CALIFORNIA
AIR RESOURCES BOARD

Mary D. Nichols, Chair
Matthew Rodriquez, CalEPA Secretary
Edmund G. Brown Jr., Governor

January 5, 2018

Administrator Scott Pruitt
United States Environmental Protection Agency
Air and Radiation Docket and Information Center, Mail Code: 28221 T
1200 Pennsylvania Avenue, NW
Washington, D.C. 20460
Docket No. EPA-HQ-OAR-2014-0827

Dear Administrator Pruitt:

The California Air Resources Board (CARB), Pennsylvania Department of Environmental Protection, Vermont Department of Environmental Conservation, and Washington Department of Ecology appreciate the opportunity to provide comments on the United States Environmental Protection Agency's (U.S. EPA) Proposed Rule for Repeal of Emission Requirements for Glider Vehicles, Glider Engines, and Glider Kits, as published in the *Federal Register* on November 16, 2017. (82 Fed. Reg. 53,442.) After a thorough assessment of the proposed rule by CARB's legal and technical staff, we are writing to strongly oppose U.S. EPA's proposal to repeal emission requirements for glider vehicles, glider engines, and glider kits and urge you to reconsider the repeal.

U.S. EPA's proposed reinterpretation of the Clean Air Act to preclude it from regulating gliders is unreasonable and impermissible. The enormous emissions increase allowed by the proposed repeal could cause a great heath concern, and a repeal would create unfair business competition for heavy-duty manufacturers who have made investments to comply with current emissions requirements.

As discussed in the attached detailed comments, U.S. EPA is basing its decision to repeal the requirements for gliders on a proposed reinterpretation of the federal Clean Air Act that would exclude glider vehicles from the definition of "new motor vehicle", glider engines from the definition of "new motor vehicle engine", and glider kits from the definition of "incomplete new motor vehicles." The proposed reinterpretation is in direct conflict with the interpretation U.S. EPA itself used less than two years ago when developing its regulations of emissions from glider vehicles, glider engines and glider kits, in the final Phase 2 greenhouse gas regulation. (81 Fed. Reg. 73,478 (Oct. 25, 2016.)) EPA's proposed reinterpretation is inconsistent with the fact that glider vehicles are being manufactured, marketed, and sold as "new" vehicles, and is inconsistent with the language and purpose of the statute.

Glider vehicles with pre-2007 engines have much higher oxides of nitrogen (NOx) and toxic diesel particulate matter (PM) emissions than modern original engine manufacturer

certified vehicles. In U.S. EPA's own testing, glider vehicle NOx emission levels were 4 to 40 times higher, and PM emission levels were 50 to 450 times higher than emissions from vehicles certified to current emission standards[1]. As described in further detail in the attachments, CARB's staff and researchers have found dozens of gliders on California roads in recent years with alarmingly high emission levels consistent with U.S. EPA's testing.

The proposed glider repeal would have a profoundly harmful impact on public health, and would put at risk states' efforts to meet federal ambient air quality standards and State Implementation Plan commitments. The repeal would effectively place thousands of outdated heavy-duty engines that do not meet the modern emission standards that have been in effect during the last decade, on our highways. A repeal would put the American people, especially those in disadvantaged communities near trucking corridors, at risk by abandoning the commitment to reduce their exposure to smog forming and toxic pollutants that lead to hospitalizations, asthma cases, lost work and school days, and premature deaths. CARB staff estimates that if the glider repeal takes effect, over 120,000 dirty gliders would be on our nation's highways by 2025, which would have a nationwide impact of causing 9,000 to 21,000 premature deaths and $40 to 140 billion in economic harm. Under the structure of the federal Clean Air Act, U.S. EPA has the duty to ensure that trucks meet emission standards and do not endanger the public's health and welfare, and California and other states must rely on EPA to perform that duty. Repealing the glider requirements would be a clear shirking of that duty and a failure of U.S. EPA to fulfill its statutory mandate.

Glider builders have been circumventing the requirements for these important emission controls by using pre-2007 remanufactured engines, misusing a loophole in the provisions to sell thousands of dirty heavy-duty vehicles each year with completely uncontrolled emissions. To comply with current emission regulations, manufacturers of new heavy-duty engines and vehicles have made significant investments in the last decade to develop, refine, and deploy emission control technologies such as diesel particulate filters and selective catalytic reduction systems. Allowing the glider industry to circumvent current emissions regulations would unfairly put legitimate manufacturers and dealers of heavy-duty vehicles and engines at a competitive disadvantage.

The glider requirements are part of the federal Phase 2 greenhouse gas regulations, which were developed during three years of close coordination between CARB and U.S. EPA. Next month, CARB's staff will bring the Phase 2 standards[2], including the glider

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[1] Chassis Dynamometer Testing of Two Recent Model Year Heavy-Duty On-Highway Diesel Glider Vehicles, November 20, 2017, Docket No.: EPA-HQ-OAR-2014-0827-2417

[2] Proposed California Greenhouse Gas Emissions Standards for Medium- and Heavy-Duty Engines and Vehicles (Phase 2) and Proposed Amendments to the Tractor-Trailer GHG Regulation (https://www.arb.ca.gov/regact/2018/phase2/phase2.htm - accessed 12/23/2017)

provisions, before the California Air Resources Board for its consideration and approval, so that CARB can enforce those provisions in California. CARB and the other signatory states will take all necessary actions to prevent dirty glider vehicles from endangering our citizens. We urge you to join us in our efforts to protect public health. We respectfully request that you reconsider the ill-advised and illegal proposed glider repeal.

If you have any questions regarding our comments, please contact me or Ms. Kim Heroy-Rogalski, Branch Chief, at (916) 327-2200, or by email at kim.heroy-rogalski@arb.ca.gov.

Sincerely,

Richard W. Corey
Executive Officer
California Air Resources Board

Patrick McDonnell, Secretary
Pennsylvania Department of Environmental Protection

Emily Boedecker, Commissioner
Vermont Department of Environmental Conservation

Maia D. Bellon, Director
Washington Department of Ecology

Attachment(s)

cc: See next page.

cc: Steve Cliff
Deputy Executive Officer

Jack Kitowski, Chief
Mobile Source Control Division

Michael Carter
Assistant Chief
Mobile Source Control Division

Kim Heroy-Rogalski, Chief
Mobile Source Regulatory and Development Branch
Mobile Source Control Division

Stephan Lemieux, Manager
On-Road Heavy-Duty Diesel Section
Mobile Source Control Division

ATTACHMENT 1

Comments of the California Air Resources Board in Response to the United States Environmental Protection Agency's Request for Comment on The Proposed Repeal of Emission Requirements for Glider Vehicles, Glider Engines, and Glider Kits

EPA-HQ-OAR-2014-0827

Specific CARB comments in response to U.S. EPA's requests for comment on the Proposed Repeal of Emission Requirements for Glider Vehicles, Glider Engines, and Glider Kits are presented below.

Attachment 1 discusses comments on the legal and technical issues on the proposed Repeal of Emission Requirements for Glider Vehicles, Glider Engines, and Glider Kits. Section I of Attachment 1discusses comments on legal issues and sections II to VII discuss comments on technical issues.

Attachment 2 is a brief summary of CARB's Portable Emissions AcQuisition System (PEAQS) Glider Kit Detection Program and emissions from glider vehicles detected in the program.

Attachment 3 is a brief summary of real-world heavy-duty diesel truck emissions from gliders in California

Comments of the California Air Resources Board in Response to the United States Environmental Protection Agency's Requests for Comment on the Proposed "Repeal of Emission Requirements for Glider Vehicles, Glider Engines, and Glider Kits," 82 Federal Register 53,442 (Nov. 16, 2017)

EPA-HQ-OAR-2014-0827

Issue for which U.S. EPA seeks comment:

I. Is U.S. EPA's proposed interpretation that it lacks authority to regulate glider vehicles, glider engines, and glider kits under the Federal Clean Air Act (CAA) section 202(a)(1) reasonable?

I.1. U.S. EPA is Authorized to Regulate Glider Vehicles, Glider Engines, and Glider Kits Under CAA § 202(a)(1)

As explained in greater detail below, U.S. EPA's proposed interpretation that it lacks authority to prescribe emission standards for glider vehicles, glider engines, and glider kits under section § 202(a)(1) of the federal Clean Air Act (CAA) is incorrect. U.S. EPA's proposed interpretation is inconsistent with the fact that glider vehicles are manufactured, marketed, and sold as "new" vehicles, is inconsistent with the text of the CAA that defines "new motor vehicles" and "new motor vehicle engines", and is inconsistent with the purpose of Title II of the CAA that authorizes and mandates U.S. EPA to promulgate and revise regulations to control air pollutants emitted from new motor vehicles and new motor vehicle engines in order to protect the public's health and welfare, and our nation's air quality.

It is settled law that courts will determine the propriety of U.S. EPA's interpretations of the CAA using the standard established by the U.S. Supreme Court in *Chevron U.S.A. Inc. v. Natural Resources Defense Council, Inc.,* 467 U.S. 837, 842-843 (1984).[1]

> When a court reviews an agency's construction of the statute which it administers, it is confronted with two questions. First, always, is the question whether Congress has directly spoken to the precise question at issue. If the intent of Congress is clear, that is the end of the matter; for the court, as well as the agency, must give effect to the unambiguously expressed intent of Congress. If, however, a court determines ... the statute is silent or ambiguous with respect to the specific issue, the question for the court is whether the agency's answer is based on a permissible construction of the statute.

Chevron, 467 U.S. 837, 842-843 (1984).[2]

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[1] *Utility Air Regulatory Group v. EPA*, 134 S.Ct. 2427, 2439 (2014).

[2] *See also Chevron* at 843, fn. 9 ("If a court, employing traditional tools of statutory construction, ascertains that Congress had an intention on the precise question at issue, that intention is the law and must be given effect.")

I.1.1 U.S. EPA's Proposed Interpretation That Glider Vehicles and Glider Engines are Not "New Motor Vehicles" and "New Motor Vehicle Engines", Respectively, is Not Reasonable Because It is Expressly Inconsistent with the Text of the CAA

U.S. EPA's proposed interpretations of "new motor vehicle" and "new motor vehicle engine" are inconsistent with the text of the CAA and are therefore foreclosed under *Chevron* step one (i.e., Congress has directly spoken to the precise question at issue). CAA § 216(2) defines a "motor vehicle" as "any self-propelled vehicle designed for transporting persons or property on a street or highway"; with the exception of vehicles and engines that are imported or offered for importation, CAA § 216(3) defines a "new motor vehicle" as "a motor vehicle the equitable or legal title to which has never been transferred to an ultimate purchaser," and further defines a "new motor vehicle engine" as "an engine in a new motor vehicle *or* a motor vehicle engine the equitable or legal title to which has never been transferred to the ultimate purchaser." (Emphasis added).

Congress has expressly authorized U.S. EPA to regulate motor vehicles whose equitable or legal titles have never been transferred to ultimate purchasers. Glider vehicles clearly meet this statutory definition because they are marketed and sold as "new" trucks[3], and because the ultimate purchasers of glider vehicles obtain the initial titles to glider vehicles.[4] The fact that glider vehicles incorporate previously owned engines and transmissions does not thereby exclude glider vehicles from the definition of "new motor vehicles." "New motor vehicles" necessarily incorporate "new motor vehicle engines" in order to meet CAA §§ 216(2) and (3)'s criteria that motor vehicles are self-propelled, but Congress expressly defined "new motor vehicle engine" to encompass not only vehicle engines whose equitable or legal titles have never been transferred to ultimate purchasers, *but also engines in new motor vehicles*, *regardless of whether such engines were previously owned.* These statutory definitions collectively evidence Congress' intent that the definition of "new motor vehicles" encompass both motor vehicles powered by motor vehicle engines whose legal or equitable titles have never previously been transferred to ultimate purchasers, and new motor vehicles powered by previously owned engines.

U.S. EPA's proposed interpretations of "new motor vehicle" and "new motor vehicle engine" directly and impermissibly conflict with the clear statutory text defining "new motor vehicle" and "new motor vehicle engine" in CAA § 216(3) because its interpretations expressly exclude the category of previously owned engines in new motor vehicles from the statutory definition of "new motor vehicle engine", and would further exclude the category of new motor vehicles powered by previously owned engines from the definition of "new motor vehicle", therefore rendering those categories of new motor vehicle engines and new motor vehicles as mere surplusage. "It is

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[3] *Greenhouse Gas Emissions and Fuel Efficiency Standards for Medium- and Heavy-Duty Engines and Vehicles—Phase 2*, 81 Fed. Reg. 73478, 73514, fn 82 (Oct. 25, 2016); See advertisements for glider vehicles cited below in Section V of CARB's comments.

[4] 81 Fed. Reg. 73478, 73514, fn 83 (Oct. 25, 2016).

axiomatic that a statute must be construed to avoid that result so that no provision will be inoperative or superfluous." *Motor & Equip. Mfrs. Ass'n v. EPA*, 627 F.2d. 1095, 1108 (D.C Cir. 1979) *cert denied*, 446 U.S. 952, 100 (1980). Because U.S. EPA's proposed interpretations directly conflict with Congress' unambiguously expressed intent, they are foreclosed under *Chevron* step one. U.S. EPA's assertion that "a previously owned engine ... becomes a 'new motor vehicle engine' within the meaning of CAA section 216(3), due to the engine's now being in a 'new motor vehicle,' reflects circular reasoning…",[5] simply misses the point. The classifications of new motor vehicles and new motor vehicle engines are not the result of circular reasoning, but are instead directly compelled from the statutory definitions of "new motor vehicle" and "new motor vehicle engine."

U.S. EPA's reliance on the legislative history of the Automobile Information Disclosure Act of 1958 (AIDA)[6] to support its interpretation of "new motor vehicles" and "new motor vehicle engines" in CAA § 216(3) does not cast doubt on this expression of congressional intent. U.S. EPA first acknowledges that "[w]hile the legislative history of the 1965 CAA *does not expressly indicate* that Congress based its definition of 'new motor vehicle' on the definition of 'new automobile' first adopted by the Automobile Information Disclosure Act of 1958, *it seems clear* that such was the case."[7] U.S. EPA then infers, solely from its observation that the definition of "new motor vehicle" in section 208(3) of the Motor Vehicle Air Pollution Control Act[8] appears to be very similar to the definition of "new automobile" in the AIDA, that "Congress intended, for purposes of Title II [of the Clean Air Act] that a 'new motor vehicle' would be understood to mean something equivalent to a 'new automobile' – i.e., a true 'showroom new' vehicle."[9] U.S. EPA then states, ***without citing to any statutory text or legislative history***, it is "implausible that Congress would have had in mind that a 'new motor vehicle' might also include a vehicle comprised of new body parts and a previously owned powertrain,"[10] and that "Congress did not intend that a vehicle comprised of a new outer shell conjoined to a previously owned powertrain should be treated as a 'new vehicle,' based solely on the fact that the vehicle may have been assigned a new title following assembly."[11] Based solely on this reasoning, U.S. EPA concludes that the statutory definition of "new motor vehicle" in § 216(3) of the CAA must exclude glider vehicles, because glider vehicles are powered by previously owned engines.[12] U.S. EPA also utilizes this same reasoning to conclude that a glider engine does not meet the statutory interpretation of a "new motor vehicle engine." U.S. EPA reasons that a glider engine is necessarily a previously owned engine, that installing a previously owned engine in a

[5] 82 Fed. Reg. 53442, 53446 (Nov. 16, 2017). (Emphasis in original removed).
[6] Pub. L. 85-506, 72 Stat. 325-327.
[7] 82 Fed. Reg. 53442, 53445 (Nov. 16, 2017). (Emphasis added).
[8] Pub. L. 89-272, 79 Stat. 992-996.
[9] 82 Fed. Reg. 53442, 53446 (Nov. 16, 2017).
[10] *Ibid.*
[11] *Ibid.*
[12] *Ibid.*

glider kit does not transform the completed glider vehicle into a new motor vehicle,[13] and that because a glider vehicle is not a “new motor vehicle”, a glider engine cannot be defined as an new motor vehicle engine.

U.S. EPA’s reliance on the AIDA is misplaced for two reasons. First, nothing in the AIDA’s definition of “new automobile” suggests that the definition would not apply to a car that was being marketed as a new vehicle that contained a rebuilt engine. Second, the AIDA has a purpose that is very different from that of the CAA. Congress primarily enacted the AIDA to address unscrupulous vehicle dealer marketing practices of inflating manufacturer suggested retail prices of new automobiles and the accessories and options installed on such automobiles, and with misrepresenting the actual amounts of those markups to consumers of new automobiles. Congress determined that such dealer practices could be addressed, in part, by requiring manufacturers and importers of new automobiles to label new automobiles with specified information, including manufacturer suggested retail prices of new automobiles, and of each accessory or optional equipment attached to such automobiles at the time they were delivered to a vehicle dealer.[14] Congress defined "new automobile" in the AIDA as “any passenger car or station wagon.”[15]

The definitions of “new motor vehicle” and “new motor vehicle engine,” by contrast, originate in an Act with a very different purpose. Congress enacted the Motor Vehicle Air Pollution Control Act[16] (MVAPCA) in 1965 to address a significantly different type of harm than the questionable marketing practices it addressed in enacting the AIDA - namely, the broad and intractable harm presented by vehicular and engine emissions. The legislative history of the MVAPCA indicates that Congress was fully aware that motor vehicles and motor vehicle engines were a significant source of air pollutants that were harming the public’s health and welfare, and that a comprehensive nationwide approach was required to reduce such emissions.

