



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

August 25, 2020

Re: Comments in Response to the Proposed Heavy-Duty Engine and Vehicle Omnibus Regulation and Associated Amendments (HD Omnibus Regulation)

Dear Sir or Madam,

Cummins Inc. appreciates the opportunity to provide comments regarding the California Air Resources Board's (CARB) Proposed Heavy-Duty Engine and Vehicle Omnibus Regulation and Associated Amendments, or HD Omnibus Regulation. We understand the unique air quality issues California faces and share CARB's goal to improve real-world NOx emissions from heavy-duty vehicles. Cummins is a proponent of tough, clear, and enforceable regulations around the world in order to improve the environment while delivering what our customers need.

Our company wants to play an integral role in addressing climate change and air quality issues and to that end, in November 2019 Cummins announced an ambitious new environmental sustainability strategy called PLANET 2050. PLANET 2050 is a long-range business strategy that uses actions, advocacy, and partnerships to do our part to improve the environment.¹ The strategy includes quantifiable 2030 goals along with longer-term aspirations for 2050 such as carbon-neutral products and operations.

Cummins strives to improve the environment while at the same time serving our customers. As a global power leader, we ensure our customers' success by offering a choice of technologies that

¹ <https://www.cummins.com/company/sustainability/planet-2050>



are better for our customers, the environment, and our communities. We are investing significantly in technologies ranging from cleaner and more efficient natural gas and diesel to hybrid to battery electric and fuel cell electric powertrains as well as hydrogen production. Cummins offers these recommendations for changes to the HD Omnibus Regulation necessary for bringing efficient, reliable, and cost-effective power to our customers and for ensuring the regulation succeeds in providing air quality benefits for California. As we have done throughout the rulemaking process, Cummins will continue to work with CARB and other stakeholders to finalize the necessary changes.

Changes are needed to recognize shortened lead times, unforeseen challenges, and manufacturers' investments

During development of CARB's proposed HD Omnibus Regulation, Cummins participated in industry discussions with CARB to explore the possibility of voluntary nationwide NOx reductions by manufacturers. Despite manufacturers bringing forth voluntary nationwide proposals, an agreement could not be reached between CARB and industry. CARB's HD Omnibus Regulation contains a 50-state option for Model Year (MY) 2024-2026 NOx standards which Cummins believes adds unnecessary complexity and regulatory uncertainty. As such, it could be removed from the proposal.

Cummins is working towards meeting CARB's proposed MY 2024 0.050 g/bhp-hr NOx standard with advanced technology internal combustion engines and powertrains, including alternative fuel options, even as concerns remain with the sweeping changes to certification and compliance requirements proposed in the HD Omnibus Regulation. In addition to a 75% reduction in the NOx certification standard starting in 2024, CARB is proposing other brand new requirements and procedures that will be implemented for the first time in MY 2024 such as a new low-load certification cycle (LLC); new, longer durability demonstration and deterioration factor (DF) test requirements; a new Moving Average Window (MAW) based in-use compliance protocol; and a new California-specific Averaging, Banking, and Trading (CA-ABT) program which begins even earlier in MY 2022, among other changes. Manufacturers are faced with understanding and implementing yet-to-be finalized requirements at the same time as developing new products to comply with them. The unprecedented scope of change in a short amount of time presents numerous uncertainties and challenges, some of which are discussed below.



More flexible, streamlined alternatives are needed to complete durability/deterioration factor testing due to the short lead time for MY 2024. One of the most critical concerns related to the short lead time for complying with MY 2024 requirements is the long-hour testing driven by CARB's proposed new durability/DF requirements. The proposed new procedures would require the equivalent of full useful life aging, for example, 4,200 hours of engine dynamometer testing for medium heavy-duty engines and 9,800 hours for heavy heavy-duty engines (with an option for 4,900 hours plus accelerated aftertreatment aging and in-use emissions reporting). Even the reduced option would consume at least one year of the roughly three calendar years between now and 2024. These test durations exceed the time available in a manufacturer's product development schedule considering technology evaluations, product design choices, and early product development builds which must be completed before DF testing, and OBD demonstrations and other pre-certification activities which must be completed after DF testing. Flexibility is needed to allow manufacturers to streamline the DF procedures and use alternative approaches in demonstrating durability to address the short lead time for certification of MY 2024-2026 products.

