# REQUEST FOR CORRECTION OF INFORMATION

**submitted on behalf of**

**THE STATE OF KANSAS, THE STATE OF NEBRASKA,**

**THE ENERGY FUTURE COALITION, and URBAN AIR INITIATIVE**

**Concerning the U.S. Environmental Protection Agency's**

**EPAct/V2/E-89 FUEL EFFECTS STUDY**

**and**

**MOTOR VEHICLE EMISSIONS SIMULATOR MODEL (MOVES2014)**

**Docket ID Nos. EPA–420-R-13-002, FRL-9917-26-OAR**

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March 6, 2015

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## INTRODUCTION

The Energy Future Coalition and Urban Air Initiative (Petitioners) respectfully petition the United States Environmental Protection Agency (EPA) for correction of information concerning motor vehicle fuel emissions represented in the Motor Vehicle Emissions Simulator model (MOVES2014) and the EPAct/V2/E-89 fuel effects study (EPAct study)[1] on which it is based. As described below, both the model and the study seriously mischaracterize the air pollution effects of blending ethanol into gasoline.

This is a story of data manipulated to produce a policy-driving scientific model whose results are precisely the opposite of what occurs in the real world. The key concept obscured by the EPAct study and the resulting MOVES2014 model is that blending ethanol into ordinary gasoline reduces harmful emissions produced when gasoline combusts in an engine. Ethanol accomplishes this salutary effect both by diluting the most harmful components in gasoline with its own clean octane and by lowering the temperature at which various proportions of the fuel mixture combust, which further lowers pollution.

These proven facts about ethanol's emissions effects would have been confirmed by any study that simply added ethanol to an existing gasoline

[1] EPA, Assessing the Effect of Five Gasoline Properties on Exhaust Emissions from Light-Duty Vehicles Certified to Tier 2 Standards: Analysis of Data from EPAct Phase 3 (EPAct/V2/E-89), Final Report (Apr. 2013) (hereinafter "EPAct Final Report"), http://www.epa.gov/otaq/models/moves/documents/420r13002.pdf.

blendstock as occurs at refineries across the country, allowing ethanol to dilute the fuel's hydrocarbon content and to lower its distillation profile.

Instead the EPAct study's designers—which included a Chevron consultant—did the opposite. They artificially reversed the beneficial ethanol-blending effects described above, dumping in more of the most polluting fuel additives—high-boiling-point hydrocarbons—to restore the distillation profile of the ethanol-gasoline blends, though not required by any law or private standard. As a result, the EPAct Study unfairly attributes to ethanol the emissions effects of the hydrocarbons used to elevate the targeted distillation temperatures. And now the MOVES2014 vehicular emissions model, which incorporates the EPAct study's conclusions, requires States to adopt those same mistaken conclusions about the causes of vehicular air pollution when they decide how to come into compliance with EPA's air quality standards.

### A. The EPAct Study

The EPAct study is an ambitious but misguided analysis of the emissions effects of five fuel parameters (ethanol content, aromatics content, Reid Vapor Pressure (RVP), T50, and T90) based on 15 vehicles and 27 test fuels including so-called straight gasoline (E0) and blends of gasoline with 10%, 15%, and 20% ethanol (E10, E15, and E20). EPA conducted the EPAct study with the assistance

of Southwest Research Institute (SwRI) and the Coordinating Research Council (CRC), a non-profit organization supported by the American Petroleum Institute.

Instead of testing the emissions effects of mid-level ethanol blends by simply adding ethanol to commercial gasoline blendstocks ("splash blending"), the EPAct study's designers created novel fuels through a "match blending" process in which they first adjusted the gasoline blendstock to hold constant selected parameters, including T50 and T90—the "distillation temperatures" at which 50% and 90% of the contents of the fuel are vaporized. In order to match the T50 and T90 of fuels with varying ethanol concentrations, high distillate aromatic and saturated hydrocarbons were added to fuels with higher ethanol content to counteract ethanol's beneficial effect of lowering T50 and T90.

The stated purpose of this perverse blending methodology was to match certain arbitrary distillation points across the various test fuels, specifically T50 and T90—the temperature at which 50% and 90% of the contents of a given fuel vaporize. But there is no good reason, law, or standard for holding T50 and T90 constant, and any semblance of uniformity among the test fuels is illusory, for the distillation profiles of blended fuels are not straight lines. The resulting test fuels deviated significantly from fuels available in the market—with some fuels exceeding legal limits on driveability (a measure of cold-start and warm up

performance) and others containing unrealistically high octane ratings, thanks to the addition of costly and harmful high-distillate hydrocarbons.

The result of this "match blending" was the EPAct study's conclusion that "other factors being equal, increasing ethanol is associated with an increase in emissions."[2] This conclusion is misleading at best, because other factors are never equal in the real world.[3] There is no regulatory, mechanical, or health justification for adding high-boiling-point hydrocarbons to test fuels for the purpose of measuring ethanol's effect on tailpipe emissions.[4] And that is the only way to account for the EPAct study's results: ethanol has been shown in numerous empirical studies to contribute to a *decrease* in emissions.

Even when one accounts for the other four fuel parameters (aromatics, T50, T90, and RVP), it is impossible to derive accurate results from the EPAct study. The study fails to control for differences in the full range the test fuels' distillation temperatures (other than T50 and T90). Because of ethanol's non-linear effect on gasoline distillation, raising the T50 of higher ethanol blends to *match* the T50 of

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[2] *Id.* at 7.

[3] *See* Anderson et al., *Issues with T50 and T90 as Match Criteria for Ethanol-Gasoline Blends*, SAE 2014-01-9080, at 1034 (2014) ("[O]ther factors are not equal when ethanol is added to gasoline. Depending on the blendstock, the added ethanol reduces T50 due to near-azeotropic behavior and reduces T90 and aromatics content by dilution. Considered as a whole, these factors tend to reduce emissions with increasing ethanol.").

[4] *Id.* at 1030 ("[Blendstock] modifications should generally not be needed to control these parameters in studies evaluating the effects of ethanol content on emissions if starting with an E10 fuel or using an E10 intended [blendstock].").

E0 and E10 blends results in elevated T60-80 distillation temperatures. And whenever more heat is required to vaporize fuel components, more emissions result. The EPAct study also fails to account for differences in the speciation of the test fuels' hydrocarbon content. The high-distillate hydrocarbons used to raise T50 and T90 have the greatest effect on emissions, but for purposes of its match blending methodology, the EPAct study treats all aromatics alike.[5]

### B. The MOVES2014 Model

The MOVES model, developed by EPA's Office of Transportation and Air Quality (OTAQ), estimates emissions for mobile sources at the national, county, and project level for criteria pollutants, greenhouse gases, and air toxics. The Clean Air Act requires EPA to update its mobile source emissions models regularly. MOVES2014 is the latest such iteration and reflects the benefits of the Tier 3 rule and other recent rulemakings, new emissions data, and newly reported effects of fuel properties such as gasoline sulfur and ethanol. Pursuant to EPA's Official Release of the MOVES2014 model, States must immediately begin using MOVES2014 in the construction of their State Implementation Plans (SIPs) for compliance with the National Ambient Air Quality Standards (NAAQS).[6]

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[5] *See infra* at 31.

[6] Official Release of the MOVES2014 Motor Vehicle Emissions Model for SIPs and Transportation Conformity, 79 Fed. Reg. 60343, 60344 (Oct. 7, 2014).

The MOVES2014 model incorporates the EPAct study, and the model's negative treatment of the emissions resulting from ethanol blends is directly based on the conclusions of the EPAct study.