During a series of hearings conducted in 1965, members of Congress consistently stated their awareness that motor vehicle emissions were threatening the public health and welfare, and that the federal government needed to enact emission standards to address the harm associated with such emissions.

> The legislation being discussed by the committee today would help meet the objectives as proposed by President Johnson that we end "the poisoning of the air we breathe" and called upon us to "prevent the pollution of our air before it happens." The millions of motor vehicles which jam the highways and

[13] *Ibid*. "[W]hile adding a previously owned engine to a glider kit may result in the creation of a 'motor vehicle,' the assertion that the previously owned engine thereby becomes a new motor vehicle engine' within the meaning of CAA section 216(3), due to the engine's now being in a 'new motor vehicle,' reflects circular thinking. ..."
[14] H.R. Rep. 85-1958, 2d Sess., 1958 U.S. Code Cong. & Admin News, pp. 2902-2909.
[15] Pub. L. 85-506, 72 Stat. 325.
[16] Pub. L. 89-272, 79 Stat. 992-996.

> expressways of this country are the main culprits in the pollution of our air and some efforts should be taken to reduce these pollutants.[17]
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> Motor exhaust fouls our cities and towns. Smoke and soot from such fumes cause as much as $5 billion a year in plant and property damage. Corrosion and soiling caused by motor exhaust has been estimated to cost the average person $30.00 a year. The damage that these fumes can do is evident to anyone who has inspected an automobile exhaust pipe after several thousand miles of use.
>
> Exhaust fumes sicken pedestrians and motorists alike and may even cause death. These fumes offend our noses; irritate our eyes; and foul the air we breathe. Auto exhaust has been shown to cause cancer in mice; scientists fear that it produces the same disease in humans….
>
> [M]otor exhaust is the only major source of air pollution not under some degree of local or Federal regulation. The time for such regulation is now. Motor vehicles already dump 92 million tons of carbon monoxide alone into the air. Within the next decade, the number of automobiles trailing this lethal gas and other harmful pollutants along our roads and highways will increase by a third. The air around us is an exhaustible resource which must be protected and conserved. To prevent increasing damage to property and health from exhaust fumes and to insure that our children and grandchildren will have clean air to breathe, we must begin the moves needed to stop this fouling of our environment now.[18]

The most pertinent provisions of the MVAPCA for purposes of U.S. EPA's proposed interpretation are set forth below:

Section 202(a) of the MVAPCA required the Secretary of Health, Education, and Welfare to:

> [P]rescribe as soon as practicable standards, applicable to the emission of any kind of substance, from any class or classes of new motor vehicles or new motor vehicle engines, which in his judgment cause or contribute to, or are likely to cause or contribute to, air pollution which endangers the health or welfare of any persons, and such standards shall apply to such vehicles or engines whether they are designed as complete systems or incorporate other devices to prevent or control such pollution.[19]

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[17] Hearing before Subcommittee on Public Health and Welfare of the House Comm. on Interstate and Foreign Commerce, on Sen. No. 306, 89th Cong., 1st Sess., (Cong. Helstoski, p. 90).
[18] *Id.*, (Cong. Long, pp. 98-99).
[19] Pub. L. 89-272, 79 Stat. 992-993.

Section 208 of the MVAPCA defined the terms "manufacturer," "motor vehicle," "new motor vehicle," "new motor vehicle engine," and "ultimate purchaser" that are largely identical to the current definitions of those terms, as codified in CAA § 216(3).

> (1) The term “manufacturer” means any person engaged in the manufacturing or assembling of new motor vehicles or new motor vehicle engines, or importing such vehicles or engines for resale, or who acts for and is under the control of any such person in connection with the distribution of new motor vehicles or new motor vehicle engines, but shall not include any dealer with respect to new motor vehicles or new motor vehicle engines received by him in commerce.
>
> (2) The term “motor vehicle” means any self-propelled vehicle designed for transporting persons or property on a street or highway.
>
> (3) The term “new motor vehicle” means a motor vehicle the equitable or legal title to which has never been transferred to an ultimate purchaser; and the term “new motor vehicle engine” means an engine in a new motor vehicle or a motor vehicle engine the equitable or legal title to which has never been transferred to the ultimate purchaser.
>
> (5) The term “ultimate purchaser” means, with respect to any new motor vehicle or new motor vehicle engine, the first person who in good faith purchases such new motor vehicle or new engine for purposes other than resale.[20]

In enacting the MVAPCA, Congress was fully aware that vehicular and engine emissions represented a significant risk to the public health and welfare, and accordingly enacted a statutory definition of "new motor vehicle" that was sufficiently broad to further the MVAPCA's overarching goal of reducing or eliminating vehicular and engine emissions to levels that would “prevent increasing damage to property and health from exhaust fumes and to insure that our children and grandchildren will have clean air to breathe…”[21] In light of the drastically different nature of the problems addressed by the AIDA and the MVAPCA, and the different statutory approaches Congress enacted to address those problems, it is not reasonable that Congress intended the definition of "new motor vehicle" in the MVAPCA would be constrained by the definition of “new automobile” in section 2(d) of the AIDA.[22] For instance, the definition of “new motor vehicle” in the MVAPCA encompasses a broader category of vehicles, including heavy-duty vehicles,[23] than the passenger cars and station wagons specified in the AIDA’s definition of “new automobile,” and further encompasses motor vehicles powered by “new motor vehicle engines,” a term that does not even appear in the AIDA.

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[20] Pub. L. 89-272, 79 Stat. 994-995.
[21] Hearing before Subcommittee on Public Health and Welfare of the House Comm. on Interstate and Foreign Commerce, on Sen. No. 306, 89th Cong., 1st Sess., (Cong. Long, pp. 98-99).
[22] Pub. L. 85-506, 72 Stat. 325.
[23] *See Natural Resources Defense Council v. Thomas*, 805 F.2d 410, 414 (D.C. Cir. 1986).

I.1.2 U.S. EPA's Interpretation Supporting Its Current Regulations of Glider Vehicles and Glider Engines ("Current Interpretation") Is Consistent with the Text, Structure, and Purpose of the Clean Air Act

In contrast to U.S. EPA's proposed interpretation, U.S. EPA's interpretation supporting its current regulations that define a glider vehicle powered by a previously used engine as a "new motor vehicle" (U.S. EPA's "current interpretation") is entirely consistent with the text, structure, and legislative history of CAA §§ 202(a), 202(a)(3)(A), and 202(a)(3)(B)(ii). As discussed in Section I.1.1, Congress enacted the MVAPCA in 1965 to address the harm caused by air pollutants emitted from motor vehicles and motor vehicle engines. Although the MVAPCA authorized the promulgation of emission standards for new heavy-duty vehicles and new heavy-duty vehicle engines, U.S. EPA failed to promulgate such standards even by the mid-1970s, and when Congress amended the CAA in 1977, it expressed its frustration with U.S. EPA's lack of progress by enacting statutory provisions that required U.S. EPA to prescribe emission standards for heavy-duty vehicles and heavy-duty engines by specified statutory deadlines.[24]

The U.S. Court of Appeals for the District of Columbia Circuit interpreted the structure and legislative history of the 1977 Amendments to the CAA that explicitly directed U.S. EPA to regulate heavy-duty vehicles and heavy-duty vehicle engines as evidencing Congress' intent that U.S. EPA establish heavy-duty emission standards that are technology forcing.[25] In *NRDC v. Thomas*, environmental organizations and engine manufacturers challenged U.S. EPA regulations that established various criteria pollutant standards for 1987 and subsequent model year heavy-duty engines. Engine manufacturers asserted that U.S. EPA impermissibly adopted technology-forcing particulate matter (PM) standards for 1991 and 1994 model year heavy-duty engines, because the applicable statutory provision stated U.S. EPA was required to promulgate standards based on "adequately demonstrated technology", not on technology that was "technology forcing."[26] The *Thomas* court, in examining the U.S. EPA's

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[24] *See* discussion in *Natural Resources Defense Council v. Thomas*, 805 F.2d 410,414 (D.C. Cir. 1986).
[25] *NRDC v. Thomas*, 805 F.2d 410, 430 (D.C. Cir. 1986).
[26] The relevant statutory provision read:

> The Administrator shall prescribe regulations under paragraph (1) of this subsection applicable to emissions of particulate matter from classes or categories of vehicles manufactured during and after model year 1981 (or during any earlier model year, if practicable). Such regulations shall contain standards which reflect the greatest degree of emission reduction achievable through the application of technology which the Administrator determines will be available for the model year to which such standards apply, giving appropriate consideration to the cost of applying such technology within the period of time available to manufacturers and to noise, energy, and safety factors associated with the application of such technology. Such standards shall be promulgated and shall take effect as expeditiously as practicable taking into account the period necessary for compliance.

42 U.S.C. § 7521(a)(3)(A)(iii).

characterizations of adequately demonstrated and technology forcing technologies, stated:

> That the provisions at issue in this case seek to promote technological advances while also accounting for cost does not detract from their categorization as technology-forcing standards. As we pointed out in *NRDC v. EPA,* 655 F.2d 318, 328 (D.C. Cir.), *cert. denied,* 454 U.S. 1017, 102 S.Ct. 552, 70 L.Ed.2d 415 (1981):
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> > The legislative history of both the 1970 and the 1977 amendments demonstrates that Congress intended the agency to project future advances in pollution control capability. It was "expected to press for the development and application of improved technology rather than be limited by that which exists today." S.Rep. No. 1196, 91st Cong., 2d Sess. 24 (1970), *reprinted in* 1 Legislative History 424....

NRDC v. Thomas, 805 F.2d 410, 430 (D.C. Cir. 1986).

As discussed above, Congress enacted these provisions to authorize and to require U.S. EPA to reduce emissions from new motor vehicles and new motor vehicle engines, and further enacted provisions that specifically direct U.S. EPA to expeditiously reduce emissions from new heavy-duty motor vehicles and new heavy-duty motor vehicle engines by promulgating technology-forcing emission standards. U.S. EPA's current interpretation advances those purposes because it allows U.S. EPA to regulate the practice of installing previously owned engines into new vehicle chassis, and further requires those engines to demonstrate compliance with currently applicable emissions standards. These current requirements are fully consistent with the purposes of the Clean Air Act because the emissions from glider vehicles, as fully explained in comments below, contribute significant levels of harmful air pollutants that present significant adverse risks to the public's health and welfare.

U.S. EPA's current interpretation is also consistent with the provisions of the CAA that implement Congress' intent that newly manufactured motor vehicles and motor vehicle engines will be subject to increasingly stringent emission standards. CAA § 203(a)(1) requires manufacturers of new motor vehicles and new motor vehicle engines to obtain "certificates of conformity" before they can legally sell, offer for sale, or introduce into commerce in the United States new motor vehicles or new motor vehicle engines. In order to obtain such certificates, manufacturers must submit vehicles or engines to U.S. EPA, and U.S. EPA must test or require testing of those vehicles or engines to verify those vehicles or engines conform with applicable regulations promulgated under § 202(a).[27] U.S. EPA issues certificates of conformity to conforming vehicles or engines, but certificates of conformity are only valid for a time period not to exceed one year.[28] The limited duration of a certificate of conformity does not mean that certified vehicles and engines are only subject to emission standards during the effective time

[27] CAA § 206(a)(1).
[28] Ibid.

period of their certificate of conformity; rather, CAA § 202(a)(1) expressly requires that any emission standards for new motor vehicles and new motor vehicle engines promulgated under § 202(a)(1) must be applicable for a specified "useful life." U.S. EPA is authorized to prescribe regulations defining the useful life for various classes of vehicles and engines.[29]

The duration of a certificate of conformity is limited by design, to ensure that new motor vehicles and new motor vehicle engines are subjected to, and must demonstrate compliance with currently applicable, and increasingly stringent emission standards, before they can be sold or introduced into commerce. For example, U.S. EPA's heavy-duty diesel engine emission standards for 1988 model year engines specified an oxides of nitrogen (NOx) standard of 10.7 grams per brake horsepower-hour (g/bhp-hr), and a PM standard of 0.60 g/bhp-hr, and its 2015 model year heavy-duty diesel engine emission standards specify a much lower NOx standard of 0.20 g/bhp-hr and a PM standard of 0.01 g/bhp-hr. U.S. EPA's current interpretation is consistent with these provisions because it ensures that gliders and the engines powering gliders will be required to comply with currently applicable emission standards that U.S. EPA has previously determined are technically feasible, and are needed to protect the public health and welfare from the harms associated with vehicle and engine emissions.

I.1.3 U.S. EPA Is Authorized to Regulate Glider Kits Pursuant to CAA §§ 202(a), 208, and 203

A glider kit is "a tractor chassis with frame, front axle, interior and exterior cab, and brakes. It is intended for self-propelled highway use, and becomes a glider vehicle when an engine, transmission, and rear axle are added. Engines are often salvaged from earlier model year vehicles, remanufactured, and installed in the glider kit."[30]

U.S. EPA's proposed interpretation states that it lacks authority to regulate glider kits under CAA § 202(a)(1) because glider vehicles are not "new motor vehicles" and consequently glider kits cannot be defined as "incomplete new motor vehicles." U.S. EPA also reasons that glider kits cannot be categorized as "motor vehicles" as defined in CAA § 216(2), because they lack a powertrain, and therefore do not constitute a self-propelled vehicle.[31]

I.1.3.1 U.S. EPA's Proposed Interpretation That It Lacks Authority to Regulate Glider Kits is Inconsistent with the Text of the CAA

U.S. EPA's proposed interpretation that it lacks authority to regulate glider kits is inconsistent with the text of CAA § 202(a) that expressly authorizes and directs U.S. EPA to prescribe standards for both incomplete motor vehicles and systems and

[29] CAA § 202(d)(1).
[30] 81 Fed. Reg. 73478, 73512-513 (Oct. 25, 2016).
[31] *Id*. at 53446.

components installed on motor vehicles. CAA § 202(a)(1) requires U.S. EPA to, in pertinent part, prescribe standards "applicable to such vehicles and engines for their useful life … whether such vehicles and engines are designed as complete systems *or incorporate devices to prevent or control such pollution.*"[32] To the extent U.S. EPA's proposed interpretation that it lacks authority to regulate glider kits is based on its premise that glider vehicles are not "new motor vehicles" as defined by CAA § 216(3), that aspect of its proposed interpretation is foreclosed under *Chevron* step one, as discussed in Section I.1.1.

To the extent that U.S. EPA's proposed interpretation is based on its determination that glider kits are not "motor vehicles" because they lack a powertrain needed to meet the definition of a "self-propelled" vehicle, that interpretation is inconsistent with the text of the CAA that expressly authorizes and directs U.S. EPA to regulate components or systems that comprise motor vehicles, notwithstanding the fact that such components and systems are incapable of propelling themselves. Congress clearly authorized U.S. EPA to prescribe standards not only for complete new motor vehicles and new motor vehicle engines, but also for incomplete vehicles and engines and systems, and components incorporated into vehicles and engines. In addition to CAA § 202(a)(1), CAA § 202(a)(6) directs U.S. EPA to promulgate standards requiring onboard vapor recovery systems (primarily consisting of carbon canisters, fuel tanks and hoses); CAA § 202(a)(5) requires U.S. EPA to consider prescribing fill pipe standards for new motor vehicles; CAA § 202(k) requires U.S. EPA to promulgate and occasionally revise standards to control evaporative emissions from gasoline-fueled motor vehicles, and CAA § 202(m) requires U.S. EPA to promulgate regulations requiring the installation of onboard diagnostic systems. Moreover, these specific sections cannot be characterized as exceptions to the otherwise overriding interpretation that only "complete vehicles" are subject to CAA § 202(a). As U.S. EPA stated in the rulemaking action associated with the current regulations for glider vehicles, glider engines, and glider kits:

> Congress did not indicate that these incomplete vehicle provisions were exceptions to the definition of motor vehicle. Just the opposite. Without amending the new motor vehicle definition, or otherwise indicating that these provisions were not already encompassed within Title II authority over "new motor vehicles", Congress required EPA to set standards for evaporative emissions from a portion of a motor vehicle. Congress thus indicated in these provisions: 1) that standards should apply to "vehicles" whether or not the "vehicles" were designed as complete systems; 2) that some standards should explicitly apply only to certain components of a vehicle that are plainly not self-propelled. Congress thus necessarily was of the view that incomplete vehicles can be motor vehicles.[33]

[32] CAA § 202(a)(1). (Emphasis added).
[33] "Greenhouse Gas Emissions and Fuel Efficiency Standards for Medium- and Heavy-Duty Engines and Vehicles - Phase 2; Response to Comments for Joint Rulemaking, EPA-420-R-16-901 August 2016 (hereinafter "RTC") at pp. 56-57. [EPA-HQ-OAR-2014-0827-2344]

U.S. EPA has, consistent with that statutory authority, adopted emission standards that are applicable to only discrete systems or motor vehicle components,[34] and such standards are implemented by testing the regulated components or systems, and not the entire vehicle. For example, an onboard diagnostic system is primarily comprised of a computer, sensors, and wiring – none of these components is capable, either singularly or collectively, of propelling a vehicle, yet Congress explicitly directed U.S. EPA to require the installation of such systems in vehicles in CAA § 202(m).

