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DEPARTMENT OF
TRANSPORTATION

April 29, 2019

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DOCKET OPENING

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National Highway Traffic Safety Administration
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West Building, Ground Floor, Room W12-140
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Washington, DC 20590

Attention: NHTSA Docket ID No. NHTSA-2018-0067
U.S. EPA Docket ID No. EPA-HQ-OAR-2018-0283

Re: Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule for Model Years 2021-2026
Passenger Cars and Light Trucks

Dear Mr. Lieske and Mr. Tamm:

The California Air Resources Board (CARB) is writing to briefly address the March 25, 2019 supplemental comments submitted to the federal dockets on the proposed Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule for Model Years 2021-2026 Passenger Cars and Light Trucks on March 25, 2019, by Toyota Motor North America (Toyota). Toyota's supplemental comments address comments that CARB and others submitted to the dockets referencing Toyota's Atkinson-cycle engines. After reviewing Toyota's supplemental comments, CARB submits this supplemental letter providing clarity on matters "of central relevance to the rulemaking."¹ CARB also incorporates by reference the separate supplemental comments of its expert, K. Gopal Duleep, dated April 29, 2019 (Docket No. _____).

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); SAFE Vehicles Rule, 83 Fed. Reg. 42,986, 43,471 (Aug. 24, 2018) (citing 49 C.F.R. § 553.23 (committing that "[l]ate filed comments will be considered to the extent practicable"))).

In its supplemental comments, Toyota argues that some stakeholders have overstated the capabilities of its latest generation of the Atkinson-cycle engine. Toyota seems to imply that CARB: (1) has erroneously concluded that the new 2.5L engine in the 2018 model year Camry supports the federal agencies' estimates for level 2 high compression ratio (HCR2) engines,² and (2) has unrealistic expectations that an Atkinson-cycle engine in a truck can approach the fuel economy and CO₂ performance of the 2018 Camry.³ However, Toyota's supplemental comments actually affirm CARB's submitted comments and confirm that the National Highway Traffic and Safety Administration (NHTSA) and U.S. Environmental Protection Agency (EPA) (collectively, the Agencies) used incorrect estimates and assumptions in their proposed SAFE Vehicles Rule. The central point remains clear: vehicles on the road today are using technologies that the Agencies maintained would not be available before 2030. The Agencies' failure to account for these improvements, and continuing improvements likely over the next decade, critically undermines the Agencies' proposal, which is grounded substantially on these unreasonable assumptions.

Toyota's Supplemental Comments Demonstrate that the Agencies Arbitrarily Excluded Advanced Atkinson Technology from the Volpe Model.

Toyota appears to agree with CARB's position that the Volpe model did not capture improvements to Atkinson technology that are already deployed in the 2018 Camry 2.5L engine. Toyota cites a statement in CARB's comment letter that the 2018 Camry 2.5L engine is currently exceeding the efficiencies assumed for HCR1 engines and achieving similar efficiencies as the modeled HCR2 package, even though the 2018 Camry 2.5L engine does not have the full menu of technologies in HCR2. Toyota then states that "[t]his performance level should be expected as the 2018 2.5L Camry is equipped with CEGR, a high energy coil, and other combustion design advancements that extend beyond the Agencies' definition of HCR1."⁴ By affirming that the Toyota Camry already has deployed advanced Atkinson technology beyond HCR1, Toyota's supplemental comments support CARB's comments that the Agencies arbitrarily excluded advanced Atkinson technologies from the Volpe model for two reasons.

First, CARB's comments cited the capability of the 2018 Camry as evidence that current technology already exceeds what the Agencies had determined was the full capability of Atkinson-cycle engines (modeled as the HCR1 package). The Agencies eliminated a more advanced Atkinson technology (the HCR2 package) from their modeling runs for the proposed SAFE Vehicles Rule, apparently concluding that the HCR1 package represents the

² Richard Gezelle, Jr., Senior Program Manager, Toyota Motor North America, Supplemental Comment Letter on Proposed Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule for Model Years 2021-2026 Passenger Cars and Light Trucks (Mar. 26, 2019) at 3, EPA-HQ-OAR-2018-0283-7450, NHTSA-2018-0067-12376 ("Toyota Supplemental Comment").

³ Toyota Supplemental Comment at 6.

⁴ Toyota Supplemental Comment at 3.

requisite and maximum feasible technology from now through 2030⁵ and that there would be no anticipated further advancements. CARB explained in its comment letter that such elimination was patently wrong, as current vehicle models are already achieving engine efficiencies and technology combinations not only beyond HCR1 but actually approaching that of the HCR2 package.⁶ While the technology combinations deployed in the marketplace differ slightly⁷ from the Agencies' definition of HCR2, the Agencies' decision to ignore the existing technology capability and anticipated future advancement was arbitrary. Toyota's supplemental comments support CARB's comments by confirming that the 2018 Camry exceeds the HCR1 capability used by the Agencies and performs similarly to the Agencies' HCR2 package. Indeed, Toyota's supplemental comments show that today's technology can do better than what the Agencies assumed for the next 12 years.