Because the erroneous information at issue in this Request for Correction is the product of the EPAct study's flawed design, Petitioners respectfully request that EPA withdraw the EPAct study and the MOVES2014 model, so that an objective and accurate fuel effects study and emissions model may take their place following a meaningful opportunity for public comment.

## II. PETITIONERS' INTEREST IN THE EPACT STUDY AND MOVES2014 MODEL

The States of Kansas and Nebraska are directly regulated by EPA's Official Release of the MOVES2014 model, which requires the States to use the model in constructing State Implementation Plans (SIPs) for compliance with the National Ambient Air Quality Standards (NAAQS). The challenged rule therefore imposes an administrative burden on the States. The MOVES2014 model also diminishes State revenues derived from Kansas and Nebraska's agricultural industries because it encourages all States to develop SIPs that limit the sale and consumption of ethanol in motor vehicle fuel.

The Energy Future Coalition is a bipartisan public policy initiative that brings together business, labor, and environmental leaders to address the challenges and opportunities of the transition to cleaner energy technologies. The

Coalition seeks to identify and advance innovative policy options that appeal to a diverse array of competing interests and attract broad political support.

Urban Air Initiative is a group of concerned citizens, non-profit groups, agriculture organizations, businesses of all types, and other stakeholders determined to reduce the threat to public health posed by our use of petroleum-based fuels, especially in urban areas where citizens are exposed to mobile source emissions at dangerous levels.

The Petitioners filed a petition for judicial review of EPA's Official Release of the MOVES2014 Model.[7] The petition was filed within the limitation period provided by 42 U.S.C. § 7607(b)(1), to preserve Petitioners' right to judicial review. But Petitioners proposed, and the Government agreed to, an extended briefing schedule, with the opening brief due June 8, 2015. *See* Order, *Kansas v. EPA*, No. 14-1268 (D.C. Cir. Jan. 21, 2015). Petitioners file this Request for Correction of Information to afford an opportunity for the Agency to withdraw the challenged model and underlying fuel effects study before briefing commences in *Kansas v. EPA*.

[7] *Kansas v. EPA*, No. 14-1268 (D.C. Cir. Dec. 5, 2014).

## III. THE AGENCY'S INFORMATION QUALITY GUIDELINES REQUIRE THE EPACT STUDY AND MOVES2014 MODEL TO MEET HIGH STANDARDS OF OBJECTIVITY, UTILITY, AND INTEGRITY.

Pursuant to the Information Quality Act[8] and the implementing guidelines of the Office of Management and Budget,[9] EPA promulgated its own Information Quality Guidelines.[10] Those Guidelines reflect the Agency's goal that "[d]isseminated information should adhere to a basic standard of quality, including objectivity, utility, and integrity."[11]

For information to be objective, it must be "accurate, reliable, and unbiased," and it must "be[] presented in an accurate, clear, complete, and unbiased manner."[12]

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[8] Pub. L. 106-554, § 1(a)(3), 114 Stat. 2763, 2763A-153 (Dec. 21, 2000), *codified in* 44 U.S.C. § 3516, note (requiring OMB to promulgate guidelines that "require that each Federal agency . . issue guidelines ensuring and maximizing the quality, objectivity, utility, and integrity of information (including statistical information) disseminated by the agency" and "establish administrative mechanisms allowing affected persons to seek and obtain correction of information maintained and disseminated by the agency that does not comply with the [OMB] guidelines").

[9] Office of Management and Budget, Information Quality Guidelines (Oct. 1, 2002), *available at* http://www.whitehouse.gov/sites/default/files/omb/inforeg/iqg_oct2002.pdf.

[10] EPA, Guidelines for Ensuring and Maximizing the Quality, Objectivity, Utility, and Integrity of Information Disseminated by the Environmental Protection Agency (Oct. 2002) (hereinafter "Information Quality Guidelines"), *available at* http://www.epa.gov/QUALITY/informationguidelines/documents/EPA_InfoQualityGuidelines.pdf.

[11] *Id.* at 3.

[12] *Id.* at 15.

To meet the "utility" standard, information must be "useful[] . . . to its intended users"[13]—in this case the States who must use the MOVES2014 model in constructing their SIPs.

The "integrity" requirement demands that information be protected "from unauthorized access or revision, to ensure that the information is not compromised through corruption or falsification."[14]

### A. The EPAct Study and the MOVES2014 Model Are Subject to the Information Quality Guidelines.

EPA's Information Quality Guidelines apply to "information" that is "disseminated" by the Agency.[15] The EPAct study and the MOVES2014 model, including their conclusions about ethanol's effect on vehicular emissions qualify as "information," which is defined to include "any communication or representation of knowledge such as facts or data, in any medium or form."[16] The EPAct study and MOVES2014 model were "disseminated" when they were published to the

[13] *Id.*

[14] *Id.*

[15] *Id.*

[16] *Id.*; *see also id.* ("Preliminary information EPA disseminates to the public is also considered 'information' for purposes of the Guidelines.").

Agency's website,[17] and again when they were used in support of EPA's mandate that the States employ MOVES2014 in their SIPs.[18]

EPA's Information Quality Guidelines apply equally to information generated by contractors, "[s]ince EPA is responsible for managing the work assigned to contractors" and thus "has a relatively high degree of control over the quality of this information." *Id.* at 6.

### B. The EPAct Study and MOVES2014 Model Are "Influential" Information Subject to the Highest Standards of Quality.

The Agency's Information Quality Guidelines adopt a graded approach, in which the applicable standard of quality depends upon the significance of the information in question. "EPA recognizes that some of the information it disseminates includes influential scientific, financial, or statistical information, and that this category should meet a higher standard of quality."[19]

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[17] *See* EPAct Final Report, *supra* note 1; MOVES (Motor Vehicle Emission Simulator), http://www.epa.gov/otaq/models/moves/; Information Quality Guidelines, *supra* note 10, at 15 ("EPA initiates a distribution of information if EPA prepares the information and distributes it to support or represent EPA's viewpoint.").

[18] Official Release of the MOVES2014 Motor Vehicle Emissions Model for SIPs and Transportation Conformity, 79 Fed. Reg. 60343, 60344 (Oct. 7, 2014); *see* Information Quality Guidelines, *supra* note 10, at 15 ("EPA initiates a distribution of information if EPA prepares the information and distributes it . . . to formulate or support a regulation, guidance, or other Agency decision or position.").

[19] *Id.* at 19.

### 1. The EPAct Study and MOVES2014 model are "influential" information.

The EPAct study and the MOVES2014 model that incorporates its findings both contain "influential" information for purposes of the Information Quality Guidelines and thus "should adhere to a rigorous standard of quality."[20] For at least three reasons, the EPAct study and MOVES2014 model are among the classes of information that EPA "generally consider[s] . . . to be influential."[21]

First, the EPAct study itself, and the MOVES2014 model reflecting its conclusions, are presumptively "influential," because the EPAct study represents a "[m]ajor work product[] undergoing peer review as called for under the Agency's Peer Review Policy."[22]

Second, the EPAct study is itself a "top Agency Action," and both the EPAct study and the MOVES2014 model were "disseminated in support of [a] top Agency action"—namely, the Official Release of the MOVES2014 model, EPA's final action ordering MOVES2014 to be used to estimate air pollution emissions in official State- (and possibly EPA-) authored plans for bringing nonattainment areas into compliance with the NAAQS for all criteria pollutants.[23] "Top Agency

[20] *Id.* at 20.

[21] *Id.* at 20.

