

July 10, 2017

Scott Pruitt, Administrator
Environmental Protection Agency
1200 Pennsylvania Avenue, N.W.
Washington, DC 20460

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OFFICE OF THE
EXECUTIVE SECRETARIAT

Re: 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

Pursuant to 5 U.S.C. § 553(e) and 42 U.S.C. § 7607(d)(7)(B), Fitzgerald Glider Kits, LLC (“Fitzgerald”), Harrison Truck Centers, Inc. (“Harrison”), and Indiana Phoenix, Inc. (“Indiana Phoenix”) (collectively, “Petitioners”), on behalf of the glider industry, hereby request that the Environmental Protection Agency (“EPA”) reconsider the 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,” 81 Fed. Reg. 73,478 (Oct. 25, 2016) (“Phase 2 Rule”), to “gliders.”¹

Background

“Gliders” are medium- and heavy-duty trucks that are assembled by combining certain new truck parts (that together constitute a “glider kit”) with the refurbished powertrain—the engine, the transmission, and typically the rear axle—of an older truck. The glider kit generally includes the tractor chassis with frame, front axle, cab, and brakes. 81 Fed. Reg. at 73,512. A glider is manufactured by combining the powertrain from the used vehicle with the parts in the glider kit.

Gliders are approximately 25% less expensive than new trucks, a significant cost savings for small businesses and owner-operators. Env'tl. Prot. Agency & Dep't of Transp., Response to Comments for Joint Rulemaking (“RTC”), at 1846 (Aug. 2016) (comment of GATR Truck Center). Businesses and drivers that cannot afford a new truck often purchase gliders as an alternative to continuing to drive their older vehicle. *Id.* at 1825 (comment of Clarke Power Services). Glider kits can also extend the working life of a damaged vehicle. *Id.* Gliders also require less maintenance, yielding less downtime, and have modern safety features and amenities. *Id.* Overall, they offer a more economical option for smaller fleets and owner-operators to maintain the reliability of their commercial trucking operations.

In the Phase 2 Rule published October 25, 2016, EPA for the first time mandated that glider kits, glider vehicles, and rebuilt engines installed in gliders (hereinafter “gliders”) satisfy

¹ The Phase 2 Rule was jointly promulgated by EPA and the National Highway Traffic Safety Administration (“NHTSA”), an agency within the Department of Transportation (“DOT”). Because Petitioners request reconsideration of only certain elements of the Phase 2 Rule that were promulgated pursuant to EPA’s Clean Air Act authority, this Petition is directed to EPA, and not NHTSA or DOT.

emissions standards applicable to new motor vehicles and new motor vehicle engines. The regulations accomplish this by ignoring the age of the engine and other powertrain elements installed in gliders and applying instead emissions standards based on the “calendar year in which assembly of the glider is completed.” 81 Fed. Reg. at 73,943; *see* 40 C.F.R. § 1037.635. In other words, if a glider assembler installs a reclaimed engine in a glider in 2017, that engine must be certified to comply with all emissions standards applicable to new engines from model year 2017, regardless of the actual model year of the engine. “This requirement applies to all pollutants, and thus encompasses criteria pollutant standards as well as the separate [greenhouse gas (“GHG”)] standards.” 81 Fed. Reg. at 73,943; *see* 40 C.F.R. § 1037.635.

Recognizing that the new standards applied to gliders in the Phase 2 Rule were both sudden and onerous, the Phase 2 Rule purports to provide some “transitional flexibilities,” 81 Fed. Reg. at 73,942, but these provisions are not enough to prevent a devastating impact on the glider industry when the standards become almost fully applicable to gliders on January 1, 2018. In 2017, glider assemblers are permitted to produce a limited number of gliders exempt from the regulations. The number of gliders exempted in 2017 for any particular company is equivalent to the “highest annual production of glider kits and glider vehicles for any year from 2010 to 2014” by the company. 40 C.F.R. § 1037.150(t)(3). Because of the growth of their business since 2014, this provision has forced Fitzgerald, Harrison, and Indiana Phoenix to scale back production in 2017 to a certain degree, but it has allowed for continued operation. Beginning January 1, 2018, however, the 2017 regime is replaced with an allowance to build only 300 gliders per year that are exempt from the regulations. *Id.* § 1037.105(t)(1)(ii). This stringent production cap would effectively destroy the glider industry.²

