of the MAW in-use testing requirement for diesel vehicles and consider whether technical amendments are needed at that time. [OP-94]

    Agency Response: CARB has considered the comment to conduct a technical review and agrees that the PEMS standards will continue to be evaluated, which was requested by the Board as well as aligning with any further changes from the HD Omnibus program. Recently, CARB has conducted further testing of gasoline medium-duty vehicles (MDV) in class 2b and class 3 after the initial test data that were shared. The current test data[17,18,19] confirm the previous analysis made in the SRIA, ISOR, and

[17] CARB. 2022. MDV MAW Calculations – ACCII. CARB2022c, First 15-Day Notice.
[18] CARB. 2022. PEMS data of MY2020 Ford F250 class 2b gasoline used for MAW analysis. CARB2022xxx, Second 15-Day Notice.
[19] CARB. 2022. PEMS data of MY2021 Silverado 2500 Class 3 gasoline used for MAW analysis. CARB2022yyy, Second 15-Day Notice.

Appendix H of the ISOR, which determined gasoline vehicles emit less NOx than diesels and are capable of meeting the PEMS standard with fewer changes to their emission control systems than diesel MDVs. The 2021 Silverado shown in the figure below is already meeting the 2030 standards with its current hardware and calibration. Therefore, other gasoline MDVs should be able to achieve the same emission levels with similar hardware or better calibration. Furthermore, the test data show that a gasoline MDV can emit over ten times more NOx during towing operation than normal operation at GVWR capacity, which is the case with the 2020 Ford F250 shown in the diagram below. These data further support the need for a PEMS in-use standard for gasoline MDVs to further control emissions beyond the limits of the chassis dynamometer test cycles.

PEMS testing was conducted on several different routes to test emissions during different conditions commonly found in California. The downtown Riverside route mainly included city driving, which is representative of conditions you might see in urban areas. The Escondido route is mainly highway with downhill and uphill driving. The Escondido route represents long-haul drives on the highway which is common for vehicles carrying heavier loads over long distances. The last route was the Lake Arrowhead route, which is mainly highway, but contains a drive off the highway to a larger uphill and downhill drive along Lake Arrowhead mountain. The PEMS testing conducted for gasoline MDVs is similar to the same PEMS testing conditions used for the diesel MDVs described in Appendix H of the ISOR. Each vehicle in the figure below is tested twice on each route at half payload, and for the Escondido route, additional testing is conducted at 80-83% GCWR. The emission for each test is shown by each bar.

CARB's previous testing of diesel MDVs showed diesel MDVs emit much higher emissions for NOx.[20] At this point CARB has evaluated the current technology and emission levels for both diesel and gasoline chassis-certified MDVs under varying test conditions using the 3-bin MAW and MAW test procedures and standards. As part of the Resolution 22-12, the Board has directed the Executive Officer to monitor the implementation of the ACC II regulations and report back to the Board starting in 2025 and no less frequently than triennially on the progress of the review. Additionally, it was directed by the Board to continue coordination between the ACC II regulations and the HD Low NOx Omnibus regulations and return to the Board if needed to ensure alignment between the two regulations on the MDV in-use standard. Thus, a specific technical review as suggested by the commenter is not necessary as CARB will continue to monitor and evaluate the adopted PEMS in-use standard for the duration of its implementation.

[20] CARB. 2022. MDV Chassis Engine Speed and Torque - ACCII. CARB2022e, First 15-Day Notice.