[22] *Id.* at 20.

[23] EPA has ordered states to use MOVES2014 in SIP development "as expeditiously as possible." 79 Fed. Reg. at 60344. After a two-year grace period, the States must also use the

actions" include "studies" like the EPAct study, as well as "rules, substantive notices, policy documents, [and] guidance," such as the Official Release of the MOVES2014 model "that demand the ongoing involvement of the Administrator's Office," or involve "issues that have the potential to result in major cross-Agency or cross-media policies, or provide a significant opportunity to advance the Administrator's priorities."[24]

The EPAct study's conclusions about ethanol and the MOVES2014 model's incorporation of those conclusions will be particularly influential, since the optimal use of ethanol in gasoline is a subject of ongoing debate in Congress and the public square with major ramifications for a the biofuels and automobile industries in the United States.[25] Although ethanol has been proven to reduce emissions of criteria pollutants and their precursors when added to gasoline, EPA's model will force States to write new SIPs under the false assumption that the opposite is true. This will encourage States to implement policies (for SIP credit) that discourage the sale and consumption of ethanol. If MOVES2014 were replaced with an accurate

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MOVES2014 model to ensure that highway and transit projects using federal funding conform to the relevant SIPs. *Id.* at 60345.

[24] Information Quality Guidelines, *supra* note 10, at 20.

[25] *See id.* at 20 ("Top Agency actions usually have potentially great or widespread impacts on the private sector, the public or state . . . governments.").

emissions model, States could gain SIP credit for policies that encourage the sale of higher blends of ethanol and the vehicles that run on them.

Third, and relatedly, the Official Release of the MOVES2014 model, in support of which the EPAct study and MOVES2014 model were disseminated, is an "Economically Significant action,"[26] that may determine the future not only of the biofuels industry but of the automobile industry, whose ability to design next-generation high-compression engines for compliance with EPA and NHTSA's fuel efficiency greenhouse gas emissions regulations and depends upon the octane rating of the fuel, which is related to its ethanol content, since ethanol is currently the least expensive source of high octane.[27]

Finally, the EPAct "model will likely be used to evaluate the effects of future ethanol content in gasoline by government agencies, industry, academia, and

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[26] *Id.* at 20 (citing Executive Order 12866, Regulatory Planning and Review, 58 Fed. Reg. 51735 (Oct. 4, 1993)).

[27] *See Control of Air Pollution from Motor Vehicles: Tier 3 Motor Vehicle Emission and Fuel Standards*, 79 Fed. Reg. 23414, 23528-29 (Apr. 28, 2014) (noting that an E30 fuel "could help manufacturers who wish to raise compression ratios to improve vehicle efficiency as a step toward complying with the 2017 and later light-duty greenhouse gas and CAFE standards. This in turn could help provide a market incentive to increase ethanol use beyond E10"); Derek A. Splitter & James P. Szybist, *Experimental Investigation of Spark-Ignited Combustion with High-Octane Biofuels and EGR. 1. Engine Load Range and Downsize Downspeed Opportunity*, Energy & Fuels (revised Dec. 21, 2013) ("The unique properties of midlevel alcohol-gasoline blends were shown to be the enabling technology toward higher engine efficiency, leading to feasible near-term increases invehicle efficiency and reductions in CO2."); *id.* ("If a lower carbon renewable fuel can be used with higher engine efficiency, this could enable simultaneous compliance with RFS II and CAFE.").

special interest groups,"[28] so it will "have a clear and substantial impact on important public policies of private sector decisions."[29]

**2. Because they are influential, the EPAct study and MOVES2014 model must use the best available science and the best available data collection methods.**

Because the EPAct study and MOVES2014 model constitute "influential" information, they are "subject to a higher degree of quality (for example, transparency about data and methods) than information that may not have a clear and substantial impact on important public policies or private sector decisions."[30]

For influential information, such as air pollutant emissions estimates at issue here, that involves "human health, safety or environmental risk assessments," the Information Quality Guidelines provide that "EPA will ensure, to the extent practicable and consistent with Agency statutes and existing legislative regulations, the objectivity of such information disseminated by the Agency by applying the following . . . principles . . . :

> (A) The substance of the information is accurate, reliable and unbiased. This involves the use of:
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> > (i) the best available science and supporting studies conducted in accordance with sound and objective scientific practices,

[28] Anderson et al., *supra* note 3, at 1033.

[29] Information Quality Guidelines, *supra* note 10, at 20.

[30] *Id.*

including, when available, peer reviewed science and supporting studies; and

(ii) data collected by accepted methods or best available methods (if the reliability of the method and the nature of the decision justifies the use of the data).[31]

For the reasons that follow, the EPAct study and the MOVES2014 model do not satisfy even the basic requirements of objectivity, utility, and integrity applicable to all EPA-disseminated information—much less the heightened standards of information quality for influential risk assessments.

## IV. THE EPACT STUDY SHOULD BE WITHDRAWN BECAUSE ITS DESIGN WAS FUNDAMENTALLY FLAWED AND ITS RESULTS ARE INACCURATE.

### A. The EPAct Study's Design Was Not Objective.

To meet the Information Quality Guidelines' standard of objectivity, EPA-disseminated information must be "accurate, reliable, and unbiased."[32] From the beginning, the EPAct study was incapable of producing accurate and reliable data, because its design is fundamentally biased against ethanol.

#### 1. The EPAct study's design was influenced by biased market actors.

For reasons unknown, EPA abandoned its initial test fuel matrix, which had been designed with the help of experimental design software. In redesigning the test fuel matrix, "EPA requested that SwRI work with Mr. Jim Uihlein from

[31] *Id.* at 22. Influential risk assessments must also be presented in a form that is "comprehensive, informative, and understandable." *Id.*

[32] *Id.* at 15.

Chevron to prepare a 30-fuel experimental design for the Coordinating Research Council."[33] The Agency has not explained why it relied on an oil company to design the test fuels to be used in its fuel emissions test. That choice was unusual because Chevron manufactures and sells gasoline and the aromatic hydrocarbons in it that compete with ethanol as rival sources of octane.

EPA's reliance on an outside consultant with an incentive to generate results favorable to petroleum and disfavorable to ethanol violated the objectivity requirement of the Information Quality Guidelines, as well as EPA's Scientific Integrity Policy, which requires all employees, including scientists and managers, to "[a]void conflicts of interest and ensure impartiality."[34]

The EPAct study's objectivity is also suspect in that the entities responsible for measuring the properties of the test fuels, including T50, T90, ethanol, and aromatics content were mostly oil companies.[35] In the "round robin" fuel testing process, the testing companies were allowed to see how their data compared with the other companies' before it was finalized.[36] This created the possibility of

[33] EPAct Appendix A: Re-Design, *supra* note 39, at A-8.

[34] EPA, Scientific Integrity Policy 3.

[35] *See* EPA, EPAct/V2/E-89: Assessing the Effect of Five Gasoline Properties on Exhaust Emissions from Light-Duty Vehicles Certified to Tier 2 Standards: Final Report on Program Design and Data Collection 26 (Apr. 2013) ("BP, Chevron, ConocoPhillips, EPA, ExxonMobil, Marathon, PAC (distillation equipment manufacturer) and Shell").

[36] *Id.* at 29.

uncorrected mistakes or even collusion between the various testing companies who could adjust their own data to match the others'. And the risk of mistakes is not merely hypothetical: "EPA and NREL identified [unspecified] results [that] were obviously in error and requested retesting by the respective laboratories."[37] Contrary to EPA's information integrity policy,[38] the Agency has not made the erroneous fuel testing data public, so it is not possible to speculate about the cause of the errors or to test the accuracy of the approved results. This is significant, because the accuracy of the entire EPAct study and, by extension, the MOVES2014 model, depends on accurate identification of the test fuel parameters.