Despite EPA’s stated goal to reduce greenhouse gas emissions, EPA did not perform any actual testing to analyze the environmental impact of remanufactured engines and gliders compared to new Original Equipment Manufacturer (“OEM”) vehicles. Instead, it relied on unsubstantiated assumptions about the number of older engines used in gliders and the emissions from engines used in gliders.

If left in place, the Phase 2 Rule would significantly curtail American manufacturing and effectively shut down the glider industry and the nearly 20,000 jobs it supports across the nation. For example, Fitzgerald, which is based out of Tennessee and Kentucky, is currently responsible for 1,600 direct and indirect jobs in those two states alone and several thousand more associated with suppliers across the country. Yet, if this regulation goes into full effect, by the end of the year, the company will be forced to cut production and its workforce by 90%. Harrison, based in Iowa, employs approximately 450 people, and its suppliers account for many more glider-related jobs. Indiana Phoenix, based in Indiana, directly employs over a 100 people in Avilla, Indiana. The Phase 2 Rule, if it takes effect, would put more job opportunities out of reach for economically challenged areas already struggling with unemployment. Additionally, it would force small businesses to buy more expensive new vehicles instead of growing their business and creating jobs.

² There are additional exceptions from the general requirement for engines from more recent model years or with relatively few miles of engine operation. *See* 40 C.F.R. §§ 1037.150(t)(2); 1037.635(c). These carve outs do not apply to the vast majority of the gliders assembled by companies like Fitzgerald and Harrison, which tend to use engines from earlier model years and that have been subjected to normal use.

Bases for Reconsideration

EPA should reconsider the application of the Phase 2 Rule to glider kits, glider vehicles, and rebuilt engines installed in gliders for three reasons: (1) Section 202(a) of the Clean Air Act does not authorize EPA to regulate gliders; (2) EPA's prior decision to regulate gliders was based on unsupported assumptions rather than data; and (3) reconsideration is warranted under Executive Order 13783.

1. Section 202(a) of the Clean Air Act Does Not Authorize EPA to Regulate Gliders

The Phase 2 Rule relied on EPA's authority under section 202(a) of the Clean Air Act to regulate emissions from "new motor vehicles" and "new motor vehicle engines." 42 U.S.C. § 7521(a)(1). Because glider vehicles are not "new motor vehicles" and glider engines are not "new motor vehicle engines," EPA lacked authority under this provision to apply the Phase 2 Rule to gliders.

A glider is not a "new motor vehicle" because the most significant parts of the vehicle—the engine, transmission, and typically the rear axle—are not new. A vehicle is a "new motor vehicle" within the meaning of the Clean Air Act only if "equitable or legal title" to the vehicle has "never been transferred to an ultimate purchaser." 42 U.S.C. § 7550(3). For gliders, the "legal or equitable" title to the main components of the vehicle had previously "been transferred to an ultimate purchaser"—the owner of the donor truck. Simply adding new parts to a used truck does not make it a "new motor vehicle." The Phase 2 Rule's consideration of this issue was arbitrary and capricious and contrary to law. The Rule indicated first that EPA's authority could not be challenged because EPA had implicitly found gliders to be new vehicles in its Phase 1 Rule, which granted an interim exemption for gliders. 81 Fed. Reg. at 73,513-14. EPA, however, had an obligation to determine in the Phase 2 Rule that it had authority to act. *See Louisiana Pub. Serv. Comm'n v. FCC*, 476 U.S. 355, 374 (1986) ("[A]n agency literally has no power to act . . . unless and until Congress confers power upon it."); *Arlington v. FCC*, 133 S. Ct. 1863, 1880 (2013) (same). The Phase 2 Rule also erroneously based its interpretation of the Clean Air Act on marketing materials from the Fitzgerald web site. 81 Fed. Reg. at 73,514. EPA's legal authority does not turn on how a glider is described in marketing materials. EPA should reconsider this issue and conclude that because the principal parts of a glider are used, a glider is not a "new motor vehicle."

