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Air and Radiation Docket and Information Center
EPA Docket Center Reading Room
WJC West Building, Room 3334
1301 Constitution Avenue, NW
Washington, D.C. 20004
By email to:*a-and-r-Docket@epa.gov* and *nelson.brian@epa.gov*

Mr. Brian Nelson, Director, HD On-Road & Non-Road Center
Office of Transportation and Air Quality Assessment and Standards Division
United States. Environmental Protection Agency
2000 Traverwood Drive
Ann Arbor, Michigan 48105

RE: Supplemental Comments to Initial California Air Resources Board Comment Letter Submitted on May 13, 2022, Regarding Control of Air Pollution from New Motor Vehicles: Heavy-Duty Engine and Vehicle Standards

Docket ID No. EPA-HQ-OAR-2019-0055, RIN 2060-AU41

Dear Mr. Nelson:

Since the submission of California Air Resources Board's (CARB) comments on May 13, 2022, and the closing of the comment period for the Clean Trucks Plan (CTP) notice of proposed rulemaking (NPRM) on May 16, 2022, CARB staff has reviewed the comments submitted by other stakeholders on the CTP NPRM. I am writing this supplemental letter to comment on some requests and statements made by other stakeholders in order to provide CARB's feedback and clarity on "matters of central relevance to the rulemaking" before the U.S. Environmental Protection Agency (U.S. EPA).[1]

Because this letter bears upon such matters, please add it to the record of this rulemaking and all appropriate dockets. The main points of our supplemental comments are summarized below:

- The Truck and Engine Manufacturer Association (EMA) has asked the U.S. EPA to provide a 0.026 Grams per brake-horsepower hour (g/bhp-hr) margin when setting nitrogen oxides (NOx) standards. The margin requested by EMA is dangerously and unnecessarily large, given the margins with which manufacturers have historically certified. In addition, crankcase ventilation, which was not included in U.S.

[1] 42 U.S.C. § 7607(d)(4)(B)(i); see also id. §7607(d)(7)(A) (providing that such material forms part of the administrative record for judicial review).

EPA's NPRM technology package, offers a cheap, widely used way for manufacturers to provide additional margin if needed.

- Regarding EMA's concerns about possible pre-buy and no-buy caused by the proposed regulations, we expect any pre-buy and no-buy effects to be small. History shows sales are driven by economic factors (recession, etc.) much more than any emission standard changes. In addition, supply chain issues today make pre-buy impossible or unlikely. Finally, sensitivity analyses CARB staff performed for the Omnibus regulation show that even with a 20 percent pre-buy/no-buy, the Omnibus regulation was still cost-effective and worth pursuing, and the same would hold true for U.S. EPA's program.
- CARB staff opposes Daimler's ask for regulatory relief for hydrogen-fueled internal combustion engines (H_2-ICE) because such engines emit tailpipe NOx just like traditional combustion engines. In addition, adding special flexibilities for H_2-ICE technology would violate applicable public notice requirements because it is outside the scope of U.S. EPA's rulemaking.
- CARB staff opposes EMA's request for U.S. EPA to retain the language defining the parent engine based on existing requirements because doing that would allow manufacturers to avoid testing the engine with highest potential emissions.
- CARB staff objects to EMA's assertion that biodiesel specification regulations are needed as part of the CTP rulemaking.
- CARB staff disagrees with EMA's comments regarding a need for more consideration of on-board diagnostics (OBD) requirements and capabilities before adoption of the proposed standards.
- CARB staff believes there is a need to continue particulate matter (PM) and non-methane hydrocarbons (NMHC) measurements as a part of the heavy-duty in-use testing (HDIUT) program.
- Many private and public agencies are investing in future infrastructure activities to support the heavy-duty (HD) sector's transition to zero-emission. Furthermore, CARB staff believes that rollout of initial heavy-duty zero-emission vehicle (HD ZEV) volumes is not dependent on the infrastructure of pre-existing public charging networks.

CARB staff's supplementary comments are presented in detail below:

Margin Requirement - EPA-HQ-OAR-2019-0055-1203_Attachment_1.pdf (Pages 23-33), EMA

In its comment letter, EMA uses a margin stack-up analysis to request a 0.026 g/bhp-hr margin to be included in establishing future NOx emissions standard in order to ensure that 97.7 percent of the future engine sales would have emission levels below the applicable standards (page 28 of the EMA comment letter).