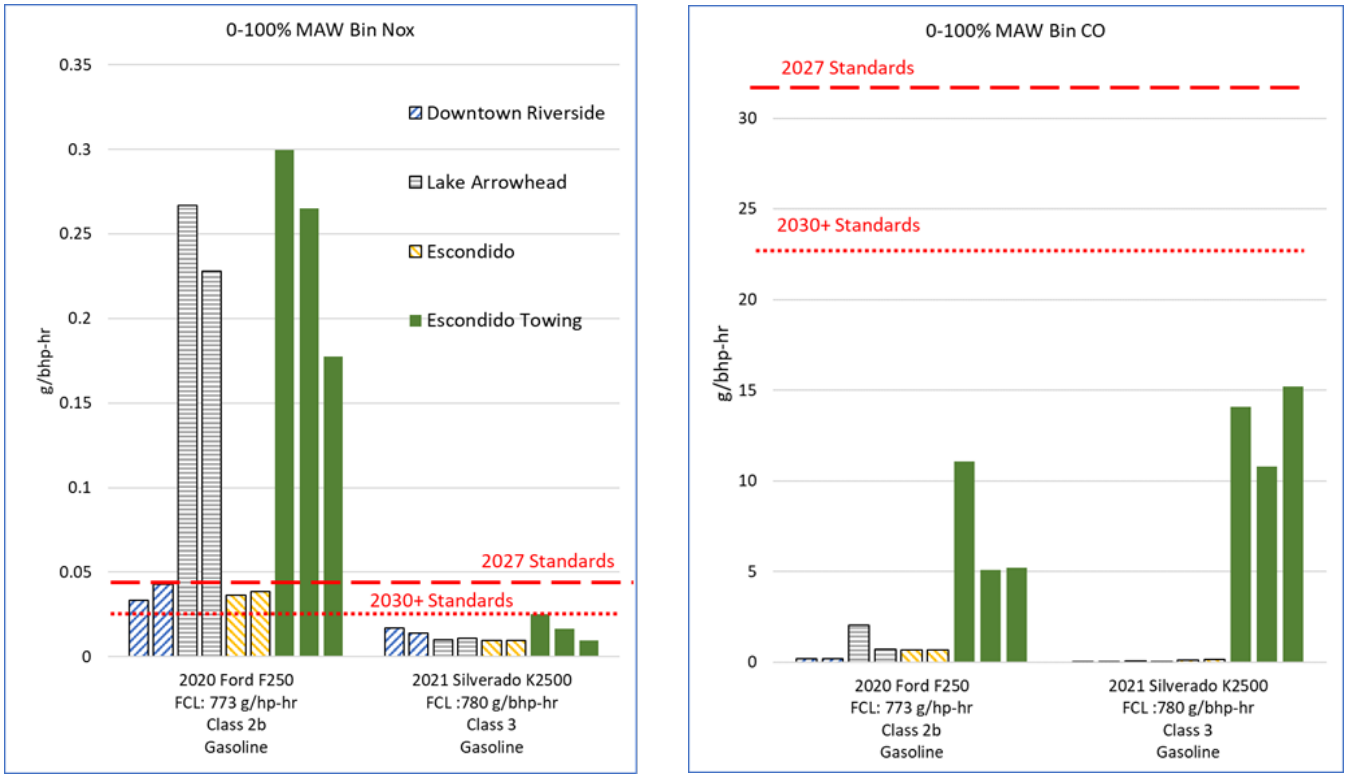

Figure 1: CARB test data[21, 22, 23] of chassis-certified gasoline MDVs tested on-road using PEMS and evaluated using the MAW analysis method. The emissions for each standard are shown for the corresponding model year and each bar represents the emissions for that test on each route.

16. Comment: MEMA strongly supports CARB's goal of aligning corresponding stringency for medium-duty (MD) chassis certification to avoid inconsistency with the more stringent MD NOx engine certification. MEMA urges CARB to ensure the in-use testing standards for other criteria pollutants (CO, NMHC) are at least as stringent as current chassis requirements, to ensure there is no emissions backsliding. MEMA supports the adoption of a standalone US06 standard for medium-duty vehicles (MDVs). [OP-139]

    Agency Response: CARB has considered the comment to evaluate CO and NMHC emissions for the in-use PEMS standard, and CARB has determined that the proposed in-use PEMS standards are appropriate. The purpose of the proposed PEMS in-use standard was to align stringency with the engine-certified path for MDVs and to ensure emissions that occur beyond the testing capabilities of the chassis dynamometers were controlled. CARB has evaluated the proposed PEMS in-use standards for both gasoline and diesel chassis-certified MDVs. Chassis-certified MDVs are still required to meet the current chassis requirements for CO and NMHC during