Such a conclusion would be consistent with the treatment of this issue by the National Highway Traffic Safety Administration ("NHTSA"). NHTSA's regulations make clear that a truck is not considered to be "newly manufactured" if the "engine, transmission, and drive axle(s) (as a minimum) of [an] assembled vehicle are not new" and at least two of those three components come from the same donor vehicle. 49 C.F.R. § 571.7(e). Gliders do not fall within this definition. EPA failed adequately to explain its departure from NHTSA's approach.

Moreover, "glider kits" do not even fall within the Clean Air Act's definition of "motor vehicle." Under the Act, a "motor vehicle" must be "self-propelled." 42 U.S.C. § 7550(2). But a glider kit lacks an engine, transmission, and often a rear axle. A collection of parts lacking these key components obviously is not "self-propelled." The Phase 2 Rule relies on particular

provisions authorizing regulation of specific vehicle components. 81 Fed. Reg. at 73,514; *see* 42 U.S.C. § 7521(a)(5)(A) (fueling systems); *id.* § 7521(a)(6) (onboard vapor recovery systems). But there is no provision authorizing regulation of the parts that make up a glider kit. The fact that the Clean Air Act allows EPA to regulate certain specified vehicle components, but not the components in a glider kit, undermines the Phase 2 Rule’s application to glider kits. Congress understood how to grant EPA authority to regulate vehicle components but declined to authorize regulation of glider kits. *See TRW, Inc. v. Andrews*, 534 U.S. 19, 28-29 (2001) (applying *expressio unius* canon of construction). Under the interpretation set forth in the Phase 2 Rule, there would be no limit on EPA’s authority to regulate parts of vehicles.

The Phase 2 Rule also states that EPA has authority to regulate “incomplete vehicles” and “vehicle components” under Section 202(a). *See* 81 Fed. Reg. at 73,514. It first points to language from Section 202(a)(1) stating that EPA has authority “whether such [new motor] vehicles . . . are designed as complete systems or incorporate devices to prevent or control . . . pollution.” 42 U.S.C. § 7521(a)(1). This portion of section 202(a)(1), however, merely provides that emissions standards are limited to the useful life of a vehicle or engine. *See id.* It does not purport to expand EPA’s authority in the first sentence of that section. *See id.* (“The Administrator shall by regulation prescribe (and from time to time revise) in accordance with the provisions of this section, standards applicable to the emission of any air pollutant from any class or classes of *new motor vehicles*” (emphasis added)).³

Finally, the Phase 2 Rule erred in concluding that glider engines are “new motor vehicle engines” under the Act. A “new motor vehicle engine” is defined as either (1) “an engine in a new motor vehicle,” or (2) a “motor vehicle engine the equitable or legal title to which has never been transferred to the ultimate purchaser.” 42 U.S.C. § 7550(3). Because a glider is not a new motor vehicle, a glider engine is not “an engine in a new motor vehicle.” *Id.* And because a glider engine has previously been owned, title in the engine has previously been “transferred to an ultimate purchaser.” *Id.*

For all of these reasons, Petitioners respectfully suggest that EPA reconsider its authority to regulate gliders under Section 202(a) of the Clean Air Act.