U.S. EPA previously acknowledged that its authority to regulate parts or components of motor vehicles is necessarily dependent upon "the significance of the components in comparison to the entire vehicle and the significance of the components for achieving emissions reductions,"[35] but this factor clearly extends U.S. EPA's authority to regulate glider kits, since glider kits comprise a "largely assembled tractor chassis with front axles, frame, interior and exterior cab, and brakes. This is not a few assembled components; rather, it is an assembled truck with a few components missing."[36] Moreover, the glider vehicle components (aerodynamic designs, and tire rolling resistance specifications) significantly reduce the GHG emissions emitted from completed glider vehicles. Consequently, even if a glider kit is incapable of propelling itself until it is incorporated in a motor vehicle, it is subject to regulation under § 202(a) because it constitutes an "incomplete motor vehicle." U.S. EPA's proposed interpretation that it lacks any authority to regulate glider kits is therefore foreclosed under *Chevron* step one because it is inconsistent with the text and structure of the Clean Air Act, and with the overriding purpose of the Clean Air Act to control emissions associated with motor vehicles or motor vehicle engines, since it improperly disregards U.S. EPA's statutory mandate to regulate emissions attributable to motor vehicle components or systems or incomplete motor vehicles.

I.1.3.2 U.S. EPA's Interpretation Supporting Its Current Regulation of Glider Kits ("Current Interpretation") is Consistent with the Text, Structure, and Purpose of the Clean Air Act

In contrast to U.S. EPA's proposed interpretation of its lack of authority to regulate glider kits, U.S. EPA's current interpretation of its authority to regulate glider kits is entirely consistent with the statutory text and the structure of the CAA provisions discussed above in Section I.1.3.1, and is also consistent with Congress' directive that U.S. EPA control pollution emitted from not only complete vehicles, but also from incomplete vehicles and systems or components incorporated in vehicles. U.S. EPA's current interpretation properly recognizes that glider kits largely comprise the essential elements of a fully assembled heavy-duty tractor, and that glider kits contain those components that primarily affect the GHG emissions generated from glider vehicles that

[34] *See* e.g., 40 CFR 86.146-96 and 86.150-98 (refueling spitback and refueling test procedures); 40 CFR 86.1813-17(a)(2)(iii) (canister bleed evaporative emission test procedure); 81 Fed. Reg. 73748, 73514 (Oct. 25, 2016).
[35] 81 Fed. Reg. 73748, 73514 (Oct. 25, 2016).
[36] *Id*. at 73515.

warrant regulation[37], and U.S. EPA therefore appropriately established requirements for glider kits in the existing regulations for glider vehicles.[38]

I.1.3.2.1 U.S. EPA's Current Interpretation Properly Recognizes That the CAA Authorizes Regulation of Multiple Manufacturers, and Imposes Primary Compliance Obligations Upon Those Manufacturers with the Greatest Degree of Control Over New Motor Vehicles or New Motor Vehicle Engines

U.S. EPA's current interpretation of its authority to regulate glider kits is also consistent with provisions of the CAA that expressly authorize more than one entity to be designated as the manufacturer of a motor vehicle or motor vehicle engine, and that authorize the regulation of multiple manufacturers of new motor vehicles and new motor vehicle engines. Although the issue of which entity is responsible for complying with specific compliance obligations is distinct from the issue of whether a particular vehicle, engine, or motor vehicle component can be regulated by U.S. EPA under CAA § 202(a), Congress' enactment of provisions that establish compliance obligations for manufacturers, and that expressly allow for the regulation of multiple manufacturers supports U.S. EPA's current interpretation that compliance obligations are properly imposed on manufacturers of glider kits. CARB has previously discussed in Sections I.1.3.1 and I.1.3.2 that glider kits are subject to regulation under CAA § 202(a).

The CAA imposes primary compliance obligations upon manufacturers of new motor vehicles and new motor vehicle engines. For example, CAA § 203(a)(1) prohibits manufacturers of new motor vehicles and engines from introducing uncertified vehicles and engines into commerce. CAA § 206(a)(1) requires manufacturers of new motor vehicles and engines to submit new motor vehicles and new motor vehicle engines to U.S. EPA, to enable U.S. EPA to test or require testing of such vehicles and engines to determine compliance with U.S. EPA regulations prescribed under CAA § 202(a). CAA § 207(a)(1) imposes warranty requirements upon new motor vehicle and engine manufacturers, and § 207(c)(3) requires manufacturers to furnish written instructions for the "proper use and maintenance of the vehicle or engine by the ultimate purchaser," and to provide a label or tag indicating the vehicle or engine is covered by a certificate of conformity "issued for the purpose of assuring achievement of emissions standards prescribed under section 7521 of this title." CAA § 208(a) requires new vehicle and engine manufacturers to maintain records, perform tests, and provide information needed to ensure they are complying with applicable requirements.

CAA § 216(1) defines a manufacturer, in pertinent part, as:

> *any person* engaged in the *manufacturing or assembling* of new motor vehicles, new motor vehicle engines, ... or *importing such vehicles or engines for resale*, or *who acts for and is under the control of any such person in connection with*

[37] *Id*. at 73515.

[38] "The Phase 2 rule contains no emission standards for glider kits in isolation, but the standards for glider vehicles necessarily reflect the contribution of the glider kit.". *Id*. at 73513.

the distribution of new motor vehicles, new motor vehicle engines .... but shall not include any dealer with respect to new motor vehicles, new motor vehicle engines ... received by him in commerce."[39]

This definition clearly contemplates and authorizes more than one entity to be designated as a manufacturer of a new motor vehicle, which accurately reflects the heavy-duty vehicle industry's practice, in which multiple entities coordinate activities to produce a new heavy-duty motor vehicle. Typically, one entity manufactures an engine, another entity manufactures a chassis, one or multiple entities manufacture emission control components, and still another entity assembles the separate components into a completed heavy-duty vehicle. U.S. EPA has previously announced that in situations involving multiple manufacturers, it has developed an "overarching principle" that places the obligation to certify and test vehicles and engines on the entity with the most control over the subject vehicle or engine.[40] This principle is consistent with the CAA's definition of "manufacturer", the heavy-duty vehicle industry practice of multiple entities contributing to the manufacture of a vehicle, and the provisions of the CAA that impose primary compliance obligations on vehicle and engine manufacturers, and furthers the purposes of the CAA by ensuring that if corrective action is required, U.S. EPA can quickly obtain needed information from, and if needed, require corrective actions from the entities with the greatest degree of control over vehicles or engines.

U.S. EPA's current interpretation that a glider kit manufacturer can be a manufacturer of motor vehicles and can be designated as either the certificate holder of a motor vehicle or as an entity that is required to provide test data to a manufacturer of a glider vehicle, is also consistent with the above mentioned text, structure, and purpose of the above mentioned statutory provisions. Glider kits, like heavy-duty vehicles, are produced and assembled by different entities, and glider manufacturers design, build, and assemble a significant portion of the complete truck (i.e., the tractor chassis, cab, tires, body, and brakes). Glider kit manufacturers also control essential elements of the completed glider vehicle's GHG emissions, and are therefore properly designated as manufacturers of motor vehicles and properly assigned compliance obligations. U.S. EPA's current interpretation is therefore entirely consistent with the CAA's fundamental objective of expeditiously reducing vehicular pollution from both complete and incomplete new motor vehicles and new motor vehicle engines.

I.1.3.2.2 Glider Kit Manufacturers Are Alternatively Required to Test Glider Kits for Conformance with Tractor GHG Standards Pursuant to CAA § 208 and § 203, and Are Liable for Manufacturing a Noncompliant Glider Kit or Causing Another Entity to Violate the CAA

U.S. EPA's proposed interpretation regarding its authority to regulate glider kits fails to address its previous determination that even if glider kits are determined not to be motor vehicles as defined by CAA § 216(2), and even if glider kit manufacturers are

[39] CAA § 216(1). (Emphasis added).
[40] 81 Fed. Reg. 73478, 73515 (Oct. 25, 2016).

determined not to be manufacturers of motor vehicles as defined by CAA § 216(1), the current glider kit test requirements relating to required testing and recordkeeping requirements are authorized by CAA §§ 203 and 208.[41]

CAA § 208(a) provides, in pertinent part, that manufacturers of new motor vehicle or engine parts or components "shall establish and maintain records, perform tests where such testing is not otherwise reasonably available ... make reports and provide information the Administrator may reasonably require to determine whether the manufacturer ... has acted or is acting in compliance with this part." Even if glider kits are categorized as new motor vehicle components, glider kit manufacturers would be the manufacturers of new motor vehicle "components" and would be required by CAA § 208(a) to perform testing to demonstrate glider kits comply with applicable tractor emission standards,[42] and could be required to perform testing to demonstrate that they are not causing violations of the applicable tractor GHG emission standards, either by manufacturing a noncompliant glider kit or by furnishing a glider kit to an entity that assembles glider vehicles that is inconsistent with a certified tractor configuration.[43]

CAA § 203 prohibits both specified actions and the "causing of those actions," including selling, offering for sale, or introducing into commerce a new motor vehicle that is not covered by a valid certificate of conformity,[44] and manufacturing a part or component "intended for use with or as part of, a motor vehicle ... where a principal effect of the part or component is to bypass, defeat, or render inoperative any device or element of design installed on or in a motor vehicle ..."[45] A glider kit manufacturer that provides a noncompliant glider kit is therefore liable under CAA § 203(a)(1) for causing another entity to introduce into commerce a noncompliant tractor and is additionally liable under CAA § 203(a)(3)(B) for manufacturing or causing the manufacture of a part or component that bypasses or defeats devices or elements of design required by the tractor standards.

I.1.4 U.S. EPA's Proposed Interpretation of Its Lack of Authority to Regulate Glider Vehicles, Glider Engines, and Glider Kits Is Not Entitled to Deference

Even if the statutory provisions discussed above in Sections I.1.1 through I.1.3.2 of this document are determined to be ambiguous with respect to Congress' intent to regulate emissions from glider vehicles, glider engines, and glider kits, U.S. EPA's proposed interpretation is not entitled to deference. U.S. EPA has not advanced any reasonable explanation of how its proposed interpretation is consistent with the marketing and sale of glider vehicles as "new trucks." As discussed in Section I.1.1 and further in Section V below, glider manufacturers advertise and sell glider vehicles as "new trucks"[46] and the

[41] *Id*. at 74517.
[42] *Ibid*.
[43] See. e.g., 40 CFR § 1037.235.
[44] CAA § 203(a)(1).
[45] CAA § 203(a)(3)(B).
[46] 81 Fed. Reg. 73748, 73514, fn 82 (Oct. 25, 2016). *See* advertisements for glider vehicles cited below in Section V of CARB's comments.

initial title to glider vehicles are transferred to the ultimate purchasers of those glider vehicles.[47]

U.S. EPA's proposed interpretation would also eviscerate CAA § 202(a)'s express statutory authority to regulate new motor vehicles that are powered by previously owned engines and previously owned engines in new motor vehicles, and would necessarily impede, rather than advance, the Clean Air Act's overall objective of expeditiously reducing emissions from heavy-duty vehicles and heavy-duty engines because it would expressly disavow any authority to regulate the significant quantities of air pollutants emitted from glider vehicles and glider engines that constitute significant adverse threats to the public's health and welfare. Glider vehicle emissions are discussed further under Section III below. U.S. EPA's proposed interpretation is manifestly not reasonable in light of the text, policies, and objectives of the Clean Air Act, and is accordingly foreclosed under *Chevron* step two (i.e., the agency's answer is not based on a permissible construction of the statute). *Natural Resources Defense Council, Inc., v. U.S.E.P.A,* 822 F.2d 104, 111 (D.C. Cir. 1987).

During the development of the federal "Phase 2" Greenhouse Gas regulation, "Greenhouse Gas Emissions and Fuel Efficiency Standards for Medium- and Heavy-Duty Engines and Vehicles— Phase 2",[48] U.S. EPA promulgated the current regulations applicable to glider vehicles, glider engines, and glider kits because it determined that the unchecked increase of glider vehicles would result in significant increases of criteria pollutant emissions that would adversely affect the public's health and welfare. U.S. EPA noted that since 2010, the production of glider kits had increased by nearly a factor of ten, compared to glider sales in the 2004-2006 time frame.[49] Prior to the 2007 model year, annual glider sales were approximately 500 units.[50] U.S. EPA believed that this significant increase in glider sales reflected an attempt to avoid complying with current heavy-duty diesel engine emission standards that are much more stringent than previously applicable emission standards.[51] For example, the federal NOx emission certification emission standard for 2001 model year heavy-duty diesel engines is 4.0 g NOx/bhp-hr, and is 0.20 g NOx/bhp-hr for 2010 and newer model year engines. U.S. EPA also noted that most glider vehicles produced today are powered by engines that were manufactured before 2002,[52] and consequently could emit quantities of NOx and PM that are *20 to 40 times higher* than quantities of NOx and PM emitted by engines certified to current emission standards.[53]

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[47] 81 Fed. Reg. 73478, 73514, fn 83 (Oct. 25, 2016).
[48] 81 Fed. Reg. 73478 (Oct. 25, 2016).
[49] EPA based its estimate of both glider sales in the 2004-2006 time frame and glider sales since 2010 from information obtained from a report entitled "Industry Characterization of Heavy Duty Glider Kits," MacKay & Company, Sept. 30, 2013 [EPA-HQ-OAR-2014-0827-0545]; *See* "Frequently Asked Questions about Heavy-Duty "Glider Vehicles" and "Glider Kits", EPA-420-F-904 (July 2015), p.2, fn. 1.
[50] EPA-420-F-904 (July 2015), p.2.
[51] 81 Fed. Reg. 73478, 73943 (Oct. 25, 2016).
[52] *Ibid*.
[53] *Ibid.*

U.S. EPA estimated the environmental impacts attributable to gliders by using a revised version of its "Motor Vehicle Emissions Simulator", (MOVES2014a).[54] U.S. EPA initially estimated that 5,000 glider vehicles were produced annually,[55] but Volvo and even some commenters that opposed the glider requirements subsequently provided U.S. EPA information indicating that annual glider sales have increased to over 10,000 units.[56] U.S. EPA accordingly revised its glider sales estimates to reflect 10,000 gliders per year sold in 2015 and subsequent years,[57] assumed those gliders emitted levels of pollutants equivalent to the emissions from 1998 through 2001 model year heavy-duty engines, and based on these estimates, determined that in 2025, glider vehicles would emit "nearly 300,000 tons of NOx and nearly 8,000 tons of PM annually. Although glider vehicles would make up only five percent of heavy-duty tractors on the road, their emissions would represent *about one third* of all NOx and PM emissions from heavy-duty tractors in 2025."[58]

U.S. EPA comprehensively discussed the adverse health, environmental, and air quality impacts of criteria pollutants, including NOx and PM,[59] determined that completely eliminating the quantities of NOx and PM emissions attributable to gliders would result in "substantial public health-related benefits" equivalent to $6 to $14 billion in annual benefits (2013$), and concluded that "[i]t is clear that removing even a fraction of these glider vehicles with high polluting engines … will yield substantial health-related benefits."[60] U.S. EPA also performed a quantified risk analysis that indicated "for a single model year, assuming the use of 5,000-10,000 high polluting engines in glider vehicles, PM2.5-related exposures are estimated to result in 350 to 1,600 premature mortalities."[61] U.S. EPA further determined that it was authorized to promulgate the glider requirements pursuant to the authority of section 202(a) of the Clean Air Act,[62] and accordingly promulgated the current regulations applicable to glider vehicles, glider engines, and glider kits, in order to prevent the potentially significant increases of air pollutants, and especially NOx and PM, that are "associated with the most serious adverse health effects up to and including premature mortality."[63]

U.S. EPA has not advanced any reasonable explanation of how its proposed interpretation is consistent with the overall objectives of Title II of the Clean Air Act, and has not demonstrated that it has considered in a detailed and reasoned fashion the issues associated with the significant quantities of pollutants emitted by glider vehicles. Instead, U.S. EPA's proposed interpretation would completely exempt all vehicles constructed from new chassis and previously owned engines from current emission standards, effectively creating a loophole not only for glider manufacturers, but also for

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[54] Ibid.; referencing description of emissions modeling methodology beginning at 73819.
[55] Ibid.
[56] Ibid.
[57] Ibid.
[58] Ibid. (Emphasis in original).
[59] 81 Fed Reg. at 73836 – 858 (Oct. 25, 2016).
[60] *Id*. at 73943.
[61] RTC at p. 1919.
[62] 81 Fed Reg. 73478, 73945-946 (Oct. 25, 2016).
[63] Id. at 73943.

manufacturers of other categories of vehicles and engines. For instance, U.S. EPA's proposed interpretation would allow entities to procure previously owned passenger car engines (e.g., from scrapyards) and install such engines into new passenger car chassis without needing either to demonstrate compliance with current emission standards or obtain certificates of compliance, thereby directly undermining the essential goal of Title II of the CAA to expeditiously reduce vehicular emissions. U.S. EPA's proposed interpretation would therefore undermine or even completely negate the emissions benefits associated with new motor vehicle emission standards, and would likely disincentivize vehicle and engine manufacturers from researching or applying new technologies in order to further reduce vehicle or engine emissions, which is clearly inconsistent with the policies and objectives of Title II of the Clean Air Act.