Second, CARB noted that the Agencies—perhaps attempting to minimize inconsistency between their HCR1 engine assumption and the real-world 2018 Camry performance—erroneously suggested that coupling the HCR1 package with another technology package of improved accessories (referred to as IACC)⁸ would be sufficient to represent the improved level of performance evidenced by the 2018 Camry. CARB's comments showed that combining HCR1 and IACC was still woefully inadequate to represent the state of current Atkinson technology even when coupled with additional technologies.⁹

CARB also highlighted that EPA itself stated that the efficiency improvements of the 2018 Camry (and several other engines) approached those of the HCR2 technology package that the Agencies would now conclude is not feasible before 2030.¹⁰ In its supplemental comments, Toyota explains that the 2018 Camry deploys further improvements to the Atkinson-cycle engine as well as additional technologies and that Toyota plans to roll out those improvements throughout its line-up.¹¹ Toyota's supplemental comments therefore confirm that performance levels similar to the performance achieved by the combination of

⁵ The Agencies' modeling for the SAFE Vehicles Rule extended through the full useful life of the MY2030 fleet, as that is the model year the Agencies predicted the manufacturers' technology applications and credit use would stabilize. See SAFE Vehicles Rule, 83 Fed. Reg. at 42,998; Preliminary Regulatory Impact Analysis for the SAFE Vehicles Rule, July 2018, Updated August 23, 2018, October 16, 2018, Docket No. EPA-HQ-OAR-2018-0283-3041, p. 536.

⁶ CARB, Comment Letter on Proposed Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule for Model Years 2021-2026 Passenger Cars and Light Trucks (Oct. 26, 2018) at 98-102, EPA-HQ-OAR-2018-0283-5054, NHTSA-2018-0067-11873 ("CARB Comment").

⁷ For example, the 2018 Camry engine has a 13:1 compression ratio instead of the 14:1 compression ratio modeled in HCR2.

⁸ Improved accessories for these purposes are devices mechanically driven by the engine and thus consume work produced by the engine. Examples include alternators, air conditioning compressors, oil pumps, and, in the case of the 2018 Camry, an electric water pump.

⁹ CARB Comment at 98-102.

¹⁰ CARB Comment at 100-02.

¹¹ Toyota Supplemental Comment at 7, 8.

technologies reflected in the HRC2 package reflect the current state of the 2018 Camry and that the Agencies underrepresented the capability of Atkinson-cycle engines by arbitrarily limiting technology to nothing better than what HCR1 and IACC combined could provide. The Agencies must include advanced Atkinson technology combinations in their analyses because the 2018 Camry and other engines already achieve not only higher efficiencies than reflected by the HCR1 and IACC packages but also similar levels of performance to the HCR2 package modeled by the Agencies.¹²

Toyota's Supplemental Comments on Advanced Atkinson Technology in Light-Duty Truck Applications Demonstrate that Combining HCR1 and IACC Does Not Approximate Advanced Atkinson Technology.

In Toyota's supplemental comments, Toyota notes that it would be unrealistic to assume that a truck with an Atkinson-cycle engine could approach the fuel economy of a sedan with an equivalent engine.¹³ CARB made no such assertion to the contrary in its comments, and in fact agrees with that statement. Because the GHG and fuel economy standards are footprint-based, the Tacoma does not have to meet the same GHG and fuel economy standards as the Camry.

Notably, Toyota's comments never refute—and in fact bolster—CARB's actual point. CARB previously explained that combining HCR1 and IACC does not accurately approximate current (much less future) Atkinson technology because, although the 2016 Toyota Tacoma has already been designated by the Agencies as having both HCR1 and IACC technology, the 2018 Camry deploys even more advanced Atkinson technology – demonstrating that already-deployed technology exceeds HCR1 + IACC.¹⁴ In its supplemental comments, Toyota acknowledges that the 2018 Camry has technologies and improvements that the 2016 Tacoma engine does not, including a high-energy coil, combustion design advancements, and an electric water pump.¹⁵ The 2018 Camry engine is also newer and achieved an overall higher thermal efficiency of 40 percent relative to the 2016 Tacoma's 38 percent.¹⁶

It was thus arbitrary for the Agencies to assume no feasible improvement exists beyond HCR1 (or HCR1 combined with IACC) and, as such, that the 2016 Tacoma's performance is as

¹² For reference, the HCR1 package represents about a 14 percent performance improvement, IACC represents about a 1-2 percent performance improvement, and the HCR2 package represents about a 3-7 percent performance improvement above HCR1. See Preliminary Regulatory Impact Analysis, *supra* note 5, at 304 fig. 6-109, 313 fig. 6-119, 460 table 6-76; see also the FCIV tab in the source files for the CAFE Model. These performance improvement numbers are not precise estimates, as actual improvement of course varies with other assumptions, such as other technologies included and car size, but are provided to illustrate generally the degree of improvement represented by each package.

¹³ Toyota Supplemental Comment at 6.

¹⁴ CARB Comment at 99.

¹⁵ Toyota Supplemental Comment at 1, 6-7.

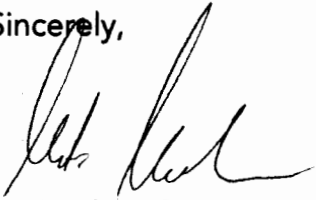
¹⁶ Toyota Supplemental Comment at 7.

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good as Atkinson technology will get through 2030. To the contrary, both CARB's comments and Toyota's supplemental comments confirm that Toyota has already made further incremental improvements in Atkinson technology in the 2018 Camry package and plans to expand these improvements to the rest of its line-up.

Given that the Agencies have used unsupported and arbitrary assumptions and estimates for their proposed SAFE Vehicle Rule, as Toyota's supplemental comments affirm, the Agencies must withdraw this proposed rule.

Sincerely,

A handwritten signature in black ink, appearing to read "Michael McCarthy", written over a light blue horizontal line.

Michael McCarthy
Chief Technology Officer
Emission Compliance, Automotive Regulations, and Science Division

cc: Richard Corey
CARB Executive Officer