2. EPA’s Prior Decision To Regulate Gliders Was Based on Unsupported Assumptions Rather than Data

The Phase 2 Rule relied upon unsupported assumptions to arrive at the conclusion that immediate regulation of glider vehicles was warranted and necessary. First, the Phase 2 Rule assumed that *all* glider engines would be older engines from before 2002. *See* 81 Fed. Reg. at

³ The Phase 2 Rule also indicated that EPA’s authority to regulate “defeat devices” “support[ed] the actions EPA is taking [under section 202] with respect to . . . glider kits.” 81 Fed. Reg. at 73,518. There is no basis for this contention. Under the Act, a defeat device is “any part or component intended for use with, or as part of, any motor vehicle or motor vehicle engine, 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 or motor vehicle engine* in compliance with [Clean Air Act] regulations.” 42 U.S.C. § 7522(a)(3)(B) (emphasis added). But the “principal effect” of a glider kit is not to “bypass, defeat, or render inoperative” some “device” or “element of design” in a vehicle. The Rule never explained what device or element of design it thought was being defeated.

73,943 (“The modeling also assumed that these gliders emit at the level equivalent to the engines meeting the MY 1998-2001 standards”); RTC 1960-1961. EPA indicated that it believed “most glider vehicles currently being produced use remanufactured engines of this vintage,” *id.* (emphasis added), but it made no effort to quantify what percentage of glider engines in fact would fall within this category and instead assumed that *all* of them would. In fact, the model year of the engines used in glider vehicles varies depending on the donor vehicle or owner and includes engines from after 2002.

EPA also assumed that the nitrogen oxide (“NO_x”) and particulate matter (“PM”) emissions of glider vehicles using pre-2007 engines would be at least ten times higher than emissions from equivalent vehicles being produced with brand new engines. *See id.* at 73,942. But EPA relied on no actual data to support this conclusion; it simply relied on the pre-2007 standards. *Id.* A recent study by Tennessee Technological University (“Tennessee Tech”) analyzing the NO_x, PM, and carbon monoxide (“CO”) emissions from both remanufactured and OEM engines reached a contrary conclusion. *See* Exhibit 1 (Letter to the Hon. Diane Black from Philip B. Oldham, President, Tennessee Technological University, and Thomas Brewer, Associate Vice President, Center for Intelligent Mobility (June 15, 2017)). The results showed that remanufactured engines from model years between 2002 and 2007 performed roughly on par with OEM “certified” engines, and in some instances even out-performed the OEM engines. *See id.* at 1. Tennessee Tech’s research also “showed that remanufactured and OEM engines experience parallel decline in emissions efficiency with increased mileage.” *Id.* at 2. Tennessee Tech also estimated that glider vehicles would emit less than 12% of the total NO_x and PM emissions for all Class 8 heavy duty vehicles, *see id.*, not 33% as the Phase 2 Rule suggests, *see* 81 Fed. Reg. at 73,943. Tennessee Tech’s findings constitute new information, developed since the Phase 2 Rule was promulgated, and provide a basis for EPA to reconsider the existing rule pursuant to Section 307 of the Clean Air Act. 42 U.S.C. § 7607(d)(7)(B); *see* S. Rep. No. 91-1196, at 41-42 (1970) (“[N]ew information . . . may dictate a revision or modification of any promulgated standard or regulation established under the [Clean Air] act.”); *Oljato Chapter of the Navajo Tribe v. Train*, 515 F.2d 654, 660 (D.C. Cir. 1975) (same).

EPA also did not account for its own low-sulfur diesel rule. Starting in 2006, EPA required that diesel fuel refiners produce diesel fuels with a 97% lower sulfur content. *See* 40 C.F.R. §§ 80.500, 80.520. This reduction of sulfur significantly reduced the amount of NO_x, PM, and other pollutants emitted from diesel engines, including gliders and other heavy-duty truck tractors. This reduction was not taken into account in the development of the Phase 2 Rule for gliders.