### 2. The EPAct study's design was altered mid-stream without scientific justification.

The EPAct study's designers violated the Information Quality Guidelines' objectivity requirement when they made a series of changes to its initial design without any scientific justification—without any explanation at all, for the most part. For example, the designers

- eliminated four E10 fuels with low T50 (150°F)[39]

[37] *Id.* at 30.

[38] *See* Information Quality Guidelines, *supra* note 10, at 13.

[39] EPA, EPAct/V2/E-89: Assessing the Effect of Five Gasoline Properties on Exhaust Emissions from Light-Duty Vehicles Certified to Tier 2 Standards: Final Report on Program Design, Appendix A: Re-Design of Fuel Matrices for EPAct Program, at A-3 (Apr. 2013) (hereinafter "EPAct Appendix A: Re-Design").

- rejected an "several" unreported "design attempts" randomly generated by a computer program[40]
- eliminated all four E15 fuels with low T50 (150°F)[41]
- re-designed the entire test fuel matrix due to an unspecified "problem in blending the [E15] fuels"[42]
- removed three recently added test fuels that had characteristics of splash-blending (falling T50 with increased ethanol and relatively low aromatics), including test fuel 28 (E14.5), which had relatively low T50 (195°F) and aromatics (22.6%)[43]
- raised the T50 of the low-T50 E15 test fuel from 150°F to 165°F, and raised the T50 of all E20 test fuels from 160°F to 165°F[44]
- raised the T50 of the two high-T50 E15 test fuels from 190°F to 220°F[45]
- reduced the test fleet from 19 to 15 vehicles for the Phase-3 program "due to budget constraints."[46]

[40] *Id.* at A-4

[41] *Id.* at A-5.

[42] *Id.* at A-7.

[43] *Id.* at A-12.

[44] *Id.*

[45] *Id*.

- further reduced the experiment to 5 vehicles and 11 fuels for speciated hydrocarbons as part of a "reduced design" "[d]ue to limitations in budget"[47]
- omitted results for Bag 3 (hot start) emissions, "as review of results suggests that the models for Bag 3 may be less reliable than those in Bags 1 and 2."[48] (Most of the pollution emitted by vehicles occurs during the cold start, before the catalyst warms up.)

In the course of these changes, the number of test fuels in the experimental matrix shifted from 16 to 25[49] to 30[50] to 31[51] to 27[52] (and finally to 11 for speciated hydrocarbons).[53]

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[46] EPAct Final Report, *supra* note 1, at 2; *accord* EPA, Air Toxic Emissions from On-road Vehicles in MOVES2014, at 30 (Dec. 2014) (hereinafter "Air Toxics in MOVES2014").

[47] Air Toxics in MOVES2014, *supra* note 46, at 20, 30.

[48] EPAct Final Report, *supra* note 1, at 3.

[49] EPAct Appendix A: Re-Design, *supra* note 39, at A-4.

[50] *Id.* at A-8.

[51] *Id.* at A-13.

[52] *See* EPAct Final Report, *supra* note 1, at 2

[53] Air Toxics in MOVES2014, *supra* note 46, at 20, 30.

### 3. The EPAct study's final design was far from optimal.

As a result of the serial alterations to the design of the EPAct study, the G-efficiency of the study deteriorated from its initial value of 72.6%[54] to 68.1[55] to 64.1[56] to 59.4[57] and finally to 51.6%.[58]

This diminished G-efficiency value does not fully capture the diminished utility of the EPAct study, because it does not take into account the eleventh hour reduction of test fuels and vehicles due to funding shortfalls or the decision to omit the inaccurate Bag 3 (hot start) results.[59] Nor does it account for the radical over-simplification that comes with treating T50 and T90 as representative of all distillation temperatures in a study of ethanol blends or treating all aromatics alike.[60]

### 4. The EPAct study's test fuels are not representative of market fuel.

Although the EPAct study was intended to "provide the basis for generation of updated fuel effects models representing the gasoline vehicle fleet at the time of

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[54] EPAct Appendix A: Re-Design, *supra* note 39, at A-4.

[55] *Id.* at A-5.

[56] *Id.* at A-9.

[57] *Id.* at A-9.

[58] *Id.* at A-12.

[59] *See supra* at 13.

[60] *See infra* at 28-30.

the study,"[61] EPA expressly declined to use real-world fuels in the study.[62] This omission is hard to fathom for a study intended to "provid[e] a basis for the development of statistical models capable of predicting emissions for the majority of *in-use fuels*."[63]

The EPAct study included only match-blended fuels, even though refiners would have no reason to artificially elevate T50 when blending ethanol into fuel (except possibly to make it look worse).[64]

At the very least, the EPAct study should have included a reference case of splash-blended gasoline-ethanol fuels actually used in the marketplace. Instead the study's designers removed the three test fuels that had characteristics of splash-blended market fuels (relatively low T50 and low aromatics).[65]

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[61] EPAct Final Report, *supra* note 1, at 1.

[62] *See* Air Toxics in MOVES2014, *supra* note 46, at 19 ("The properties of the test fuels were not assigned to represent in-use fuels, but rather to allow development of statistical models that would enable estimation of relative differences in emissions across the ranges of fuel properties expected in commercially available summer fuels in the U.S."); *Contra* Final Report, *supra* note 1, at 76 ("This program . . . us[ed] a statistically-designed partial factorial matrix of 27 gasoline test fuels covering typical market ranges of ethanol, T50, T90, aromatics, and RVP."), *and* EPAct Final Report, *supra* note 1, at 1 ("A critical feature of the study design is that the properties of the test fuels are assigned to span the range of in-use fuel properties.").

[63] EPAct Final Report, *supra* note 1, at 1 (emphasis added).

[64] Anderson et al., *supra* note 3, at 1034 ("[M]inimal modifications to the blendstock should be required assuming that future specifications for E15 and higher blends are carried over from existing E10 specifications.").

[65] *See supra* at 18.

### a. The distillation temperature range of the test fuels exceeds that of market fuel.

The range of T50 values in EPAct test fuels (165-240°F) is significantly higher than the observed range of T50 values for E10 market fuel (154.8-226.5°F)[66] and for splash-blended E15 using commercial blendstocks (155-206°F).[67] This is the result of the EPAct study's designers' unexplained decision to raise the "T50 of E15 fuel 26 and all E20 fuels . . . to 165°F from 150°F and 160°F, respectively," and to raise the "T50 of E15 fuels 27 and 29 . . . from 190°F to 220°F."[68]

### b. The EPAct study's E15 test fuels with high T50 exceed ASTM's driveability index.

Out of the three E15 fuels in the final test fuels matrix of the EPAct study, two of them are not legal market fuels, because they exceed the ASTM driveability index (DI) maximum of 1250.[69] Test fuel 27 has a DI of 1374, and test fuel 28 has a DI of 1318. The high T50 values of these fuels (225°F and 219°F, respectively)

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[66] Texas Fuel Survey (June 2014), June2014_GasolineDataReport_NoDHAData.xlsx, http://www.tceq.texas.gov/assets/public/implementation/air/am/contracts/reports/mob/5821199776FY1420-20140815-ergi-summer_2014_fuels_DataFiles.zip, *accompanying* Diane Preusse et al., Eastern Research Group, Inc., 2014 Summer Fuel Field Study: Final Report (Aug. 15, 2014).