CARB staff conducted a historical survey of past margin levels used by HD diesel engine manufacturers and submitted the information in its comment letter[2] to U.S. EPA. If EMA's margin stack-up analysis was correct, it should also apply to previous engine sales as these engines would also require similar (or greater) margin levels in order to comply with the existing emissions standards. Based on historical certification data, a 0.026 g/bhp-hr NOx margin requirement would mean that 24 percent of the HD diesel engine families sold between 2010 and 2020 model years in California did not have sufficient margin levels to be certified but were nevertheless certified by engine manufacturers. The historical data indeed suggests that engine manufacturers do not feel the need to include any margins when certifying their existing products for sale. It therefore does not make sense to include margin stack-ups for establishing future standards.

It should also be noted that engine manufacturers have many options to comply with the proposed Option 1 standards including establishing a margin by deploying new emission control technologies. For instance, today's diesel engines do not typically use closed crankcase ventilation systems, and hence vented blowby or open crankcase ventilation presents an untapped means to further reduce NOx emissions from on-road HD diesel engines. Rather than closing crankcases, most HD diesel manufacturers instead measure and account for emissions from the blowby gases, which are vented directly to the atmosphere. Some rudimentary physical filtration is typically employed to reduce oil mist and a portion of PM emissions from the raw exhaust of the blowby gases. But NOx aftertreatment has not been applied to these directly vented blowby gases.

Blowby vented from the crankcase presents a ready opportunity for significant additional NOx reductions. For 0.20 g/bhp-hr NOx certified engines, the blowby NOx contribution was typically a very small fraction of total engine NOx emissions, which were dominated by the tailpipe contribution. However, as the blowby percentage of total exhaust flow approaches the percentage of NOx surviving the aftertreatment, the blowby becomes a much more important opportunity for reducing an engine's overall NOx emissions impact. For example, if one percent of raw exhaust is escaping via blowby and the aftertreatment reduces the remaining exhaust flow's tailpipe NOx by 99 percent, then both blowby NOx and tailpipe NOx emission rates would be of similar orders of magnitude.

Currently, technological pathways exist for eliminating blowby NOx emissions. Closed crankcase ventilation is an obvious pathway to eliminate the NOx emissions contribution from blowby. Routing the blowby crankcase vapors to eventually go through the existing exhaust aftertreatment would render blowby NOx negligible and could be accomplished in a number of ways.

Introducing the blowby gases into the inlet of the engine has been employed in the light-duty sector for many years as well as in Cummins Optional Low NOx certified medium- and heavy-HD engines certified through diesel test procedures since the 2016

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[2] *https://www.regulations.gov/comment/EPA-HQ-OAR-2019-0055-1186* . Pages 41-44.

model year.[3] Cummins reported a 70 percent reduction in methane emissions just by closing the crankcase of those methane powered engines.[4] They apparently valued the emissions reductions sufficiently to merit working through whatever potential durability challenges the blowby gases in the intake tract may have presented to turbo compressor wheels, various intake air sensors and the like.

Alternatively, one could avoid exposing the turbo compressor to blowby gases by routing blowby gases into the main exhaust prior to the aftertreatment with the associated backpressure on the crankcase. This could also be achieved without the crankcase pressure rise by actively pumping blowby gases to a post turbo compressor (boosted) intake location or an exhaust pre-aftertreatment location using a smaller version of the exhaust gas recirculation pumps available today.[5] Actively pumped crankcase ventilation strategies are used extensively across stationary and marine reciprocating engines to control oil mist and reduce operator exposures.

The fraction of gases escaping as blowby is also a potential target for engineering improvements. The designs of valve guides and valve stem seals, turbocharger shaft seals, and the piston ring stack and cylinder liners can each affect the amount of blowby experienced by a given engine initially and as it wears. Each approach to eliminating blowby NOx would have different engineering tasks to assure acceptable function and durability, but sufficient physical filtering of these gases in preparation for combustion or catalytic treatment is an application engineering endeavor not an act of technology invention.

Testing shows elimination of blowby NOx emissions would yield significant "compliance margin" beyond current Low NOx Engine demonstrations. The industry typical approach of including vented blowby emissions in the emissions measurement was also employed in the Southwest Research Institute Stage 1 and Stage 3/Stage 3 Rework Low NOx diesel engines and further work is being done on an Off-Road Low NOx engine. The performance reported previously for these engines has not exploited the significant additional NOx reduction opportunity from eliminating blowby emissions that are being directly vented to the environment. Measurements with and without the blowby included were conducted on more than one base engine platform and showed that blowby emissions contribute between 20-60 percent of cycle average NOx depending on engine designs and test cycles. Applying this kind of closed crankcase benefit specifically to the Stage 3 Rework engine is projected to yield an overall 20 percent federal test procedure (FTP) compliance margin at 435,000 miles, 35 percent FTP compliance margin at 600,000 miles, and 18 percent at 800,000 miles (see attached presentation by Southwest Research Institute).

