June 28, 2013

Joint Comments by the American Petroleum Institute and the Association of Fuel & Petrochemical Manufacturers on

The U.S. Environmental Protection Agency Proposed Rule

Control of Air Pollution from Motor Vehicles: Tier 3 Motor Vehicle Emission and Fuel Standards

Docket ID No. EPA-HQ-OAR-2011-0135

Table of Contents

Executive Summary

The American Petroleum Institute (API)[1] and the American Fuel & Petrochemical Manufacturers (AFPM)[2] developed these detailed comments in response to the Environmental Protection Agency's Proposed Rule on *Control of Air Pollution from Motor Vehicles: Tier 3 Motor Vehicle Emission and Fuel Standards*. API and AFPM submit these comments on behalf of America's refining industry, a strategic and valuable U.S. asset. The industry supports more than 500,000 jobs and contributes 1.9% to GDP. It provides the U.S. with secure supplies of domestic fuel products, with nearly 90% of U.S. gasoline consumption currently refined here. Maintaining a strong domestic refining industry is critical to our nation's economic viability.

EPA has failed to provide an adequate scientific justification, technical need, or cost effectiveness for its proposed Tier 3 rulemaking; as such, this rule is unnecessary. API and AFPM oppose publication of the Tier 3 final rulemaking. The proposed Tier 3 rule would impose high costs with negligible environmental benefits. Combined with other regulations, such as the RFS2, this rule would impact domestic fuel supplies, result in increased consumer costs, and affect energy security.

<u>EPA has not adequately justified the need for a 10 ppm average sulfur standard for gasoline</u>

EPA relies on very few studies to support its proposal to lower the average annual sulfur standard for gasoline below the current level of 30 ppm. None of these studies evaluate vehicle emission control system response to changes in gasoline sulfur content either between or within the range defined by the proposed level of 10 ppm S and the current standard (30 ppm S). As such, EPA can only conjecture on what is necessary to meet the proposed Tier 3 emissions standards. EPA relies either on older vehicle studies designed to address different issues at the time or on data generated from vehicles tested on fuels containing sulfur levels outside of the 10 to 30 ppm range. For this proposal, the Agency makes numerous inaccurate assumptions and data interpolations that are well outside the scope of those earlier studies. Furthermore, EPA makes several assertions without supporting data. For example, EPA offers no test data that compares PM emissions from 10 ppm and 30 ppm sulfur fuels and instead just relies on light-duty vehicle emissions measurements on a 7 ppm sulfur test fuel to support an assertion that the proposed PM standards are feasible. Detailed analysis and critique of the scientific shortcoming in EPA's analysis are provided in our specific comments that follow this Executive Summary.

[1] API is the national trade association representing all segments of the U.S. oil and natural gas industry. Its more than 500 members – including large integrated companies, exploration and production, refining, marketing, pipeline, and marine businesses, and service and supply firms – provide most of the nation's energy. Since 2000, the industry has invested over $2 trillion in U.S. capital projects to advance all forms of energy, including alternatives.

[2] AFPM is a trade association representing high-tech American manufacturers of virtually the entire U.S. supply of gasoline, diesel, jet fuel, other fuels and home heating oil, as well as the petrochemicals used as building blocks for thousands of products vital to everyday life.

In addition, we submit to this docket a recent report by Sierra Research which identified significant shortcomings and concerns with EPA's data analysis and conclusions on fuel sulfur effects on vehicle emissions. Sierra makes several key findings that reinforce our concerns with the Tier 3 proposal. Among the most notable: EPA's selection of 10 ppm as the average annual gasoline sulfur standard is flawed, EPA ignores the impact of vehicle technology on sulfur sensitivity, and EPA fails to justify the proposed sulfur limit. Sierra notes that EPA's flawed methodologies and analysis result in overstated emissions impacts, and an improper cost-effectiveness analysis.

Negligible environmental benefits

The emissions inventory and air quality impacts of the Tier 3 proposal are negligible.

Emissions benefits of the Tier 2 program continue to be realized as the vehicle fleet turns over. In modeling the environmental impacts out to year 2022, recent studies by ENVIRON showed that Tier 3 would yield incremental reductions in mean monthly summer 2022 $PM_{2.5}$ concentrations of no more than 0.1 $\mu g/m^3$ in contrast to a maximum incremental reduction of 2.7 $\mu g/m^3$ in mean monthly $PM_{2.5}$ ambient levels under the federal Tier 2 program. Similarly for ozone, ENVIRON found the maximum ozone benefit expected from Tier 3 to be less than 1 ppb, relative to a maximum ozone benefit of 12 ppb anticipated from the federal Tier 2 program. EPA's modeling calculates Tier 3 reductions in ozone of 0.5 - 1.35 ppb and in $PM_{2.5}$ of 0 - 0.05 $\mu g/m^3$ in years 2017 - 2030. It should be mentioned that the current ozone and $PM_{2.5}$ NAAQS are 75 ppb and 12 $\mu g/m^3$, respectively. The ENVIRON studies support the conclusion that EPA's Tier 3 standards for new vehicle emissions and gasoline sulfur will provide negligible reductions in emissions inventories, and negligible improvements in air quality.

The Regulatory Impact Analysis is flawed and should be reissued

The draft Regulatory Impact Analysis (DRIA) in EPA's proposed Tier 3 rule does not meet EPA Guidelines for Ensuring and Maximizing the Quality, Objectivity, Utility and Integrity of Information Disseminated by EPA. EPA should withdraw the RIA and develop/resubmit a RIA that is consistent with OMB guidelines.

EPA begins with a flawed baseline, skewing the end results and resulting in overstated emissions benefits. Specifically, EPA uses EIA's 2011 Annual Energy Outlook which projects higher gasoline demand to 2030. Recent EIA's 2013 outlook projects decreasing gasoline demand with associated reductions in emissions. We recommend that EPA uses AEO 2013. In evaluating emissions benefits, EPA focused only on the vehicle/fuel system (use emissions) and ignored the fuel production emissions. We recommend that EPA uses a well-to-wheels, lifecycle basis for gasoline and ethanol air quality impacts.

API and AFPM also detail a number of deficiencies in the methods incorporated into the MOVES model which lead to an overstatement of the emissions inventory benefits of Tier 3, which need to be corrected.

EPA significantly underestimates refinery capital costs and uses incorrect modeling assumptions, for example with regard to octane, no sulfur compliance margin and the presumption ethanol will be used beyond safe limits. These incorrect assumptions combined with overly simplistic models result in significantly understated cost estimates. Furthermore, EPA misrepresents the actual impact of this rule by citing only average gasoline cost estimates and ignoring the marginal cost impacts, in contrast with macro-economic theory.

EPA's DRIA assumes implausible health benefits due to highly conservative, unrealistic assumptions. In the DRIA, the overwhelming majority of the benefits are derived from a very small calculated reduction of 0.05 $\mu g/m^3$ in $PM_{2.5}$ when the NAAQS standard is 12 $\mu g/m^3$. EPA assumes with 100% certainty that exposure to any level of PM and ozone, whether far above or far below the current national standards, causes mortality. If EPA's assumptions on mortality are not correct, and mortality does not occur at all or does not occur at lower levels, the benefits of the Tier 3 rule would be markedly reduced and the costs of the rule would exceed the benefits. API and AFPM detail our concerns in each of these areas, and point out the omission of key uncertainties that EPA failed to quantify. Using more realistic assumptions per existing references, the economic benefits of this proposed rule would be markedly lower than the costs in the proposed rule. As explained in detail in the comments, the flawed DRIA does not comply with OMB guidelines and should be withdrawn.

<u>Fuel Program Recommendations</u>

EPA has not demonstrated the need for Tier 3. API and AFPM recommend that EPA provides a technically sound justification absent the analytical data gaps in the current proposal. EPA should withdraw and resubmit a new DRIA consistent with OMB guidelines. Should EPA, however, decide to proceed with the Tier 3 rulemaking, API and AFPM make the following recommendations:

- Five year lead time

Implementation on January 1, 2017 is not necessary to enabling heavy duty vehicles to meet the emission standards, for the development of lower cost technologies to improve fuel economy; or to reduce emissions from the in-use vehicle fleet. Rather than the 3 years EPA proposes, *if* EPA decides to proceed with the Tier 3 rulemaking, EPA should provide 5 years of lead time from the date of publication of the final rule in the federal register in order to implement any changes to the average gasoline sulfur requirement.

- Maintain a 80 ppm per-gallon sulfur cap

API and AFPM support EPA's proposed option for maintaining the current per gallon sulfur caps: 80-ppm at the refinery gate and 95-ppm downstream. As EPA notes, the annual average sulfur standard is a factor that limits the amount of sulfur in gasoline; per gallon caps are important to manage planned and unplanned refinery unit downtime. Beyond the refinery gate, the introduction of sulfur into gasoline occurs during pipeline shipment through multiproduct pipelines and back-to-back shipments with higher sulfur content jet fuel. A recent study by Turner Mason shows that reductions below the current sulfur cap standards, will result in even higher capital costs, reduced compliance flexibility, and potential loss of gasoline supplies.

- Support the Averaging Banking and Trading provisions

API and AFPM support the inclusion of an ABT program as part of the Tier 3 regulations that allows refiners (including blender refiners) and importers to generate early and standard credits. We generally agree with the structure of the standard credit generation program, allowing credits to be generated for gasoline that over-complies with the 10 ppm annual average standard. Some changes are needed to make the system more effective, including changes to early credit life, treatment of remaining Tier 2 credits, trading restrictions, and the deficit carryover provisions.

Certification Fuel Recommendations

EPA proposes to change the ethanol content of the gasoline certification test fuel from 0% (E0) to 15% (E15) by volume. The certification fuel should be representative of a gasoline/ethanol blend that is currently prevalent in the market place; that fuel is one which contains 10% ethanol (E10) by volume.

EPA does not state its legal basis for designating test fuels, and incorrectly asserts sweeping discretion under the statute. EPA makes the forward-looking prediction that the Renewable Fuels Standard will lead to an expansion of E15, despite the limited commercial availability of the fuel today. EPA needs to set certification fuel standards that reflect current driving conditions, and the Agency would be in violation of the Clean Air Act if it specifies an ethanol content above 10% for gasoline certification fuel.

In addition to ethanol content, EPA proposes to make changes to several other certification fuel characteristics. API and AFPM recommend consistency between certification fuel standards and the industry recognized standard for gasoline developed by ASTM International: ASTM D4814. API and AFPM provide detailed comments relating to certification fuel octane, distillation temperatures, sulfur, aromatics, olefins, aromatics distribution, and the test methods used by laboratories to determine these characteristics.