The Phase 2 Rule also erroneously assumed that the only explanation for the growth of the glider vehicle market was that glider assemblers sought to avoid the increasingly restrictive emission standards for engines in new OEM tractors. 81 Fed. Reg. at 73,943. The reality is that glider vehicles do not directly compete with new OEM tractors. For most individuals or companies that purchase gliders, the choice is not between a glider or a new tractor. The choice is between a glider and continuing to run their old tractor. Further, glider vehicle assemblers often take the lead on forward-thinking research and development that benefits the entire industry, including innovative research on fuel additives, emission devices, and tire and wheel combinations in small production runs. *See* Exhibit 1, at 2. Glider assemblers are currently

testing components, light weight drive systems, alternative fuel mixtures, autonomous drive systems, light weight body materials, and intelligent transportation systems. *Id.* In short, the glider assemblers are a complementary part of the medium- and heavy-duty truck industry, not direct competitors to OEMs.

Finally, the Phase 2 Rule failed to consider the significant environmental *benefits* that glider vehicles create. Glider vehicle GHG emissions are less than those of OEM vehicles due to gliders' greater fuel efficiency, and the carbon footprint of gliders is further reduced by the savings created by recycling materials. Gliders are 20% more fuel efficient than OEM vehicles. *See id.* Moreover, gliders reuse engines and other components, instead of casting new parts. Glider assemblers reuse approximately 4,000 pounds of cast steel in the remanufacturing process, including 3,000 pounds for the engine assembly alone. *Id.* Reusing these components avoids the environmental impact of casting steel, including the significant associated NO_x emissions. *See, e.g.,* National Emission Standards for Hazardous Air Pollutants: Integrated Iron and Steel Manufacturing, 68 Fed. Reg. 27,646 (May 20, 2003); Env'tl. Prot. Agency, *Alternative Control Techniques Document – NO_x Emissions From Iron and Steel Mills*, EPA-453/R-94-065 (Sept. 1994); *see also* Exhibit 1, at 2. Given their better fuel efficiency and reuse of cast steel, gliders have a lower carbon footprint than OEM vehicles, a fact not considered in the development of the Phase 2 Rule.

In light of the new information developed by Tennessee Tech and the unsupported assumptions that form the basis for the Phase 2 Rule as it applies to gliders, EPA should reconsider the rule.


3. Reconsideration Is Warranted under Executive Order 13783

The March 28, 2017 Executive Order, "Presidential Executive Order on Promoting Energy Independence and Economic Growth," further highlights why EPA should reconsider the Phase 2 Rule as it applies to gliders. Exec. Order No. 13,783 (Mar. 28, 2017). The Executive Order rescinds (among other things) the June 2013 report from the Executive Office of the President, titled "The President's Climate Action Plan," and instructs EPA and all other federal agencies to "identify existing agency actions related to or arising from" the now-rescinded plan and to "suspend, revise, or rescind, or publish for notice and comment proposed rules suspending, revising, or rescinding any such actions, as appropriate and consistent with law and with the policies set forth in section 1 of th[e] order." *Id.* §§ 3(b), (d). The Phase 2 Rule is a direct product of the Climate Action Plan. 81 Fed. Reg. at 73,480. And reconsideration of the application of the Phase 2 Rule to gliders is consistent with the Executive Order's stated purpose of avoiding environmental regulation that "constrain[s] economic growth" and "prevent[s] job creation" and ensuring that "environmental regulations comply with the law, are of greater benefit than cost, and are developed through transparent processes that employ the best available peer-reviewed science and economics." Exec. Order No. 13,783 §§ 1(a), (e). Because the Phase 2 Rule is related to the rescinded Climate Action Plan, and because the portion of the Rule that applies to gliders conflicts with the policies set forth in Section 1 of the Order, EPA should reconsider the rule. Based on that reconsideration, EPA should "suspend, revise, or rescind" the Rule as applied to gliders, including, as necessary, by promulgating new regulations. *See id.* § 3(d).