Provisions are needed to address unknowns associated with the all-new in-use compliance protocol. Another concern is the potential for unforeseen challenges related to the proposed new MAW-based in-use compliance protocol. This protocol segregates real-world emissions data into three bins ("3B-MAW", or in the case of Otto engines, a single bin or "B-MAW") and applies an in-use limit to each bin based on a 1.5x conformity factor, or multiplier, of a corresponding certification standard. CARB and manufacturers have no experience implementing such an approach, especially at the low in-use NOx thresholds in the proposal. Given the already-compressed product development schedules discussed above and little time for further evaluation of the 3B-MAW/B-MAW method itself or validating compliance to it, CARB should provide for addressing unknowns associated with it. For example, CARB should consider initially allowing additional "guard rails" such as higher conformity factors and/or additional data exclusions to cover unique duty cycles or other unanticipated issues.

Changes are needed in the CA-ABT provisions to appropriately recognize manufacturers' investments. Powertrain manufacturers should receive credit for their zero-emission powertrains instead of the vehicle manufacturer. Provisions for averaging, banking, and trading of emission credits are longstanding and provide flexibility for manufacturers in managing the investment and lead times associated with complying to new, stringent requirements. Associated with the new CA-ABT program, CARB has proposed to allow vehicle manufacturers that certify Class 4-8 zero-



emission vehicles (ZEV) to generate NOx credits for use in complying with the HD Omnibus Regulation NOx standards if the ZEV family uses a CARB-certified zero-emission powertrain. As proposed, a zero-emission powertrain manufacturer such as Cummins who does not manufacture vehicles would be prevented from generating such credits. Since the HD Omnibus Regulation sets new NOx standards and other requirements for engine/powertrain certification applicable to the engine/powertrain manufacturer, it is more appropriate for zero-emission credits brought into the Omnibus program to be earned by the zero-emission *powertrain* manufacturer, rather than the zero-emission *vehicle* manufacturer. This change would provide consistency with NOx and greenhouse gas credit ownership in existing engine regulations, continue to foster a level playing field among manufacturers, and provide incentive for powertrain manufacturers, including vertically-integrated manufacturers who manufacture both the powertrain and the vehicle, to invest in and develop zero-emission powertrain technology.

Additionally, the CA-ABT program should recognize the early investment that has already been made by manufacturers certifying to CARB's optional 0.02 g/bhp-hr NOx standard by allowing early credits without adding new requirements. Additional new requirements beyond today's requirements (e.g., longer DF testing, MAW in-use protocol, longer emissions warranty and useful life periods, etc.) should not apply for pre-MY 2027 0.02 g/bhp-hr NOx-certified engines to receive early compliance credits. Also, such engines should be allowed to generate credits and qualify for purchase incentives at the same time.

CARB should not finalize emissions warranty and useful life changes and instead first conduct a comprehensive study to assess the cost implications, including impacts on new technology adoption

The more stringent 2024 warranty reporting and corrective action provisions and the proposed lengthening of emissions warranty and useful life periods in 2027 and 2031 are other areas of significant concern for Cummins. The proposed changes will further raise the costs of vehicles, which negatively impacts technology adoption and the corresponding environmental benefits. For example, CARB proposes mandatory recalls and extended warranty for certain components based solely on failure rate, even in cases with no emissions impact, starting MY 2024. CARB also proposes to nearly double emissions warranty and useful life periods in terms of mileage, along with doubling current warranty years, in two steps to be phased in by MY 2031. Together these



changes will increase the initial purchase price of the vehicle as manufacturers seek to re-coup the costs of providing mandatory longer coverage, incorporating changes to improve component durability (if possible), or paying for replacements when component improvements are not possible. Changing these requirements at the same time as introducing new technology to meet new NOx standards will further exacerbate vehicle price increases.

Cost increases related to the longer emissions warranty and useful life periods are difficult to quantify as manufacturers must still explore and evaluate possible 2027 engine architectures. Validation models and cost projections rely on historical data for existing components and development experience for new technologies. However, the proposed new requirements for emissions warranty and useful life extend beyond the mileage and time periods covered by most historical data and far exceed the experience that can be accumulated during the typical three- to four-year product development cycles for these products. Further exploration of technology choices and costs is needed.