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[3] *https://www.truckinginfo.com/137270/cummins-starts-production-of-isl-g-natural-gas-engine*
[4] *https://mart.cummins.com/imagelibrary/data/assetfiles/0042998.pdf*
[5] *https://www.eaton.com/us/en-us/products/engine-solutions/superchargers/TVS-technology-applications/tvs-diesel-egr-pump.html*

Cost for closed crankcase ventilation is expected to be low compared to other means for additionally achieving equivalent NOx reductions. Closed crankcase ventilation has already been commercially demonstrated on medium- and heavy-HD Optional Low NOx engines for 6 model years and across 3 displacements (6.7-liter, 8.9-liter and 12-liter). It is quite likely that the any additional filtering of the closed crankcase blowby gases needed to maintain durability across longer useful life could be accomplished for very reasonable cost. The cost of implementing such filtering is expected to be very competitive compared to other methods of securing additional margin from engines already well equipped with modern generation catalysts and aftertreatment architectures, model-based controls, and cylinder deactivation and exhaust gas recirculation cooler bypass thermal management hardware. Products for closing turbocharged diesel crankcases already exist ready for evaluation and validation from many suppliers.[6,7,8] One might note that Cummins initially chose in model year 2016 to reduce greenhouse gas (GHG) emissions relative to their existing ISL-G engine by capturing the blowby methane via external closed crankcase methods rather than immediately investing in the spark-ignition specific cylinder head and other engine internal design changes subsequently seen in their about-to-be-released lower GHG spark-ignited products. This may be another indication of the closed crankcase approach's practicality and cost effectiveness for reducing blowby emissions relative to other means of improving the engine itself.

Concern regarding possible pre-buy and no-buy caused by the proposed regulations EPA-HQ-OAR-2019-0055 1168_Attachment_1.pdf (Exhibit "D"), EMA

EMA voiced concerns that the proposed regulations would cause economic disruption and have less benefits than projected due to pre-buy or no-buy of vehicles due to the regulation's increased cost of engines. But this scenario simply cannot offset the benefits of more stringent standards. At a fundamental level, companies are not going to rush out and buy so many trucks in a few years (especially under current economic conditions) as to undermine comprehensive national rules, or fail to buy trucks for many years. Even very substantial responses along these lines, should they occur, would not warrant setting weaker standards because remaining reductions are still very large. As mentioned in the final statement of reasons[9] (FSOR) for the Low NOx Omnibus Regulation, CARB staff conducted an analysis to see the possible impacts of a pre-buy
no-buy scenario. Staff analyzed a scenario where there is a 20 percent decrease in sales and fleets retain their existing vehicles longer throughout the life of the regulation. This would result in fewer Low NOx engine sales in the analyzed time period up to 2050. The retained vehicles would have engines meeting the current 0.2 g/bhp-hr NOx emissions standard. In this analysis, from 2024 to 2050, the pre-buy and no buy effect resulted in approximately 40

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[6] *http://donaldson-filters.com/donaldsonoemfiltration/library/files/documents/pdfs/053490.pdf*
[7] *https://www.cumminsfiltration.com/eme/closedcvfilters*
[8] *https://oem.mann-hummel.com/en/oem-products/crankcase-ventilation-systems.html*
[9] *https://ww2.arb.ca.gov/sites/default/files/barcu/board/rulemaking/hdomnibuslownox/fsor.pdf*

percent less NOx benefits compared to the assumed compliance. The cost effectiveness increased to $7.50 per pound NOx. Even if a pre-buy no-buy would occur as a result of the regulation, there would be a significant reduction in NOx in the time period adding up to 206,312 tons of NOx. The benefits would be significant, cost effective and worth pursuing.

The historical assessment of pre-buy based on HD emissions regulations was investigated in Anticipation and Environmental Regulation by Rittenhouse and Zaragoza-Watikins, as cited by U.S. EPA.[10] Their analysis shows minimal impacts on sales projections due to upcoming regulations. Diesel aftertreatments were first introduced in 2007 and the analysis showed an increase in sales slightly outside of regular variation for four months. There was a symmetric decrease in sales lasting for four months. Their study shows the impacts of pre-buy due to regulation changes are minimal and occur for only a short time span. The comments from the Moving Forward Network[11] (MFN) also reached this conclusion on page 38. Additionally, the MFN comments also showed the impact on sales of HD vehicles greatly depends on economic factors. Events like the dot com crash, great recession and COVID-19 pandemic have a much greater impact than any emission standard changes, affecting hundreds of thousands of engine sales.