[21] CARB. 2022. MDV MAW Calculations – ACCII. CARB2022c, First 15-Day Notice.
[22] CARB. 2022. PEMS data of MY2020 Ford F250 class 2b gasoline used for MAW analysis. CARB2022xxx, Second 15-Day Notice.
[23] CARB. 2022. PEMS data of MY2021 Silverado 2500 Class 3 gasoline used for MAW analysis. CARB2022yyy, Second 15-Day Notice.

certification. We expect manufacturers to continue to design and control emissions during the FTP and standalone SFTP cycles. During towing operation, the PEMS test data collected by CARB has shown that current gasoline MDVs are emitting 6-17 g/mile of CO when towing. Although the PEMS in-use standards for NMHC and CO will be at less stringent levels than the chassis dynamometer standards, the PEMS in-use standard will be evaluating CO and NMHC emissions on-road during all engine operations, which includes off-cycle and towing. The PEMS in-use standards will limit emissions under all on-road conditions when previously manufacturers were only designing their emission control systems to handle emissions specifically during the chassis test cycles. As an example, the PEMS in-use standard will limit high emissions as was seen in U.S. EPA test data for a 2017 gasoline MDV Ram pickup truck that was emitting nearly 60 g/mile of CO during PEMS on-road testing. If staff for the HD Low NOx Omnibus program decides to make changes in a later rulemaking regarding the NMHC and CO emissions standards, then we would align with their changes for chassis-certified MDVs. Based on the current test data and research, CARB will not make any further changes to the PEMS in-use standards.

17. Comment: Commenter requests in-use test procedures that allow for efficient ICE technology, while medium-duty trucks continue to progress toward electrification [T1-12, B1-5].

    Agency Response: CARB has considered the comment and based on the research and current technology available it would be appropriate for chassis-certified MDVs to meet the same PEMS standard as engine-certified MDVs. MDVs are required to be 55% ZEV sales by 2035 under the ACT regulations. Therefore, conventional MDVs will persist on the road longer than LDVs after 2035. Although MDVs make up only about 4% of the total light- and medium-duty fleet, they will account for 32% of the total NOx emissions in 2026 from these vehicles. CARB test data[24, 25, 26] show that they can emit four to ten times more during towing on-road than normal operation when the vehicle is only loaded to its GVWR capacity. The technology package demonstrated by the HD Low NOx Omnibus rulemaking was using standard technology readily available for all diesel vehicles.[27] Utilizing the same technology for new MDVs in the earlier model years will ensure the best emission reductions in the long-term especially when these vehicles will be on the road much longer. Additionally, much of the research and development to meet the HD PEMS standard will carry over to the manufacturers' chassis-certified products, therefore it would be best to apply the ACC II PEMS standards at the same time as the HD PEMS standards. Based on the research and test

[24] CARB. 2022. MDV Chassis Engine Speed and Torque - ACCII. CARB2022e, First 15-Day Notice.
[25] CARB. 2022. MDV MAW Calculations – ACCII. CARB2022c, First 15-Day Notice.
[26] CARB. 2022. PEMS data of MY2020 Ford F250 class 2b gasoline used for MAW analysis. CARB2022xxx, Second 15-Day Notice.
[27] CARB. 2020. 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, Staff Report: Initial Statement of Reasons. CARB2020, First 15-Day Notice.

data collected, CARB has concluded that no further changes are required for the MDV PEMS in-use test procedures.

Chassis Dyno Test Procedures and Standards

18. Comment: We support the lower medium-duty vehicle FTP fleet average standards, and we thank CARB for adding new emission bins for compliance flexibility. The lower standards will require steady criteria emission performance improvements between 2026 and 2029 MY, but we believe that these standards will be achievable through calibration and aftertreatment design changes. [OP-94]

    Comment: MEMA supports the CARB proposed standalone US06 standard for non-ZEV NMOG+NOx MDV fleet of 0.175 g/mi for class 3 and 0.150 g/mi for class 2b. MEMA supports CARB's phase-in period and proposed changes to the emissions bins for the MDV standards. [OP-139]