U.S. EPA's proposed interpretation of "glider kits" is likewise not entitled to deference. Instead of recognizing and embracing its authority to regulate motor vehicle and motor vehicle engine components and systems, U.S. EPA proposes to discard that authority, without providing any explanation of how its proposed interpretation supersedes the clear directives of the relevant statutory provisions, is consistent with the structure of the statutory provisions discussed in Sections I.1.3.1, I.1.3.2.1, and I.1.3.2.2, or furthers the purposes of the Clean Air Act. U.S. EPA's silence on this issue is not surprising, in light of the findings discussed above regarding the emissions and adverse health impacts attributable to glider vehicles, and the fact that both U.S. EPA and CARB have obtained emissions data from glider vehicles (which are typically assembled from glider kits)[64] that indicate glider vehicles emit significantly higher levels of criteria pollutant emissions than those emitted from current model year heavy-duty vehicles.[65]

U.S. EPA has not advanced any reasonable explanation of how its proposed interpretations will advance the objectives of the Title II of the Clean Air Act, or demonstrated that it has considered this matter in a detailed and reasoned fashion. U.S. EPA's proposed interpretation that it lacks authority to regulate glider vehicles, glider engines, and glider kits is therefore not entitled to deference, and is accordingly foreclosed under *Chevron* step two.

I.1.5 U.S. EPA's Proposed Repeal of its Current Regulations of Glider Vehicles, Glider Engines, and Glider Kits is Arbitrary, Capricious, and Contrary to Law

I.1.5.1 U.S. EPA Properly Enacted its Current Regulations of Glider Vehicles, Glider Engines, and Glider Kits to Address the Adverse Threats to the Public Health and Welfare Associated with the Significant Quantities of Air Pollutants Emitted by Glider Vehicles

[64] Id. at 73512-73515.

[65] "Chassis Dynamometer Testing of Two Recent Model Year Heavy-Duty On-Highway Diesel Glider Vehicles", U.S. Environmental Protection Agency (Nov. 20, 2017) EPA-HQ-OAR-2014-0827-2417]; See CARB reports: Attachment 2: The Portable Emissions AcQuisition System (PEAQS): Glider Kit Detection, and Attachment 3: Real-World Heavy-Duty Diesel Truck Emissions from Gliders in California

As described in Section I.1.4, U.S. EPA promulgated the current regulations applicable to glider vehicles, glider engines, and glider kits because it determined that the unchecked increase of glider vehicles would result in significant increases of criteria pollutant emissions that would adversely affect the public's health and welfare, including an estimated 350 to 1,600 premature mortalities in a single model year, resulting from exposures to PM2.5 emitted by glider vehicles.[66]

In establishing the glider requirements, U.S. EPA also appropriately recognized that it should distinguish gliders that are manufactured for valid business purposes (i.e., to salvage relatively new engines and powertrains from vehicles that have been damaged in collisions),[67] and that do not cause substantial adverse environmental impacts, from gliders that are produced to avoid compliance with current heavy-duty diesel engine criteria pollutant emission standards.[68] U.S. EPA accordingly established provisions that allow used, rebuilt, or remanufactured engines to only meet the emission standards to which they were originally certified, instead of the GHG and criteria engine standards corresponding to the date the glider vehicle is manufactured, provided such engines are within their useful lives, have less than 100,000 miles of operation, or are less than three years old. 40 CFR § 1037.635(c). U.S. EPA determined that these categories of qualifying engines are consistent with the originally intended purpose of glider kits and vehicles - to salvage relatively new powertrains, *and would have limited adverse emissions impact.*[69]

U.S. EPA further established several provisions that provided significant flexibility for small businesses, including allowances for qualifying small businesses to produce up to 300 gliders that are exempt from otherwise applicable vehicle or engine standards. 40 CFR § 1037.150(t)(1). U.S. EPA explained that it capped this exemption at 300 gliders because it believed this number "reflects the upper end of the range of production that occurred before significant avoidance of the 2007 criteria pollutant standards began,"[70] and this relief is appropriately provided to small businesses that likely produced gliders for legitimate purposes.[71]

I.1.5.2 U.S. EPA's Failure to Provide a Reasoned Explanation for the Proposed Repeal of the Current Regulations of Glider Vehicles, Glider Engines, and Glider Kits Warrants Reversal Pursuant to §307(d)(9) of the CAA

Less than a year after finalizing the current regulations of glider vehicles, glider engines, and glider kits, U.S. EPA is now proposing to entirely repeal those regulations, based solely on its proposed interpretation of the Clean Air Act's statutory definition of "new motor vehicles" and "new motor vehicle engines." CARB has explained in Sections I.1

[66] RTC at p. 1919.
[67] EPA-420-F-15-904, July 2015.
[68] 81 Fed. Reg. 73478, 73941 (Oct. 25, 2016).
[69] Id. at 73944.
[70] Ibid.
[71] Id. at 73944-945.

through I.1.4 of its comments why U.S. EPA's proposed interpretation is incorrect, and is explaining in this section why U.S. EPA's failure to provide a reasoned explanation for its proposed repeal warrants reversal under § 307(d)(9) of the CAA, which authorizes the U.S. Court of Appeals for the District of Columbia to reverse an U.S. EPA action, including a repeal of an existing regulation, that is "in excess of statutory jurisdiction, authority, or limitations, or short of statutory right," or is "arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law." *Blue Water Network v EPA;* 370 F.3d 1 (D.C. Cir. 2004).

The "arbitrary and capricious" standard of review specified in §307(d)(9) is essentially the same standard of review as specified in the federal Administrative Procedure Act, 5 U.S.C. § 706(2)(A). *Ethyl Corp. v. EPA,* 51 F.3d 1053, 1064 (D.C. Cir. 1995). 5 U.S.C. 706(2)(A) requires a reviewing court to "ensur[e] that EPA has 'examine[d] the relevant data and articulate[d] a satisfactory explanation for its action including a rational connection between the facts found and the choice made,' that the Agency's 'decision was based on a consideration of the relevant factors,' and that the Agency has made no 'clear error of judgment.' " *Blue Water Network,* 370 F.3d 1, 11 *quoting Motor Vehicle Mfrs. Ass'n v. State Farm Mut. Auto. Ins. Co.,* 463 U.S. 29, 43, 103 S.Ct. 2856, 2866, 77 L.Ed.2d 443 (1983) (internal citations and quotation marks omitted), (hereinafter "State Farm").

The *State Farm* court stated that an agency that is revoking an existing regulation must supply a reasoned analysis for that change:

> [T]he revocation of an extant regulation is substantially different than a failure to act. Revocation constitutes a reversal of the agency's former views as to the proper course. A "settled course of behavior embodies the agency's informed judgment that, by pursuing that course, it will carry out the policies committed to it by Congress. There is, then, at least a presumption that those policies will be carried out best if the settled rule is adhered to." Atchison, T. & S.F.R. Co. v. Wichita Bd. of Trade, 412 U.S. 800, 807–808, 93 S.Ct. 2367, 2374–2375, 37 L.Ed.2d 350 (1973*). Accordingly, an agency changing its course by rescinding a rule is obligated to supply a reasoned analysis for the change beyond that which may be required when an agency does not act in the first instance.*

State Farm, 463 U.S. 29, 41-42 (1983). (Emphasis added.)

An agency proposing a change in preexisting policy must show that "the new policy is permissible under the statute, that there are good reasons for it, and that the agency believes it to be better..." *FCC v. Fox Television Stations, Inc.*, 556 U.S. 502, 515 (2009). (Emphasis in original removed).

As a threshold matter, CARB has already demonstrated in Sections I.1 through I.1.4 of these comments that U.S. EPA will not be able to demonstrate that its proposed interpretation permissibly interprets the Clean Air Act, and consequently U.S. EPA will

be unable to supply a reasoned analysis for its proposed revocation of the existing glider requirements. *FCC v. Fox Television*, 556 U.S. 502, 515 (2009).

Moreover, U.S. EPA will not be able to meet its burden of demonstrating that its proposed repeal of its current regulations of glider vehicles, glider engines, and glider kits satisfies the "arbitrary and capricious" standard of review specified in §307(d)(9) of the CAA. As discussed above in Section I.1.4, U.S. EPA obtained and relied upon data supplied by commenters indicating that the annual production of glider vehicles currently exceeds 10,000 units per year, projected that the unrestricted increase of glider production and sales would result in approximately 300,000 tons of NOx and 8,000 tons of PM being emitted into our nation's air annually in the year 2025, and determined that eliminating the quantities of NOx and PM emissions attributable to gliders would result in substantial public health-related benefits. U.S. EPA consequently determined that it needed to enact regulations to address the significant adverse health, environmental, and air quality impacts attributable to emissions generated from glider vehicles. U.S. EPA also appropriately recognized that in developing such regulations, it needed to structure the regulations to accommodate gliders that are produced in conformance with legitimate business purposes (i.e., to salvage relatively new engines and powertrains from heavy-duty vehicles that are damaged in collisions), as distinguished from gliders that are produced as a means of evading compliance with 2010 and newer model year heavy-duty diesel engine standards.

It is also clear that U.S. EPA is not disputing the factual record supporting the promulgation of the current regulations of glider vehicles, glider engines, and glider kits and is solely basing its proposed repeal of such regulations on its legal interpretation of the statutory terms "new motor vehicle" and "new motor vehicle engine."[72] However, because U.S. EPA indirectly discusses information submitted by Fitzgerald Glider Kits LLC, Harrison Truck Centers, Inc., and Indiana Phoenix, Inc. (Petitioners)[73] that Petitioners assert directly contradict U.S. EPA's prior findings regarding the quantity of pollutants emitted by glider vehicles,[74] CARB is providing detailed comments, *infra*, regarding its assessment of Petitioner's claims (as described further in section III.3 below). CARB only states here that Petitioners only supplied a superficial description of test results generated from a test program conducted by the Tennessee Technological University Department of Civil and Environmental Engineering (Tennessee Tech) between September to November 2016, but that broad description does not include sufficient information that would allow CARB, or any other member of the public, to assess the validity of Petitioners' assertions. This is evident in light of the fact that neither Petitioners nor U.S. EPA have provided information describing the emissions data measured by the Tennessee Tech study, the test facilities, test equipment, test procedures and test protocol used to generate the test data, or the vehicles tested.

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[72] 82 Fed. Reg. 53442, 53444 (Nov. 16, 2017).

[73] Petitioners submitted a request on July 10, 2017 that EPA reconsider the current regulations of glider vehicles, glider engines, and glider kits. "Petition for Reconsideration of Application of the Final Rule Entitled 'Greenhouse Gas Emissions and Fuel Efficiency Standards for Medium-and Heavy-Duty Engines and Vehicles – Phase 2 Final Rule" to Gliders" AX-17-001-0937, Correspondence – Fitzgerald Gliders/ Indiana Truck Centers / Indiana Phoenix; [EPA-HQ-OAR-2014-0827-2382].

[74] 82 Fed. Reg. 53442, 53444 (Nov. 16, 2017).

The lack of this information impairs both CARB's and U.S. EPA's ability to assess the validity of Petitioners' claims. For example, CARB notes that U.S. EPA staff spoke with the Tennessee Tech staff on November 7, 2017 regarding the test program referenced by Petitioners,[75] and documented that during that phone conversation, Tennessee Tech staff stated that "***no particulate matter samples were collected during testing.***"[76] However, representatives from Tennessee Tech stated in a letter that summarized the heavy-duty truck test program and the test results to the Hon. Diane Black,[77] that each heavy-duty truck tested during the subject test program "was evaluated for fuel efficiency, carbon monoxide (CO), *particulate matter* (PM) emissions and nitrogen oxide (NOx),[78] and that *particulate matter emissions* from all thirteen heavy-duty vehicles were below threshold detection points.[79] Petitioners similarly represented those statements to U.S. EPA. "Tennessee Tech also estimated that glider vehicles would emit less than 12 percent of the total NOx and *PM* emissions for all Class 8 heavy-duty vehicles."[80]

In any event, as stated above, U.S. EPA is not disputing the factual record supporting the promulgation of the current regulations of glider vehicles, glider engines, and glider kits, and has not identified or introduced any factual findings that contradict its prior determinations that the uncontrolled production and sales of gliders would result in approximately 300,000 tons of NOx and 8,000 tons of PM being emitted into our nation's air annually, in the year 2025,[81] that these pollutants have adverse health, environmental, and air quality impacts,[82] and that eliminating these quantities of NOx and PM emissions would result in "substantial public health-related benefits,"[83] including the prevention of 350 to 1,600 premature mortalities attributable to PM2.5-related exposures from gliders."[84]

U.S. EPA has failed to articulate any rational connection between the undisputed factual determinations that exhaust emissions from gliders result in significant adverse health, environmental, and air quality impacts, and its proposed decision to repeal the glider

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[75] Memorandum: EPA Teleconference with Tennessee Tech University Regarding Glider Test Report Summarized in June 2017 Letter; Tennessee Tech University – Summary of Heavy Duty Truck Study and Evaluation of the Phase II Heavy Duty Truck Rule"; Nov. 13, 2017 [EPA-HQ-OAR-2014-0827-2416].
[76] *Id.* at p.3. (Emphasis added).
[77] The correspondence was supplied as an attachment to "Petition for Reconsideration of Application of the Final Rule Entitled 'Greenhouse Gas Emissions and Fuel Efficiency Standards for Medium-and heavy-Duty Engines and Vehicles – Phase 2 Final Rule' to Gliders" AX-17-001-0937, Correspondence – Fitzgerald Gliders/ Indiana Truck Centers / Indiana Phoenix, Exhibit 1. [EPA-HQ-OAR-2014-0827-2382].
[78] AX-17-001-0937, Correspondence – Fitzgerald Gliders/ Indiana Truck Centers / Indiana Phoenix, Exhibit 1, p.1 [EPA-HQ-OAR-2014-0827-2382]. (Emphasis added).
[79] *Id.* at Exhibit 1, p. 4. (Emphasis added).
[80] AX-17-001-0937, Correspondence – Fitzgerald Gliders/ Indiana Truck Centers / Indiana Phoenix, p.5 [EPA-HQ-OAR-2014-0827-2382]. (Emphasis added).
[81] 81 Fed. Reg. 73940, 73943 (Oct. 25, 2016).
[82] *Id.* at 73836 – 858.
[83] *Id.* at 73943.
[84] RTC at p. 1919.

requirements, *which would necessarily only increase the numbers of glider vehicles and their associated adverse health, environmental, and air quality impacts*. Consequently, U.S. EPA's failure to provide a reasoned explanation for its proposed repeal warrants reversal under § 307(d)(9) of the CAA.

Finally, to the extent that U.S. EPA is currently soliciting comments and information comparing costs and emissions characteristics of glider vehicles and existing older trucks, CARB notes that U.S. EPA considered and responded to largely identical comments in its rulemaking action establishing the current regulations of glider vehicles, glider engines, and glider kits, so U.S. EPA will likely not receive additional factual information that would contradict its prior factual determinations.

U.S. EPA previously responded to comments that glider vehicles are often suitable options for small businesses and independent operators seeking to replace an older vehicle with a vehicle with up-to-date safety features.[85]

> Other commenters stated that gliders offer many advantages for operators over used trucks, including lower operating costs *and improved safety*. However, these operators could achieve these same or greater benefits by purchasing fully compliant new vehicles. MFX noted costs associated with the 2007-era vehicles, but they are no longer relevant. As noted above, with the advent of the Phase 1 standards, and even more so under the 2017 Phase 1 standards and, later, Phase 2 standards, operators will be able to purchase fully optimized Phase 1 or Phase 2 vehicles that will have much better fuel efficiency and reliability than the 2007 products.

RTC at p. 1885. (Emphasis added).

U.S. EPA also responded to comments suggesting that "limiting the availability of glider vehicles could result in older, less safe, more polluting trucks remaining on the road that much longer. U.S. EPA particularly seeks information and analysis addressing the question whether glider vehicles produce significantly fewer emissions overall compared to the older trucks they would replace."[86]

> Some commenters argued that gliders offer an efficiency advantage compared to continuing to use older trucks, and that glider use also resulted in reduced HFC emissions from the A/C systems. However, this is a false comparison. While it may have been valid when glider vehicle sales were less than 1,000 per year, it is not valid for current sales. As supported by comments from truck manufacturers and dealerships, glider sales now come at the expense of sales of fully compliant new trucks. … Clarke Power Services commented that newly rebuilt engines have lower criteria emissions than a "worn oil burning engine which is beyond its useful life." However, that is not relevant to this

[85] 82 Fed. Reg. 53442, 53446-447 (Nov. 16, 2017).
[86] Id. at 53447.

> discussion since engines can be rebuilt without replacing the chassis. The appropriate comparison is to new vehicles with fully compliant new engines. When compared to these engines, even the most carefully rebuilt and recalibrated 1998-vintage engine would have NOx and PM emissions at least 20 times as high as engines meeting current standards.

RTC at pp. 1877-878.

"Some commenters stated that remanufacturing an engine and transmission uses 85 percent less energy than manufacturing them new, but did not provide an analysis for EPA to evaluate."[87]

> Finally, some commenters stated that glider engines actually have better fuel economy and greenhouse gas ("GHG") emissions than today's low NOx engines. However, this is not true. Even before Phase 1, engine manufacturers had improved fuel consumption significantly beyond 2009 levels. The 2014 Phase 1 standards required significant additional improvement and the Phase 1 2017 standards will result in even more improvement. Fleets purchasing gliders would thus see greater efficiency improvements by purchasing trucks meeting GHG standards for new vehicles and engines.

RTC at pp. 1877-878.