EPA states that its goal is to reduce the number of certification fuels that manufacturers would need to use to test their vehicle fleet, and yet the Agency proposes to allow vehicle manufacturers to request approval for alternative certification fuels such as those which contain high ethanol content. EPA should not finalize rules allowing vehicle manufacturers to certify on various alternative blends, as it could have a significant impact on market dynamics, such as a proliferation of boutique fuels that do not fit with the existing fungible fuel system or service stations storage tank configurations.

Performance-Based Measurement Systems (PBMS)

We commend EPA for embracing a performance-based approach to specifying analytical testing requirements for fuel property measurements, as doing so allows for flexibility and encourages innovation. We broadly support the adoption of a PBMS for fuels, concur with EPA's proposed categorization of fuel parameters as absolute- or method-defined, and urge the Agency to expedite its effort in extending PBMS to on-line analytics and automated sampling. However, we do have a number of concerns regarding the specific details proposed by EPA. Several of our main concerns are as follows:

- A one year grace period for ASTM D6708 Assessments on Voluntary Consensus-based Standards Body (VCSB) alternate method candidates for method-defined fuel parameters is inadequate. We suggest a minimum grace period of 18 months, given the time required to plan and complete such an endeavor.
- EPA should not extrapolate Precision Qualification Criteria for Absolute Parameters to those used for Method-Defined Parameters. We recommend that the precision standard deviation qualification criterion for method-defined parameters be based on a Test Performance Index (TPI) approach as per ASTM D 6792 *Standard Practice for Quality System in Petroleum Products and Lubricants Testing Laboratories.*
- EPA has proposed Accuracy Qualification Requirements for Reference Installations and for Designated Method Installations used to qualify method-defined parameter instruments which are overly restrictive. We are concerned that the proposed requirement to stay within the middle 50% of the distribution of measurements of the industry monthly inter-laboratory crosscheck program for at least 5 months will severely restrict the number of participants. We suggest that a requirement of 3 out of 5 successive exchanges is more realistically achievable.
- Sites should be granted greater flexibility in choosing procedures to comply with the proposed Statistical Quality Control (SQC) Requirements. We suggest that a site should be given the option of using either one of the two SQC procedures outlined in ASTM D6299, and not mandated to use both.

<u>Proposed standards for denatured fuel ethanol and other oxygenates</u>

In the event that EPA finalizes a more stringent average sulfur standard, API and AFPM support EPA's proposal that producers of fuel ethanol, or other oxygenates, be required to also meet a 10-ppm sulfur cap.

API and AFPM do not support limiting the products that can be used as alcohol denaturants, and recommend that if EPA must act, the latest version of ASTM International Specification D4806 should be adopted, and EPA should not further narrow the list of available denaturants. And, we contend that EPA should not limit the concentration of denaturant to 2%.

Ethanol has become a significant component within the gasoline fuel pool and should be subject to requirements similar to gasoline refiners. However, API and AFPM believe that cumbersome individual batch reporting for all fuels has little value. We agree EPA should not set limits for benzene, olefins, and aromatics content of ethanol.

Proposed standards for fuel used in flexible fueled vehicles

API and AFPM agree that E16-50 ethanol blends for use in FFV should meet the same sulfur, RVP, and benzene standards, and minimum deposit control requirements otherwise applicable to gasoline. API and AFPM do not agree that EPA should treat E16-50 as gasoline under current regulations. In API's and AFPM's view, this action would require formal rulemaking with a waiver from the substantially similar requirements.

While API and AFPM may support EPA's effort to develop regulations for E51-E83, the process EPA used to inform the regulated community runs afoul of the federal Administrative Procedures Act (APA) and the federal Clean Air Act (CAA). These additional regulations include prescribing new requirements for E51- E83 for key fuel properties such as sulfur, RVP, and benzene, although the benzene limits proposed would preclude the use of some denaturants, and EPA should set E51-83 benzene standards similar to gasoline standards.

Technical amendments and regulatory streamlining

We appreciate EPA effort to make regulatory streamlining a priority. We support the elimination of unnecessary and outdated provisions in order to improve administrative efficiency and reduce regulatory compliance burdens. These proposed streamlining provisions are independent of Tier 3 and should be finalized earlier than the Tier 3 final rule. We agree with the Agency that these are straightforward and should be implemented quickly.

- Testing and Reporting for EPA's Complex Model

We support the initiative to streamline testing and reporting for EPA's Complex Model, including the eliminating API gravity and oxygenates. We also recommend that the requirement for aromatics, distillation, and olefins be eliminated completely for winter Reformulated and Conventional gasoline batches. API and AFPM recommend additional regulatory changes to eliminate testing that provides no value, is redundant or otherwise unnecessary. In addition, we recommend reporting frequency and deadlines be changed to meet the needs of EPA and the regulated parties, and EPA update regulatory references to the most up to date standards.

- De minimis batch volumes

We agree with EPA's concept of a de minimis value, below which a party would not be required to correct and resubmit their batch reports. However, the proposed level is of little practical value.

We suggest that a de minimis threshold value of 0.5 percent of any batch is a practical level that will provide the intended relief for regulated parties but will still sufficiently protect the integrity of EPA reporting and compliance programs.

- Other items should be included in regulatory streamlining

Additional topics should have been included in regulatory streamlining, including:

- Diesel blendstocks: should not be used in determining RFS volume obligations
- RFS and gasoline or diesel exports: RFS volume obligations should be reduced or fuel "designated for export."
- MSAT2: EPA should allow refiners to use composite samples to reduce costs and simplify reporting and recordkeeping.
- Batch reports and the addition of ethanol to Conventional gasoline blendstock: EPA should allow the same survey approach used for Reformulated gasoline blendstock to apply to Conventional blendstock
- RFG liability defense elements: Industry should be allowed to rely on the RFG Survey Association survey samples of individual brands.
- Downstream pentane blending: EPA should study the range of pentanes and similar hydrocarbons contained in the gasolines and some pentane blending scenarios to determine a theoretical limit on the volume of pentanes that could be blended.
- Fuel economy labeling: Smog scales should be consistent between Tier 2 and Tier 3 vehicles to ensure consumers can appropriately compare vehicles.
- Streamline the issuance of air permits: EPA needs to issue permits expeditiously, and EPA should adopt the recommendations from the Clean Air Act Advisory Committee ("CAAAC").

Anti-backsliding

EPA has not provided Congress with analyses required by legislation. We believe that the emissions benefits from the Tier 3 rule should be counted as offsets for the environmental impacts of the Renewable Fuel Standard since the RFS was effective long before Tier 3.

DETAILED COMMENTS

I. Gasoline sulfur reduction unjustified

A. Inadequate technical Justification

1. Unsupported claims based on EPA referenced studies

EPA did not adequately justify the need for a 10 ppm annual average sulfur standard for gasoline:

- EPA utilized very few studies and none of these examined gasoline sulfur effects on light-duty vehicle exhaust emissions over the range of 10 to 30 ppm.
- EPA tested very few "Tier 3 – like" vehicles and did not distinguish between the sulfur effects for these vehicles and those for older technology vehicles.
- The "Umicore" study used only one PZEV vehicle and the gasoline sulfur (3 versus 33 ppm) effects on emissions were confounded by changes in other fuel properties.
- The 2005 MSAT study utilized Tier 2 vehicles and examined sulfur effects (6 versus 32 ppm) with an unrealistic sulfur loading cycle for the 32 ppm fuel (3 hour cruise at 35 mph).
- The EPAct/V2/E-89 program did not look at sulfur effects (sulfur at 25 ppm). Instead, EPA determined Tier 2 vehicle-fuel effects for 5 fuel properties: aromatics, ethanol content, RVP, T_{50} and T_{90}. To determine sulfur effects, EPA then used a separate program (in-use fleet test) to adjust for fuel sulfur sensitivity.
- The EPA in-use fleet test examined sulfur effects at two levels (5 and 28 ppm) and had a number of questionable test practices including using an unrealistic base fuel (0% ethanol, high aromatics, very low olefins at essentially 0 vol%, and high T_{50}); requiring mild operation before testing; test cycle; vehicle history and data analysis.
- EPA references test data from Toyota to support their position but do not provide any details or the reference material.
- EPA indicates that a number of 2009 MY Tier 2 vehicles easily meet the 2025 NMOG+NO_x target of 30 mg/mi even when running on current cert fuel (15-80 ppm sulfur).
- EPA offers no test data that compares PM emissions from 10 ppm and 30 ppm sulfur fuels and instead just relies on light-duty vehicle emissions measurements on a 7 ppm sulfur test fuel to support an assertion that the proposed PM standards are feasible.
- EPA asserts that sulfate compounds can be a significant contributor to PM emissions from stratified lean-burn gasoline engines and diesel engines with no supporting data on technology deployment(s).

- We see no justification for EPA's comment that "FTP PM emissions increased with CO_2 emissions for the PFI vehicles".

Detailed Comments

In developing the 10 ppm gasoline sulfur average, EPA relied on very few studies to support their position, none of which look at the linearity of sulfur effects between 10 and 30 ppm to understand vehicle emission system response over the range of interest.

One study, the "Umicore" study, looks at a single PZEV vehicle (2009 Chevrolet Malibu) operating on two fuels – a CARB Phase II Cert fuel at 33 ppm sulfur and a "zero-sulfur" EEE-Lube certification fuel with 3 ppm sulfur. To infer any differences in NO_x emissions between 10 ppm and 30 ppm sulfur fuels from this work is beyond our capability, unless we assume linearity in NO_x response to fuel sulfur levels. Confounding any NO_x results from this limited sulfur study are the underlying base fuel properties that although not noted by the authors, we believe are different and therefore significantly impact the emissions results. Specifically, we believe there to be differences in distillation properties, chemical composition and oxygenates. The standard industry practice is to use sulfur dopants to avoid underlying base fuel changes impacting the emissions. We would also note that results from testing two fuels on a single vehicle do not provide much guidance on the potential impact of the proposed Tier 3 emissions regulations. In particular, the "Umicore" paper did not provide a statistical analysis to show whether the measurements made on the single vehicle tested were (a) statistically significant and/or (b) broadly characteristic of the underlying technology represented. These concerns as well as others regarding the Umicore study are further detailed in comments submitted by API to EPA Administrator Lisa P. Jackson on November 11, 2011 and available in the Docket for this proposed rule.[3]

A second study used by EPA to support its 10 ppm sulfur proposal was the "MSAT (Mobile Source Air Toxics) Study", conducted in 2005 with several automakers to examine the effects of sulfur and other fuel properties on nine Tier 2 vehicles. It is interesting to note that this study has not appeared in literature reviews of fuel effects on emissions including one of the most comprehensive reports, Coordinating Research Council (CRC) Report E-84 "Review of Prior Studies of Fuel Effects on Vehicle Emissions" published in August 2008.[4] Several of the participating MSAT Study automakers are also members of CRC.