    Comment: We agree with CARB's decision to require Standalone SFTP certification for all test groups; however, we are concerned that CARB has chosen to require that 100% of test groups comply with the Standalone SFTP requirements in 2026 MY. This requirement has the potential to reduce emissions from high-speed/high-load driving. This requirement will result in significantly increased levels of investment in internal combustion engines over the next four years and presents substantial workload challenges. Instead of requiring 100% phase-in of standalone SFTP requirements in 2026 MY, we recommend that CARB phase-in the standalone SFTP requirements over a three-year period (2026-2028 MY); as was done for the new coldstart test procedures. This approach would spread internal combustion engine investment out over a longer time period, allow greater levels of short-term investment in ZEV technologies, and achieve CARB's goal of 100% Standalone SFTP certification by 2028 MY. [OP-94]

    Agency Response: Thank you for your comments. We appreciate your support for the proposed ACC II regulations. This supports CARB's analysis and justification for the proposed standards. The adopted SFTP requirement phase-in years are from model years 2026 through 2029, therefore manufacturers are given four years to transition their fleet to the new requirement instead of three years as the commenter requested. CARB is not making any further changes to the proposed chassis standards.

19. Comment: Given the proportional vehicle weights, reported NMOG+NOx certification values of best-in-class performers, as well as, the need to provide further air quality benefits, MECA believes gasoline and diesel fueled medium-duty vehicles are capable of complying with lower NMOG+NOx standards. We encourage CARB staff to consider further correlational analysis between the Omnibus and LEV III/IV light-duty standards for Class 2b and Class 3 medium duty vehicles to ensure a comparable and ambitious medium-duty fleet average is set. [B1-1].

    Comment: MECA also suggests equivalent certification limits be set over the applicable US06 test cycle portion (full US06 or US06 Bag 2 for Class 2B) and LA-92 (Class 3) test cycles in these weight classes to ensure robust calibration and emissions control performance. [B1-1].

Comment: Commenter supports the proposal and suggests it can be strengthened by strengthening the PM and NOx standards for medium-duty vehicles based on already-available engine and aftertreatment technologies [T1-19, T1-20, B1-1].

Agency Response: CARB has considered the comments to set more stringent chassis dynamometer standards and has determined that setting a more stringent PEMS in-use standard rather than much tighter chassis standards was the most comprehensive approach and would achieve greater emissions reductions. CARB analyzed current certification data and determined that it would not be appropriate, considering the relevant factors, to require current class 2b and class 3 MDVs to meet more stringent chassis standards than what was proposed in the ACC II rulemaking. Meeting more stringent standards would require significantly greater investments but would be limited in their cost effectiveness if they only achieved benefits on the driving conditions represented by the chassis cycles. Manufacturers had also stated concerns that they were not capable of meeting the stringent FTP requirements and the PEMS in-use standards together. This was due to managing the cold-start requirements of the FTP and meeting the high load standards of the PEMS in-use standards. To ensure the best cumulative reductions possible and align stringency with HD, CARB chose to adopt the HD PEMS test procedures and standards for the MDV in-use requirement and increase the stringency of the class 3 fleet average to levels closer to class 2b. CARB also further reduced the class 2b fleet average slightly. We expect that changes made to the emission control systems for the MDVs meeting the PEMS in-use standard will also lead to lower emission levels during the chassis certification test cycles. If U.S. EPA decides to adopt more stringent standards for their MDV chassis standards, CARB will reevaluate the appliable chassis standards to determine the best solution for maximizing cost-effective emission reductions.

20. Comment: For MDVs greater than 10,000 pounds gross vehicle weight rating (GVWR), this subsection allows engine certification to the heavy-duty engine standards and test procedures under 13 CCR 1956.8. Subsection (a)(3)(B) provides that MDVs so certified are "not subject to the MDV fleet average, emission standards, or phase-ins of this section 1961.4." However, these vehicles should not be required to meet any of the provisions in this section 1961.4. Otherwise, it is not clear what provisions of 1961.4 apply to engine certified MDVs. For clarity, we recommend modifying this as follows:

(B) For engines used in MDVs that are certified to the engine standards of title 13, CCR, section 1956.8 in accordance with subsection (a)(3)(A), including those produced by small volume manufacturers, the engines and MDVs ~~are not subject to the MDV fleet average, emission standards, or phase-ins of this section 1961.4 and~~ must be certified to the ~~LEV IV chassis standards and test procedures set forth in this section 1961.4~~engine standards, emissions averaging provisions, and test procedures in title 13, CCR, sections 1956.8(c)(1)(C) or 1956.8(h)(7), as applicable to heavy-duty diesel or Otto-cycle engines and as set forth in [15-24]

Agency Response: CARB has considered the comment to change the regulatory text but has determined that CARB's proposed regulatory language is more specific and is clearer for certification. The removal of the language highlighted by the commenter would provide less clarity than the current ACC II regulation text. The highlighted

language was added to clarify that engines used for MDVs that are certified to section 1956.8 of 13 CCR are not subject to the requirements of section 1961.4 of 13 CCR. CARB is aware that manufacturers have been uncertain whether their engine-certified MDVs can be counted toward their chassis-certified MDV phase-ins. Maintaining the regulatory text will avoid any unnecessary confusion in the certification process as it explicitly states engine-certified MDV are not subject to these specific provisions. The current text was written with the same intention as the commenter has stated, which is to not subject engine-certified MDVs to the requirements of 13 CCR section1961.4. Based on this rationale, CARB has concluded that no further change is necessary to the regulatory language.

C. Evaporative Emission Proposals

Running Loss Standard

1. Comment: Commenter agrees with the CARB objective to continue to reduce evaporative emissions through a stricter running loss standard and adding a requirement to control puff loss. [B1-1, OP-139]

   Agency Response: CARB appreciates the support for the tighter running loss standards and the new requirement to control puff loss.

Minimum Canister Size Standard and Equation to Control Puff Emissions

2. Comment: European Union (EU) and China have adopted test methods for controlling puff emissions, but these have limitations. The European method only measures the puff load, not the puff plus refueling loads. Whereas China's test procedure includes puff and refueling loads but does not occur at elevated temperature. The commenter believes CARB could improve upon these methods to capture both puff and refueling emissions [B1-1].

   Comment: Supports puff emissions controls and recommends that the puff emissions regulation aligns with the puff emissions standards in Europe and China to encourage technology alignment with these regions and provide global harmonization where possible. [OP-139]

   Agency Response: CARB considered these comments suggesting that it adopt a puff emission regulation that aligns with or builds upon Europe and China's existing standards, and decided to depart from the other agencies' procedures because they do not take into account the primary conditions that cause puff loading to the vehicle's canister. Specifically, China's test procedure does not reach high enough temperatures, and Europe's procedure is solely puff loading (venting of the sealed tank prior to refueling) by itself without the addition of refueling emissions. The adopted provision thus goes beyond the Europe and China requirements and is more representative of the vapor that would be loaded to the canister when refueling a plug-in hybrid vehicle on a hot day since it is based on cumulative vapor loading to the canister from both puff loading and refueling at high temperature. Aligning with either of these existing international standards would not ensure sufficient control of refueling emissions, which are needed for attainment of air quality standards.

Modifying either of these existing standards to be more comprehensive of puff and refueling emissions would add test burden to manufacturers without achieving the commenter's intent of harmonization and without providing significant added benefit for assuring the canister is adequately sized to capture puff emissions as compared to the design-based approach that has been adopted.

3. Comment: The 1.2 canister aging factor (which is used in CARB's proposed minimum canister working capacity equation) should be eliminated or greatly reduced. Automakers worked cooperatively with ARB to develop this equation and agree except for the 1.2 constant that is used to account for canister aging. Inclusion of this factor could raise hardware and packaging concerns. Loss of EPA butane working capacity (which the 1.2 factor was derived from) does not reflect a loss of canister capacity using gasoline or occurs on a smaller scale. Data used by CARB to develop this 1.2 factor were probably based on conventional evaporative canisters, which would not reflect the vastly higher purge volume between loading associated with NIRCOS. Industry continues to improve canister designs and minimize capacity degradation as previously shown to CARB. [OP-133, OP-154]

   Comment: Commenter has concerns with the following regarding the minimum canister working capacity equation to control evaporative puff emissions: carbon deterioration (aging) factor should be based on tests using butane working capacity (BWC) and not gasoline working capacity (GWC). Also commenter believes that the proposed 15-day change of the minimum canister working capacity equation to base the carbon deterioration factor on GWC instead of BWC warrants further review for the following two reasons: 1) GWC is a parameter used in canister effectiveness assessments by suppliers and automakers but it has no regulatory basis and is not referenced in any regulatory requirement or provision that the commenter is aware of; and 2) It is not technically appropriate to use GWC data for the carbon deterioration factor in the minimum canister working capacity equation, but to then use BWC for compliance with the overall equation. [B1-1, 15-14].