> Some commenters suggested that another legitimate purpose of glider kits is to improve efficiency. For example, Clarke Power Services stated that trucking fleets purchasing glider vehicles "are not motivated by circumventing the EPA policies, but are most interested in being more efficient by removing old equipment from service and introducing a significantly improved heavy-duty truck in its place." We do not agree. First, the significant adverse public health and environmental consequences of order of magnitude and greater increases in NOx and diesel PM emissions would exist even if the commenter were correct. The commenter is in any case mistaken in suggesting that glider vehicles have a fuel efficiency advantage over new tractors. As explained above, with the advent of the Phase 1 GHG and fuel consumption standards, fleets purchasing gliders would see greater efficiency improvements by purchasing trucks meeting GHG standards for new vehicles and engines. Although this would cost more upfront, these costs would be recouped via greater fuel savings within the first few years of ownership.

RTC at pp. 1878-879.

I.1.6 Conclusion Regarding the Unreasonableness of U.S. EPA's Proposed Interpretation

[87] RTC at pp. 1877-878.

U.S. EPA's proposed interpretation that it lacks authority to prescribe emission standards for glider vehicles, glider engines, and glider kits under section § 202(a)(1) of the federal Clean Air Act is incorrect because that interpretation is expressly inconsistent with the text, structure, legislative history, and purpose of Title II of the CAA that authorizes and mandates U.S. EPA to promulgate and revise regulations to expeditiously control the air pollutants emitted from new motor vehicles and new motor vehicle engines, including previously owned engines in vehicles.

Moreover, even if the relevant statutory provisions are determined to be ambiguous with respect to Congress' intent to regulate emissions from glider vehicles, glider engines, and glider kits, U.S. EPA's proposed interpretation is not entitled to deference because U.S. EPA has not advanced any reasonable explanation of how its proposed interpretation is consistent with the marketing and sale of glider vehicles as "new trucks", its proposed interpretation would eviscerate CAA § 202(a)'s express statutory authority to regulate new motor vehicles that are powered by previously owned engines and previously owned engines in new motor vehicles, and U.S. EPA's proposed interpretation would impede, rather than advance, the Clean Air Act's overall objective of expeditiously reducing emissions from heavy-duty vehicles and heavy-duty engines. This is readily apparent from the rulemaking record associated with the current regulations applicable to glider vehicles, glider engines, and glider kits, which indicates that in the year 2025 glider vehicles are estimated to emit approximately 300,000 tons of NOx and 8,000 tons of PM annually, and that in a single model year, $PM_{2.5}$-related exposures from glider vehicle exhaust are estimated to result in 350 to 1,600 premature mortalities, unless glider sales are controlled.

Finally, U.S. EPA's failure to provide a reasoned explanation for its proposed repeal warrants reversal under § 307(d)(9) of the CAA, because U.S. EPA cannot demonstrate that its proposed interpretation permissibly interprets the Clean Air Act, and has not articulated any rational connection between the undisputed factual determinations that exhaust emissions from gliders result in significant adverse health, environmental, and air quality impacts, and its proposed decision to repeal the glider requirements, which would only increase the numbers of glider vehicles and their associated adverse health, environmental, and air quality impacts.

For all of these reasons, CARB and the other signatory states respectfully request that U.S. EPA revoke its proposed "Repeal of Emission Requirements for Glider Vehicles, Glider Engines, and Glider Kits," 82 Fed. Reg. 53,442 (Nov. 16, 2017).

II. CARB Comment: Gliders we are already seeing in CA

Analysis of the California Department of Motor Vehicles registration database and CARB's truck reporting (TRUCRS) database show at least 862 glider vehicles registered in the state, with approximately 97 percent of them equipped with pre-2007 engines. In addition, staff have identified approximately 236 out-of-state glider vehicles registered in the TRUCRS database. Staff believes there are many more, as not all

gliders are easily identifiable via vehicle identification number. Furthermore, CARB's roadside testing campaigns have shown evidence of gliders operating in California. The test results of these gliders are described in section III below.

III. CARB Comment: Gliders with pre-2007 engines are much dirtier than modern, original equipment manufacturer (OEM) certified vehicles

Gliders are much higher emitting than modern OEM certified heavy-duty vehicles as evidenced by the following:

a. From glider sales data submitted to U.S. EPA, glider manufacturer marketing materials, and data gathered by CARB staff regarding gliders registered for use in California, we know gliders are using remanufactured engines certified to previous, less stringent emission standards. Emission standards have become progressively more stringent over the last couple of decades for HD trucks (as described further in IV.1. below), and so using remanufactured old engines means using engines designed, built, and certified to much less stringent standards than today.

b. Some of the uncontrolled engines used in glider vehicles may have been produced with calibrations or defeat devices that produced high levels of in-use NOx emissions and were part of a settlement agreement between U.S. EPA, CARB, and the seven engine manufacturers that produced those noncompliant engines. It is not known whether these glider engines are reprogrammed during rebuild to lower their emissions to conform to the applicable standards, and therefore it is more likely that these engines may still be emitting at levels similar to those with defeat devices.

c. Test data from U.S. EPA show glider NOx levels were 4 to 40 times higher, and PM levels were 50 to 450 times higher than vehicles certified to current emission standards, as included in Section III.1 below.

d. CARB PEAQS data found that black carbon emission factors (EF_{BC}) and NOx emission factors (EF_{NOx}) from two glider vehicles were among the highest of all vehicles sampled, as included in Section III.2.1 below.

e. CARB contractor roadside data found glider vehicles emitting approximately four to ten times higher NOx and 8 to 71 times higher black carbon emissions than 2010 and later model year engines, as included in section III.2.2 below.

f. The glider repeal Notice of Proposed Rulemaking cites Tennessee Technological University (Tennessee Tech) purportedly showing gliders as clean as modern OEM certified vehicles, but those data are invalid and flawed for the reasons described in section III.3 below.

Regulations to control pollutant emissions from on-road heavy-duty diesel engines have been getting more and more stringent since the 1970s, beginning with smoke controls, and continuing in the 1990s through 2010, with increasingly stringent standards for NO_X and PM emissions (as described further in IV.1. below). Most of the NO_X and PM standards that were implemented in the early years prior to the 2007 and 2010 standards were met using in-cylinder emission controls that reduced engine-out NO_X emissions. However, beginning in 2007, heavy-duty engine manufacturers were required to meet a PM standard of 0.01 g/bhp-hr, a NO_X standard of 0.20 g/bhp-hr, and a non-methane hydrocarbon (NMHC) standard of 0.14 g/bhp-hr.[88] The PM standard, which took full effect in 2007, was met using diesel particulate filters (DPF) that reduce PM by more than 90 percent. The NOx standard which was phased-in from 2007 to 2010 required higher rates of exhaust gas recirculation (EGR) to meet the 2007 to 2009 phase-in NOx standards and selective catalytic reduction (SCR) aftertreatment to meet the final 2010 NOx standard. Thus, using remanufactured uncontrolled engines means using engines designed, built, and certified to much less stringent standards than today.

Based on production sales data submitted to U.S. EPA[89], marketing ads by glider manufacturers, and CARB analysis of the DMV and TRUCRS database, the majority of glider vehicles use pre-2007 model year engines. These engines do not have aftertreatment emission control systems such as DPF and SCR. Compared to currently OEM certified heavy-duty vehicles, glider vehicles emit significantly higher amounts of NOx and PM emissions. As discussed in section III.1 below, U.S. EPA recently tested two late model year glider vehicles on a dynamometer and showed that emissions from glider vehicles were significantly higher than those from conventionally manufactured heavy-duty vehicles. In addition, section III.2 discusses CARB staff evaluation of emissions data recently collected at several locations in California which found that black carbon and NOx emissions from glider vehicles were significantly higher than emissions from other heavy-duty vehicles.

As described further in section III.3 below, Tennessee Tech, who was hired by Fitzgerald Glider Kits, the largest glider manufacturer, claimed that it tested glider vehicles and purportedly showed that glider vehicles were as clean as modern OEM certified vehicles. However, Tennessee Tech test results did not follow standardized test protocols and lack scientific credibility for a number of reasons.

III.1 U.S. EPA Testing

Recently, U.S. EPA emissions tested two late model year (2016 and 2017) glider vehicles over several test cycles on a heavy-duty chassis dynamometer. The test cycles selected represent a variety of real world heavy-duty vehicle operations and

[88] Final Rule for Control of Air Pollution from New Motor Vehicles: Heavy-Duty Engine and Vehicle Standards and Highway Diesel Fuel Sulfur Control Requirements, U.S. EPA , January 18, 2001 (https://www.epa.gov/regulations-emissions-vehicles-and-engines/final-rule-control-air-pollution-new-motor-vehicles-heavy - accessed 12/26/2017)
[89] Memorandum from Charles Moulis, to William Charmley, Re: Summary of Glider Production Data, (Nov. 15, 2017). EPA-HQ-OAR-2014-0827-2379 (https://www.regulations.gov/document?D=EPA-HQ-OAR-2014-0827-2379 – accessed 11/20/2017).

include the Urban Dynamometer Driving Schedule, the World Harmonized Test Cycle, and the Super Cycle. Emissions from the glider vehicles were compared to results with the same tests conducted on conventionally manufactured 2014 and 2015 model year heavy-duty vehicles. Based on these tests, glider vehicle NOx levels were 4 to 40 times higher, and PM levels were 50 to 450 times higher than vehicles certified to current emission standards.[90]

III.2 CARB Testing:

CARB staff recently analyzed emissions data from heavy-duty vehicles operating on California highways and found emission rates of glider vehicles were very high and consistent with U.S. EPA's 2017 testing. Emissions data collected from two separate projects designed to evaluate the benefits of California's heavy-duty vehicle regulations and to also evaluate compliance rates are summarized below.

III.2.1 Portable Emissions AcQuisition System (PEAQS) Program

Using a roadside measurement system called the Portable Emissions AcQuisition System (PEAQS), CARB staff measured real-world, on-road vehicle emissions from more than 7,500 heavy-duty vehicles across California to evaluate heavy-duty vehicle regulations benefits and detect vehicle compliance issues.[91] As discussed further in Attachment 2, in the course of sampling, this project obtained emission data from two glider vehicles tested in November 2016. Emissions from the two glider vehicles were compared to the rest of the vehicles. Glider #1 and #2 black carbon emission factors (EF_{BC}) were in the 96 and 98 percentiles, respectively (meaning they were dirtier than 96-98 percent of vehicles tested). During testing, Glider #2 emitted black visible smoke, as shown in Figure 1. The glider #2 NOx emission factor (EF_{NOX}) was in the highest two percent of all EF_{NOX} recorded. Overall, the two glider vehicles tested were among the highest emitting of all vehicles tested.

[90] Chassis Dynamometer Testing of Two Recent Model Year Heavy-Duty On-Highway Diesel Glider Vehicles, November 20, 2017, Docket No.: EPA-HQ-OAR-2014-0827-2417

[91] See Attachment 2 for a brief description of the emissions data collection project using PEAQS.

Figure 1: Glider kit #2 vertical exhaust stacks and exhaust during SAE J1667 opacity measurement.

III.2.2 Emissions Collected from California Roadways

Since 2011, CARB has been conducting research to evaluate the effectiveness of CARB's heavy-duty vehicle regulations such as the Drayage and the Truck and Bus regulations, as discussed further in Attachment 3. CARB staff analyzed emissions data collected from on-road heavy-duty vehicles at the Port of Oakland in 2015, in Cottonwood in 2013, and the Caldecott Tunnel in 2014 and 2015.[92] In the sampling days when gliders were observed, there were approximately 34 glider observations out of a total of 5539 observations. Glider vehicles were found to emit approximately four to ten times higher NOx (Figure 2) and 8 to 71 times higher black carbon emissions than 2010 and later model year engines (Figure 3)**.**

[92] See Attachment 3 for a brief description of the emissions data collection program (Real-World Heavy-Duty Diesel Truck Emissions from Gliders in California).

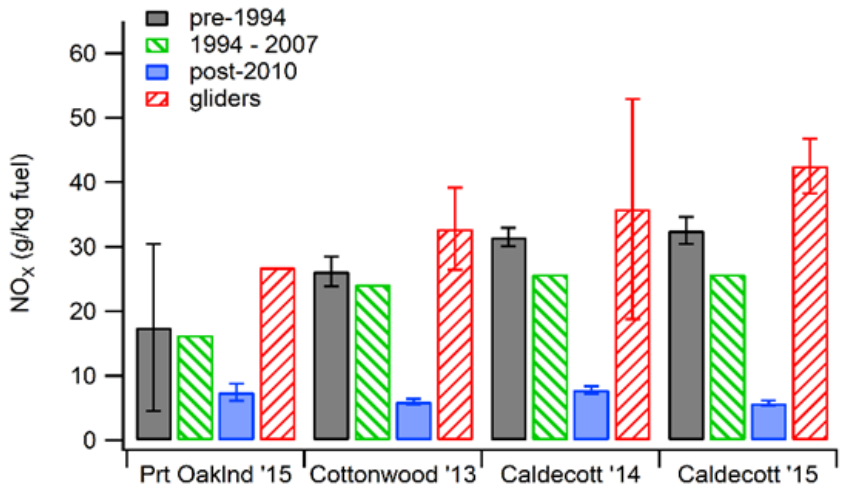

Figure 2: NOx fuel-based emission factors for pre-MY1994, MY1994 – 2007, post-MY2010, and glider vehicles.
(Error bars represent the standard error of the mean).

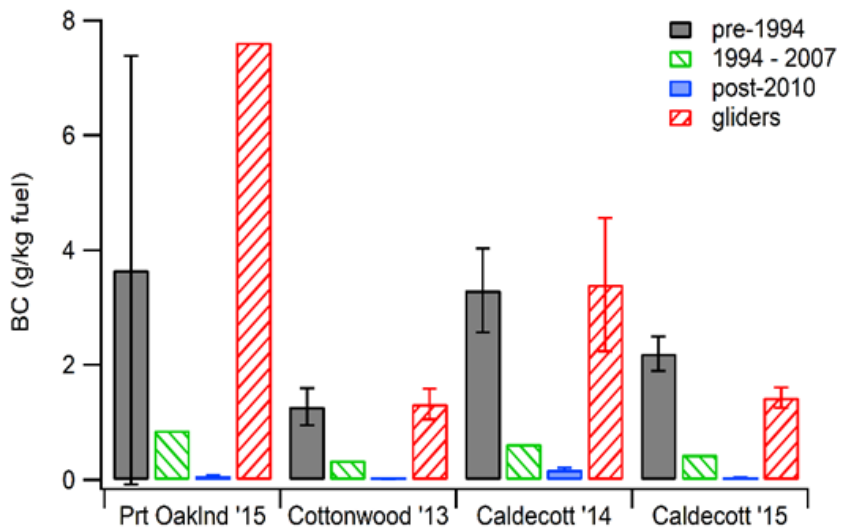

Figure 3: Black Carbon (BC) fuel-based emission factors for pre-MY1994, MY1994 – 2007, post-MY2010, and glider vehicles.
(Error bars represent the standard error of the mean)

III.3 Tennessee Tech Testing

U.S. EPA's Notice of Proposed Rulemaking states that the petitioners submitted a letter from Tennessee Tech that described a study in support of their petition. The petitioners claim that the Tennessee Tech study had analyzed NOx, PM, and carbon monoxide emissions from both remanufactured and OEM certified engines and reached a conclusion that remanufactured engines from model years between 2002 and 2007

performed roughly on par with 2016 OEM certified engines, and in some instances even out-performed the 2016 OEM engines. CARB staff find that these claims lack validity and scientific credibility for the reasons described in detail below.

The only written information available to CARB staff about Tennessee Tech testing was: (1) a four-page letter from the President of Tennessee Tech attached as a supporting document to the "Petition for Reconsideration" by Fitzgerald Glider Kits submitted to U.S. EPA[93] and (2) a U.S. EPA memo[94] summarizing a teleconference discussion between U.S. EPA and Tennessee Tech on the testing protocols used by Tennessee Tech. CARB staff also contacted Tennessee Tech to get more information related to the testing done to support the petition for reconsideration submitted to U.S. EPA by Fitzgerald Glider kits. Further testing documentation was requested of Tennessee Tech at that time including any final report and detailed emissions data, but no documentation has been forthcoming.

