RENEWABLE FUELS ASSOCIATION

March 25, 2019

Attention: Docket No. EPA-HQ-OGC-2018-0818

Via Regulations.gov
U.S. Environmental Protection Agency
1200 Pennsylvania Avenue, NW
Washington, DC 20460

Re: Comments of Renewable Fuels Association to Notice of Proposed Partial Consent Decree; Request for Public Comment in Sierra Club v. Pruitt, *No. 1:17-cv-02174-APM (D.D.C.)*

The Renewable Fuels Association ("RFA") appreciates the opportunity to comment on the partial consent decree in *Sierra Club v. Pruitt*, No. 1:17-cv-02174-APM (D.D.C.).

I. RFA'S INTEREST IN THE CONSENT ORDER AND INTRODUCTION

As the representative of America's ethanol industry, RFA's mission is to advance the development, production, and use of fuel ethanol by strengthening America's ethanol industry and raising awareness about the benefits of renewable fuels. The Anti-backsliding study that is the crux of the *Sierra Club v. Pruitt* litigation and of the proposed consent order comes from the Energy Independence and Security Act, which requires EPA "to determine whether the renewable fuel volumes required by this section will adversely impact air quality as a result of changes in vehicle and engine emissions of air pollutants regulated under" the Clean Air Act.[1] RFA has an interest in ensuring that the air quality benefits of ethanol—particularly the reductions in air toxics and emissions that contribute to ground-level ozone—are accurately reflected in EPA's study because the results will be used to determine whether "regulations" are necessary to "mitigate" the air quality

[1] 42 U.S.C. § 7545(v)(1).

impacts of the Renewable Fuels Standard ("RFS").[2] Recent scientific studies and analyses demonstrate that the inclusion of ethanol in gasoline provides net reductions in the emissions of key pollutants that endanger human health and contribute to ground-level ozone formation.[3] Thus, we are confident that EPA's Anti-backsliding Study—if based on credible and sound scientific methods, data, and modeling—will confirm the air quality benefits attributable to growth in ethanol consumption under the RFS.

However, the use of inappropriate modeling tools, questionable methods, or flawed data could lead to incomplete, unreliable, or skewed results and conclusions about ethanol's impacts. Therefore, RFA's comments herein relate largely to the underlying methodology that is anticipated to form the basis for the Anti-backsliding Study to be completed under the terms of the proposed consent decree.

RFA acknowledges that § 211(v) of the Clean Air Act, as amended by the Energy Independence and Security Act of 2007, requires EPA to issue an Anti-backsliding Study. However, unless the Anti-backsliding Study reflects the best available science, RFA remains concerned that a flawed, rushed study would be counter-productive. To the extent that EPA uses the MOVES2014b model for emissions modeling in the Anti-backsliding Study, the emissions model likely will not accurately demonstrate reductions in the harmful air pollution that many other studies attribute to the use of higher ethanol blends in gasoline.[4] Although MOVES2014b is not specifically mentioned in

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[2] *See* Renewable Fuels Association and Growth Energy, "California Multimedia Evaluation of Gasoline-Ethanol Blends between E10 and E30 Tier I Report" Comments to California Air Resources Board (Feb. 14, 2019) at 45 ("None of the E15 studies, whether done on California fuels or other US fuels found a statistically significant increase in any criteria pollutant. NOx, CO, PM mass emissions, or organic emissions (NMOG, THC, or NMHC depending on the study) were measured. Statistically significant decreases were found for NMHC, CO and potency weighted toxics, and a marginally significant decrease in NOx emissions due to changes in ethanol content in the fuel.").

[3] *See id*. (summarizing studies); Anderson, J., Wallington, T., Stein, R., and Studzinski, W., "Issues with T50 and T90 as Match Criteria for Ethanol-Gasoline Blends," 7 *SAE Int. J. Fuels Lubr*. 3 (Nov. 2014) 1027, 1031 ("Numerous studies in which ethanol was splash-blended with a fixed gasoline blendstock have demonstrated reductions of vehicle exhaust emissions, particularly particulate matter (PM), non-methane hydrocarbons (NMHC), and the air toxics 1,3-butadiene and benzene. Particularly noteworthy is the reduction of PM emissions with the addition of ethanol, which has been demonstrated in many studies and is supported by fundamental combustion chemistry considerations.") (citing eleven studies).