In the current economic climate and supply chain shortages resulting from COVID-19, there are doubts that pre-buy could even be possible. The supply chain delays have made the supply of any type of vehicle very limited. We are a couple of years into low production/high demand conditions where desired vehicle purchases are stacking up due to aging fleets because dealers cannot secure vehicles from original equipment manufacturers (OEM) who are constrained on accessing parts (e.g., computer chips, castings, and at times certain lubricants)[12]. The vehicles that were not manufactured are a permanent 'hole' in the age distribution of vehicles moving through the fleet resulting in further demand for vehicles for the foreseeable future that will also drive-up vehicle prices until the production volumes catch up. Because the cost of vehicles is currently inflated due to supply chain problems, pre-buying additional vehicles today would not provide savings. It is also expected that 2023 vehicle production will also suffer computer chip and other supply chain constraints on manufacturer volumes[13,14,15,16]. Under these supply chain limitations, ramping up production to make more vehicles in a year would not be possible. Vehicle manufacturers will need to get back to their previous production volumes to satisfy replacements, and then produce more to start working through the backlog of pent-up demand and growth in the transportation sector. If it takes them half as many years to make up the 2020 to 2023 hole in

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[10] Draft Regulator Impact Analysis. Page 407. March 2022, EPA-420-D-22-00

[11] *https://www.regulations.gov/comment/EPA-HQ-OAR-2019-0055-1277* ; page 38

[12] *https://www.wsj.com/articles/chip-shortage-curtails-heavy-duty-truck-production-11630661401*

[13] *https://www.fleetowner.com/news/article/21242829/chip-availability-continues-to-hamper-oem-production-act-reports*

[14] *https://www.busandmotorcoachnews.com/global-shortage-of-microchips-slows-bus-production/*

[15] *https://www.truckinginfo.com/10173589/may-truck-orders-remain-constrained-by-supply-chain*

[16] *https://www.repairerdrivennews.com/2022/04/12/chip-shortages-expected-to-last-into-2023-auto-execs-say/*

production starting in 2024, that leaves only 2026 to execute a "pre-buy" effort. Because fleets will likely already have been buying vehicles at an accelerated rate just to backfill their delayed replacements, it is unlikely they would have the resources to further accelerate purchasing to execute a pre-buy.

Request for Regulatory Relief for H_2-ICE Hydrogen-Fueled Internal Combustion Engines - EPA-HQ-OAR-2019-0055_168_Attachment_1.pdf (Pages 125-129), Daimler Truck North America LLC (Daimler)

Daimler is requesting the introduction of so-called regulatory relief measures applicable to future model year H_2-ICEs. According to Daimler, the intent of these measures is to "… foster innovation and enable immediate penetration of innovative technologies with effectively zero carbon dioxide (CO_2) emissions and near-zero NOx emissions such as H_2-ICE engines".

CARB staff is strongly opposed Daimler's request for two reasons:

- CARB staff does not believe that the H_2-ICE technology is equivalent to other zero-emission technologies such as battery- or fuel-cell electric vehicles. As stated by Daimler, H_2-ICE technology does emit tailpipe NOx emissions, and the engine-out NOx emissions are high enough that a complex selective catalytic reduction (SCR) aftertreatment system would be needed to reduce the tailpipe emissions to a level that complies with the regulations. It is therefore unreasonable to consider H_2-ICE technology as an advanced zero-emission technology. CARB staff firmly believes that future H_2-ICE products should go through a vigorous certification process to evaluate the durability of the hardware as well as demonstrating compliance with auxiliary emission control device requirements as well as all other regulatory requirements for internal combustion engines.

- As a threshold matter, Daimler's proposal would require U.S. EPA to take final actions in contravention of applicable public notice requirements,[17] because such final actions would impermissibly depart from "the terms or substance of the proposed rule", and "[the] description of the subjects and issues involved"[18] in the NPRM.[19] U.S. EPA expressly states that it is *not* proposing to enact policies to advance the introduction of zero-emission vehicles (ZEV) in this rulemaking action, nor is it proposing to establish nationwide requirements that manufacturers must produce a portion of their vehicle fleets as ZEVs, but states it will consider such policies in the context of future rulemaking proposals.[20] Moreover, the NPRM does not contain either factual data, the methodology of obtaining and analyzing such data, or the major legal interpretations and policy considerations underlying Daimler's proposal, in contravention of 42 U.S.C. § 7607(d)(3)(A) through (C).