The Tier 3 Draft Regulatory Impact Analysis (DRIA) provides the following short discussion of the MSAT Study:

[3] See EPA-HQ-OAR-2011-0135-0042

[4] This report is available on the CRC website at: http://www.crcao.org/reports/recentstudies2008/E-84/E-84%20Report%20Final,%20Aug%2014.pdf

> *"In 2005 EPA and several automakers jointly conducted a program that examined the effects of sulfur and other gasoline properties, benzene, and volatility on emissions from a fleet of nine Tier 2 compliant vehicles, the "MSAT (Mobile Source Air Toxics) Study. Reductions for FTP-weighted emissions for the sulfur changes in this program were 33 percent for NO_x, 11 percent for THC, 17 percent for CO, and 32 percent for methane. Given the prep procedures related to catalyst clean-out and loading, these results may represent a "best case" scenario that magnifies what would be expected under more typical driving conditions. Nonetheless, these data suggested the effect of sulfur loading was reversible for Tier 2 vehicles, and that there were likely to be significant emission reductions possible with further reductions in gasoline sulfur level."*

Having reviewed the publicly available documentation on the above program, we find the details to be very limited. The vehicles are noted to be from model years 2004-2007 meeting the Tier 2 Bin 5 or Bin 8 emissions standards. At this point, without a list of vehicles tested, we have no knowledge of the range of technologies tested, but given the model year information, this suggests that manufacturers provided some pre-production vehicles for this 2005 test program. In addition, these vehicles would likely not meet Tier 3 emission levels based on their Tier 2 Bin designations.

The fuel set used in this study was limited and not well designed. It relied upon a base fuel to which butane, benzene, and sulfur were sequentially added to produce the three main test fuels. Sulfur levels were 6 ppm for the base fuel and 32 ppm for the sulfur-doped base+butane+benzene fuel.

EPA indicates that "Given the prep procedures related to catalyst clean-out and loading, these results may represent a "best case" scenario that magnifies what would be expected under more typical driving conditions", but the prep test procedure for sulfur loading is unrealistic as defined in the MSAT RIA "Where a sulfur loading prep was indicated, a 3-hour 35 mph cruise was conducted immediately before the final drain and fill. The purpose of this prep procedure was to equilibrate the catalyst with higher sulfur fuel, simulating conservatively the conditions that might occur in typical suburban driving." [5] No data were presented to indicate equilibration of emissions before or after the sulfur clean-out and loading procedures.

Further expanding on the above point, an independent review of the MSAT study noted that the use of different preconditioning cycles between the tests on the high and low sulfur fuels "…will impact sulfur loading, and this makes the conclusions with respect to sulfur impact highly questionable." [6]

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[5] See Chapter 6 of the RIA of the MSAT2 final rule, at: http://www.regulations.gov/#!documentDetail;D=EPA-HQ-OAR-2005-0036-1168

[6] Sierra Research*, Assessment of the Emission Benefits of US EPA's Proposed Tier 3 Motor Vehicle Emission and Fuel Standards*, June 2013.

Without individual vehicle data we are constrained in our ability to provide informed comment neither on the statistical analysis of this program nor on the impact of individual vehicles on the overall fleet response. However, we note that EPA recognized the limited nature of this work in its closing comments on the test program as described in Chapter 6 of the RIA for the MSAT2 rulemaking: "Clearly the data from this scoping study indicate that there may be benefits to future fuel controls, though in many cases the size of the test program was not sufficient to determine effects with statistical confidence. At this time, EPA is hoping to conduct a more comprehensive fuel effects test program, as directed by the Energy Policy Act of 2005, "in cooperation with stakeholders and other interested parties, to generate new data over the next several years. We expect that work will produce updated emissions models, as well as sufficient data to make decisions about future fuels programs."

The EPAct/V2/E-89 gasoline fuel effects study resulted in a new fuel/emissions equation for intended use in MOVES. This comprehensive assessment evaluated independent fuel effects on fifteen MY2008 vehicles meeting Tier2 Bin5 standards. A statistically optimal study design was developed to represent 5 fuel properties: aromatics, ethanol content, RVP, T_{50} and T_{90}. These properties were selected based on previous studies as having potential exhaust emissions impacts. It is acknowledged that "sulfur also affects emissions but due to its impact on vehicle catalyst, it is necessary to assess the effects of sulfur separately from those of other fuel properties."

While the EPAct assessment is a detailed document on the experimental design, test procedure development, and fuel effects summary, a key missing component is the reduction in sulfur as proposed in this rulemaking. All test fuels, which were evaluated within the EPAct test program contained sulfur levels of 25 +/- 5 ppm, thus the robust fuel effects equation that was developed based on statistical analysis of the study data has no sensitivity to sulfur.

In order to capture the potential emissions effects of reducing gasoline sulfur levels below 30 ppm, a separate equation was developed for use in the EPA mobile source emissions inventory model, MOVES. This equation was based solely on the EPA study of sulfur effects on exhaust emissions of in-use Tier 2 light-duty vehicles. The coefficients applied to this equation were from mixed model results with inherent assumptions which were acknowledged within the in-use sulfur report (see comments below). The sulfur effects were then applied multiplicatively to other gasoline fuel effects in MOVES. EPA did not provide a comparative analysis of expected emissions impacts due to the sulfur equation change in MOVES.

A more recent EPA study was conducted beginning in 2009 to understand gasoline sulfur effects on the in-use Tier 2 fleet.[7] For this EPA effort (hereinafter termed the "In-use sulfur study"), in-use MY 2007-2009 vehicles from the state of Michigan were evaluated for sulfur reversibility, instantaneous, and mileage accumulated effects at 28 ppm and 5 ppm sulfur. The fuel used for

[7] See the documents related to the EPA "Ultra-low Gasoline Emissions Study" available at: http://www.epa.gov/otaq/models/moves/t2sulfur.htm

these experiments contained 0 vol% ethanol and was doped with dibutyl disulfide to increase sulfur content from 5 to 28 ppm. This test fuel is not representative of in-use fuels due to its low ethanol content, high aromatics, very low olefins at essentially 0 vol%, and high T_{50}. While this study was not designed to evaluate fuel effects other than sulfur, the temperature of the exhaust, emissions species present, and potential catalyst effects are not representative of real world driving conditions. The sulfur history of the vehicles /catalysts is also unclear.

Vehicle operation prior to the testing process is also an area of concern. The civilian or NVFEL drivers were instructed to "avoid hard accelerations and high speeds in an effort to preserve the "as-received" state of the catalyst". This instruction contradicts the overall objectives of this program and biased the "as-received" state of the catalyst.

The report of the EPA In-Use sulfur study contains a significant amount of statistical analysis, however interestingly, raw data trends are largely absent from the body of the document. In review of the raw data provided in the appendix, it is clear that there are issues concerning the drive cycle chosen to evaluate sulfur effects. The pre- and post-catalyst clean out emissions on 28 ppm sulfur fuel show varying trends where, in some cases, the emissions levels post catalyst clean out were higher than the pre-catalyst clean out. The drive cycles chosen for both the catalyst clean-out and mileage accumulation are also only one set of potential driving conditions and typically would not be seen in-use. Previous studies have shown that sulfur accumulation/reversibility is sensitive to driving cycle.

A primary issue with EPA's statistical analysis of the data from the In-Use sulfur study is that the individual vehicles were treated as random variables. If this is true, a subset of the total vehicle population would be expected to have the same responses as the entire population. However, EPA did not present an analysis of whether the different fleets had an impact on the analysis. This should have been done to determine whether EPA's assumption that "vehicle" is a random variable is valid. This is of key importance because EPA used different sets of vehicles to analyze different emission effects. For instance, the clean-out effect at 28 ppm sulfur was measured on a fleet of 81 vehicles, and the clean out effect at 5 ppm sulfur was measured with a fleet of 23 vehicles, which were a subset of the larger fleet.

If the vehicles were truly random variables as EPA assumed, then the responses of the individual models would not be expected to be different, and each vehicle would be treated the same as any other vehicle. However, EPA reported most of the results according to vehicle model, suggesting that EPA itself doesn't believe in the random variable assumption. See, for example, Figures 7-2 and 7-5 of the In-Use Study—these plots, as well as plots in Appendix E, suggest that there are major differences in how different vehicle models responded to the sulfur clean-out cycle with 28 ppm sulfur fuel.

The statistical analysis that EPA conducted did not account for the possibility that the variability of responses within models to fuel differences could be very different from the variability between models. This is important statistical information and can help sharpen the analysis. Treating cars as random variables is a good assumption when one sample of each model is tested; however, when multiple samples of each model are tested, this assumption may not be valid. In any case, this assumption should have been tested by EPA on the large 81-vehicle fleet that tested 5 samples of most models.

EPA made a mid-test change to the procedure for mileage accumulation (from multiple dyno FTP runs to on-road mileage accumulation); however there was no evaluation of the significance of this change to the resulting emissions effects. In addition, the report references that between and within vehicle, variances were significant. An influence analysis should have been completed, such as was done in the EPAct study, on all emissions to show potential biases due to specific vehicle types, including a sensitivity case removing those vehicles having significant influence to the overall conclusions in the report. This was completed only for Bag 2 NO_x. Also, due to the vehicle variances, a number of statistical models were applied to the data which would not converge. The final structure chosen was done such that "due to limited available options, we acknowledge that there might be some limitations inherent in the assumption of constant distance between two measurements" (assumes regularly spaced time intervals for all vehicles which is not the case when emissions were measured at different mileage accumulation rates).

Finally, a large number of emissions concentration measurements taken from Bags 2 and 3 were either lower or similar to the measured background concentrations. The percent differences which are referenced in these cases represent a very small magnitude, which may have errors associated with the analyzers' capability. The report does not indicate the measurement error at levels below the analyzer calibration points for NO_x in Bag 2 and does not mention the calibration points or error for other low emitting species.

To provide additional support for the proposed change in fuel sulfur levels, EPA comments on the impact of sulfur on "Tier 3 like" vehicles. In the first instance, EPA indicates that "Emissions of vehicles certified to the SULEV standard of the California LEV II program, or the equivalent Tier 2 Bin 2 standards, can provide some insight into the impact of fuel sulfur on vehicles at the very low proposed Tier 3 emissions levels. Vehicle testing by Toyota of LEV I, LEV II, ULEV and prototype SULEV vehicles showed larger percentage increases in NO_x and HC emissions for SULEV vehicles as gasoline sulfur increased from 8 ppm to 30 ppm, as compared to other LEV vehicles they tested." EPA does not include a reference for this work nor does it appear at first glance to be in the docket (searching the 600+ docket titles for Toyota). Given the lack of reference and supporting information, we cannot evaluate, provide informed comment, nor accept the Toyota program outcomes mentioned to support fuel sulfur effects on proposed Tier 3 emission level vehicles.