Although more information about testing procedures, test vehicles, dynamometer and emissions equipment, and how the data were collected and analyzed would aid in evaluating the Tennessee Tech work, it is clear that the test methods and equipment used were fundamentally incapable of quantifying pollutants of interest and that unsupportable conclusions have been drawn from the data, including the conclusion that remanufactured engines performed equally as well as 2016 OEM "certified" engines and in some instances out-performed the 2016 OEM engines; that PM emissions from remanufactured engines were below threshold detection limits; and a glider's remanufactured engine provides the best NOx performance of any engine tested. The conclusions made in the Tennessee Tech letter are baseless and lack scientific credibility for a number of reasons discussed below:

i. ***The glider vehicles tested have newer engines with some emission controls and hence are not representative of typical glider vehicles which use pre-2002 uncontrolled engines***. The Tennessee Tech letter indicates that 13 engines were tested, eight of which were remanufactured engines and five were OEM engines. The letter indicates glider engines tested were model years 2002 to 2007. However, no other information was provided about the OEM or the glider engines, except for the engine model names. The glider engines tested are not representative of the glider engines normally used by glider manufacturers. Model year 2002 to 2006 engines are normally equipped with EGR while 2007 model year engines may have been equipped with EGR and DPF. However, in practice, most of the glider engines installed on glider vehicles are pre-2002 model year engines without either EGR or DPF. Thus, emissions from the engines tested by Tennessee Tech would be expected to be much

[93] Petition for Reconsideration of Application of the Final Rule Entitled "Greenhouse Gas Emissions and Fuel Efficiency Standards for Medium- and Heavy-Duty Engines and Vehicles—Phase 2 Final Rule" to Gliders from Fitzgerald Glider Kits, LLC; Harrison Truck. July 10, 2017. (https://www.epa.gov/regulations-emissions-vehicles-and-engines/petitions-reconsideration-phase-2-ghg-emissions-and-fuel - accessed 12/27/2017)

[94] Memorandum from George Mitchell to Greenhouse Gas Emissions Standards and Fuel Efficiency Standards for Medium- and Heavy-Duty Engines and Vehicles – Phase 2 – Dockett EPA-HQ-OAR-2014-0827. November 13, 2017.

lower than the emissions from the majority of glider engines used in the glider vehicle market, and the Tennessee Tech testing therefore is not valid to use to compare glider vehicle emissions to modern OEM certified vehicles.

ii. ***The test cycle used is inadequate to characterize real-world behavior of heavy-duty vehicles and was of such a short duration that it would not allow the emission controls on modern OEM certified vehicles to warm up and function properly.*** To adequately compare glider vehicle emissions to those of modern OEM certified vehicles with emission controls, test cycles allowing those emission controls (selective catalytic reduction, for example) to reach full operating temperature would need to be used as these emissions technologies are intended to do in the course of a normal operating day. The Tennessee Tech tests however were conducted on a chassis dynamometer with a test cycle consisting of short steady state load points at a single constant engine speed. This cycle, which is less than ten minutes long including a five-minute warm-up, and is overly simplified compared to the operation of on-road heavy-duty vehicles. It does not include transient behavior, the balance of cold, warm and hot running conditions, or the range of engine speeds encountered in-use. The short duration of the entire testing schedule which is less than ten minutes including warm-up does not allow the engine and catalyzed aftertreatment systems to reach their full operating temperatures. The protocols including the test procedures and test cycles were apparently created by Tennessee Tech and did not follow any standardized test protocols specified in the Code of Federal Regulations (CFR), title 40, Part 1065. Tennessee Tech should have used one or more of the many existing chassis dynamometer test cycles derived from in-use heavy-duty operations, such as the Urban Dynamometer Driving Schedule[95], CARB heavy-duty cruise and transient cycles[96], drayage truck duty cycle[97], or other cycle that is representative of heavy-duty operations as the basis for a much more real world emissions representative test sequence.

iii. ***The test vehicle and engine aftertreatment preconditioning appears to be inadequate***. The control of test vehicle and engine aftertreatment preconditioning before each emissions test is not described and can have a profound impact on the representativeness of a given test cycle. From the descriptions given, Tennessee Tech used a 5-minute engine warm-up test procedure without any description of the warm-up cycle used. It does not appear that all the engines and aftertreatment systems would have reached full functioning temperature during the test sequence. Applying a longer loaded warmup would help reduce this bias, as would also including controlled cold start

[95] EPA Urban Dynamometer Driving Schedule (UDDS) for Heavy-Duty Vehicles (https://www.dieselnet.com/standards/cycles/udds.php accessed - accessed 12/27/2017)
[96] Heavy Heavy-Duty Diesel Truck (HHDDT) Schedule, (https://www.dieselnet.com/standards/cycles/hhddt.php - accessed 12/27/2017)
[97] Couch, P. and J. Leonard. Characterization of Drayage Truck Duty Cycles at the Port of Long Beach and Port of Los Angeles. TIAX. March 2011. (http://www.cleanairactionplan.org/documents/tiax-characterization-of-drayage-truck-duty-cycles-at-the-port-of-long-beach-and-port-of-los-angeles-march-2011.pdf -- accessed 12/27/2017)

testing as well. Thus, for the OEM engines tested which included engines with aftertreatment systems, the test duration (preconditioning plus test runs) would not have allowed the aftertreatment system to reach full operating temperatures resulting in overemphasis of uncontrolled tailpipe emissions during this artificially short testing window. Tennessee Tech should have followed engine preconditioning procedures for different duty cycles including cold start transient, hot start transient, warm start transient, and discrete mode and ramped modal steady state testing which are specified in 40 CFR 1065.518.

iv. ***The test equipment used has limited ability to simulate real world conditions***. The dynamometer equipment mentioned in the docketed discussion with U.S. EPA is an absorption-only type dynamometer that cannot rapidly adjust the applied load to recreate speed and load transients characteristic of in-use operation that are known to increase emission rates of pollutants, especially diesel PM or soot. Choice of this dynamometer equipment limited the study's ability to accurately explore transient operational modes that are known to be significant to PM emission rates. EPA's own testing of glider vehicles shows increased PM emission rates for transient cycles compared to PM emission rates over test cycles with more steady state cruise character illustrating the need for more sophisticated transient testing that the Tennessee Tech study's less capable dynamometer would not allow.

v. ***The emissions instrumentation used is not appropriate for quantifying vehicle exhaust emissions***. The equipment would not qualify for use in determining emissions compliance of on-road heavy-duty vehicles or engines. The detection method is not of the regulated type for official vehicle emission measurements and instead uses electrochemical cells to detect CO and NOx by calculation from NO and NO_2 cells, and has no means of measuring PM emission rates. Electrochemical cells are notoriously slow to respond compared to the high rates of change engine exhausts display. It is unclear if the researchers characterized the biasing effect of the slow response time of this instrument compared to the short 50 second sampling periods of the Tennessee Tech test sequence. Further this instrumentation chosen for the Tennessee Tech study would not be capable of meeting the accepted vehicle emissions measurement practices and the calibration and drift stability requirements for certification and in-use level testing to assess compliance as specified in 40 CFR Part 1065 for the newer engines and 40 CFR Part 86 as may be applicable to the older original engines. Compliance grade instrumentation also includes means to calibrate full scale response and check zero concentration response before and after each emissions test interval. The Tennessee Tech instrumentation does not include this capability by inherent design, nor was there discussion of manual calibration procedures applied externally to understand the impacts of this instrument's intrinsic limitations on the conclusions of this study.

vi. ***The emissions results are not completely described, but from what is presented, it is clear they are inadequate to support the claims in***

***Tennessee Tech's letter*.** No PM samples were collected during the testing[98]. However, without even specifying the PM standard, Tennessee Tech claimed that all glider vehicles tested met the standard, clearly an invalid claim. NOx emissions were reported in a footnote as a range from a low of 0.44 to a high 0.64 g/hp-hr, claiming further that the lowest was for a remanufactured Detroit Diesel DD15 engine. The reported NOx values did not separate the glider engine NOx emissions from the new engine NOx emissions, but instead reported a summary for the composite glider and new engine NOx emissions as a single range. The DD15 is a relatively modern engine architecture (i.e., 2008 and newer[99]) with aftertreatment emissions controls and is thus not at all generally representative of the pre-2002 engines typical of gliders. NOx emissions in a tabular form by engine tested were not provided. Overall, no PM quantification and inadequate detail on NOx emissions measured is presented to tell what emissions were measured from each vehicle tested, but even from the limited information provided, it is clear it is invalid to use the Tennessee Tech data to claim that typical glider vehicles perform equally as modern OEM "certified" engines.

vii. ***Conclusion*:** The issues discussed above as well as many other issues not discussed such as quality control/ quality assurance, test laboratory environmental conditions, data analysis including calculation of engine work, make the Tennessee Tech engine emissions testing invalid and discredit any claims using it to assert that glider vehicles are as low-emitting as modern OEM certified vehicles.

IV. CARB Comment: Emission increase and associated health impact that would result from Repealing Requirements for Glider Vehicles

IV.1. 2007/2010 Heavy-Duty Vehicle Emission Standards

In December 2000, U.S. EPA adopted emission standards for model year 2007 and later heavy-duty engines.[100] CARB adopted the same standards in October 2001[101].

The standards required heavy-duty engine manufacturers to meet a very stringent PM standard of 0.01 gram per brake-horsepower-hour (g/bhp-hr), a NOx standard of 0.20

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[98] Memorandum from George Mitchell to Greenhouse Gas Emissions Standards and Fuel Efficiency Standards for Medium- and Heavy-Duty Engines and Vehicles - Phase 2 - Docket EPA-HQ-OAR-2014-0827. SUBJECT: EPA Teleconference with Tennessee Tech University Regarding Glider Test Report Summarized in June 2017 Letter; Tennessee Tech University – Summary of Heavy Duty Truck Study and Evaluation of the Phase II Heavy Duty Truck Rule. November 13, 2017

[99] CARB Executive Order: https://www.arb.ca.gov/msprog/onroad/cert/mdehdehdv/2008/detroitdiesel_hhdd_a2900127_14d8_1d3-0d01.pdf

[100] Control of Air Pollution from New Motor Vehicles: Heavy-Duty Engine and Vehicle Standards and Highway Diesel Fuel Sulfur Control Requirements; Final Rule. Federal Register Vol. 66, January 18, 2001 (https://www.gpo.gov/fdsys/pkg/FR-2001-01-18/pdf/01-2.pdf - accessed 12/26/2017)

[101] CARB. On-Road Heavy-Duty Diesel Engine Reduced Emission Standards, October 2001. (https://www.arb.ca.gov/msprog/onroadhd/reducstd.htm - accessed 12/26/2017)

g/bhp-hr, and a non-methane hydrocarbon standard of 0.14 g/bhp-hr. The PM standard, which took full effect in 2007, was met using a DPF that reduced PM by more than 90 percent. The NOx standards were phased in on a percent-of-sales basis: 50 percent from 2007 to 2009 and 100 percent in 2010. Manufacturers met the phase-in NOx standards by certifying, on average, to a NOx family emission limit of around 1.2 g/bhp-hr. This phase-in NOx standard was met using previously acquired emission credits and with higher EGR rates, while the final 2010 NOx standard was met using the SCR. In addition, since sulfur can poison and degrade the performance of aftertreatment catalysts, ultra- low sulfur diesel fuel with a sulfur content less than 15 parts per million was introduced prior to the implementation of the 2007 and 2010 heavy-duty engine NO_X and PM standards. The introduction of ultra-low sulfur diesel fuel also had the additional effect of reducing PM from the entire in-use heavy-duty fleet.

U.S. EPA estimates that implementation of the 2007/2010 heavy-duty engine standards will provide emissions reductions of 2.6 million tons of NOx, 115,000 tons of NMHC, and 109,000 tons of PM by 2030 when the existing fleet gets replaced by vehicles meeting the 2010 heavy-duty engine standards[102].

IV.2 Emission Impacts inside California

IV.2.1 Truck and Bus Regulation

In addition to the emissions benefits achieved through the introduction of new 2007/2010 compliant heavy-duty engines, California has adopted a number of fleet rules that are designed to reduce criteria pollutant and GHG emissions from in-use heavy-duty vehicles that operate in California. One of these fleet rules is the Truck and Bus regulation[103].

The Truck and Bus regulation requires fleets to turnover their pre-2010 diesel trucks and buses that operate in California to become compliant with the 2010 heavy-duty engine standards by 2023. The regulation applies to nearly all privately and federally-owned diesel fueled trucks and buses and to privately and publicly owned school buses with a gross vehicle weight rating (GVWR) greater than 14,000 pounds. The regulation consists of phase-in schedules in which newer heavier trucks and buses with a GVWR greater than 26,000 pounds must meet PM filter requirements beginning January 1, 2012. Lighter (GVWR 14,001 to 26,000 pounds) and older heavier trucks must be replaced starting January 1, 2015. By January 1, 2023, nearly all trucks and buses will need to have 2010 model year engines or equivalent. Compliance with the regulation is achieved through CARB's enforcement programs. In addition, Senate Bill 1 (SB1) allows only vehicles compliant with the Truck and Bus regulation to be registered by California's Department of Motor Vehicles (DMV).

[102] Heavy-Duty Engine and Vehicle Standards and Highway Diesel Fuel Sulfur Control Requirements, EPA420-F-00-057, December 2000 (https://www.epa.gov/regulations-emissions-vehicles-and-engines/final-rule-control-air-pollution-new-motor-vehicles-heavy#additional-resources – accessed 12/20/2017)
[103] Truck and Bus Regulation (https://www.arb.ca.gov/msprog/onrdiesel/onrdiesel.htm - accessed 12/20/2017)

IV.2.1.1 Compared to other states, it is expected that the Truck and Bus regulation will to a certain extent mitigate the impacts of glider vehicle emissions in California. Nevertheless, glider vehicles will still remain a significant concern because they will be difficult to enforce under the Truck and Bus regulation, and as discussed earlier, gliders are much dirtier than a modern OEM certified vehicles. As also described earlier, we are already aware that glider vehicles with uncontrolled engines are operating on California roadways. With the proposed repeal, we expect to see more glider vehicles on California roads, especially out-of-state glider vehicles. It is easier to enforce the Truck and Bus rule for California registered vehicles since compliance with the rule is tied to DMV registration. However, despite CARB's best efforts, especially when taking into account out-of-state registered gliders, compliance will never be 100 percent. This is because, first, it is often difficult to identify a glider vehicle since they look similar to new heavy-duty vehicles and may not use the glider OEM chassis vehicle identification number (VIN) when registering, further obscuring the glider's actual configuration. Secondly, it is nearly impossible to inspect every truck that enters California, 24 hours a day, seven days a week, making it possible for gliders to easily cross the border during hours when enforcement is not active. Thus, if U.S. EPA adopts the proposed repeal, more and more gliders will cross into California.

IV.2.1.2. As more gliders cross into California, their emissions impact will have significant consequences. For example, even if only a small number of gliders operate in California, California's overall air quality progress will be impeded. Based on EMFAC2014 modeling, if gliders made up only seven percent of the total medium and heavy-duty vehicles in California, their emissions contribution would completely offset the benefits of California's in-use diesel fleet rules, including the Truck and Bus rule, putting California's citizens at risk and making it impossible for California to meet its SIP commitments.

IV.3. Emission impacts outside CA

The impact of glider vehicle emissions on the air quality of states outside of California is expected to be much worse than in California since most of the states do not have regulations that are similar to California's Truck and Bus regulations, nor as many enforcement resources as California. If the proposed repeal of gliders becomes effective, the emission benefits from the 2010 heavy-duty engine standards will be significantly reduced if not completely wiped out, resulting in serious air quality and health issues for the citizens of these states.

If the proposed repeal of gliders becomes effective, based on US EPA's numbers, in the year 2025 there will be 128,750 gliders on the road nationwide (Response to Comments for Joint Rulemaking, pages 1961-1962). According to table A-4 of that document, 1,000 model year 2017 gliders will emit harmful pollutants causing 70 - 160 premature deaths, equivalent to U.S. $0.3 - 1.1 billion dollars in economic harm. If the glider repeal becomes effective, the expected over 128,000 gliders on the road in 2025 would

have a lifetime impact of 9,000 to 21,000 deaths and U.S. $40 – 140 billion dollars in economic harm nationwide. Additional gliders produced after 2025 would add to this total. To avoid these thousands of deaths and significant economic harm, EPA should reconsider the glider repeal.

V. CARB Comment: Glider repeal would be unfair to heavy-duty manufacturers who have been complying with emissions requirements.

Gliders are currently being marketed as new vehicles. For example, the Daimler glider kit web page advertises glider kits as[104]

> "THE NEXT BEST THING TO A ***NEW*** [emphasis added] TRUCK";
>
> "A Daimler Heavy-duty vehicles Glider Kit is a ***brand new*** [emphasis added], complete assembly to repair your wrecked or badly worn vehicle that includes the frame, cab, steer axle and wheels, plus a long list of standard equipment"
>
> "A Glider is built to your specifications on the same assembly line as ***new*** [emphasis added] Freightliner and Western Star heavy-duty vehicles"

Fitzgerald Glider Kits also has similar marketing ads[105]:

> "This is a question we get quite frequently and the answer is simple. A glider kit is a ***new*** [emphasis added] truck without an engine or transmission that has reman rears that are factory installed".
>
> "Once the assembly is complete you have a truck that looks, feels and drives like a brand ***new truck*** [emphasis added]. The advantages really stack up to make a glider kit a great option when purchasing a new truck."
>
> "We [Fitzgerald Glider Kits] constantly test ***new*** [emphasis added] technology and products to ensure that our trucks are the ***ultimate choice*** [emphasis added] that is unsurpassed by any competition."

To comply with current emission regulations, manufacturers of new heavy-duty engines and vehicles have invested hundreds of millions of dollars to develop advanced technologies to comply with current regulations.[106] Allowing the glider industry to

[104] http://www.dtnaglider.com/Default.aspx
[105] https://www.fitzgeraldgliderkits.com/what-is-a-glider-kit/
[106] Mandel, J. Oral Statement of the Truck and Engine Manufacturers Association on December 4, 2017, Washington D.C. U.S. EPA Hearing on Proposed Repeal of Emission Requirements for Glider Vehicles, Glider Engines, and Glider Kits; Proposed Rule

circumvent current emissions regulations would put manufacturers of heavy-duty vehicles and engines who are compliant with the rules at a competitive disadvantage. Major engine and vehicle manufacturers have expressed concern over U.S. EPA's proposal to repeal the current glider vehicle requirements since such action will result in businesses avoiding the purchase of currently certified powertrains.[107] The Phase 2 glider provisions do not ban gliders but allow the glider vehicle option for the market while ensuring a level playing field for all manufacturers of heavy-duty vehicles and engines by requiring most glider vehicles to have the same emission controls as other new vehicles.

VI. Feedback regarding other "Issues for Which U.S. EPA is Seeking Comments":

In this section, we provide feedback to specific issues for which U.S. EPA sought comment in the glider repeal NPRM. For each issue, the issue for which feedback is sought is listed and then CARB staff's response provided.