  It is accordingly clear that the NPRM notice fails to provide adequate notice and opportunity to comment on a final U.S. EPA action that would finalize Daimler's

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[17] 5 U.S.C. § 553(b), 42 U.S.C. § 7607(d)(3)
[18] 5 U.S.C. § 553(b)(3)
[19] *Envtl. Integrity Project v. EPA*, 425 F.3d 992 (D.C. Cir. 2005).
[20] NPRM at 17420.

> proposal, given that U.S. EPA expressly stated it would not enact policies or requirements regarding ZEVs in the NPRM.[21] Furthermore, the proposed final U.S. EPA action cannot be considered a "logical outgrowth" of the NPRM notice since the logical outgrowth doctrine does not extend to final rules that are not rooted in the agency's proposal or to situations where "interested parties would have had to 'divine [the agency's] unspoken thoughts,'." *Envtl. Integrity Project*, 425 F.3d at 996. Moreover, the logical outgrowth doctrine only applies if the NPRM itself provides recipients sufficient notice of the final action that U.S. EPA may take- i.e., U.S. EPA cannot assert that requisite notice resulted from comments received. *Shell Oil Co. v. EPA*, 950 F.2d 741, 760 (D.C. Cir. 1991); *Small Refiner Lead Phase-Down Task Force v EPA*, 705 F.2d 506, 549-550 (D.C. Cir. 1983). First, this request is beyond the scope of the CTP rulemaking and was not proposed in the NPRM. In order to evaluate the benefits and feasibility of this request, an official proposal would need to be provided by U.S. EPA so that all stakeholders would have the opportunity to evaluate and provide comments to U.S. EPA. Daimler's request completely circumvents the rulemaking process and should not be considered by U.S. EPA.

Request Regarding Selection of Test Engines - EPA-HQ-OAR-2019-0055-1203_Attachment_1.pdf (Pages 114-115), EMA

EMA submitted a comment requesting that U.S. EPA retain the language defining the parent engine based on existing requirements in §86.096-24(b)(3)(ii) which allows selecting "the engine that features the highest fuel feed per stroke, primarily at the speed of maximum rated torque and secondarily at rated speed." It should be noted that this language was originally established for combustion engines that did not deploy any aftertreatment systems. In making its proposal, EMA has overlooked the requirement in §86.096-24(b)(3)(iii) which states:

> The Administrator may select a maximum of one additional engine within each engine-system combination based upon features indicating that it may have the highest emission levels of the engines of that combination. In selecting this engine, the Administrator will consider such features as the injection system, fuel system, compression ratio, rated speed, rated horsepower, peak torque speed, and peak torque.

CARB's Omnibus regulation modified the applicable regulatory language in §86.096-24(b)(3)(iii) by adding the following statement to the end of subparagraph:

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[21] "If the APA's notice requirements mean anything, they require that a reasonable commenter must be able to trust an agency's representations about *which particular* aspects of its proposal are open for consideration." *Envtl. Integrity Project v. EPA*, 425 F.3d at 998.

> For 2024 and subsequent model years, the Executive Officer will also consider the aftertreatment conversion efficiency.

CARB staff supports the proposed U.S. EPA language in §1036.235(a)(1) that requires the manufacturer to select an engine configuration for criteria pollutant certification testing that is "most likely to exceed (or have emissions nearer to) an applicable emission standard or FEL… ." That approach would be consistent with the requirements in §86.096-24(b)(3)(iii). In terms of the parent engine selection process, the methodology for determining the model with the highest emission levels can be discussed with the certification staff.

Furthermore, given the introduction of GHG subfamilies under recent phase 2 technical amendments in §1036.230(f):

> Engine families may be divided into subfamilies with respect to compliance with CO_2 standards.

CARB staff does not believe that the requirement for parent engine selection would interfere with GHG subfamily determination. While the parent engine would determine the certification NOx level, different GHG subfamilies would be declared to represent the corresponding GHG family certification levels for the various subfamilies.