[67] *Compare* EPAct Appendix A: Re-Design, *supra* note 39, at A-13, *with* American Petroleum Institute, Determination of the Potential Property Ranges of Mid-Level Ethanol Blends: Final Report 21 (Apr. 23, 2010).

[68] EPAct Appendix A: Re-Design, *supra* note 39, at A-12.

[69] ASTM, Standard Specification for Automotive Spark-Ignition Engine Fuel, D4814.

are responsible for the excessive DI. (T50 values of 183°F or lower would remedy the problem and would be made possible by simply splash-blending additional ethanol into existing gasoline blendstock.)

The EPAct study's reliance on fuels that could not legally be sold demonstrates that the Study is not objective and casts doubt on the accuracy of its results.

### c. The EPAct study did not include an E15 test fuel with low T90 and low aromatics.

Although the EPAct study purports to "span the ranges of in-use fuel properties" in its selection of test fuels, the test fuel matrix does not include a single E15 fuel with low T90 and low aromatics. Former fuel 28 (in Design #4), which possessed those characteristics (T90=325°F and 22.6% aromatics) was removed from the study in the final revisions to the fuel matrix.[70] Two out of three remaining E15 fuels had high aromatics (35%), and a different set of two E15 test fuels had high T90 (340°F).[71] The disproportionate association of E15 with PM-producing aromatics contributes to the EPAct study's erroneous link between ethanol and emissions.

[70] EPAct Appendix A: Re-Design, *supra* note 39, at A-13.

[71] *Id.*

### d. The test fuels contain unrealistically high levels of octane from hydrocarbons.

Octane was not among the fuel parameters that were matched in the EPAct study. Indeed, octane could not have been matched, because the aromatic hydrocarbons that were added along with ethanol to artificially raise T50 and T90 are octane-rich. Therefore, the octane ratings of the test fuels were allowed to rise to an unrealistic degree. Some test fuels had octane ratings as high as 103 RON.[72]

These octane ratings are not found with any frequency in the market place.[73] Hydrocarbon octane additives are expensive to produce, and refiners will not add them to fuel in excess of the amounts needed for octane.[74] And ethanol, the other major source of octane is limited by the combination of a law prohibiting the sale of a fuel that is not substantially similar to an existing certification fuel,[75] and a

[72] Anderson et al., *supra* note 3, at 1036.

[73] *See* Control of Air Pollution from Motor Vehicles: Tier 3 Motor Vehicle Emission and Fuel Standards Final Rule: Regulatory Impact Analysis, at 3-3 (Mar. 2014) (hereinafter "Tier 3 RIA") ("According to AAM summer fuel surveys, the average octane of finished regular grade gasoline has remained constant between 87-88 AKI over the past decade . . . despite the increasing blend of ethanol.").

[74] *See id.* ("[I]t is evident that many refiners have backed off on octane production at the refinery by reducing levels of aromatics and olefins. Producing these high-octane components at the refinery represents a significant cost to refiners so they are able to reduce costs by taking advantage of ethanol's octane value."); *see also* Draft Regulatory Impact Analysis: Tier 3 Motor Vehicle Emission and Fuel Standards (Mar. 2013), at 3-2 ("[T]he [Alliance of Automobile Manufacturers summer fuel] survey does tell us one important thing about octane—refiners are doing their best not to give it away. We anticipate that this trend will continue into the future as E15 replaces E10.").

[75] 42 U.S.C. § 7545(f).

regulation prohibiting the introduction of alternative certification fuels that are not already commercially available.[76]

As Anderson et al. points out, widespread adoption of a high-octane fuel, whether by market forces or by an exercise of EPA's authority to set a minimum octane requirement to reduce air toxics,[77] would allow for innovations in engine design with corresponding improvements in fuel efficiency and reductions in emissions.[78] But the EPAct study does not account for these benefits, even though it makes use of high octane fuels.[79]

**5. The EPAct study fails to control for confounding variables.**

The EPAct's designers recognized that "consideration of single coefficients in isolation can easily result in misleading conclusions."[80] Unfortunately, the EPAct study and the MOVES2014 model derived from it both neglect this warning. The EPAct Final Report concludes that "[o]ther factors being equal, increasing ethanol is associated with an increase in emissions, as indicated by the positive ethanol coefficients in most models, both for running and start

[76] 40 C.F.R. § 1065.701(c).

[77] *See* Clean Air Act § 202(*l*), 42 U.S.C. § 7521(*l*).

[78] Anderson et al., *supra* note 3, at 1036.

[79] *Id.*

[80] EPAct Final Report, *supra* note 1, at 3; *see id.* ("[I]n interpreting or applying the models, *it is critical to consider the effects of all five fuel properties in conjunction with each other*.").

emissions."[81] The EPAct study makes no serious effort to disentangle these "other factors" in the results it reports, creating a serious "risk that the EPAct model will be applied or interpreted incorrectly, leading to incorrect conclusions about fuel property effects on emissions."[82]

Even if it were possible to reverse-engineer an accurate allocation of emissions effects among the fuel parameters studied—and for reasons discussed below it is not—the EPAct study's misleading conclusions violate the Information Quality Guidelines' requirement that information "be[] presented in an accurate, *clear*, *complete*, and *unbiased* manner."[83]

Moreover, the study's limitations prevent it from accurately measuring the interaction of these five properties *in the proportions that actually occur in the market.* For example, the range of T50 and aromatics levels represented in the test fuels are not representative of the range of T50 and aromatics levels found in real consumer fuels.[84] When ethanol is blended into gasoline, T50 and aromatics decline because of ethanol's low boiling point and its high octane. The failure to study ethanol blends with typical T50 and aromatics levels had a profound effect

[81] *Id.* at 7.

[82] Anderson et al., *supra* note 3, at 1034.

[83] Information Quality Guidelines, *supra* note 10, at 15; *see also id.* at 22 (requiring influential risk assessments to be presented in a manner that is "consistent with the purpose of the information" and "comprehensive, *informative*, and *understandable*").

[84] *See supra* at 22.

on its results. The Final Report admits ethanol's emissions profile would have been much more favorable, if ethanol had been splash-blended into the gasoline and distillation temperatures and aromatics levels had been allowed to fall as a result: "if typical collateral fuel changes (lower T50 and aromatics) are accounted for, we might project that blending ethanol would tend to reduce THC, NMHC and NMOG emissions (highlighting the important sensitivities of these other fuel parameters.)"[85] Unfortunately this nuanced view is not reflected in the design of the study, the reported results, or the MOVES2014 model on which the states must now base their Implementation Plans.

But the EPAct study's confounding defect runs deeper than a simple failure to fully and transparently account for the interactions of the five targeted fuel parameters. Even a sophisticated user of the EPAct study's data with full control over the five parameters is unable to glean accurate results, because the match-blending methodology itself is irremediably flawed. It is impossible to meaningfully match these fuel properties given their complex, non-linear relationship with one another in blended fuel.

[85] EPAct Final Report, *supra* note 1, at 232; *see also id.* at 231 ("[S]ince blending ethanol into gasoline also affects many other fuel properties, and given that ethanol is blending in [sic] into gasolines in different ways that affect the collateral property changes differently, it is difficult to interpret trends across the body of literature without more information on multiple fuel property changes.").