[4] The MOVES2014 model has already undergone two substantial revisions (MOVES2014a and MOVES2014b) and five additional minor updates since its original release in October 2014. *See* https://www.epa.gov/moves/moves2014-update-log. This underscores the complexity, uncertainty, and proclivity toward errors associated with the model, as well as the inability of the model to keep up with rapid and dynamic changes in real-world fuel and vehicle markets. *See* Coordinating Research Council Report No. E-101 (August 2016) at 47 ("The Fuel Wizard tool that operates within the MOVES2014 GUI was tested and found to produce incorrect results that were off by orders of magnitude. This finding was communicated to EPA upon its discovery. Formulaic errors in the Fuel Wizard development were confirmed by EPA."). The critique in this comment related to MOVES2014b applies equally to earlier iterations of the model.

the consent order, RFA has concerns with the deadline of the consent order, March 20, 2020. This date likely does not provide adequate time for EPA to improve its methodology and produce a study based on test fuels and data that more accurately represent real-world fuel blends. RFA strongly believes that the deadline for the Anti-backsliding Study should be driven by the time needed to correct the MOVES2014b model's treatment of ethanol blends or to develop a new model for ethanol blends, rather than an arbitrary date in the consent order. As a result of these concerns, RFA believes the March 20, 2020 completion deadline for the Anti-backsliding Study should be extended by at least 180 days so that EPA may improve the MOVES2014b model's approach to ethanol blends, or develop an appropriate alternative modeling tool.

II. THE ANTI-BACKSLIDING STUDY'S METHODOLOGY SHOULD INCORPORATE REAL WORLD FUEL INPUTS AND SCENARIOS

MOVES2014b—EPA's current vehicle emissions modeling system—estimates mobile source emissions of criteria pollutants, greenhouse gases, and air toxics. According to multiple independent third-party reviews, MOVES2014 provides an inadequate and unreliable tool for estimating the exhaust emissions of ethanol-gasoline blends. The model's use of data from the EPAct/V2/E-89 Fuel Effects Study mars the effectiveness of MOVES2014 with regard to ethanol-gasoline blends.

The MOVES2014 model produces inaccurate ethanol emissions results because it relies upon "match blending" methods intended to "match" specific fuel parameters, rather than the "splash blending" of ethanol into commercial gasoline blendstocks—which would mirror real-world gasoline blending practices. The model's questionable predictions for certain emissions result from its use of data that misrepresents the actual parameters and composition of mid-level ethanol blends.[5] Specifically, the default ethanol blend data in the MOVES2014 model is based on the EPAct/V2/E-89 Fuel Effects Study, which created unique match-blended fuels by adjusting the gasoline blendstock to hold constant select parameters, namely the distillation temperatures (T50 and T90, the temperatures at which fifty percent and ninety percent, respectively, of the fuel are vaporized). Because the addition of ethanol to gasoline blendstock reduces the blended gasoline's T50 and T90,

[5] *See* Coordinating Research Council Report, *supra* note 4, at 47 ("Comparing MOVES2014 fuel property changes to those of California and API blending resources is notably an apples-to-oranges comparison as EPA indicates that the E0 to E10 differences of MOVES are from national refinery modeling and are not reflective of the change in properties from ethanol splash blending.").

the study added high distillate aromatic and saturated hydrocarbons to account for and reverse ethanol's effect on T50 and T90.

As a result, the match-blended fuels in the EPAct/V2/E-89 study did not resemble actual ethanol-gasoline blends found in commerce. While the distillation temperatures between the test fuels were controlled, the addition of additional aromatics caused other inadvertent effects. For example, some fuels in the model contained unrealistic octane ratings—higher than would be available in the marketplace—due to the addition of high-distillate hydrocarbons. And because ethanol affects gasoline distillation in a non-linear fashion, increasing the T50 of blends containing more than 10 percent ethanol to match the T50 of E0 and E10 blends elevated T60-80 distillation temperatures.[6] Higher upper distillation temperatures in the ethanol blends above E10 mean that more heat is needed to vaporize fuel components adequately.[7] Higher temperatures generally result in incomplete combustion and greater pollution.[8]