Concerns Regarding Fuel Quality - EPA-HQ-OAR-2019-0055-1203_Attachment_1.pdf (Pages 134-141), EMA

In addition to EMA, other engine manufacturers including Daimler, Navistar, and Paccar have once again raised issues and concerns regarding the quality of biodiesel fuel in the U.S. and how poor fuel quality may adversely impact the emission performance of diesel engines in the field. Volvo's comments,[22] while expressing a desire for tighter fuel standards, acknowledge that biodiesel quality problems are not widespread. Navistar and others refer to a CARB study of biodiesel NOx mitigation additive efficacy while ignoring the regulatory countermeasures[23] CARB put in place in 2020 as a direct result of this study. The study showed that certain additives to finished biodiesel were not mitigating non-aftertreatment engines' increased NOx emissions while that fuel was being used. The study does not indicate damage to aftertreatment systems but rather describes a compliance issue for fuel suppliers not vehicle or engine manufacturers. CARB and U.S. EPA's vehicle and engine testing procedures already have mechanisms for dealing with in-use vehicles encountered with demonstrably out-of-spec fuel in their tanks. The range of engine-out NOx increases even for the out-of-spec fuels were within the capability of SCR systems to compensate and control at the tailpipe. It is important to differentiate between an engine's instantaneous and reversible NOx response between two different fuel compositions that is the subject of the CARB study of biodiesel NOx mitigation additive efficacy (especially so if a test fuel is not

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[22] *https://www.regulations.gov/comment/EPA-HQ-OAR-2019-0055-1324*
[23] *https://ww2.arb.ca.gov/rulemaking/2020/adf2020*

even legal for sale) and separately the potential for actual damage to the aftertreatment from purported fuel contamination as might be the case for high metal content fuels. Some of the commenters appear to conflate the former effect and its limited effect duration during that given tank of fuel with the latter effect that rather integrates toward long-term cumulative effect via a catalyst deactivation mechanism.

CARB staff performed an extensive field sampling study of diesel and biodiesel fuel quality in the California market and found no evidence that would substantiate the claims by engine manufacturers of contaminated fuel. The results of this study were provided to U.S. EPA[24] during the Advanced NPRM comment period. CARB also analyzed nationally obtained samples provided from a U.S. EPA sampling campaign with consistent results. EMA commented that a Fuels Institute study found 50 percent of samples contained detectable metals. Merely possessing the analytical chemistry capability to detect the presence of a given element does not address whether that element is present in sufficient quantities to be a practical concern. Indeed, EMA notes that levels were well below recommended limits. The large field sample count results of the Fuels Institute study and the several years of BQ-9000 producer audit data are all consistent with the CARB field sampling study's result that fuel contamination is not a widespread issue.

In the past, CARB staff has reached out to OEMs and requested information regarding the origin of their poor-quality samples that have been identified. Each time, the OEMs have refused to provide information regarding the source of these samples. Without further information, claims regarding poor-quality fuels cannot be corroborated. Therefore, CARB staff firmly objects to the need for new biodiesel specification regulations as part of the CTP rulemaking.

The most potentially significant issues OEMs raised allege the possibility for occasional deviation outside of fuel specifications or an "off spec batch" that as discussed above has not been found to be a frequent occurrence. This is much different from when the 2007/2010 standards necessitated an entirely new fuel to be able to even conduct the engine demonstration testing in the lab and then the subsequent wide-spread oil refinery upgrades and 2006 rollout of Ultra Low Sulfur Diesel distribution to enable the proposed technology's commercial introduction. Again, the OEM fuel quality control concerns raised here are much different than the earlier situation of a current on-spec fuel (200 parts per million Low Sulfur Diesel) being positively destructive to the proposed technology PM and NOx catalyzed aftertreatment). U.S. EPA is not dependent on improvements in fuel quality to be able to move forward with standards at least as stringent as the NPRM's Option 1.

CARB staff also note that an additional relief from chemical aging compared to today's situation is anticipated on the lubricant composition side via recent American Petroleum Institute actions to define a new generation of "PC-12" category oils. These new oils are expected to become available in time for 2027 coinciding with CARB and anticipated

[24] *https://www.regulations.gov/comment/EPA-HQ-OAR-2019-0055-0471*

U.S. EPA standards. Among the target improvements is compatibility with longer useful lives and warranty periods and "improved aftertreatment capability."[25,26]

CARB in the Omnibus FSOR responses[27] to comments noted the likelihood of just such action and its potential additional benefit, though the Omnibus standard stringency was not based on assuming such lubricant improvements. U.S. EPA likewise is not dependent on such future lubricant improvements to move forward with standards at least as stringent as the NPRM's Option 1.