   Agency Response: CARB considered these comments on changing the Carbon Deterioration Factor (which is used in CARB's proposed minimum canister working capacity equation), and it decided that based upon a review of canister aging data from industry, the 15-day change in which CARB updated the Carbon Deterioration Factor from 1.2 to 1.08, is appropriate. Staff initially based the Carbon Deterioration Factor on aged canisters tested using butane working capacity (BWC) and not gasoline working capacity (GWC). The "1.2" value of this factor which was presented in the proposal for the ACC II regulations was based on aged canisters tested for BWC. Staff learned from discussions with manufacturers and from this comment from the auto industry that it is more appropriate to base this factor on aged canisters tested for GWC instead. Therefore, in a 15-day change, CARB updated the Carbon Deterioration Factor to 1.08,[28] based on this data of aged canisters tested using GWC. CARB believes it was justified to use GWC data to update the Carbon Deterioration Factor (which is one component of the minimum canister working capacity equation) in

[28] CARB. 2022. Puff Equation Change: Data and Reasons Supporting Adjustment of the 1.2 Factor to 1.08. CARB 2022k, First 15-Day Notice.

the 15-day change, even though GWC is not currently in ACC II regulations, because gasoline vapors are what the canister is exposed to in-use. But when it comes to compliance with the overall minimum canister working capacity equation, it is appropriate that manufacturers would actually be checking their canister's BWC. This is because BWC is a more standardized and common measurement than GWC, making it a more feasible method for industry to implement and perform this check.

4. Comment: Commenter has concerns with the following regarding the minimum canister working capacity equation to control evaporative puff emissions: canister capacity for currently certified PHEVs does not match (exceeds in multiple cases) capacity determined using CARB minimum capacity equation, which they are concerned may prompt manufacturers to reduce the capacity of the canisters on existing and future vehicle models. This deviation is even larger in the 15-day change equation. [B1-1, 15-14, T1-19].

   Agency Response: CARB considered these comments indicating concern that manufacturers may reduce the capacity of the canisters on existing and future PHEV vehicle models since the canister capacity for currently certified PHEVs in multiple cases exceeds the capacity determined using the CARB minimum capacity equation, and it decided not to make any changes based on this comment. It is not CARB's intent to match canister capacity for currently certified PHEVs with capacity determined using the CARB minimum capacity equation. CARB's aim for this new additional canister sizing requirement is to ensure canisters have adequate capacity to limit puff emissions. As they currently do, manufacturers will still be required to size the canister appropriately to meet all of the other applicable evaporative standards, some of which may necessitate a larger canister than the minimum needed solely to meet this new puff emission requirement. For some vehicles, actual canister capacity may exceed the minimum sizing requirement as some manufacturers use a greater compliance margin in their vehicle designs or may be using the same canisters from similar non-PHEV vehicles which may be designed for a larger amount of vapor loading. As such, it does not mean that manufacturers with over-complying canisters will remove technologies and risk violating the current suite of other evaporative emission standards as a result of this new minimum canister capacity equation requirement. In other vehicles, especially some of the larger PHEVs, actual canister capacity is not meeting the new minimum capacity requirements, and these are the vehicles that this requirement addresses. Larger vehicles have larger fuel tanks which generate more vapors and thus need a canister large enough to handle puff and refueling emissions; the new minimum sizing requirement ensures that vehicles in the future will have sufficiently sized canisters to control emissions.