VI.1 (i) Comments submitted in the Phase 2 rulemaking docket lead U.S. EPA to believe that a glider vehicle is often a suitable option for those small businesses and independent operators who cannot afford to purchase a new vehicle, but who wish to replace an older vehicle with a vehicle that is equipped with up-to-date safety features. (82 FR 53446)

and

VI.2 (ii) U.S. EPA seeks comment on the matter of the anticipated purchasing behavior on the part of the smaller trucking operations and independent drivers if the regulatory provisions at issue were to be repealed. (82 FR 53447)

CARB Comment: It is true that glider vehicles are cheaper than new vehicles. The average price of a new OEM certified Class 8 sleeper cab tractor is approximately $125,000[108], while the average price of a new glider vehicle with an uncontrolled engine is about 10 to 15 percent lower[109]. However, rather than purchase a glider vehicle with a gross polluting refurbished uncontrolled engine, small businesses and owner-operators wishing to avoid the cost of a new OEM vehicle have the option to purchase a vehicle with better emissions performance and safety features than current glider vehicles at a much lower price than a new vehicle.

The current emission standards requiring use of SCR and DPF took effect with model year 2010; hence seven-year-old used trucks available now come equipped with modern emission controls. Current average retail price for a three- to five-year old

[107] Volvo Group North America, Cummins Inc., and Navistar Inc. Letter to Honorable Scott Pruitt, U.S EPA September 11, 2017

[108] Cannon, J. What does a Class 8 truck really cost? CCJ. January 25, 2016 (https://www.ccjdigital.com/what-does-a-class-8-truck-really-cost/ - accessed 12/27/2017).

[109] Jaillet, J., Gliders 101: Five common questions about glider kits answered, Overdrive, July 29, 2014 (https://www.overdriveonline.com/gliders-101-five-common-questions-about-glider-kits-answered/)

sleeper cab tractor is approximately $55,000[110], which is about 55 percent lower than the average price of a new modern OEM certified Class 8 sleeper cab tractor. Such a vehicle would have the same emission control systems as new trucks (DPF, SCR, etc.) as well as up-to date safety features. Furthermore, on the used truck market, glider vehicles cost as much as $10,000 more in resale than comparable factory used heavy-duty vehicles with emission controls, solely because they are equipped with uncontrolled engines[111]. In addition, not only small businesses purchase glider vehicles, large trucking businesses are also purchasing glider vehicles with uncontrolled engines, presumably not due to a lower purchase price, but rather to circumvent emission regulations[112]. Thus, U.S. EPA cannot use the affordability of a noncompliant glider kit to justify the proposed repeal of the Phase 2 glider vehicle requirements. Because cheaper used vehicles are available, it appears that the majority of businesses purchase glider vehicles with uncontrolled engines not for affordability reasons but to circumvent the 2010 criteria pollutant emission standards.

Prior to 2010, estimated glider kit production volumes were less than 1,000 vehicles per year, nationwide. However, since 2010 there has been an uptick in the number of gliders with uncontrolled engines produced reaching a peak of significantly over 10,000 gliders in 2015. At these levels, gliders amount to about five percent of new Class 8 heavy-duty vehicles sold in a year. Most gliders are equipped with refurbished 2001 or older model year engines that are produced without any NOx or PM emission controls such as EGR, SCR, and DPF. Truck buyers are attempting to avoid the perceived "inconvenience" of maintaining emissions controls by buying glider vehicles with no emission controls. Repealing the Phase 2 glider requirements would encourage even more fleets to buy noncompliant glider vehicles, further increasing the demand for these vehicles. This would put more noncompliant glider vehicles on the road to the detriment of air quality and public health. As mentioned above, it would also put manufacturers of heavy-duty vehicles and engines who have been investing significant resources and money to comply with the regulations at a competitive disadvantage.

VI.3 U.S. EPA solicits comment and information on whether limiting the availability of glider vehicles could result in older, less safe, more-polluting heavy-duty vehicles remaining on the road that much longer. (82 FR 53447)

CARB Comment: Keeping the Phase 2 glider vehicle restrictions in place would not result in more older, more dangerous and more polluting heavy-duty vehicles on the road. Businesses typically replace their older heavy-duty vehicles when, for example, maintenance or reliability issues become too great a concern. CARB staff is unaware of

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[110] J.D. Power, Commercial Truck Guidelines – Industry Update, November 2017 (http://www.nada.com/b2b/NADAOutlook/Guidelines.aspx)

[111] Jaillet, J., Gliders 101: Five common questions about glider kits answered, Overdrive, July 29, 2014 (https://www.overdriveonline.com/gliders-101-five-common-questions-about-glider-kits-answered/)

[112] Schneider offers glider kit heavy-duty vehicles for sale, FleetOwner, October 29, 2015. (http://www.fleetowner.com/equipment/schneider-offers-glider-kit-heavy-duty vehicles-sale) (Also see listing at https://www.truckpaper.com/listings/heavy-duty vehicles/for-sale/list/category/15101/heavy-duty-heavy-duty vehicles-glider-kit-heavy-duty vehicles?PCID=2000704874&dlr=1&EID=1&ParentCategoryID=207&mdlx=Contains&LiftGate=All&Cond=All).

any evidence that would suggest that the cost of modern OEM certified heavy-duty vehicles prevents truck buyers from turning over older, dirtier vehicles. In addition, as discussed above, businesses that need to replace an older less-safe, more-polluting vehicle and that cannot afford the cost of a new vehicle, may purchase a much less expensive used truck or a new glider vehicle with an OEM certified engine for a price much less than the price of a new truck. Thus, the current Phase 2 glider requirements will not limit the availability of affordable replacement vehicles.

In addition, as U.S. EPA emphasized it in its final Phase 2 rule supporting materials, U.S. EPA did not propose to ban gliders. Rather, the final rule would require glider vehicles to meet the standards that all other new heavy-duty vehicles are required to meet. Furthermore, the regulation provides certain exemptions that provide flexibility for small businesses and for certain other specific applications. Those flexibilities include provisions for small manufacturers to build up to 300 glider vehicles per year with noncompliant engines as well as exemptions for engines within their useful regulatory life or with odometer readings less than 100,000 miles or be less than three years old. Thus, there is no reason for businesses to hold on to their old vehicles for a longer period than they would if there were no emission requirements for glider vehicles.

VI.4 U.S. EPA particularly seeks information and analysis addressing the question whether glider vehicles produce significantly fewer emissions overall compared to the older heavy-duty vehicles they would replace.

CARB Comment: Because glider vehicles are being sold with uncontrolled engines, it is likely they are emitting at levels typical of other OEM (uncontrolled) older engines, and thus generally speaking, CARB staff does not believe glider vehicles produce fewer emissions than the vehicles they would replace. As discussed above, based on information in the U.S. EPA Phase 2 rulemaking materials, marketing ads of glider vehicle manufacturers, and California DMV and TRUCRS registration database analysis, the overwhelming majority of glider kits are assembled with refurbished engines of model years 1998 to 2001. These engines do not have emission control systems such as EGR, DPF and SCR. According to California DMV data, the useful life of Class 8 heavy duty vehicles is about 15 to 20 years. In calendar year 2018, if a glider vehicle replaces a 15 year old vehicle, it would be replacing a vehicle with a 2003 model year engine, which would have EGR and therefore would have lower NOx than an uncontrolled pre-2002 glider engine. In other words, the glider vehicle would likely be higher emitting than the vehicle it replaced. If a glider vehicle replaced a 20 year old engine, it would be replacing a vehicle with a 1998 model year engine, which would be uncontrolled and hence would have emissions approximately the same as the pre-2002 glider engine. Overall, based on the analysis above, CARB staff concludes glider vehicles being sold today are unlikely to produce fewer emissions than the vehicles they would replace.

Furthermore, some of these engines were produced with calibrations or defeat devices that produced high levels of NOx emissions in-use and were part of a settlement agreement between U.S. EPA, CARB, and the seven engine manufacturers that

produced those noncompliant engines. It is not known whether these engines were reprogrammed during rebuild to lower their emissions to conform to the applicable standards, and therefore it is more likely that these engines may still be emitting at levels similar to those with defeat devices. Furthermore, some large glider manufacturers claim that they reprogram such engines during rebuild to improve fuel efficiency. Again, it is not known whether these manufacturers are increasing criteria pollutant emissions at the expense of fuel efficiency, an act of tampering that is prohibited by the Clean Air Act, section 203(a)(3)(A), unless authorized and exempted by U.S. EPA or CARB.

Notwithstanding the above discussion, CARB staff believe that it is possible that an uncontrolled glider vehicle could be cleaner than an older heavy-duty vehicles it replaces, but only if it happens to replace a very old vehicle. However, the more relevant question is whether the glider is cleaner than the vehicle that otherwise would be purchased, if the uncontrolled glider were unavailable due to the Phase 2 regulation glider restrictions. As discussed above, compared to currently OEM certified heavy-duty vehicles that a truck owner would likely otherwise choose, glider vehicles emit significantly higher amounts of NOx and PM emissions. As discussed above, based on U.S. EPA's own testing this year, glider vehicle NOx levels were 4 to 40 times higher, and PM levels were 50 to 450 times higher than for vehicles certified to current emission standards. Also, as described further above, testing by CARB staff and CARB contractors found high emission rates consistent with U.S. EPA's 2017 testing. Finally, as described above, if a truck owner cannot afford a new vehicle, they can still buy a much cheaper used vehicle up to seven years old that meets today's emission standards and hence is much cleaner than an uncontrolled glider. Overall, making more glider vehicles available by repealing the restrictions on gliders appears certain to cause more truck buyers to choose dirtier, higher emitting vehicles than the new or used vehicles they otherwise would choose.

VI.5 U.S. EPA seeks comment on the relative expected emissions impacts if the regulatory requirements at issue here were to be repealed or were to be left in place.

As explained in the above sections, if U.S. EPA repeals the current requirements, the demand for glider vehicles with uncontrolled engines will increase, putting more and more glider vehicles on the road. It will significantly increase the emissions contribution from gliders and offset the benefits gained and expected from various emission control programs, promulgated by both the federal and state governments. For California, this proposed action would impede California's overall air quality progress, even if only a small number of them operate in California. As mentioned above, based on EMFAC2014 modeling, if gliders made up only seven percent of the total medium and heavy-duty vehicles in California, it would completely offset the benefits of California's in-use diesel fleet rules, including the Truck and Bus rule, putting California's citizens at risk and making it impossible for California to meet its SIP commitments.

For other states, as described above in section IV.3., the air quality impacts of proposed action are expected to be worse than in California since none of them has a regulation similar to California's Truck and Bus rule. In these states, emission benefits from the implementation of the 2007/2010 heavy-duty engine standards are estimated to be about 2.6 million tons of NOx, 115,000 tons of NMHC, and 109,000 tons of PM by 2030 when the existing fleet gets replace by vehicles meeting the 2010 heavy-duty engine standards. U.S. EPA's proposed action has the potential to significantly reduce these emission benefits, resulting in serious air quality and health issues for the citizens of these states.

VI.6 U.S. EPA seeks comment on whether, if the Agency were to determine not to adopt the interpretation of CAA sections 202(a)(1) and 216(3) being proposed here, U.S. EPA should nevertheless revise the ''interim provisions'' of Phase 2 rule, 40 CFR 1037.150(t)(1)(ii), to increase the exemption available for small manufacturers above the current limit of 300 glider vehicles per year. U.S. EPA seeks input on how large an increase would be reasonable, were the Agency to increase the limit in taking final action.

CARB Comment: U.S. EPA should not increase the exemption of 300 glider vehicles per year available for small business. Based on the Phase 2 rule, the small business exemption was determined from historical glider production data when fleets where just using glider vehicles to salvage engines from vehicles damaged by accident. Even the current exemption of 300 glider vehicles per year by itself is a concern for air quality since, as explained above, emissions from these vehicles are significantly higher than OEM certified current engines. Revising the rule to increase the exemption would even be more concerning as far as air quality and health impacts are concerned. CARB staff recommend that U.S. EPA keep the current exemption and not revise the rule to increase the exemption.

VI.7 U.S EPA seeks comment on whether, if the Agency were to determine not to adopt the statutory interpretation being proposed here, U.S. EPA should nevertheless extend by some period of time the date for compliance for glider vehicles, glider engines, and glider kits set forth in 40 CFR 1037.635. U.S. EPA seeks comment on what would be a reasonable extension of the compliance date.

CARB Comment: U.S. EPA should not extend the date for compliance for glider vehicles, glider engines, and glider kits set forth in 40 CFR 1037.635. This is because the flexibilities specified in 40 CFR 1037.150(t) that allow small businesses to produce and sell up to 300 glider vehicles annually that do not meet the engine requirements specified in 40 CFR 1037.635 and the flexibilities provided in 40 CFR 1037.635 for engines within their useful life and other special reasons are more than enough to meet the demands for those businesses who have been manufacturing glider vehicles for legitimate reasons.

VII. Conclusion

For all the reasons discussed in the above sections, including U.S. EPA's ability to regulate gliders as new vehicles, the availability of other options such as three to five year old used heavy-duty vehicles, the high emissions impacts of glider vehicles, and the competitive disadvantage they create on heavy-duty engine OEM manufacturers, CARB and the other signatory states strongly urge U.S. EPA to keep the current glider requirements.

ATTACHMENT 2

The Portable Emissions AcQuisition System (PEAQS): Glider Kit Detection

PEAQS Introduction

Heavy duty vehicles remain a major source of particulate matter, black carbon (BC), nitrogen oxide (NO_X), and greenhouse gas emissions in California. A relatively small fraction of the vehicles operating in California are referred to as "high-emitters". These high-emitters contribute a disproportionate amount of air pollution relative to the remainder of the fleet and create local operational "hot spots". The identification and mitigation of emissions from these high-emitters is critical to protect public health.

California Air Resources Board (CARB) staff developed a pilot roadside measurement system to measure real-world, on-road vehicle emissions to evaluate the regulation benefits and detect vehicle compliance issues. The Portable Emissions AcQuisition System (PEAQS) characterizes individual vehicle emissions and couples this with automated license plate readers (ALPR) information to collect fleet activity information, characterize technology penetration, and identify compliance issues. The current PEAQS consists of a small trailer housing laboratory grade instrumentation (Figure 1) and quantifies passing vehicle BC and total NO_X fuel specific emission factors. Future implementation of PEAQS will include expansion of the laboratory grade system to include other pollutants (e.g. greenhouse gases, ammonia), expand to long-term unmanned operation of fleet activity, and explore the utilization of low-cost sensor technology in community monitoring operation. A full description of the pilot PEAQS will be found in a forthcoming SAE International journal article.

PEAQS Collected Data and Deployments

The CARB PEAQS has sampled more than 7,500 vehicles at five locations across the state of California: Port of Los Angeles; Cottonwood California Highway Patrol Weigh Station; Stockton Intermodal Railyards; Riverside, California; and the California Department of Food and Agriculture (CDFA) Inspection Station in Truckee, California. At CDFA Truckee, staff selected vehicles from the passing fleet into a secondary inspection lane for emissions sampling and inspection. During the first CDFA Truckee study CARB staff conducted a SAE J1667 smoke opacity with simultaneous PEAQS emission factor measurement (Figure 2). Additionally, PEAQS emission data was collected as the vehicle arrived and departed. A second study was conducted at CDFA Truckee where opacity checks were conducted downstream of PEAQS measurements and visual inspections were only conducted on vehicles having detectable BC emissions. These two studies sampled a total of 302 heavy-duty vehicles and found three glider kit equipped vehicles (gliders), or 0.99 percent of the total population. The presence of a glider kit was confirmed during a visual inspection of each vehicle.

Glider Kit Emission Levels

Three glider equipped vehicles were found during two weeks of sampling at CDFA Truckee in November 2016 (Gliders # 1 and #2) and August 2017 (Glider #3). Glider # 3 PEAQS emission factors are not available due to interference from large amounts of BC emitted by an equipped truck refrigeration unit. Gliders #1 and #2 BC emission factor (EF_{BC}) were found to be greater than ≈ 96 and 98 percent, respectively, of all vehicles measured by PEAQS to date (Figure 3; Table 1). Additionally, gliders #1 and #2 nitrogen oxide emission factors (EF_{NOX}) were found to

be greater than ≈ 6 and 98 percent, respectively, of all vehicles measured by PEAQS to date (Figure 4).

Note: All emissions data reported in this document were collected on the roadside as part of an on-going pilot plume capture system. The reported values do not necessarily indicate non-compliance with standards or certification values. Care should be taken when comparing emission factors as vehicle speed, acceleration, and load vary for every location and vehicle.

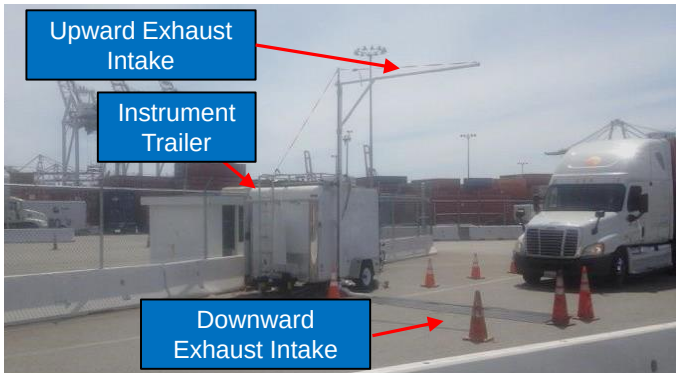

Figure 1: PEAQS laboratory grade trailer deployed at the Port of Los Angeles in April 2017.