Concerns Regarding OBD - EPA-HQ-OAR-2019-0055- 1203_Attachment_1.pdf (Pages 90-101), EMA

CARB staff respectfully disagrees with EMA's comments on pages 90-92 of their comment letter," Environmental Protection Agency (EPA) Has Not Fully Considered All of the OBD Requirements and Capabilities that Could Frustrate the Implementation of the Low-NOx Regulations." CARB staff would like to note that EMA provided the same comments[28] to CARB for its Omnibus rulemaking, and CARB staff provided responses for all these comments as part of the FSOR for the rulemaking.[29]

CARB staff also disagrees with EMA's comments on page 93, "OBD threshold requirements," supporting U.S. EPA's proposed OBD thresholds. While CARB staff understand that U.S. EPA's proposed OBD thresholds were intended to harmonize with CARB's Omnibus OBD thresholds, CARB staff now believes the OBD thresholds can be more stringent than the proposed federal OBD thresholds. While CARB staff did not have much data to support more stringent thresholds when developing the Omnibus OBD thresholds, staff has since received information that some diesel and gasoline engines certified to lower emission standards are able to meet more stringent OBD thresholds than EPA's proposed OBD thresholds. As such, CARB staff believes that more stringent OBD thresholds than those being proposed by U.S. EPA are feasible and recommends that U.S. EPA adopt more stringent OBD thresholds based on available data. Should U.S. EPA adopt more stringent OBD thresholds, CARB staff would likely propose harmonizing with U.S. EPA's thresholds in a future rulemaking update.

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[25] *https://www.truckinginfo.com/10160275/new-diesel-emissions-regs-mean-new-engine-oil-category*
[26] *https://www.forconstructionpros.com/equipment/fleet-maintenance/oils-lubricants-greases/news/21940827/api-approves-development-of-pc12-diesel-engine-oil-category*
[27] *https://ww2.arb.ca.gov/sites/default/files/barcu/board/rulemaking/hdomnibuslownox/fsor.pdf* , pages 378-379.
[28] *https://www.arb.ca.gov/lists/com-attach/10-hdomnibus2020-JAxb8FFZFNoQFNbo.zip* . Pages 98-101.
[29] *https://ww2.arb.ca.gov/sites/default/files/barcu/board/rulemaking/hdomnibuslownox/fsor.pdf*

In-Use Testing for PM and NMHC Should Be Eliminated - EPA-HQ-OAR-2019-0055-1168_Attachment_1.pdf (Pages 41-129), EMA

EMA is requesting to eliminate requirements to test the criteria pollutants PM and NMHC from in-use testing. EMA argues there has only been one incidence in the in-use program where an engine failed due to a cracked diesel particulate filter (DPF) and misfuelling. While this seems compelling, U.S. EPA and CARB staff have discovered manufacturers have been inappropriately screening their HDIUT vehicles. This includes but is not limited to rejecting engines likely to have excess PM based on visual inspections which identify excess PM on the exhaust and replacing DPFs prior to testing. These screening practices were discussed by CARB at the 2021 EMA workshop. These practices produce tests that are unrepresentative of real in-use PM emissions. Since it is unclear how the historical engines were screened for in-use PM testing, CARB staff believes it is prudent to continue PM testing using the appropriate test procedures.

EMA argues the costs of testing PM and NMHC are burdensome. CARB staff acknowledges the costs of the portable emissions monitoring systems needed for the HDIUT program for all criteria pollutants, however it is important to ensure all certified criteria pollutants are evaluated in the real world to ensure compliance. Considering these arguments, CARB staff believes there is a need to continue PM and NMHC measurements as a part of the HDIUT program.

Infrastructure for HD ZEV

In addition to these responsive comments, CARB staff noted multiple comments discussing infrastructure issues. CARB staff would like to take the opportunity to emphasize that many public and private organizations are currently working on projects focused on developing charging and fueling infrastructure for HD zero-emission technologies. A partial listing of these projects was provided on pages 6-8 of the CARB comment letter.[30]

California is tackling Medium-HD Zero-Emission Vehicle (MHD ZEV) infrastructure from many angles and providing funding for MHD ZEVs and supporting infrastructure to CARB, California Energy Commission (CEC), Department of Transportation, among other agencies. For a primer, the California ZEV Market Development Strategy[31] lays out the overall strategy to meet the State's ZEV goals and addresses vehicles, infrastructure, end users and workforce. The Zero-Emission Plan,[32] developed by CEC supports and provides a fuller description of near- and long-term actions to ensure that ZEV infrastructure will meet the needs of the growing ZEV market.