The conclusions from the MOVES2014 for mid-level ethanol blends (e.g., E15 and higher) contradict other emissions test data.[9] In early 2016, a detailed analysis of the MOVES2014 model conducted by scientists from Wyle Laboratories and the Volpe National Transportation Systems Center concluded, "Overall, it was found that the predictive emissions results generated by MOVES2014 for mid-level ethanol blends were sometimes inconsistent with other emissions results from the scientific literature for both exhaust emissions and evaporative emissions…results and trends from MOVES2014 for certain pollutants are often contrary to the findings of other studies and reports in the literature."[10] In particular, the MOVES2014 model predicts that as ethanol content increases, there is a corresponding increase in exhaust emissions of nitrogen components and particulate matter, even though real-world emissions testing based on mid-level ethanol blends has demonstrated the opposite.[11] "The results from other researchers often show ethanol-related

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[6] *See* Anderson et al., *supra* note 3 at 1031 (discussing impact of unmatched T60-T80 and how it skews results).

[7] *Id*. at 1032.

[8] *See id.* at 1031 ("These comparisons illustrate a potential issue with using single points on the distillation curve as match blending criteria. Higher T60, T70, and T80 values will likely have an adverse impact on tailpipe emissions (similar in magnitude as the T50 and T90 impacts), even though T50 and T90 are the same.").

[9] *See id*. ("Because the occurrence of decreased PM emissions with splash blending of ethanol is particularly well documented, it serves as a good example to illustrate the potential issues with ethanol-gasoline blend studies that use match blending to maintain T50 and T90 (and appear to obtain the opposite result).")

[10] Wayson, R., Kim, B., and Noel, G. January 2016. "Evaluation of Ethanol Fuel Blends in EPA MOVES2014 Model," at 12, available at: https://ethanolrfa.org/wp-content/uploads/2016/01/RFA-MOVES-Report.pdf.

[11] *See* Anderson et al., *supra* note 3 at 1032-33 ("The addition of these [higher boiling point] hydrocarbons with lower volatility (and poorer fuel vaporization and air-fuel mixing) can reasonably be concluded to be the

emissions trends that are different than the MOVES2014 results obtained for this study…; In some cases not only were magnitudes different but different [directional] trends were presented."[12]

These likely distortions are then exacerbated by the use of overly restrictive adjustment factors and equations. According to the Wyle and Volpe report, "…the trends used to determine constants in the model's equations may need to consider many more variables than are now being considered," and "the adjustment factor approach may need to be more robust and consider the changes to emissions as a function of all properties, not independently."[13]

In particular, the adjustment factors in the MOVES2014 model do not accurately account for reductions in aromatics contents and T90 temperatures when ethanol is added to gasoline via splash blending. The MOVES2014 model predicts that refiners who modify their gasoline blendstocks to produce E10 instead of E0 reduce summertime and wintertime aromatics content by 2.02% and 3.65%, respectively, and summertime and wintertime T90 by 1.77°F and 2.35°F, respectively.[14] However, EPA's own fuel trends strongly suggest a correlation between higher ethanol blends and lower aromatic content.[15] Average aromatic content dropped from 28.5% to 21.76% between 2000 and 2016.[16] In other words, as E10 use became more widespread, refiners reduced average aromatic content significantly. Indeed, EPA itself states that "[e]thanol's high octane value has also allowed refiners to significantly reduce the aromatic content of the gasoline, a trend borne out in the data."[17] And as EPA acknowledged in March 2019, "During the rapid expansion of E10 blending between 2007–2012, aromatics levels were observed to decline by a few volume percent while pump octane levels stayed constant."[18] This is a critical factor because even a small reduction in aromatics results in beneficial impacts to air emissions. EPA's MOVES2014 model continues to falsely predict that aromatics content increases as ethanol content increases, even though EPA's own real-world data

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underlying cause of the increased emissions, including PM, and not the increased ethanol content. However, if the caveat is ignored, the above conclusion may be erroneously interpreted as 'increased ethanol content increases exhaust emissions.' To avoid this confusion, it could be reasonably argued that the EPAct conclusion should instead state 'increased high-boiling-point hydrocarbon content (to compensate for the T50 reduction from increasing ethanol content) increases exhaust emissions.").