Conclusion

For the foregoing reasons, Petitioners respectfully request EPA to reconsider application of the Phase 2 Rule to gliders. Given the impending January 1, 2018 compliance date, which will effectively eliminate the industry, Petitioners request that EPA complete this reconsideration as soon as possible.

Respectfully,



Fitzgerald Glider Kits, LLC
Tommy C. Fitzgerald, President



Harrison Truck Centers, Inc.
Dustin Petersen, Shareholder



Indiana Phoenix, Inc.
Dane Keener, General Manager

EXHIBIT 1



Office of the President

TENNESSEE TECH

June 15, 2017

The Honorable Diane Black
1131 Longworth HOB
Washington, DC 20515

Reference: Tennessee Tech University – Summary of Heavy Duty Truck Study and Evaluation of the Phase II Heavy Duty Truck Rule

Congressman Black:

From September 2016 – November 2016, the Tennessee Technological University Department of Civil and Environmental Engineering (“Tennessee Tech”) conducted the first phase of its research on the environmental and economic impact of the Greenhouse Gas Emissions and Fuel Efficiency Standards for Medium- and Heavy-Duty Engines and Vehicles – Phase 2 rule (“Phase 2 Rule”) published October 25, 2016. The key areas of research were to (1) Compare Glider Kit compliance with the Phase 2 Rule; (2) Perform high level environmental footprint and economic study of OEM manufacturing vs. assembly of remanufactured components (Glider Kits); and (3) Evaluate industry optimization plans to address future environmental regulations including but not limited to production vehicles, component assembly, and facility compliance.

To carry out the environmental footprint component of the research, Tennessee Tech tested thirteen heavy-duty trucks on a common chassis dynamometer at a common site; eight trucks were remanufactured engines and five were OEM “certified” engines, all with low mileage (NOTE: These Base Line Setting Phase I results were completed by testing only one Glider Kit manufacturer’s product and one OEM’s product). Each vehicle was evaluated for fuel efficiency, carbon monoxide (CO), particulate matter (PM) emissions and nitrogen oxide (NO_x). The results of the emissions test were compared with the 2010 EPA emissions standards for HDVs. Our research showed that optimized and remanufactured 2002-2007 engines and OEM “certified” engines performed equally as well and in some instances out-performed the OEM engines. (see also Appendix A for more detailed test results).

Summary Chart of Phase 1 Test Results	
Emission Standard	Result
CO	All vehicles met the standard
PM	All vehicles met the standard
NO _x	None of the vehicles met the standard

Congressman Black
June 15, 2017

While none of the vehicles met the NO_x standard, a glider remanufactured engine achieved the best result of any engine tested (see Appendix A). Further, our research showed that remanufactured and OEM engines experience parallel decline in emissions efficiency with increased mileage. Contrary to the assertion in the Phase 2 Rule, it is our estimate that the glider kit HDVs would emit less than 12% of the total NO_x and PM emissions, not 50%, for all Class 8 HDVs. Should the Phase 2 glider cap be fully implemented on January 1, 2018, there is little doubt that consumers utilizing glider vehicles, due to economic considerations, will delay purchasing new equipment and consequently, slow the reduction of engine emissions nationwide. In this regard, the Phase 2 rule is counter-productive to its stated intent.

In addition to equal or lower emissions, glider kits have a smaller carbon footprint than OEM vehicles due to fuel efficiency and recycling of materials. Comparisons between 2016 glider kit vehicles and new EPA compliant vehicles for fuel efficiency reflect that glider kits are 20% more efficient on fuel consumption. Glider vehicles also reuse engines and other components in the remanufacturing process, resulting in the reuse of approximately 4,000 pounds of cast steel. The engine assembly alone accounts for approximately 3,000 pounds of recycled cast steel. Thus, the well-documented environmental impact of casting steel, including the significant NO_x emissions, is avoided by reusing cast steel components in glider vehicles. Consequently, given the superior fuel efficiency and the reuse of cast steel, glider vehicles have a lower carbon footprint than OEMs. None of these facts were considered in the development of the Phase 2 rule.