### a. The test fuels' distillation temperatures were imperfectly matched.

T50 and T90 are arbitrary distillation temperatures that do not fully capture the distillation profile of a blended fuel. And matching the T50 and T90 of different test fuels with varying ethanol concentrations does not guarantee that all of the fuels will have the same distillation temperature profile. Indeed, that is not feasible due to ethanol's near-azeotropic effect, which affects distillation temperatures in a nonlinear fashion. The higher the ethanol content, the more (or higher distillate) the hydrocarbons are required to equalize T50 and T90. Anderson et al. demonstrates that two different EPAct test fuels with the same T50 and T90 can have very different distillation profiles, because "matching T50 and T90 for ethanol-gasoline blends does not ensure that the region in between will also be matched." The T50 of ethanol blends can only be elevated by adding high-distillate hydrocarbons to the fuel.[86] This will tend to produce a T60-80 range significantly higher than lower ethanol blends.[87] These "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."[88] That is because

[86] *Id.* at 1032 ("[M]atching the T50 and T90 of the ethanol-containing fuels requires that their BOBs contain a greater proportion of heavier (higher boiling point) hydrocarbons than the corresponding E0 fuels.").

[87] *Id.*

[88] *Id.*

the hydrocarbons themselves—and the higher temperatures required to vaporize them—increase pollution.

The EPAct study fails to account for this byproduct of "matching" T50 and T90. As a result, the Study confounds the reported emissions effects, attributing to ethanol the effects of aromatics used to match T50 and T90 with the unintended consequence of raising T60-80 above other supposedly "matched" fuels.

**b. The test fuels' aromatics profiles were imperfectly matched.**

EPA has previously acknowledged that "aromatics do not appear to be created equally in terms of the potential impact on vehicle PM emissions."[89] Specifically, the Agency has cited "a growing number of studies showing the influence of higher-boiling aromatic compounds on particulate matter (PM) emissions from gasoline vehicles."[90]

Nevertheless, the EPAct study's match-blending methodology treats all aromatics alike for purposes achieving the 15% and 35% aromatics levels of the test fuels. This had an irradicable confounding effect on the results of the Study,

[89] Tier 3 RIA, *supra* note 74, at 3-10.

[90] *Id.* at 3-9; *see id.* ("A study published by the Japan Petroleum Energy Center (JPEC) found that PM mass emissions from a light-duty gasoline vehicle increased with increasing carbon number of aromatics in the gasoline. Honda has published a "PM Index" that correlates PM emissions to the double bond equivalent (DBE) and vapor pressure (V.P) of the fuel components. . . . According to this model, gasoline containing a large fraction of low-volatility compounds with high DBE values is expected to produce greater PM emissions.").

because high-boiling-point aromatics were included in the various test fuels in varying proportions based on their respective ethanol levels.

Fuels with higher ethanol content generally required higher doses of PM-causing high-distillate aromatic and saturated hydrocarbons in order to match T50 and T90. This phenomenon is not speculative. Anderson et al. used the EPAct study's reported test fuel hydrocarbon speciation data to demonstrate that the blendstocks modified for higher ethanol blends have higher Particulate Matter Index (PMI) values—a measure of a fuel's expected PM emissions—than blendstocks prepared for no (or lower) ethanol levels.[91] This methodology is inconsistent with the market, where "the relative proportions of the molecular species by carbon number [are] relatively consistent across [a national survey of fuel] samples."[92] Even worse, these disproportionate levels of high-distillate hydrocarbons were not accounted for in the study's results, and the increased PM emissions they caused were therefore wrongly attributed to ethanol.[93]

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[91] *See* Anderson et al., *supra* note 3, at 1033.

[92] Tier 3 RIA, *supra* note 74, at 3-8.

[93] Anderson et al., *supra* note 3, at 1033 ("[T]he PMI values of the gasoline blendstocks increase significantly with increasing ethanol content in the finished fuels due to the addition of high-boiling-point hydrocarbons to match the distillation parameters. This trend is expected to lead to significantly increased PM emissions, which, . . . have been erroneously attributed to increased ethanol content rather than to greater amounts of high-boiling-point hydrocarbons added to the blendstock.").

### c. The test fuels' total aromatic proportions were imperfectly matched and inconsistent with the experimental design.

As re-designed, the EPAct study's high-aromatics test fuels were to be composed of 35% aromatics.[94] But when analyzed by gas chromatography (GC),[95] some of the high-T90 test fuels revealed aromatics levels approaching or exceeding 40%.[96] Likewise, some of the low-aromatics test fuels, which were intended to have 15% aromatics actually had more than 20% aromatics.[97] Apparently the excessive aromatics were necessary to raise the T90 sufficiently to match it with that of the other high-T90 test fuels. This inconsistency between the study's design and its execution and between actual aromatics levels of the high-T90 and low-T90 test fuels renders undermines the objectivity of the study and the accuracy and integrity of its results.

#### 1. The selection of air toxic emissions measured was biased against ethanol.

The EPAct study focused on the few (and relatively benign) emissions from ethanol (acetaldehyde, formaldehyde, and ethanol itself) while measuring only a

[94] EPAct Appendix A: Re-Design, *supra* note 39, at A-13.

[95] The lower levels of aromatics reported by the EPAct study were measured according to D1319, which is less accurate than GC. *Cf.* EPAct Final Report, *supra* note 1, at 23, tbl. 4.

[96] *See* EPAct/V2/E-89 detailed fuel properties, http://www.epa.gov/otaq/models/moves/documents/epact-v2-e89-fuel-properties-dha.xlsx.

[97] *Id.*

small subset of the many (and more dangerous) emissions from aromatics. The study measured benzene and 1,3-butadiene, but neglected—for example—the other aromatics in the BTEX group (toluene, ethylbenzene, and xylene), ultra-fine particles (UFPs), polycylic aromatic hydrocarbons (PAHs), and black carbon.

Even if the study's results were accurate—and they are not—its highly selective focus conflicts with the Information Quality Guidelines' requirement that information be "presented in a[] . . . *complete* and *unbiased* manner"[98] and that influential risk assessments be presented in a manner that is "consistent with the purpose of the information" and "*comprehensive* [and] *informative*."[99]

### B. The EPAct Study's Results Are Demonstrably Innacurate.

The flaws in the design of the EPAct Study are manifest in its erroneous results. The EPAct Study attributes to ethanol increased emissions of various pollutants that numerous studies have shown ethanol to reduce, and it claims that lowering T50 below a certain level increases emissions. Both of these claims are refuted by prior studies.

[98] Information Quality Guidelines, *supra* note 10, at 15 (emphasis added).

[99] *Id.* at 22.

### 1. The EPAct study erroneously reports that ethanol increases particulate matter (PM) emissions.

The entire PM formation potential of gasoline comes from aromatics.[100] Ethanol, by contrast, does not produce $PM_{2.5}$, as EPA's own investigations have concluded.[101] Instead, ethanol reduces PM. "[T]he reduction of PM emissions with the additional of ethanol . . . has been demonstrated in many studies and is supported by fundamental combustion chemistry considerations."[102] EPA itself has acknowledged that "[d]ue to the high octane quality of ethanol, it greatly reduces the need for and levels of other high-octane components such as aromatics," so that "it is important to assess the effect of these reductions on ambient PM."[103]

Instead of meaningfully assessing ethanol's potential to displace aromatics and therefore reduce PM, the EPAct Study did the opposite—unnecessarily *increasing* aromatics along with ethanol to hold certain arbitrary distillation temperatures constant. In light of the well-known effects of these substances on emissions, the decision to artificially fix the T50 and T90 of the test fuels looks like a pretext for adding high-distillate aromatics. For the EPAct study's reported

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[100] *See* J.R. Odum, et al., *The Atmospheric Aerosol-Forming Potential of Whole Gasoline Vapor*, 276 Science 96, 96 (1997) ("[T]he atmospheric organic aerosol formation potential of whole gasoline vapor can be accounted for solely in terms of the aromatic fraction of the fuel."), *available at* http://www.unc.edu/courses/2007fall/envr/416/001/OdumScience97.pdf.