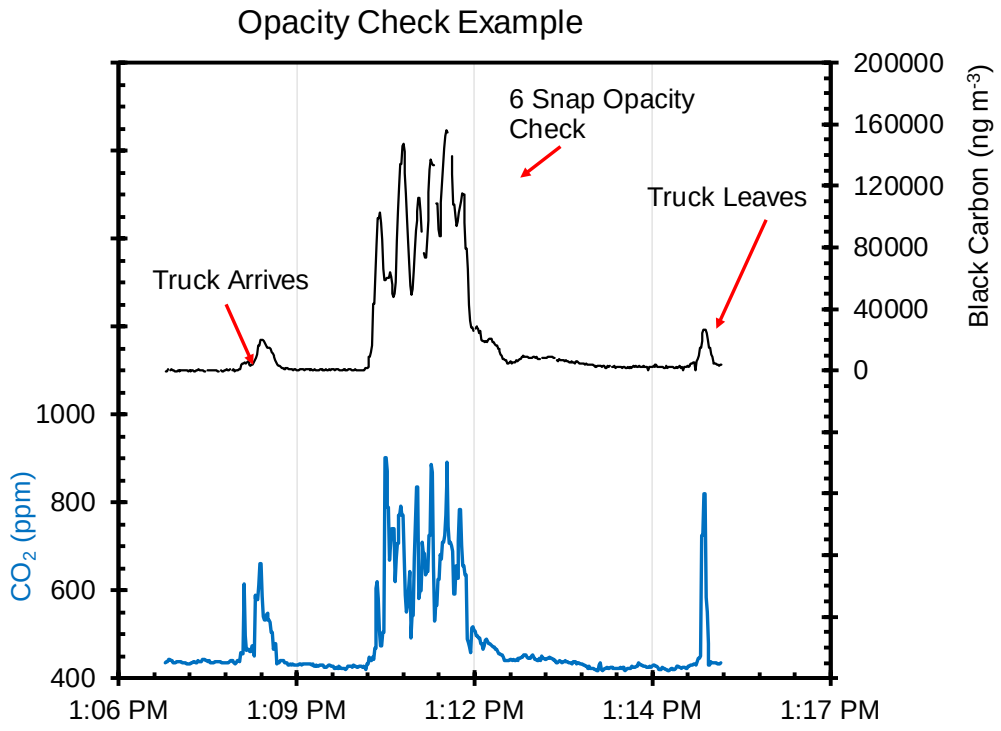

Figure 2: Time series of PEAQS measurements for carbon dioxide (CO_2; right axis) and black carbon (left axis) at CDFA Truckee.

Table 1: Truck and EF_{BC} data.

	Truck Number	1	2	3
	License State	TN	CA	SD
	Engine MY/Make	~2000 (no label)/ DDC	1992/ Caterpillar	~2000/ -
	Date Sampled	11/2/2016	11/3/2016	8/22/2017
	Location	CDFA Truckee	CDFA Truckee	CDFA Truckee
Snap Acceleration Emission Factor	**EF_{BC} (g BC / kg fuel)**	0.835	125.9	-
	SAE J1667 Opacity %	11.5	89.3	-
Driving BC Emission Factor	**EF_{BC} (g BC / kg fuel)**	0.023	0.205	-
	EF_{NOX} (g NO_X / kg fuel)	1.4	39.6	-
	Vehicle Speed (mph)	0.51	0.34	-

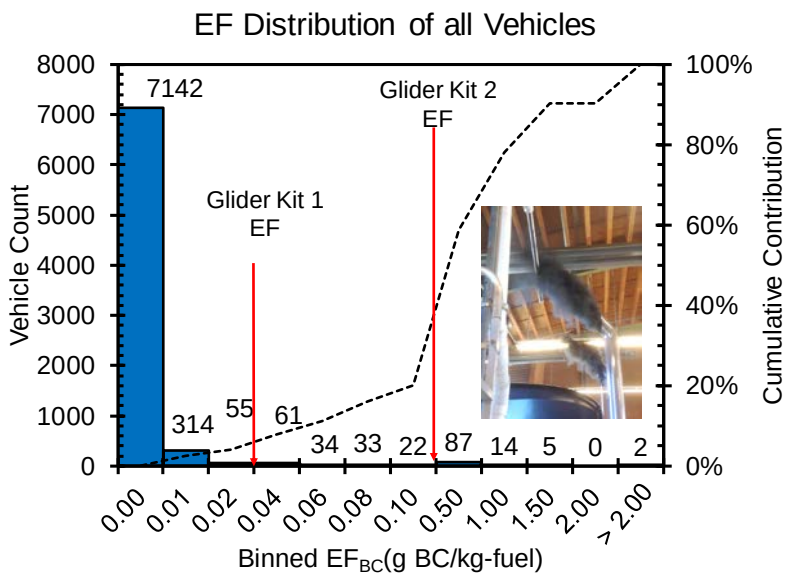

Figure 3: Summary of black carbon emission factor (EF_{BC}) of all PEAQS sampling to date. Vehicle count refers to number of verified vehicle plume captures. Inset image is glider kit #2 during SAE J1667 opacity measurement.

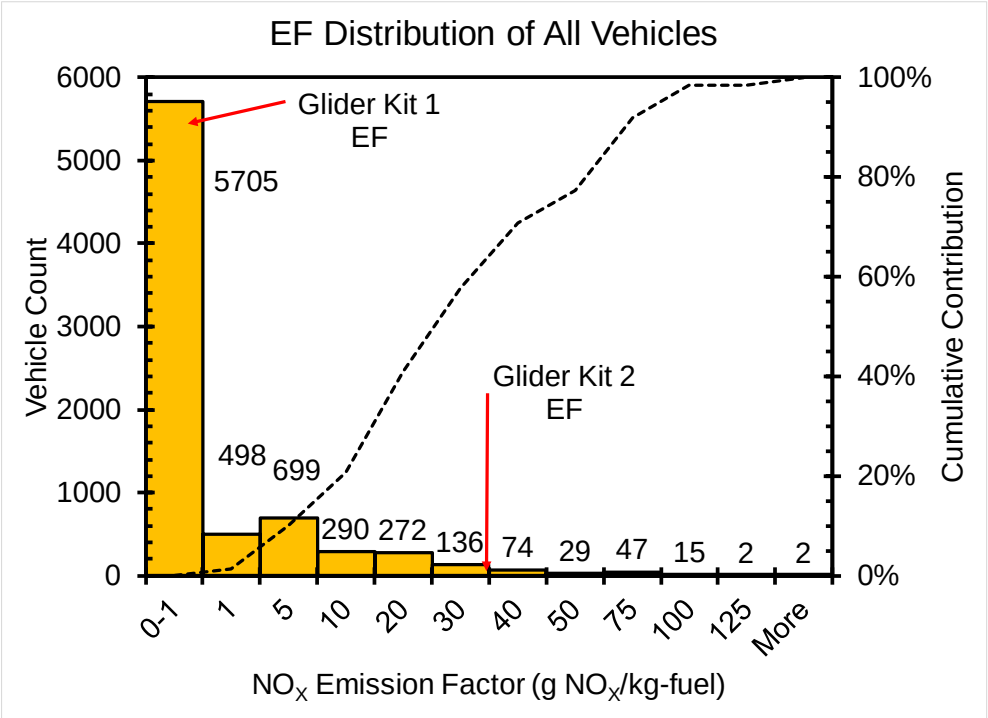

Figure 4: Summary of nitrogen oxide emission factors (EF_{NOX}) of all PEAQS sampling to date. Vehicle count refers to number of verified vehicle plume captures.

ATTACHMENT 3

Real-World Heavy-Duty Diesel Truck Emissions from Gliders in California

December 27, 2017

Figure 1. HDV sampling by UD at the Cottonwood weigh station

The California Air Resources Board has several recent and ongoing contracts that measure emission factors (EFs) from real-world heavy-duty vehicles (HDVs). These include contracts 11-309 with the University of Denver (UD) and contracts 09-340, 12-315, and 14-358 with the University of California, Berkeley (UCB). UD has sampled HDVs at the Cottonwood weigh station in northern California and the Port of Los Angeles. Exhaust plumes were collected as HDVs passed under a 50' length tent, providing an integrated sample over several seconds of driving at approximately 10 miles per hour (mph) (Fig. 1). UCB sampled exhaust plumes with a single inlet tube suspended above a roadway exiting the Port of Oakland and the eastbound highway through the Caldecott Tunnel in the Bay Area, resulting in a point sample of HDVs driving at approximately 35 and 50 mph, respectively (Fig. 2).

Figure 2. HDV sampling by UCB at the Port of Oakland

Both contractors quantified, among other things, carbon dioxide (CO_2), carbon monoxide (CO), black carbon (BC), and oxides of nitrogen (NO_X), and derived fuel-normalized emission factors for BC and NO_X. Results are presented as grams of pollutant per kilogram of fuel burned. This accounts for the highly variable dilution of tailpipe exhaust that occurs after emission and during sampling.

A glider HDV is one in which an older but functioning engine and drivetrain are installed in a newer chassis, which is known as a "glider kit." Table 1 summarizes the measurements of total and of glider HDVs observed during the 11 field campaigns supported by the contracts listed above. Note that these numbers reflect total observations, and therefore include repeat measurements of some HDVs. Overall, 0.3 percent of HDV observations were identified as gliders, based on characters in the vehicles' Vehicle Identification Numbers (VINs). This means at least 0.3 percent of the vehicles observed were gliders, although additional in state glider vehicles without special glider characters in their VINs as well as out-of-state glider vehicles with unknown VINs could have been present and not identified.

Based on these field campaigns, the number of on-road glider HDVs does not seem to have changed substantially over the past six years. There were more gliders observed in the long-haul fleets at Cottonwood (along Interstate 5) and Caldecott (along CA State Highway 24) than in the largely drayage fleets at the Ports of Oakland and Los Angeles. Excluding the 2017

observations, which are still being processed and have not been apportioned to Cottonwood and the Port of L.A., all but one of the glider observations were at the long-haul sites, representing 0.6% of the observations at these sites. In contrast, glider observations at the port sites comprised only 0.02% of the total. This may reflect enhanced and/or earlier regulations (e.g., the Drayage Rule and the San Pedro Bay Ports Clean Air Action Plan), incentives, and/or enforcement activities at the Ports.

Table 1. Summary of glider and total observations in CARB real-world HDV emission contracts

Campaign	Sampling days	Total obs.	Gilder obs.	% glider obs.	Total unique plates	Unique glider plates	% glider plates
Port of Oakland 2011	5	380	0	0%	332	0	0%
Port of Oakland 2013	5	1016	0	0%	709	0	0%
Port of Oakland 2015	3	496	1	0.2%	398	1	0.3%
Port of L.A. 2013	5	1219	0	0%	781	0	0%
Port of L.A. 2015	5	1456	0	0%	925	0	0%
Port of L.A. 2017	5	795	0 – 4*	< 0.5%	*	0 – 4*	*
Cottonwood 2013	5	1866	9	0.5%	1709	7	0.4%
Cottonwood 2015	3	694	0	0%	619	0	0%
Cottonwood 2017	5	1045	0 – 4*	< 0.4%	*	0 – 4*	*
Caldecott 2014	12	1587	4	0.3%	978	3	0.2%
Caldecott 2015	16	1590	20	1.3%	911	6	0.7%

* 2017 observations have not yet been apportioned to either Cottonwood or the Port of LA

Both BC and NO_X emissions from gliders were much higher than from more conventional HDVs.

Figure 3 summarizes the BC emissions from glider HDVs from the four campaigns in which they were observed. For comparison, emissions from pre-1994 and 1994 – 2007 HDVs, which generally do not include diesel particulate filters (DPFs) to reduce BC emissions and selective catalytic reduction (SCR) to reduce NO_X emissions, are presented, as well as post-2010 HDVs which generally include both DPFs and SCRs. With the presence of a DPF, HDVs have relatively low BC emissions. **Glider BC emissions are more comparable to pre-1994 HDVs. At these four**

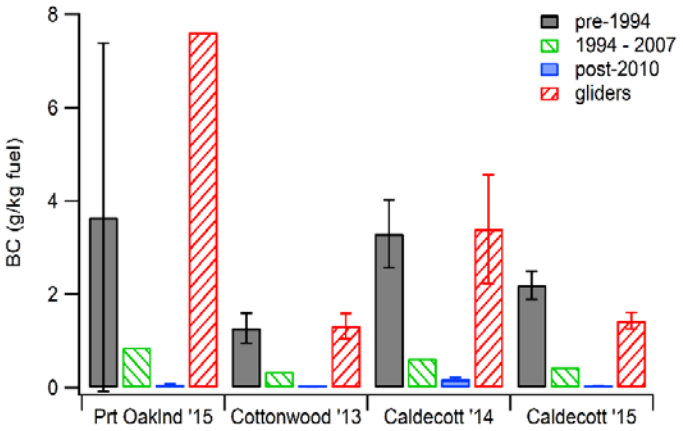

Figure 3. Black Carbon (BC) fuel-based emission factors for pre-MY1994, MY1994 – 2007, post-MY2010, and glider HDVs. Error bars represent the standard error of the mean.

campaigns, BC emissions from gliders were up to 71 times greater than those from post-2010 HDVs. Although BC emissions from 1994 –2007 HDVs are greater than post-2010 emissions, they are still much lower than BC emissions from glider HDVs. Thus, while the number of gliders in the state as of 2017 is low, an increase in their prevalence would likely result in dramatic increases in toxic diesel particulate matter exposure.

NO_X emissions from glider HDVs were also relatively high, although the difference between glider and conventional HDVs was not as dramatic as for BC (Figure 4). In part, this is due to reduced SCR efficiency of all HDVs during sampling resulting from relatively low SCR temperatures, especially exiting the ports where most HDV engines had just recently been started. Still, **NO_X emissions from gliders were up to ten times greater than from SCR-equipped HDVs, and this difference is expected to increase for HDVs under heavy loads whose SCR systems have reached optimal temperatures for NO_X reduction.** While the overall number of glider HDVs in the state is currently believed to be small, an increase in their prevalence will almost definitely lead to increased NO_X emissions from HDVs, one of the largest NO_X sources statewide. As NO_X is a precursor for both ground-level ozone and particulate matter, an increase in gliders in California will make it much more difficult to meet federal Ambient Air Quality standards for these two criteria pollutants.

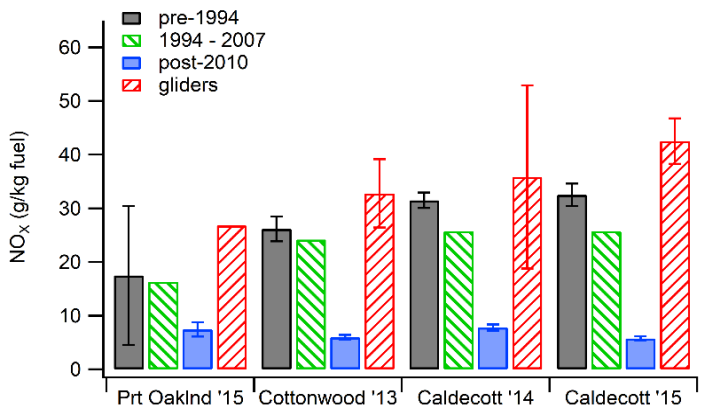

Figure 4. NO_X fuel-based emission factors for pre-MY1994, MY1994 – 2007, post-MY2010, and glider HDVs. Error bars represent the standard error of the mean.

Recent testing comparing glider to standard HDVs under controlled laboratory conditions found the gliders emit between 50 and 350 times more PM than modern HDVs (meeting current emission control standards). The average ratio of PM emissions (glider to non-glider) in the four field campaigns discussed above was 72. Figure 5 shows the impact of glider penetration into the statewide Heavy-Duty Diesel Vehicle (HDDV) fleet on total PM emissions. For context, recent decreases in HDDV PM emissions from EMFAC (CARB's mobile source emissions inventory) are also shown. **The glider portion identified in these four field campaigns, 0.3%, if present in the entire CA HDV fleet would be enough to negate 1-3 years of progress in reducing PM from HDDVs, and if only ~7% of HDVs**

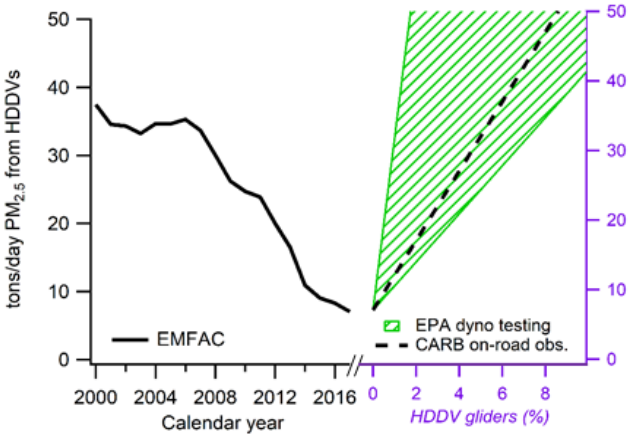

Figure 5. Tons per day particulate matter emitted by heavy-duty diesel vehicles in California (left), and increases to these emissions given current values and various assumptions about glider penetration into the HDDV fleet (right).

statewide were converted to gliders, this could eliminate all progress made this century in reducing emissions of this carcinogen.