From an economic standpoint, Tennessee Tech examined the impact of the Phase 2 Rule sales cap of 300 units for glider kits would have on the State of Tennessee. The 300 unit sales cap represents 9% of Fitzgerald's current sales. It is estimated that a 91% reduction in output by Fitzgerald would result in a direct loss of approximately 947 jobs and a loss of approximately \$512 million of economic output in the State of Tennessee alone. This impact takes into account the direct and indirect economic impact, including expenditures on labor, operations and maintenance as well as changes in the supply chain throughout the state. Additionally, on a broader scale, the economic impact of the Phase 2 Rule could easily exceed \$1 billion nationwide due to thousands of permanent job losses and supply chain interruption and reduction. The Phase 2 Rule failed to sufficiently evaluate and consider these impacts.

Finally, this phase of the research shows that trucking companies that utilize glider kit HDVs in their fleets are vigilant in maintenance and elect to optimize their fleets to maximum efficiency throughout the life span of the vehicle. Further, glider kit assemblers facilitate research and development for OEM's by conducting innovative research for fuel additives, emission devices, tire and wheel combinations in small production runs and are currently testing components, light weight drive systems, alternative fuel mixtures, autonomous drive systems, light weight body materials, and intelligent transportation systems. As a general statement, our observation is glider assemblers are in tune with industry needs and cutting edge innovation.

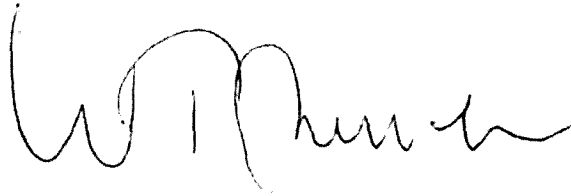
Congressman Black
June 15, 2017

Tennessee Tech will continue to evaluate HDV engines during Phase II of the research in 2017. Such effort will be conducted in conjunction with the Oak Ridge National Lab - Fuel Engines & Emissions Research Center. The goals of the next phase include development of engineering and manufacturing solutions that exceed EPA emission standards, a focused research, development, and testing plan for NO_x emissions, and to continue testing to demonstrate continuous improvement of emissions from remanufactured heavy-duty engines.

Sincerely,



Philip B. Oldham
President



Thomas Brewer
Associate Vice President
Center for Intelligent Mobility

APPENDIX A: Testing Results from Tennessee Tech Phase 1 Heavy Duty Vehicle Study

Engine	Type	CO (g/HP * hr) (2010 standard = 15.5)	PM
Detroit Diesel DD15	ReMan	0.290	BTD
Caterpillar CT13	ReMan	0.212	BTD
Detroit Diesel Series 60	ReMan	1.553	BTD
Detroit Diesel Series 60	ReMan	1.959	BTD
Detroit Diesel Series 60	ReMan	0.015	BTD
Detroit Diesel Series 60	ReMan	0.317	BTD
Detroit Diesel Series 60	ReMan	0.483	BTD
Detroit Diesel Series 60	ReMan	0.467	BTD
Detroit Diesel DD15	OEM	0.491	BTD
Detroit Diesel DD15	OEM	1.169	BTD
Detroit Diesel DD15	OEM	0.556	BTD
Detroit Diesel DD15	OEM	0.098	BTD
Detroit Diesel DD15	OEM	1.558	BTD

*BTD=below threshold detection point

** NO_x (g/HP * HP) (2010 standard = 0.2); All tested engines were higher than the standard and ranged from a low of 0.44 to a high of 6.45. The lowest tested NO_x was a Fitzgerald – Reman Detroit Diesel DD 15 using proprietary Fitzgerald engine design and set up. That same engine also tested at the 0.290 Co rate.

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- Weight: unspecified
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