EPA proceeds to provide additional support for the "insight" into the fuel sulfur impacts on "Tier 3 like" vehicles by reviewing the data from the "Umicore" study (a single PZEV vehicle) which we've already discussed above. Thus it would appear that EPA lacks data on Tier 3 emission level vehicles at the sulfur levels of interest, namely between 10 ppm and 30 ppm, to fully understand and comment on the appropriate and necessary fuel sulfur levels to allow compliance with the Tier 3 emissions requirements. Proceeding to a formal decision without providing the underlying supporting data prevents informed public comment, is a departure from accepted scientific rigor and ultimately is a violation of the Administrative Procedures Act.

There are many published studies evaluating the impacts of extremely low sulfur levels on vehicles, although, with the notable exception of the Umicore Study, these studies generally tested vehicles with emission levels higher than the proposed Tier 3 exhaust standard. Of all of the available studies, the RIA and the In-Use sulfur study report address only two—MSAT and Umicore. EPA fails to explain why other available data were not included in its analysis, and the Agency clearly should have performed the most comprehensive analysis possible. It also needs to be stressed that even the two studies selected by EPA do not support the conclusions of EPA's In-Use sulfur study or the proposed 10 ppm sulfur limit. As noted by the review conducted by Sierra Research (see section I.A.2 below), had EPA conducted a more robust analysis of sulfur effects using all of the existing data on late-model, low-emission vehicles, it would have likely observed significantly lower responses for pollutants such as NO_x and HC than those seen in the EPA In-Use Study.

In Table 1-1 of the Tier 3 DRIA, EPA demonstrates that lower gasoline sulfur levels are not necessary for compliance with the full useful life NMOG+NO_x standard as the Tier 2 certification fuel sulfur levels can vary from 15 to 80 ppm and yet there are a number of 2009 model year vehicles that were already certified below the final 2025 standard of 30 mg/mi. Tables 1-1 and 1-2 demonstrate that there are a range of domestic and foreign vehicles sizes and types that already meet the 2022 NMOG+NO_x standards by being below 50 mg/mi.

Even after all the above data have been discussed, EPA indicated in Section 1.2.3.4 of the DRIA that "A gasoline sulfur standard of 10 ppm also represents the highest level of gasoline fuel sulfur that will allow compliance with a national fleet average of 30 mg/mi NMOG+NO_x." Nowhere has EPA even tested levels above 10 ppm sulfur other than the Tier 2 baseline comparison at the current average sulfur level of 30 ppm. This is a serious deficiency in the overall technical justification for the 10 ppm sulfur level.

In discussing the SFTP NMOG+NO_x feasibility, EPA notes "The proposed new emission requirements include stringent NMOG+NO_x composite standards over the SFTP that would generally only require additional focus on fuel control of the engines and diligent implementation of new technologies like gasoline direct injection (GDI) and turbocharged engines." There are no supporting data in the DRIA to substantiate this comment and in fact the following section notes that "A range of technology options exist to reduce NMOG and NO_x emissions from both gasoline fueled spark ignition and diesel engines below the current Tier 2 standards. Available options include modifications to the engine calibration, engine design, exhaust system and after treatment systems." and further add that "To achieve the NMOG+NO_x Tier 3 SFTP standard manufacturers will need to develop and implement technologies to manage catalyst temperatures during high-load operation without using fuel enrichment."

Lean burn gasoline direct injection (GDI) engine technology is specifically identified in the auto industry white paper referenced by EPA in the NPRM as demonstrating the need for 10 ppm sulfur in the United States. However, as we have noted in previous comments on the white paper (included as Attachment No. 3), the penetration of this technology into the market place in areas such as Japan and Europe (where gasoline sulfur is capped by regulation at 10 ppm) has been limited and is not expected to grow.[8] Instead, it is expected that the automakers will rely on other, more cost-effective technologies which will not require the highly sulfur sensitive and costly exhaust aftertreatment devices needed with lean-burn engines. In the US, it is expected that the maximum potential share for lean-burn engines will reach ~3% between 2015 and 2020 and decline thereafter as observed in Japan and Europe, according to research by The Martec Group (Executive Summary is provided as Attachment No. 8).[9]

For heavy-duty engines EPA notes that "manufacturers will focus on four areas for spark ignition engines: reducing the emissions produced by the engine before the catalyst reaches light-off temperature; reducing the time required for the catalyst to reach the light-off temperature; improving the NO_x efficiency of the catalyst during warmed up operation; and, minimizing the time spent in fuel enrichment to reduce the operating temperature of the catalyst." and "focus on three areas for compression ignition: reducing the emissions produced by the engine while the catalysts and SCR system are being brought to proper operating temperature; reducing the time required for the catalysts and SCR system to reach the proper operating temperature; improving the NO_x efficiency of the SCR during warmed up operation through refinement in engine out emission controls and SCR strategies."

In discussing catalyst design changes, EPA notes "All other parameters held constant, increasing the PGM loading of the catalyst also improves the efficiency of the catalyst. The ratio of PGM metals is important as platinum, palladium, and rhodium have different levels of effectiveness promoting oxidation and reduction reactions. Therefore, as the loading levels and composition of the PGM changes the light-off performance for both NMOG and NO_x need to be evaluated. Based on confidential conversations with manufacturers it appears that there is an upper limit to the PGM loading, beyond which further increases do not improve light-off or catalyst efficiency." However, EPA does not discuss how close manufacturers are to this upper limit but instead indicates the need for 10 ppm sulfur fuel "To achieve the proposed Tier 3 NMOG and NO_x emission standards it is anticipated that manufacturers will make changes to catalyst substrates and PGM loadings. To achieve the emission levels required to meet the proposed Tier 3 NMOG+NO_x standard of 30 mg/mi with a compliance margin will require very low sulfur levels in the fuel…. For the Tier 3 FTP emission standards to be achieved and maintained, particularly in use, it is required that the sulfur content of the fuel be reduced to 10 ppm or lower." As we've already shown, EPA's own data indicate current vehicles can comply with the Tier 3 standards even when using Tier 2 fuels.

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[8] See the following Docket item: EPA-HQ-OAR-2011-0135-0042

[9] The Martec Group, *Technology Cost and Adoption Analysis: Impact of Ultra-Low Sulfur Gasoline Standards*, prepared for API, April 9, 2010. Note: this report also is available as the following Society of Automotive Engineers technical paper: McMahon, K.B., Selecman, C., Botzem, F., and Stablein, B., "*Lean GDI Technology Forecast: The Impact of Ultra-Low Sulfur Gasoline Standards*," Society of Automotive Engineers Technical Paper Series, Paper No. 2011-01-1226, 2011

When reviewing PM feasibility, EPA notes "Sulfur and nitrogen compounds are emitted primarily as gaseous species (SO2, NO and NO2). Sulfate compounds can be a significant contributor to PM emissions from stratified lean-burn gasoline engines and diesel engines, particularly under conditions where PGM-containing exhaust catalysts used for control of gaseous and PM emissions oxidize a large fraction of the SO2 emissions to sulfate (primarily sulfuric acid). Sulfate compounds do not significantly contribute to PM emissions from spark-ignition engines operated at near stoichiometric air-fuel ratios due to insufficient availability of oxygen in the exhaust for oxidation of SO2 over PGM catalysts." Given that we see little penetration of stratified lean-burn gasoline engines and diesel fuel sulfur is not under discussion for this Tier 3 rulemaking, it is not surprising that EPA offers no test data in the PM feasibility section comparing PM emissions from 10 ppm and 30 ppm sulfur fuels and instead just rely on data from a 7 ppm sulfur test fuel to support emissions compliance.

While not part of the comments on sulfur effects, we are concerned about statements made on PM emissions in the PM feasibility section of the DRIA. EPA indicates that "FTP PM emissions increased with CO_2 emissions for the PFI vehicles" and "As in the case of FTP results, US06 PM emissions increased with the increase in CO_2 emissions in PFI vehicles". Our review of the data in Tables 1-8 and 1-9 show very little correlation of CO_2 emissions and PM emissions for either drive cycle but as EPA does not indicate how they determined a correlation we would need to conduct some additional review of the docket material "Test Program to Establish LDV Full Useful Life PM Performance" to fully understand their comment. Below we show a plot of the PM data from the FTP testing as listed in Table 1-8.

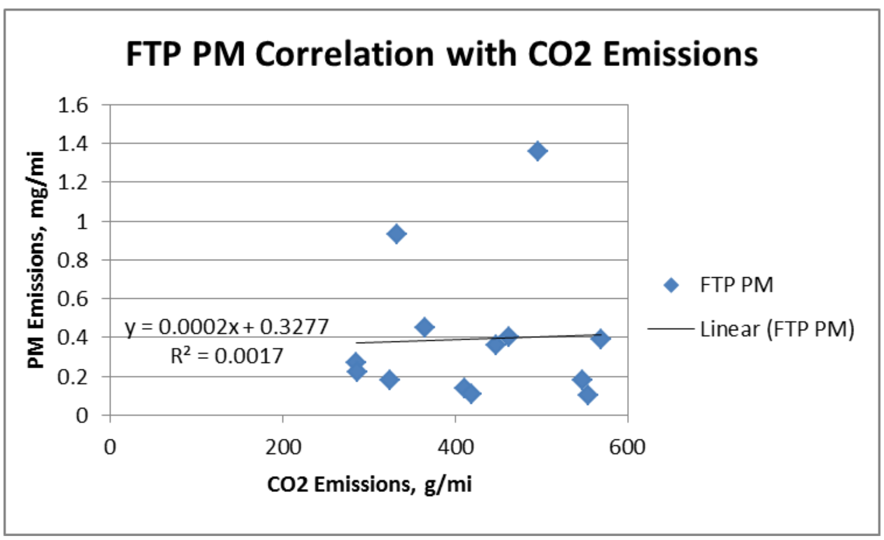

Figure 1: PM data from Table 1.8 of the EPA proposed Tier 3 rule

In summary, without test data on Tier 3 level vehicles at the appropriate fuel sulfur levels of interest (10 to 30 ppm), EPA can only conjecture on what is necessary to meet the proposed Tier 3 emissions standards and, as such, it ends up with an incoherent set of needs for both vehicles and fuels.

2. Recent Studies

Sierra Research[10] recently conducted a comprehensive evaluation of the EPA's technical justification for the proposed Tier 3 regulation as embodied in the emissions inventory estimates, air quality modeling, emission control and vehicle technology assessments, and related studies contained in the DRIA and in the public docket. A copy of the Sierra Research (hereinafter referenced as Sierra) study is attached, in its entirety, to these comments in Attachment No. 13. The study first assesses EPA's claims that the proposed 10 ppm sulfur limit is necessary for compliance with the proposed tailpipe emission standards. It then examines EPA's methodology for estimating the emission benefits and air quality impacts of the Tier 3 proposal and concludes with a review of EPA's assessment of the air quality benefits and cost effectiveness of the proposal.