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[30] *https://www.regulations.gov/comment/EPA-HQ-OAR-2019-0055-1186*
[31] *https://business.ca.gov/industries/zero-emission-vehicles/zev-strategy/*
[32] *https://www.energy.ca.gov/sites/default/files/2022-04/CEC-600-2022-054.pdf*

Today, one source of infrastructure funding for HD ZEV fleets is EnergIIZE, which provides funding for charging and hydrogen stations for HD vehicles. EnergIIZE has 4 funding lanes covering (1) fleets that need fast assistance to accommodate pending electric truck deliveries, (2) small fleets, transit or school bus fleets, or fleets operating in disadvantaged communities; (3) public DC fast charging; and (4) public hydrogen refueling. The program opened with initial allocation of $50 million with the state legislature sending strong signals to provide additional funding to this program on an annual basis. In addition, the Innovative Small e-Fleets program, which is expected to launch this summer will provide funding for creative mechanisms, like truck-as-a-service, and will support both zero-emission trucks and infrastructure solutions to small fleets that otherwise face barriers to electrification.

On the utility side, the larger investor-owned utilities have been authorized by the California Public Utilities Commission to fund transportation electrification programs. With this authorization, utilities can pay for utility upgrades necessary to bring power to the site as well as provide power to the charging infrastructure make-readies.

CARB staff has observed that there is ample opportunity for electrification across many applications without dependence on a pre-existing public HD charging network. While availability of convenient and reliable public charging networks is helpful and being actively worked on, it is not a necessary prerequisite for U.S. EPA to consider significant HD ZEV penetration across the HD sector. This is especially true in the initial introductory period of 2027-2030 which U.S. EPA is considering for Phase 2 GHG updates prior to mature exploitation of these electrification opportunities. Support for this observation of ample electrification opportunity prior to wide-spread public charging networks comes from analysis looking at the usage and operational characteristics of trucks in California conducted as part of the Advanced Clean Trucks[33,34] and Advanced Clean Fleets[35] regulatory development work. The Advanced Clean Truck's one-time Large Entity Reporting (LER)[36] from >50 truck fleets, entities with >$50M revenue and government agencies was conducted in early calendar year 2022. Of the 386,286 vehicles represented in the LER, 31 percent of day-cab tractors and 78 percent of non-tractor trucks go less than 100 miles/day. The LER also showed daily return to base facility by 91 percent of day-cab tractors and 57 percent of non-tractor trucks. Furthermore, 65 percent of day-cab tractors and 52 percent of non-tractor trucks reported having "predictable usage patterns." Further detailed aggregated breakdowns of the LER data is available on CARB's website. The ubiquity of low daily mileage usage patterns in the LER is consistent with the 2018 California Vehicle Inventory and Use Survey (VIUS)[37] data showing most "straight-trucks" travel less than 100 miles/day

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[33] *https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2019/act2019/isor.pdf*
[34] *https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2019/act2019/fsor.pdf*
[35] *https://ww2.arb.ca.gov/our-work/programs/advanced-clean-fleets/advanced-clean-fleets-meetings-events*
[36] *Large Entity Fleet Reporting - Statewide Aggregated Data (ca.gov)*
https://ww2.arb.ca.gov/sites/default/files/2022-02/Large_Entity_Reporting_Aggregated_Data_ADA.pdf
[37] *https://dot.ca.gov/programs/transportation-planning/division-of-transportation-planning/data-analytics-services/statewide-modeling/california-vehicle-inventory-and-use-survey*

and 2002 VIUS based on national data indicating almost 90 percent of Class 2b-Class 7 vehicles and 80 percent of Class 8 vehicles also travel less than 100 miles/day.[38] Despite the potential for individual fleet specific needs and constraints, there is broad electrification opportunity for delivery, solid waste collection, short-haul, and a wide range of Class 4-8 vocational applications and especially during the early deployment period when the easiest routes and applications are still available to electrification early adopters.

CARB is committed to working with U.S. EPA to finalize a comprehensive and effective federal HD engine and vehicle program. Should you have any questions or wish to discuss any of the topics in this letter, please do not hesitate to contact Ms. Kim Heroy-Rogalski, P.E., Chief of the Mobile Source Regulatory Development Branch, at *kim.heroy-rogalski@arb.ca.gov* or Mr. Stephan Lemieux, Manager of the On-Road Heavy Duty Diesel Section, at *stephan.lemieux@arb.ca.gov*.

Sincerely,

Craig Segall, Deputy Executive Officer

Attachment

cc: Kim Heroy-Rogalski, P.E., Chief, Mobile Source Regulatory Development Branch

Stephan Lemieux, Manager, Mobile Source Regulatory Development Branch

[38] *https://www.census.gov/library/publications/2002/econ/census/vehicle-inventory-and-use-survey.html*