5. Comment: Commenter has concerns with the following regarding the minimum canister working capacity equation to control evaporative puff emissions: amend Vtvs definition to also include the volume of other elements of the fuel system (in addition the fuel tank, such as fill pipe and vent lines) which would contain vapor prior to cap removal [B1-1].

   Agency Response: CARB considered this comment which suggests to include the fill pipe and vent lines to the fuel tank vapor space portion of the minimum canister working capacity equation (Vtvs), and it decided to not make any changes, since CARB

believes that including these peripheral components would increase the total system volume by only 1% (to make this estimate, CARB based its analysis on a typical configuration of a fill pipe that is 30 inches long with an internal diameter of 1.2 inch along with a fuel tank having 14 gallons vapor space when 10% filled with fuel, and assumes vapor volume of vent lines is less than vapor volume of fill pipe), and would only have a negligible effect on the resulting required canister working capacity. Therefore, CARB maintained using only the fuel tank's vapor space volume as it adequately captures fueling the tank when it is initially at a low level and provides manufacturers with a less burdensome compliance process.

6. Comment: Commenter has concerns with the following regarding the minimum canister working capacity equation to control evaporative puff emissions: commenter recommends that the 0.88 value be set at 0.90, consistent with the factor used in Vtvs, the ORVR certification test requirement, and what occurs in use during a fill up [B1-1].

   Agency Response: CARB considered this comment which suggests that the 0.88 value (current value) of the minimum canister working capacity equation be set at 0.90, and it decided not to make any changes. 0.88 was chosen since this accurately reflects the proportion of the fuel tank capacity that would be filled during an ORVR (onboard refueling vapor recovery) test, in which the tank is 10% full before refueling. Vtvs explains a completely different value: the fuel tank vapor space. This 0.88 value came from confidential auto industry ORVR refueling data, therefore CARB believes this 0.88 value is a good representation of what occurs when the vehicle is refueled when the tank is mostly empty. Additionally, changing the value to 0.90 versus 0.88 has a minimal impact (less than 2%) on the resulting canister size. Therefore, CARB has retained this value in the adopted ACC II regulations.

7. Comment: Commenter believes the most effective way to control puff loss emissions is to set a performance-based test procedure to include the measurement of both "puff" and refueling emissions to ensure that the canister capacity is sufficient and that the entire system operates effectively under elevated ambient temperatures; standards based on test procedures are more readily enforceable in-use over a certified vehicle's useful life [B1-1, 15-14].

   Agency Response: CARB considered this comment, which suggests that a performance-based test procedure is favorable over the design-based approach that CARB chose for controlling puff emissions, and it decided not to make any changes based on this comment. The design-based approach was intentionally chosen for this proposal instead of adding a new test procedure, with the aim of avoiding additional test burden for minimal benefit. There are already numerous test procedures which manufacturers need to perform to certify that their vehicles meet evaporative emission requirements that also may identify situations where the canister may be too small.

Other Changes to Evaporative Emissions Test Procedure

8. Comment: Commenter notes that the new Evaporative Emissions Standards and Test Procedures begin with the 2026 model year, and that this will delay harmonization with the federal allowance with the existing EPA ethanol retention test requirements in 40 CFR § 86.117-96, which do not require monthly ethanol retention tests once

specified conditions are met. Since CARB's current (pre-2026 model year) requirement for ethanol retention testing unnecessarily disrupts operations, automakers plan to request a modified test procedure to harmonize with 40 CFR § 86.117-96 prior to 2026MY. [15-24]

Agency Response: CARB understands this commenter's concern that the relaxing of the monthly ethanol retention test requirement, which aligns with existing U.S. EPA test requirements, does not begin until the 2026 model year; however, CARB did not propose to modify the existing ethanol retention testing requirements which will remain effective through the 2025 model year. CARB affirms that a provision exists in the "California Evaporative Emission Standards and Test Procedures for 2001 through 2025 Model Passenger Cars, Light-Duty Trucks, Medium-Duty Vehicles, and Heavy-Duty Vehicles and 2001 and Subsequent Model Motorcycles" for an automaker to request an alternative test procedure, that may be an appropriate course for automakers to take in this situation, and CARB will evaluate any such future requests consistent with the requirements of that provision and the specifics of the request.