Sierra identified significant concerns about EPA's use of mathematical relationships based on the EPAct Program data to develop in-use emissions inventories, summarized as follows:

- Fuel effects, as developed by EPA from the EPAct data, differ in some cases from published studies;
- The EPAct Program vehicle test fleet is not representative of the in-use vehicle fleet;
- The EPAct Program was not large enough to provide the data needed to resolve non-linear fuel effects;
- EPA's statistical analysis of the EPAct Program data does not address application of results to in-use conditions;
- Very low emission values observed from some vehicles create problems with the statistical analysis;
- Mathematical relationships relating fuel properties to emissions of some pollutants are too complex and the quadratic form used by EPA is not optimal; and
- The specific mathematical form chosen by EPA is not clearly superior to alternatives that provide significantly different effects when tested on commercial fuels projected by EPA for 2030.

In its review of EPA's DRIA, Sierra noted a range of technologies available to the automakers that could be used to comply with the proposed rule, most of which would improve efficiency even in the absence of any sulfur changes (Draft RIA, p. 1-28). These include the following:

- Increasing cell density;
- Using higher PGM loadings;
- Optimizing air fuel ratio control; and

[10] Sierra Research, *Assessment of the Emissions Benefits of U.S. EPA's Proposed Tier 3 Motor Vehicle Emission and Fuel Standards*, June, 2013

- Limiting the amplitude of air fuel ratio excursions.

EPA, however, did not assess the actual need for additional reductions in gasoline sulfur content in light of the emission control technology it expects automakers to deploy can be highlighted in more detail using data from Section 1.4.1.4 of the DRIA. This section deals with EPA's assessment of technology improvements required for large light-duty trucks, which EPA notes "will be the most challenging light-duty vehicles to bring into compliance…."

Figure 1-6 of the DRIA shows a number of technologies that EPA expects to be deployed in order to comply with the Tier 3 exhaust standard. EPA did not explicitly discuss the sulfur sensitivity of these technologies. However, based on the brief descriptions provided, it is reasonable to assume that the following technologies shown in Figure 1-6 will have little or no sensitivity to sulfur:

- Hydrocarbon adsorbers;
- Reduction in the thermal mass of catalyst substrates and exhaust system piping; and
- Secondary air injection

EPA notes that "90% of NMOG emissions occur during the first 50 seconds after cold start," and that "about 60% of the NO_x emissions occur in these early seconds". The three technologies listed above are designed to reduce or eliminate emissions that occur during the early period of operation, when the engine is cold and the catalyst has not yet reached operating temperature. If these technologies are employed to provide the bulk of the reduction necessary, then clearly the need for sulfur reduction is lessened. Unfortunately, it appears EPA did not consider or even discuss this possibility. These listed technologies are exclusive of changes in engine design that EPA expects could and would be made to achieve compliance, and which are also not sensitive to gasoline sulfur levels.

Figure 2 shows that if manufacturers could completely eliminate cold-start emissions, the current level of catalyst technology would allow compliance with the Tier 3 standards. Furthermore, given that cold-start emissions and cold-start emission control technologies are not likely to be very sulfur sensitive, little or no reduction in gasoline sulfur content should be required to achieve compliance. While it is unlikely to be able to eliminate this source of emissions fully, the table clearly shows that warmed-up emissions are already at a level that is compatible with the standard, which again calls into question the need for additional reduction in gasoline sulfur content and EPA's arbitrary selection of the proposed 10 ppm limit. Regardless, it is clear that EPA should have identified the possible emission control steps that are sulfur sensitive and those that are not sulfur sensitive, and evaluated whether 10 ppm sulfur was necessary and cost effective.

Furthermore, when assessing the cost effectiveness of sulfur control, which EPA should have done but did not, it is important to equate the cost of sulfur reduction with the potential benefits of those vehicle technologies that might be sulfur sensitive.

Reductions Required for Tier 3 Compliance						
	Tier 2/Bin 5 Emissions (mg/mile)				Tier 3 Emissions (mg/mile)	
Pollutant	Standard	Cert Level[a]	Cold Start[b]	Rest of FTP	Standard	Goal with Compliance Margin[c]
NMOG	90	36	32	4	-	-
NO_x	70	28	17	11	-	-
NMOG+NO_x	160	64	49	15	30	15

a. Assumes 60% compliance margin (quoted by EPA in the DRIA).
b. Cold start assumed to be first 50 seconds of FTP operation.
c. Assumes 50% compliance margin (quoted by EPA in the DRIA).

Figure 2: Reductions Required for Tier 3 Compliance

In summary, key findings of the Sierra report (which API and AFPM support) are summarized below:

1. *EPA's selection of 10 ppm for the proposed sulfur limit is flawed since relevant data were ignored, no technical justification was provided, and the sulfur test program conducted by EPA significantly overestimated the impact of fuel sulfur on in-use emissions. In addition, EPA has ignored the impact of vehicle technology on sulfur sensitivity. This is a critical shortcoming because some current vehicles can meet Tier 3 standards on 30 ppm fuel and the vehicle technologies EPA expects to be employed to meet the Tier 3 standards are not sensitive to fuel sulfur. Finally, EPA failed to perform a number of the studies and analyses necessary to justify a lower sulfur limit.*
2. *EPA's methodology for assessing the emission benefits of the Tier 3 proposal is flawed as the benefits of the reduction in fuel sulfur and other fuel property changes were not correctly estimated or accounted for in the agency's emission inventory development.*
3. *EPA has failed to establish that the air quality modeling analysis accurately assesses the impacts of the emission reductions claimed for the Tier 3 proposal and the analysis overstates the air quality benefits of reducing vehicular NO_x emissions in urban areas.*
4. *EPA's cost-effectiveness analysis has not been properly performed and the agency has not performed the incremental cost-effectiveness analysis required to demonstrate that the exhaust, evaporative, and fuel sulfur components of the Tier 3 proposal are all cost-effective.*
5. *The proposed 10 ppm sulfur limit provides only a small portion of the total expected health benefits estimated by EPA to result from the Tier 3 program; and*

6. *Although EPA failed to analyze any alternatives to the 10 ppm sulfur limit, there are alternatives to the fuel sulfur control provisions of the Tier 3 fuel that would be more cost effective.*

B. Negligible environmental benefits

The emissions inventory and air quality impacts of the Tier 3 Proposal are negligible. Even if one accepts an assertion that EPA's air quality modeling analysis is accurately assessing the impacts of the emissions reductions claimed for the Tier 3 proposal, these are likely to be negligible. As the data analysis below shows, the proposed Tier 3 standards for new vehicle emissions and gasoline sulfur will provide negligible environmental benefit, with respect to both (a) reductions in emissions inventories, and (b) improvements in air quality. API recently sponsored an assessment of the incremental nationwide emissions inventory reductions and air quality benefits associated with the adoption of progressively more stringent light duty vehicle emissions standards and gasoline sulfur limits over time.[11] The studies, conducted by ENVIRON,[12] [13] and provided as Attachments No. 9 and No. 10, showed that in 2022, the summertime ozone precursor emissions of volatile organic compounds (VOCs), oxides of nitrogen (NO_x), and carbon monoxide (CO) from gasoline-fueled light-duty vehicles are projected to be reduced by 62%, 80% and 51% respectively as a result of the implementation of the federal Tier 2 program. In contrast, implementation of a federal Tier 3 program would further reduce VOC, NO_x and CO emissions by only 8%, 11% and 7%, respectively. Similarly, Tier 3 is expected to yield lower reductions in PM precursors in comparison to those achieved by the Tier 2 program. The study showed incremental reductions in SO_2 and direct $PM_{2.5}$ of 92% and 19%, respectively, attributable to the adoption of Tier 2, compared with additional reductions in SO_2 and direct $PM_{2.5}$ of 64% and 5%, respectively, as a result of Tier 3. It should be noted that the absolute level of SO_2 emissions in Tier 2 and 3 is two orders of magnitude lower than NOx levels (e.g., 48.4 vs. 2879 Mg/day) and thus a 64% improvement of a very small number is insignificant.

Following the trend in emissions inventories, ENVIRON found that Tier 3 is expected to yield negligible improvement in ambient ozone levels relative to the large reductions that have

[11] For this study, the nationwide adoption of LEV III emissions standards was modeled as a proxy for the proposed Tier 3 emissions requirements, and gasoline sulfur levels were modeled as 1/3 of the county-specific gasoline sulfur values used in the EPA MOVES database to represent Tier 2 gasoline fuels. This approach was deemed to best approximate the reduction in gasoline sulfur content from a Tier 2 average of 30 ppm to a Tier 3 10 ppm average.

[12] ENVIRON, *Effects of Light-duty Vehicle Emissions Standards and Gasoline Sulfur Level on Ambient Ozone*, Final Report, prepared for the American Petroleum Institute, September 2012

[13] ENVIRON, *Effects of Light-duty Vehicle Emissions Standards and Gasoline Sulfur Level on Ambient Fine Particulate Matter*, Final Report, prepared for the American Petroleum Institute, June 2013

Pollutant	Tier 1 (Mg/day)	Tier 2 (Mg/day)	Tier 2 Benefit (%)	Tier 3 (Mg/day)	Tier 3 Benefit (%)
VOC	6,061	2,275	-62%	2,096	-8%
CO	83,585	40,813	-51%	37,755	-7%
NO_x	14,221	2,879	-80%	2,553	-11%
SO_2	620.3	48.4	-92%	17.5	-64%
NH_3	568.3	206.8	-64%	206.8	0%
$PM_{2.5}$	132.9	107.6	-19%	101.9	-5%

Figure 3: ENVIRON Modeling: July 2022 Gasoline LDV Emissions in the Continental U.S.

occurred (and are expected to continue) as a result of Tier 2. As shown in Figures 4 and 5 below, the maximum ozone benefit expected from Tier 3 is less than 1 ppb, relative to a maximum ozone benefit of 12 ppb anticipated from the federal Tier 2 program.