It is the initial purchaser, a variety of end-user customers from fleets to municipalities to small businesses, who will be penalized by these cost increases and will see their business models disrupted as they consider many factors including impacts to their total cost of ownership and re-sale values, while weighing alternatives such as holding on to their older vehicles longer or buying used vehicles. They may choose to forgo buying new vehicles, which will slow adoption of new technologies and reduce the envisioned emissions benefits.

CARB should not finalize the proposed changes to emissions warranty reporting, corrective actions, warranty periods, and useful life periods. CARB should instead first conduct a comprehensive study to assess the cost implications, including impacts on new technology adoption, of these changes which could have the unintended consequence of discouraging emissions improvements if customers cannot afford to buy new vehicles. Cummins is committed to working with CARB to evaluate other more cost-effective alternatives.

Cummins is committed to continue working with CARB to ensure a successful final rule

In addition to the concerns highlighted here, we have communicated other recommended regulatory changes through discussions with CARB staff and in the Appendix to these comments. Cummins is committed to continuing to work with CARB and other stakeholders on 15-day changes



to ensure the final rule is successful for the environment, for the people of California, and for our customers. For questions, please contact me: jackie.m.yeager@cummins.com.

Sincerely,

Jackie M. Yeager

Jackie M. Yeager

Director – Emissions and Fuel Efficiency Policy

Product Compliance & Regulatory Affairs

Cummins Inc.



Appendix – Additional Recommended Changes to the HD Omnibus Regulation

<i>Issue</i>	<i>Cummins' Recommendation</i>
Engines using single-point injection of gaseous fuels have delayed torque response in highly transient cycles such as the LLC and cannot meet all the cycle validation statistical criteria of §1065.514	Revise the LLC cycle regression limits for single-point injection, gaseous-fueled engines
Zero-emissions NOx credits are proposed for use in any averaging set	Maintain averaging set restrictions for zero-emission NOx credits, consistent with averaging sets that are currently in place in today's regulations for engine NOx and GHG credits
Use of the FTP CO ₂ FCL in the MAW in-use binning and emissions calculations as a surrogate for power leads to inaccuracies	More work is needed to determine a more accurate method
In-use testing analysis includes data even when regeneration occurs, malfunction indicator lamp (MIL) is illuminated, or coolant temperature is low after a shutdown period	Consider invalidating tests or data when these conditions occur
No PEMS measurement allowance is specified for in-use compliance testing	CARB and industry should work together to determine data-driven measurement allowances given the new data analysis techniques, expanded operating ranges and conditions, and lower emissions thresholds associated with the new in-use protocol
MY 2023 timing to increase useful life for medium-duty engines used in 10-14k lbs GVWR vehicles does not align with other regulatory changes or product development timelines*	Move the change to MY 2027 or at least MY 2024 to better align with other regulatory changes and product development timelines
Hours are included as a limit to emissions useful life periods only for heavy heavy-duty engines*	Add hours to emissions useful life for other engine categories to address low vehicle speed, low mileage applications
The hours limit for heavy heavy-duty engine useful life is effectively removed by reverting back to years or miles limits once the hours are reached*	Revisit the need for secondary years or miles limits and remove/adjust the values
Key-on/engine-off time does not count for purposes of identifying the end of warranty or useful life periods*	Allow key-on/engine-off time to count for cases such as hybrids where the hybrid components are still active even when the engine is off
Starting MY 2024, manufacturers may not prohibit the use of commercially available diesel and biofuel blends that meet California's fuel specifications	To ensure performance of their products as designed, manufacturers should be allowed to continue specifying allowable fuels in their maintenance instructions as well as rejecting unacceptable fuels for purposes of in-use compliance testing
Engines certified to Family Emissions Limits (FELs) lower than current standards could be subject to more stringent OBD thresholds than engines certified to MY 2024+ standards	Allow use of the proposed alternate OBD thresholds starting MY 2022 for engines certified to FELs lower than current standards

* See previous comments for additional overarching concerns and recommendations regarding emissions useful life and warranty