[101] *See* Tier 3 RIA, *supra* note 74, at 7-72.

[102] Anderson et al., *supra* note 3, at 1031 (citing 10 studies).

[103] *Id.*

causal relationship between higher ethanol content and increased PM emissions[104] can only be explained as a function of the match-blended test fuels that contained additional high distillate aromatic and saturated hydrocarbons to compensate for ethanol's effect on T50.

### 2. The EPAct study erroneously reports that ethanol increases nitrous oxide ($NO_x$) emissions.

According to the EPAct Study, increased ethanol content is correlated with increased emissions of $NO_x$.[105] This is misleading and inconsistent with studies based on more realistic assumptions about the content of gasoline-ethanol blends. When ethanol is simply splash-blended into ordinary gasoline, it lowers NOx emissions.[106] The contrary conclusion of the EPAct study can only be explained by the addition of high-distillate aromatics to compensate for ethanol's favorable effect on the T50 and T90 of blended fuel. Indeed, the Final Report comes close to admitting that aromatics are to blame for the NOx emissions attributed to ethanol: "the models also suggest that reductions in NOx could occur with corresponding

[104] *See* EPAct Final Report, *supra* note 1, at 4-6.

[105] *See id.* at 4-6, 231-32.

[106] *See* M. Matti Maricq, et al., *The Impact of Ethanol Fuel Blends on PM Emissions from a Light-Duty GDI Vehicle*, 46 Aerosol Sci. & Tech. 580 (2011) (finding decreases in NOx emissions of "about 20%"when the ethanol content of fuel is increased from 0% to 17% or higher); Robert A. Stein & Rod Harris, *Effect of Ethanol on $NO_x$ Emissions of Vehicles with SI Engines* ("$NO_x$ emissions typically decrease or are unaffected with increasing ethanol content.").

reductions in aromatics, particularly for start emissions, for which the aromatics coefficient is larger than that for ethanol." Final Report 232.

### 3. The EPAct study erroneously reports that ethanol increases total hydrocarbon (THC), non-methane organic gas (NMOG), non-methane hydrocarbons (NMHC) emissions, benzene, and 1,3-butadiene.

"Numerous studies in which ethanol was splash-blended with a fixed gasoline blendstock have demonstrated reductions of vehicle exhaust emissions, particularly . . . non-methane hydrocarbons (NMHC), and the air toxics 1,3-butadiene and benzene."[107]

Total hydrocarbon (THC) and non-methane organic gas (NMOG) are also reduced by the addition of ethanol to gasoline from E0 through E30.[108]

The EPAct Study concludes to the contrary—that "ethanol content would be associated with increases in emissions" of all these pollutants "if the remaining fuel properties could be kept constant while increasing the ethanol level."[109] The EPAct Study admits that this condition is important: "[I]f typical collateral fuel changes (lower T50 and aromatics) are accounted for, we might project that

[107] Anderson et al., *supra* note 3, at 1031.

[108] *See* Carolyn P. Hubbard et al., *Ethanol and Air Quality: Influence of Fuel Ethanol Content on Emissions and Fuel Economy of Flexible Fuel Vehicles*, 48 Envtl. Sci. & Tech. 861, 863 & fig. 3 (Dec. 13, 2013) ("The emission of THC and NMOG exhibit a clear minimum around E20-E40, 25-35% lower than for E0 and E80.").

[109] EPAct Final Report, *supra* note 1, at 6.

blending ethanol would tend to reduce THC, NMHC and NMOG emissions (highlighting the important sensitivities to these other fuel parameters)."[110]

What the EPAct Study does not make clear is that to keep all other fuel properties "constant" while adding ethanol is an unnecessary (and ultimately impossible) task, and that harmful levels of high-distillate aromatics are needed even to approximate holding all other fuel properties constant.

#### 4. The EPAct study erroneously reports that lowering T50 below a certain level causes emissions to rise.

One of the clearest indications of the inaccuracy of the EPAct Study and its bias against ethanol is the Study's conclusion about the emissions effects of T50—the temperature at which 50% of a fuel's contents will vaporize. According to the EPAct Study, T50 tends to increase Bag 1 PM emissions as it rises above 185°F *and* as it *falls* below 185°F.[111] This purported effect of T50 is illogical: PM is primarily emitted by high-distillate aromatics responsible for raising T90—not lowering T50.[112] And it is well established that lowering T50 *lowers* emissions.[113]

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[110] EPAct Final Report, *supra* note 1, at 232.

[111] Anderson et al., *supra* note 3, at 1035.

[112] *Id.* ("Lack of dependence of PM on T50 is the expected result from an engine perspective, since PM emissions primarily originate from fuel components with high DBE [double-bond equivalency] values (e.g. aromatics) and high boiling points (e.g. the T90 region and above in the distillation curve.").

[113] *See* Thomas D. Durbin et al., Effects of Ethanol and Volatility Parameters on Exhaust Emissions, CRC E-67, at 1 (Jan. 30, 2006) ("The reduction of T50 and T90 and the

The EPAct Study's conclusion is especially puzzling because, as Anderson, et al., points out, the EPAct test vehicles themselves did not actually exhibit the modeled trend of increased PM emissions below a T50 of 185°F.

Whatever their origin, the EPAct Study's reported correlation between PM emissions and *lowering* T50 is detrimental to ethanol, because ethanol lowers T50.[114]

### C. The EPAct Study Was Inadequately Peer Reviewed, and EPA Did Not Adequately Respond to Significant Criticism.

#### 1. EPA failed to subject the design of the EPAct Study to peer review.

Although EPA subjected the EPAct study to peer review when it was completed, this review came too late to correct the fundamental design flaws of the study, and EPA failed to respond to the criticisms that the EPAct study received from its reviewers.

EPA should not have waited until the EPAct study was complete to subject it to peer review. "Peer review is not restricted to the penultimate version of work

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corresponding reduction of heavy fuel hydrocarbon compounds have generally been found to reduce exhaust hydrocarbon emissions.").

[114] Anderson et al., *supra* note 3, at 1029; Robert A. Stein, et al., *An Overview of the Effects of Ethanol-Gasoline Blends on SI Engine Performance, Fuel Efficiency, and Emissions*, SAE 2013-01-1635, 6 SAE Int'l J. Engines 1, 5 (2013).

products; in fact, peer review at the planning stage can often be extremely beneficial."[115]

## V. THE MOVES2014 MODEL SHOULD BE WITHDRAWN BECAUSE IT REPLICATES THE EPACT STUDY'S FLAWS AND ERRONEOUSLY MODELS ETHANOL'S EMISSIONS EFFECTS.

### A. MOVES2014 Incorporates the EPAct Study's Erroneous Conclusions about Ethanol's Tailpipe Emissions Effects.

All of the defects in the EPAct Study, described above, apply equally to the MOVES2014 model, which incorporates the EPAct fuel effects data in a vehicular emissions model to be used by State regulators in the construction of their SIPs.[116]

### B. MOVES2014 Reflects Incorrect Assumptions about Ethanol's Evaporative Emissions Effects.

The MOVES2014 model incorporates CRC E-77-2b and E-77-2c, studies of evaporative emissions.[117] These studies attributed increased hydrocarbon permeation rates to the ethanol in gasoline.[118] But adding ethanol does not raise

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[115] Information Quality Guidelines, *supra* note 10, at 11 (citing Peer Review and Peer Involvement at the U.S. Environmental Protection Agency (June 7, 1994), http://www.epa.gov.osp.spc.perevmem.htm.