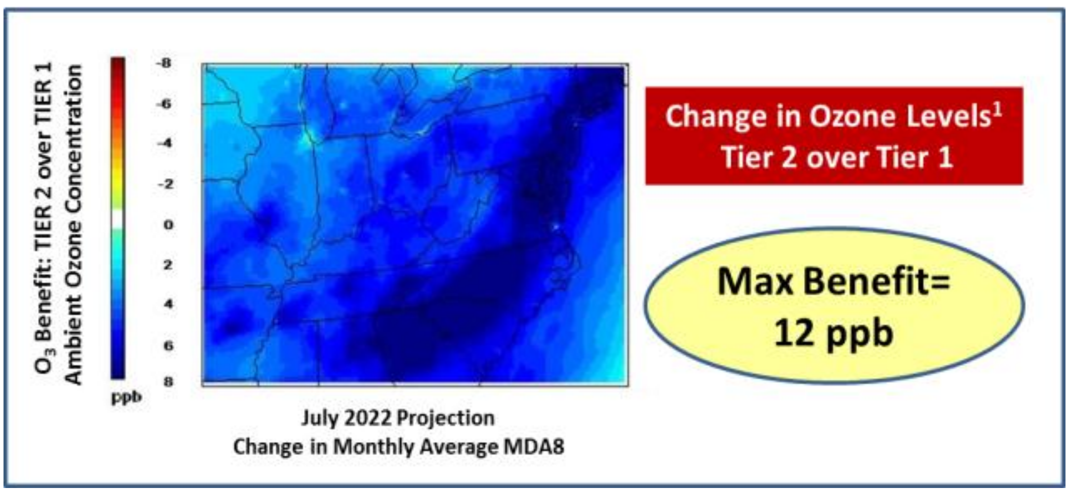

Figure 4: ENVIRON modeling: change in ozone levels from Tier 1 to Tier 2

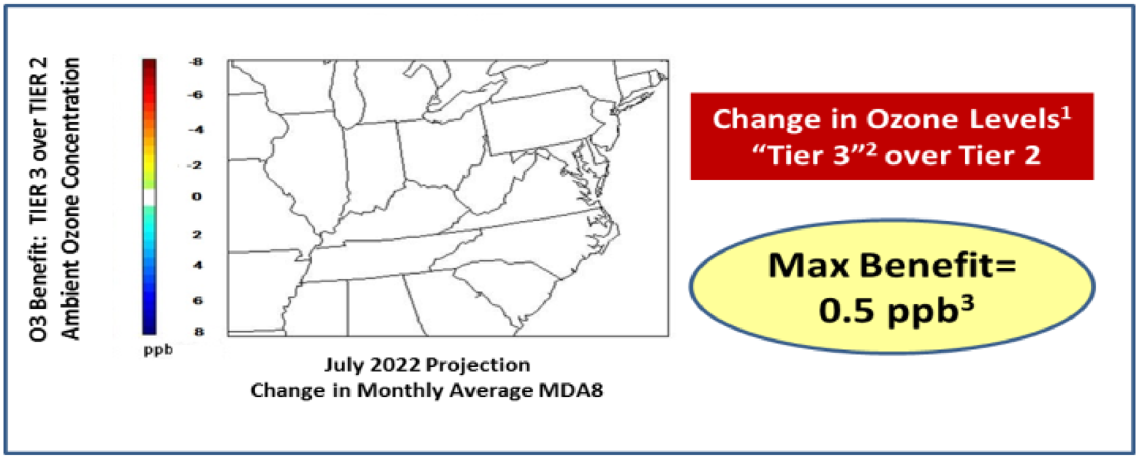

Figure 5: ENVIRON modeling: change in ozone levels from Tier 2 to Tier 3

Similarly, ENVIRON concluded that incremental reductions in the monthly mean of ambient $PM_{2.5}$ concentrations attributable to Tier 3 will be negligible in comparison to those expected from Tier 2. The study showed that Tier 3 would yield incremental reductions in mean monthly summer 2022 $PM_{2.5}$ concentrations of no more than 0.1 µg/m^3 in contrast to a maximum incremental reduction of 2.7 µg/m^3 in mean monthly $PM_{2.5}$ ambient levels under the federal Tier 2 program. See Figures 6 and 7 below.

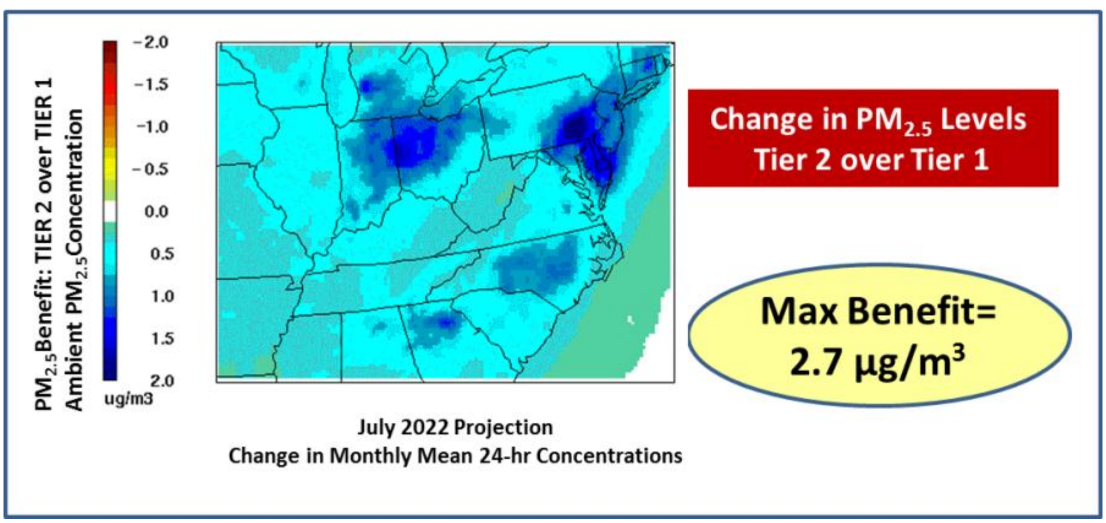

Figure 6: ENVIRON modeling: change in $PM_{2.5}$ levels from Tier 1 to Tier 2

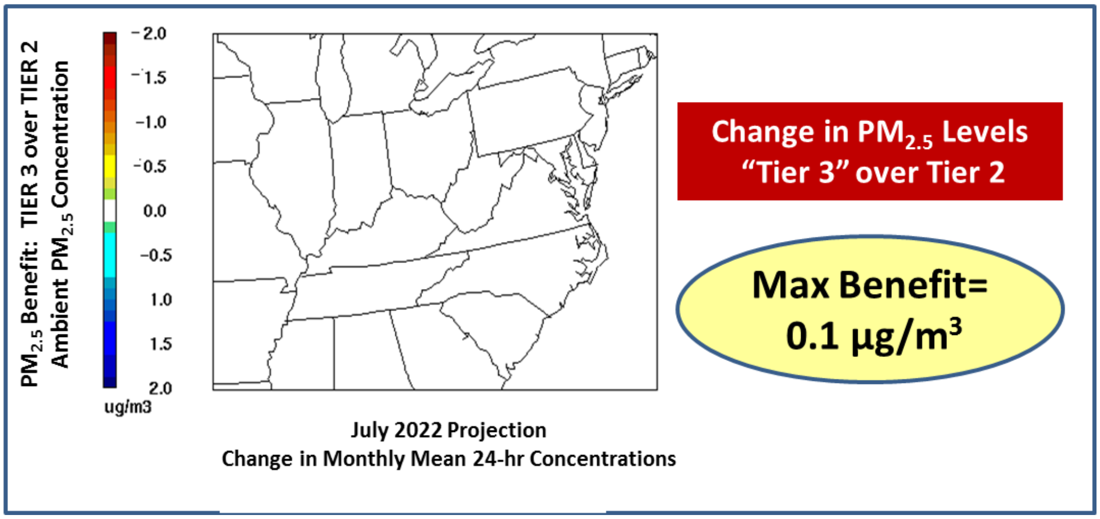

Figure 7: ENVIRON modeling: change in $PM_{2.5}$ levels from Tier 2 to Tier 3

Carbon Monoxide

In Table III-1 of the Tier 3 proposal, EPA projects CO reductions of 746,683 tons in 2017 and 5,765,362 tons in 2030, but EPA does not even bother to discuss these benefits in the Tier 3 emissions reduction section. This is because EPA knows that nationwide CO emissions are averaging less than 25% of the CO NAAQS and have decreased 73% over the past 20 years. Reductions of pollutants below the established NAAQS safe levels do not count as benefits. All CO non-attainment areas are now in attainment and are now in maintenance mode. EPA needs to eliminate throughout this proposal all CO references that imply there are benefits from further CO as part of Tier 3, including its mention in Table III-1.

Mobile Source Air Toxics

EPA claims reductions in Mobile Source Air Toxics (MSAT) that are based on the use of antiquated databases. In the case of Air toxics, EPA makes reference to the NATA 2005 database. Since EPA issued the Tier 2 vehicle and fuel standards and the MSAT2 regulations subsequent to releasing the 2005 NATA, deriving the proposed Tier 3 mobile source air toxics benefits from the 2005 NATA database yields estimates that are highly inflated, not real-world, and seriously suspect. EPA needs to develop a current toxics emissions database before it can make any claims about MSAT benefits.

A table in the Preamble of the proposed Tier 3 rule adds further doubt to EPA's toxics conclusions. Table III-12, titled: "Percent of Total Population Experiencing Changes in Annual Ambient concentrations of Toxic Pollutants in 2030…." presents information that is confusing and inconsistent. Table III-1 claims a 36% reduction in benzene on road inventories by 2030 but the Preamble text associated with table III-12 claims that over 80% of the population will see a decrease of at least 2.5% and in fact the 25-50% reduction value for Benzene shows that no percent of the population will see this level of reduction. There are similar problems for all of the air toxics for which EPA is claiming emission reduction benefits.

<u>Green House Gases (GHG)</u>

In section III B. 7 of the Preamble, EPA states that "We do not expect the Tier 3 vehicle standards to result in any discernible changes in vehicle CO_2 emissions or fuel economy." This is because EPA assumes that all the increased refinery GHG emissions will be offset by N2O and CH4 reductions in tailpipe emissions. EPA estimates refinery GHG emissions to be 4.6 $MMTCO_2e$ for 2017. EPA attempts to downplay this estimate but if their refinery by refinery model is as accurate as they claim, there can't be much downside to this estimate.

Since EPA claims that the refinery GHG emissions will be offset by other parts of this rule, EPA needs to establish a methodology to allow each refinery that participates in Tier 3 to increase its future GHG baselines by the amount that the Tier 3 final regulations will increase its GHG emissions.

C. Flawed Draft Regulatory Impact Analysis (DRIA)

The draft Regulatory Impact Analysis (DRIA) in EPA's proposed Tier 3 rule does not meet EPA Guidelines for Ensuring and Maximizing the Quality, Objectivity, Utility and Integrity of Information Disseminated by EPA. *The issues below, when taken collectively, demonstrate that the costs of the Tier 3 proposed rule are greater than the benefits.*

EPA should withdraw the RIA and develop/resubmit a RIA that is consistent with OMB guidelines.

1. DRIA Baseline

Per 2003 Office of Management and Budget (OMB) guidance to federal agencies on the development of RIAs (referred to as OMB Circular 4), "*baseline normally would be a no action baseline, what the world will be like if the proposed rule is not adopted.*"

Instead of using the most recent EIA projections of declining gasoline demand and biofuel volumes lower than RFS2, EPA assumed: (1) increasing gasoline demand per 2011 EIA outlook, (2) full implementation of RFS2 biofuel volumes, (3) 50% E15 fuel use in 2017 and 100% E15 fuel use by 2030 for all vehicles and off-road engines.