[12] Wayson, *supra* note 10, at 58.

[13] *Id*. at 12.

[14] *See* EPA, Fuel Supply Defaults: Regional Fuels and the Fuel Wizard in MOVES2014 11 (Nov. 2016).

[15] EPA Fuel Trends Report: Gasoline 2006 – 2016 26 (Oct. 2017).

[16] *See id*.

[17] *See id.*

[18] 84 Fed. Reg. 10,584, 10,604 (March 21, 2019).

shows just the opposite. Yet, even after seven revisions to the MOVES2014 modeling framework, there is no evidence that EPA has addressed this issue.

To correct the deficiencies with the MOVES2014 model, the Wyle and Volpe scientists recommend "…additional vehicle exhaust testing from mid-level ethanol blends with well-defined fuel properties."[19] RFA agrees with the conclusions and recommendations of the Wyle/Volpe study and encourages EPA to suspend further usage of the MOVES2014 model until a new emissions study is conducted.

Short of a new study, RFA has identified two ways in which EPA could increase the accuracy of its model. First, EPA could apply larger ethanol adjustment factors for aromatics and T90 to account for how MOVES2014 currently understates the potential impact of E10 on refinery operations.[20] Second, as an initial step in improving the MOVES2014b model's treatment of ethanol blends, EPA should modify the model to include the T70 parameter as an explanatory variable in analysis of fuel effects on PM emissions as recommended by Darlington *et al*.[21] In a recent *Society of Automotive Engineers* technical paper, this group of fuel experts and automotive engineers presented an alternative model that adds T70 as an explanatory variable, finding that "…if T70 is added to the Bag 1 EPAct model and used in EPA's MOVES2014 emission inventory model, increased ethanol levels beyond E10 are predicted to reduce PM from on-road motor vehicles in the U.S."[22] If EPA does not make these adjustments, then at the very least, EPA should limit the MOVES2014 ethanol variable to 10 percent to preclude inaccurate comparisons between fuels with different levels of ethanol.

III. THE MARCH 20, 2020 DEADLINE FOR THE ANTI-BACKSLIDING STUDY SHOULD BE EXTENDED BY AT LEAST 180 DAYS

RFA opposes the March 20, 2020 deadline specified in the proposed consent order to complete the Anti-backsliding Study because approximately one calendar year is insufficient to make necessary improvements to the MOVES2014b model or develop a new modeling framework, finalize

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[19] Wayson et al., *supra* note 10 at 10.

[20] *See* Comments of Urban Air Initiative (March 25, 2019), Appendix B: "Impact of Ethanol Blending on Aromatics and T90" at 4, Docket No. EPA-HQ-OGC-2018-0818.

[21] Darlington, T., Kahlbaum, D., Van Hulzen, S., and Furey, R. "Analysis of EPAct Emission Data Using T70 as Additional Predictor of PM Emissions from Tier 2 Gasoline Vehicles," SAE Technical Paper 2016-01-0996, 2016, available at https://doi.org/10.4271/2016-01-0996.

[22] *Id*.

such a complex and consequential study, and invite and respond to public comment. Even under an "expeditious" schedule, preparing the Anti-backsliding Study would take 14 months, and that timeframe did not even envision public comment.[23] RFA (and presumably other stakeholders as well) will seek the opportunity to provide public comment on the study. Accounting for time to address the concerns raised herein regarding match blends, adjustment factors, and other issues, and allowing at least 30 days for public comment and 90 days for EPA to respond to comments, EPA will need at least 180 days' time, in addition to the March 20, 2020 date provided in the consent decree, to ensure accurate results.

Thank you for the opportunity to comment. RFA appreciates your consideration.

Sincerely,

Geoff Cooper
President & CEO

[23] *See* Declaration of Christopher Grundler ¶ 9, *Sierra Club v. Wheeler*, No. 17-2174 (APM), Doc. 28-2 (D.D.C., filed Aug. 13, 2018) ("[T]he most expeditious schedule under the circumstances for completing the anti-backsliding study is approximately 14 months….").