[116] Air Toxics in MOVES2014, *supra* note 46, at 18-25, 34-40.

[117] *See* Air Toxics in MOVES2014, *supra* note 46, at 64.

[118] Harold M. Haskew & Thomas F. Liberty, *Evaporative Emissions from In-Use Vehicles: Test Fleet Expansion*, CRC E-77-2b, EPA-420-R-10-025, at 28 (June 2010) ("The 'enhanced emission' vehicles gave, on average, increasing permeation rates with increasing volatility and with increasing ethanol level [EO to E10]."); Harold M. Haskew & Tom Liberty, *Study to Determine Evaporative Emission Breakdown, Including Permeation Effects and Diurnal Emissions Using E20 Fuels on Aging Enhanced Evaporative Emissions Certified Vehicles*, CRC E-77-2c, at 23 (Dec. 2010) ("Permeation is higher with E10 or E20 compared to an ethanol-free (E0) fuel."). These studies acknowledge their sample size was too small to report statistical

gasoline hydrocarbon permeation rates. Rather, diluting aromatics with ethanol would reduce permeation.[119] Ongoing testing confirms that increasing ethanol in gasoline lowers permeation rates.[120] It is aromatics that are responsible for permeation.[121] Specifically C6 and more common C7 & C8 aromatics are much more aggressive towards increasing permeation than C9+ aromatics.[122] The MOVES2014 model's treatment of evaporative emissions is therefore not accurate or objective, because the relevant inputs are limited to ethanol, temperature, and RVP, with no consideration of the aromatic content of the blendstock.[123]

### C. The Model Reflects Incorrect Assumptions about T50 Emissions Effects.

In the real world, lowering T50—the temperature at which 50% of the fuel vaporizes—has the effect of reducing emissions.[124] This occurs because when more

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significance. *See* CRC E-77-2b, at 28 (noting a "small sample size and limited number of tests [that] preclude making statements about statistical validity"); CRC E-77-2c, at 23 ("[T]he sample sizes are still too small to make comparison with statistical significance.")]

[119] *See* Harold M. Haskew et al., *Fuel Permeation from Automotive Systems*, CRC Project No. E-65, at 22 (Sept. 2004) (finding that E85 reduced permeation by nearly 50% compared to E0).

[120] Draft results on file with Boyden Gray & Associates.

[121] The E10 test fuels in CRC E-77-2b and CRC E-77-2c had higher aromatics content than the E0 test fuels. *See* CRC E-77-2b, at C-1; CRC E-77-2c, at 251.

[122] Draft results on file with Boyden Gray & Associates.

[123] *See* EPA, Evaporative Emissions from On-road Vehicles in MOVES2014, at 4 (Sept. 2014).

[124] *See* Durbin, *supra* note 113.

of a fuel's components combust at lower temperatures, fewer harmful components remain to be emitted into the atmosphere.

But according to the MOVES2014 model—and consistent with the EPAct study[125]—lowering T50 below approximately 185°F *increases* emissions. This phenomenon is unexplained by the materials accompanying either the EPAct Study or the MOVES2014 model, and it is inconsistent with real world emissions effects.[126]

### D. The MOVES2014 Model's Default Values Are Inconsistent with Market Fuel, and State Regulators Cannot Accurately Replace Them.

As explained above, the MOVES2014 model is fundamentally flawed as a result of the confounding variables in the underlying EPAct study. But setting aside these defects in objectivity, the MOVES2014 model itself fails to meet the Information Quality Guidelines' utility standard, because it is not "useful[] . . . to its intended users"[127]—the State regulators who must use MOVES2014 in their SIPs. This is because the model only provides accurate results "when the accompanying changes in fuel properties with increasing ethanol content . . . are properly taken into account in the model (e.g. reduced T50, T90, and

[125] *See supra* at 36-37; Anderson et al., *supra* note 3, at 1035.

[126] *See supra* at 36-37.

[127] *Id.*

aromatics)."[128] As with the EPAct Study, "consideration of single coefficients in isolation can easily result in misleading conclusions."[129]

State regulators do not have the necessary tools to accurately adjust all of the MOVES2014 model's fuel parameters inputs, because most States do not have access to relevant data concerning the market fuel available within their borders—especially for E15, which is not yet widely available. This renders the model inaccurate and useless, because the default values are not representative of market fuel. The MOVES2014 model's default T50 values for E15, for example, are higher than the actual T50 values that result from splash blending additional ethanol into E10 or a standard gasoline blendstock.[130] Users of the MOVES2014 model who rely on the default values for E15 without lowering the T50, T90, and aromatics inputs appropriately will only compound the model's other flaws, and the higher-ethanol blend will appear (erroneously) to increase emissions.

### E. EPA Failed To Make the MOVES2014 Model and EPAct Study Available to the Science Advisory Panel.

Under the Science Advisory Board statute, "[for] any proposed criteria document, standard, limitation, or regulation, [EPA] shall make available to the

[128] Anderson et al., *supra* note 3, at 1034.

[129] EPAct Final Report, *supra* note 1, at 3; *see id.* ("[I]n interpreting or applying the models, *it is critical to consider the effects of all five fuel properties in conjunction with each other*.").

[130] *See* American Petroleum Institute, Determination of the Potential Property Ranges of Mid-Level Ethanol Blends: Final Report 21 (Apr. 23, 2010).

[Science Advisory] Board such proposed criteria document, standard, limitation, or regulation, together with relevant scientific and technical information in the possession of the Environmental Protection Agency on which the proposed action is based."[131] EPA's Official Release of the MOVES2014 model[132] is a regulation imposing immediate legal obligations on the States. EPA therefore should have "ma[d]e available to the [Science Advisory] Board" ("SAB") a *proposed* Official Release of the MOVES2014 model as well as the underlying EPAct Study.

Petitioners are not aware of any evidence that EPA provided the MOVES2014 model and EPAct Study to the SAB at any time. And EPA could not possibly have complied with its obligation under this statute, because it failed to issue a "proposed" version of the Official Release of the MOVES2014 model, as it did with prior versions of its emission model.[133]

## CONCLUSION

For the foregoing reasons, Petitioners respectfully request that the Agency withdraw the EPAct Study and the MOVES2014 model and to undertake a new

[131] 42 U.S.C. § 4365(c)(1); *see* Information Quality Guidelines, *supra* note 10, at 19 ("EPA also ensures the quality of information we disseminate by seeking input from . . . the Science Advisory Board.").

[132] 79 Fed. Reg. 60343 (Oct. 7, 2014).

[133] *See, e.g.*, Draft Transportation Conformity Guidance for Quantitative Hot-Spot Analyses in $PM_{2.5}$ and $PM_{10}$ Nonattainment and Maintenance Areas, 75 Fed. Reg. 29537 (May 26, 2010) (MOVES2010); EPA Releases "Draft MOVES2009" for Comment: Questions and Answers (Apr. 2009); Draft MOVES2004 Model and Documentation Released for Public Comment (Jan. 6, 2005); [Request for] Comments on Use of MOBILE5b (Nov. 22, 1996).

study of fuel effects on vehicular emissions based on splash-blending of ethanol into existing gasoline blendstock following notice and an opportunity for comment on the design of the proposed study.