2. DRIA Cost/Benefit Analysis

a) Underestimated Costs

Well in advance of the release of the EPA Tier 3 proposed rule, API published two studies conducted by Baker & O'Brien: a 2011 study titled "Potential Supply and Cost Impacts of Lower Sulfur, Lower RVP Gasoline" (Attachment No. 6) and a 2012 study "Addendum to Potential Supply and Cost Impacts of Lower Sulfur, Lower RVP Gasoline" (Attachment No. 7.)

EPA has chosen to underestimate the costs of a proposed program in an effort to improve the appearance of their cost/benefit analysis. EPA significantly underestimated refinery capital costs, e.g., FCC post-treater 1,500 $/B vs. 6,800 $/B in Baker & O'Brien. Even though EPA criticized the Baker & O'Brien capital costs, they admitted that *EPA received two vendor estimates for grassroots FCCU post-treating and elected to ignore the higher cost estimate*.

On page 5-41, EPA admits to not using any refinery data more recent than 2009 and therefore assuming that most refineries with sulfur averages above 80 ppm have an average of 30 ppm sulfur. This is a poor modeling assumption to start off a refinery by refinery analysis.

Another mistake that EPA makes in many areas is to use average values inappropriately. EPA assumes that refineries process crude with average properties and designs the units in the EPA refinery by refinery model on that basis. EPA provides no data on which specific crudes are used by the refineries in this analysis. EPA fails to recognize that refinery units must be designed with flexibility to handle the worst crudes and the poorest quality feedstocks anticipated in the refinery slate. A grassroots or revamp FCCU post-treating unit designed on a minimal basis to handle a 100 ppm sulfur feed will not produce the required sulfur reduction when a 300 ppm or 500 ppm sulfur feed is used. EPA simply assumes that the high sulfur feed will average with the low sulfur feed but this is not the case in the real world. *EPA's use of the "average case" and failure to "design" for a range of refinery feedstocks, results in a constant bias toward underestimating refinery unit costs.*

EPA makes the assumption that mandated 10 ppm average sulfur level will result in refineries targeting exactly 10 ppm. Refinery operations do not run smoothly and as a result refiners must aim below the 10 ppm target, since ending the year above 10 ppm is unacceptable. Refineries will aim for somewhere around 8 ppm, so that an upset at the end of the year does not result in non-compliance for the entire year. Even with Averaging, Banking and Trading (ABT) program, the refineries generating credits and those using the credits will target around 2 ppm below the average that they must have for compliance. The ability to create Tier 2 sulfur credits is in part caused by this under targeting of sulfur levels. EPA of course assumes that the world is perfect and in that world everyone will on average achieve exactly 10 ppm sulfur in gasoline. The fact is that the refining industry has almost always overachieved when meeting mandated product specifications. *EPA needs to redo their modeling and analysis based on an 8 ppm sulfur average to reflect real world conditions.*

Significant differences between preliminary vendor estimates and actual refinery project costs

EPA presumes a high degree of accuracy from vendor estimates and makes no adjustments to reflect that vendors are typically incentivized to provide the lowest possible estimates. After more thorough negotiations between refiners and vendors, engineering complexities are addressed and costs for specific technologies at specific refineries typically increase. Expertise in capital improvements at refineries is necessary to evaluate vendor estimates; EPA is not appropriately challenging estimates to the point that they provide realistic cost estimates or design factors.

Refiners and refinery construction contractors typically have an idea of the variability in capital costs estimates, and they typically adjust vendor estimates accordingly based on their past experiences with particular vendors. EPA lacks this expert knowledge and thus makes a low estimate of capital costs. In addition, adapting theoretical design to a real refinery platform always results in extra costs to handle these interface adjustments. Refiners and refinery construction contractors typically add some percentage above the estimate to cover these contingencies, but EPA has not factored in these costs.

Finally, EPA assumes that the industry cost of capital is 7% before taxes, which would approach 3.5% for most companies. This is compared to the 10% after taxes that Baker & O'Brien assumed. EPA mistakenly assumes that this ROI on regulatory driven refinery projects is all profit when in fact it represents the cost of obtaining the capital for such large projects and the opportunity cost of that capital. EPA is way off base with respect to the true cost of capital and the opportunity cost associated with regulatory driven investment. In the real world, a cost of capital of 3.5% over the life of the investment is far too low.

EPA's modeling shortcomings

It is interesting how EPA spends a large portion of Chapter 5 of the DRIA discussing their refinery by refinery model. However, EPA fails to mention their refinery by refinery results of 4.5 cents per gallon marginal costs even with an Averaging, Banking, and Trading (ABT) program in place. Given the shortcomings mentioned above of EPA modeling efforts, this result if adjusted properly would align very well with the Baker & O'Brien results which did not include an ABT program.

It is well known that Linear Programming (LP) modeling approaches such as EPA's refining model over optimize and underestimate refinery costs. The refinery LP approach assumes that the entire PADD modeled essentially has infinite trading capabilities for crude properties, final product properties, intermediate stream properties and unit processing capabilities. For example, EPA's average refinery is assumed to have a small hydrocracker when in fact most U.S. refineries do not have hydrocrackers. This assumption allows the notional refinery a multitude of processing options that are unavailable to most refineries.

EPA has assumed that all gasoline will be blended with 15% ethanol having only 5 ppm sulfur. While this is certainly consistent with EPA's aspirations, it is highly unlikely that E15 will dominate the nation's gasoline pool by 2020. *EPA needs to redo their calculations with 10% ethanol, which will increase the costs of desulfurization.*

EPA's calculation errors

The costs that EPA reports on Figure 5-6 and in the proposal text are a nationwide average cost of 0.79 cents per gallon. However, if one simply uses the data on the graph, it appears that the average cost is 1.08 cents per gallon. If one takes the same steps with Figure 5-1, which is very similar to the Figure VII-2 used in the proposal, the average cost calculates to be 1.21 cents per gallon instead of the 0.97 cents per gallon that EPA uses in the text of the proposal.[14] One would suspect that these differences are due to volume weighting but for EPA to simply slap an average cost on a graph which does not demonstrate that average is very misleading and confusing. At the very least, EPA should add an explanatory footnote.

EPA's inadequate modeling of octane costs

For estimating the costs of the proposal, EPA correctly pointed out that, "the most important input is the cost making up the octane loss that occurs with desulfurization." [DRIA 5.1.2 page 5-3] However, EPA then goes on to immediately dismiss the octane costs by assuming "the cost of octane is expected to decrease dramatically due to expected much larger use of ethanol under the RFS2 rulemaking". [DRIA 5.1.2 page 5-4] Specifically, EPA assumes that by 2017, 50% of the gasoline market is E10 and the other half is E15, a contested fuel authorized under a partial waiver for late model vehicles only.

First, it is not appropriate to assume high market penetration of a contested fuel simply because it makes the Tier 3 proposal more palatable from a cost perspective. It is not clear that if given the choice, consumers would willingly consume E15 fuel given its lower energy content and vehicle manufacturer statements advising against its use. It is also unclear whether the vehicle fleet composition and fueling infrastructure in RFG zones will be able to convert 75% of consumption to E15. EPA makes the assumption that since E15 does not qualify for the 1 psi ethanol waiver, 100% of the E15 will be sold in RFG areas, which will make E15 75% of all gasoline in those markets (page 7-12).

Second, EPA's assumption for the FCC octane loss penalty from increased desulfurization is overly optimistic. In Table 5-18, EPA suggests that refiners will, on average, have to reduce sulfur in FCC naphtha from 80 ppm to 21 ppm. Then for the vendor requests to estimate this cost, EPA only requested a 75 ppm to 25 ppm target. The stated rationale appears to be that a 50-ppm reduction is close enough to the 80 to 21 calculated in their averages, even though octane loss is not linear with desulfurization, especially at lower sulfur levels. The final result in Table 5-26, is that the volume-weighted average octane loss for this target is 0.49 (R+M/2). In their model, this half octane number reduction translated into 0.38 cents per gallon of FCC naphtha (page 5-5 and table 5-41 which is incorrectly referenced). FCC naphtha is assumed to

[14] 78 Federal Register 29976.

be 36% of the gasoline pool, making EPA's net operating cost for octane loss an astonishingly low value of 0.14 cents per gallon of gasoline.

Finally, this low octane cost per gallon of gasoline does not align with the trend of market octane cost. By examining the spread between premium and regular grades of gasoline, and knowing the difference in octane value of each grade, a cost/octane gallon can be calculated.

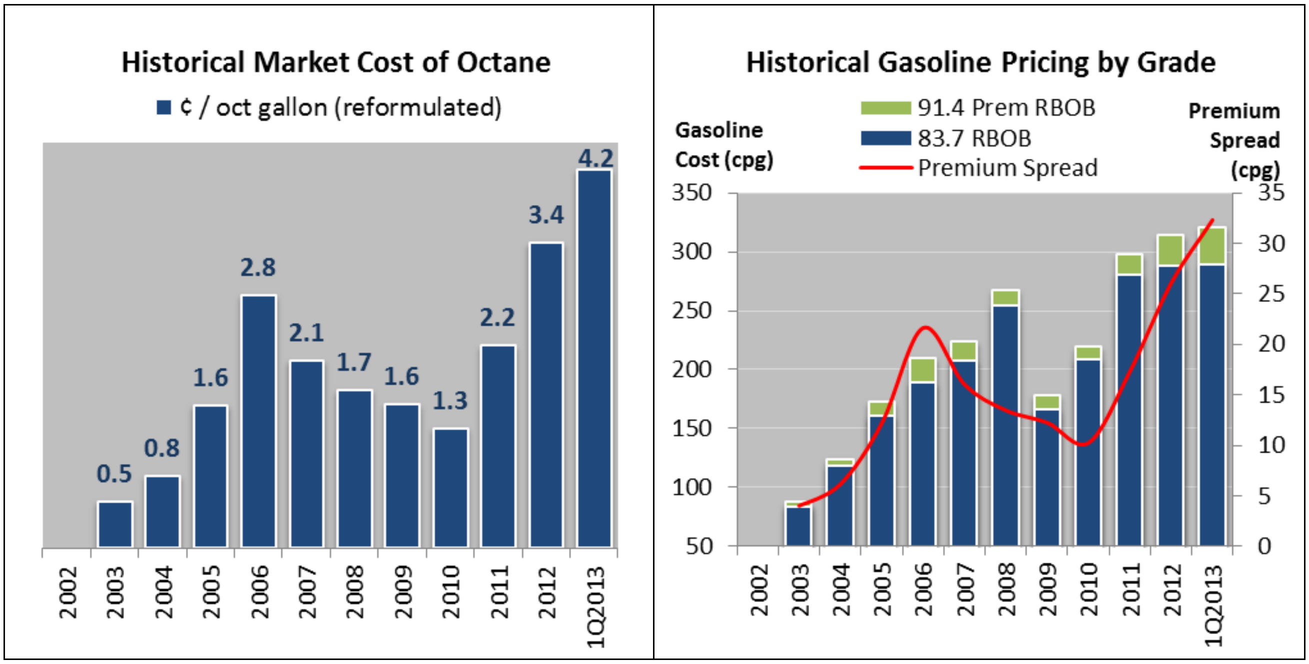

Figure 8: Market Octane Cost (premium spread divided by octane number difference) and Gasoline Prices. Source: Platts, Annual averages of daily prices.

Figure 8 above shows the annual average of daily posted prices and makes it clear that octane is getting more expensive, even as ethanol blending has saturated the market. Unless the market is assumed to be inefficient, it would appear octane has value and it is increasing. This is in direct contradiction to EPA's assessment that costs associated with octane destruction through desulfurization are largely negligible as described in the prior paragraph.

<u>Economic theory and discussion of average vs. marginal costs</u>

Throughout EPA's analysis, and especially in section 5.2 of the DRIA, EPA places extraordinary emphasis on their average cost calculations, which for reasons explained above, are biased downward. At the same time, EPA mistakenly ignores the marginal cost impacts. EPA implicitly acknowledges the relevance of marginal costs as evidenced by EPA's analysis of cost impacts refinery-by-refinery that highlighted the marginal cost.

Adjusting for shortcomings mentioned above in EPA's modeling efforts, their results could align very well with the Baker & O'Brien study. The marginal cost graph below (from the Baker &

O'Brien report) illustrates the point that a larger volume of gasoline production will incur higher than average costs of production. By definition, half the volume falls on either side of the average. Figure 9 below includes a point estimate of approximately 1 cent per gallon (i.e. EPA and MathPro) and illustrates approximately 50% of gasoline production is covered by the average cost, the other half is not. Even EPA's graphs demonstrate this fact.

Baker & O'Brien v MathPro

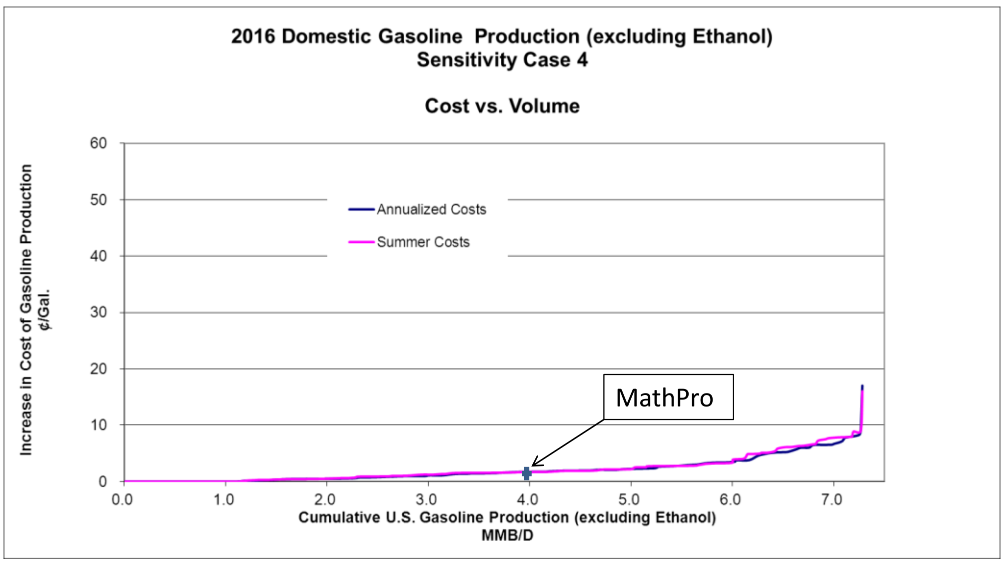

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Figure 9: Comparison of Capital Cost Projections

The Baker & O'Brien study concluded that allocating compliance and capital cost on an annualized basis resulted in a marginal cost of 6 to 9 cents per gallon in most markets. EPA's own analysis in the DRIA (Figure 5-4) illustrates a marginal cost curve that appears to exceed 6.5 cents per gallon. Does EPA believe that gasoline will be delivered to market at the average cost of production?

EPA needs to recognize that basic economics teaches that the market will have to bear the marginal cost of bringing the last increment of demanded supply into the market. Thus the marginal cost represents the true cost of this proposal to the consumer.

In section 9.3 of the DRIA, EPA reports that they do not estimate consumer price impacts of the proposed Tier 3 program. However, EPA goes on to note that the increase "should be positive and up to the increase of manufacturers' cost of gasoline production."

In this contradiction, not only does EPA point out their analytical shortcomings, but EPA has also ignored economic theory. Increasing marginal costs of production, (illustrated in both Baker & O'Brien and EPA) results in a positive relationship between total quantities supplied and price of that quantity in the market place (i.e. supply curve).

EPA focuses on the average cost, which is misleading because refineries producing up to ½ of gasoline production will by definition incur costs higher than average, some significantly higher, in order to comply with the Tier 3 proposed regulation. In order to ensure these marginal supplies of gasoline are brought to the market place, market signals will be required to incentivize these incremental supplies.

Refining sector jobs

We recommend that EPA removes the reference and benefits from 1,600 "jobs gained in the refinery sector"

First, it should be pointed out that these are temporary constructions jobs and not permanent jobs gained in the refinery sector. Second, this estimate was based on a single study by Morgenstern *et al.* "Jobs versus the environment: an industry level perspective. *J. Env. Econ. and Manag.* 43:412-436."

EPA used a figure of 2.17 jobs created per M$ of expenditures (1987 dollars scaled to 1.289 G$ costs in 2017.) The applicability of the Morgenstern study, which focuses on jobs associated with refinery emission reductions, to Tier 3 gasoline sulfur reduction is questionable.

Critique of MathPro study[15]

The MathPro study conducted for ICCT reports an average cost for PADD but in fact these are not average costs but the costs for an average notional refinery in each PADD. If the costs for refineries of different sizes fell along a straight line, this average refinery cost would be appropriate. However, a typical cost curve for refineries and for refinery units is exponential in nature not linear, as demonstrated in the earlier Figure 9. EPA recognizes the exponential nature of economies of scale in their equation 5-4 on page 5-34 which incorporates the six-tenths rule. By applying this rule, curves such as EPA's DRIA Figure 5-4 demonstrate that the costs are not linear and the mid-point of the curve is not representative of the average of all the points on the curve. Thus EPA's own RIA analysis demonstrates that the MathPro approach is faulty and does not represent the real average.

It is well known that modeling approaches such as MathPro's notional model underestimate refinery costs. The notional LP approach assumes that the entire PADD modeled essentially has infinite trading capabilities for crude properties, final product properties, intermediate stream

[15] MathPro Inc. *Refining Economics of a National Low Sulfur, Low RVP Gasoline Standard.* Performed for The International Council For Clean Transportation. October 2011.

properties and unit processing capabilities. For example, MathPro's notional refinery is assumed to have a small hydrocracker when in fact most U.S. refineries do not have hydrocrackers. This assumption allows the notional refinery a multitude of processing options that are unavailable to most refineries.

It should also be noted that MathPro's use of an average notional refinery represents some elements of a sulfur banking and credit trading system. While it does not represent the factors involved in the early credit program, it does represent the final sulfur ABT system since the notional refinery has the average sulfur removal capacity in the PADD and achieves average compliance across the PADD.

Critique of Navigant study[16]

The Navigant study makes incorrect claims on:

1. Refinery capital costs. Navigant starts their analysis with the assumption that MathPro and EPA are the "experts" in the area of sulfur reduction costs. In this particular case this is not an accurate assessment; as both MathPro and EPA simply relied on rough vendor cost estimates. On the contrary, as mentioned earlier, the Baker & O'Brien study was based on discussions with many refiners to determine actual on the ground costs at refineries. In reality refineries cannot add on small increments of new units and the supporting utilities as the MathPro and EPA approach would suggest. As a result real world compliance costs are higher than rough estimates using a notional or theoretical refinery.
2. Gasoline costs. Navigant's portrayal of market mechanisms is misleading - the fact is that consumers ultimately bear the cost of regulations. This has been true with numerous regulations, including Tier 2, and will likely be repeated with Tier 3 costs. Navigant's use of European Brent spot prices as an example to compare against U.S. gasoline retail prices makes little sense, since the Brent price has been very unrepresentative of actual average U.S. crude costs for the past 5 years.
3. Jobs. Mandatory government regulations requiring capital expenditures and the creation of temporary jobs for unjustified new specifications constitute inefficient uses of market financial resources. As such, it makes little sense for Navigant or EPA to count the mandated costs of a regulation, i.e. Tier 3, as "benefits" when in reality economic growth is slowed from what it could have been with more efficient use of capital.

b) Overestimated emissions benefits

We recommend that EPA uses EIA's AEO 2013 as the baseline to account for declining gasoline demand

[16] Schink, G. and Singer, H. (2012). *Economic Analysis of the Implications of Implementing EPA's Tier 3 Rules*

EPA relied on EIA's Annual Energy Outlook in 2011 (AEO 2011), which projected 4% higher gasoline demand in 2030 vs. 2012.

The analysis in the table below (Figure 10) compares gasoline demand and vehicle miles travelled in AEO 2011 with AEO 2013. Using as baseline AEO 2013 instead of AEO 2011, in 2030 gasoline demand is projected to be 26% lower, vehicle miles travelled 11% lower, and gasoline consumption in gallons per mile 16% lower.

In line with this analysis, baseline emissions are expected to be lower than EPA's assumed baseline. As a result, the emissions benefits from Tier 3 are overstated.

AEO 2011	2012	2017	2030	2012=>2030 % change
Billion vehicle miles traveled	2878	3136	3853	34%
Energy (Quad Btu)	16.87	17.051	17.58	4%
Gasoline demand (MBD)	9.07	9.215	9.769	8%
gasoline gallons/mile	0.048	0.045	0.039	-20%

AEO 2013	2012	2017	2030	2012=>2030 % change
Billion vehicle miles traveled	2723	2827	3417	25%
Energy (Quad Btu)	16	15.22	13.3	-17%
Gasoline demand (MBD)	8.68	8.29	7.26	-16%
gasoline gallons/mile	0.049	0.045	0.033	-33%

Delta: AEO 2013 minus EPA's baseline	2012	2017	2030
Billion vehicle miles traveled	-5.4%	-9.9%	-11.3%
Energy (Quad Btu)	-5.2%	-10.7%	-24.3%
Gasoline demand (MBD)	-4.3%	-10.0%	-25.7%
gasoline gallons/mile	1.1%	-0.2%	-16.2%

Figure 10: AEO 2011 and 2013; gasoline demand and vehicle miles travelled comparison

We recommend that EPA uses a well-to-wheels, lifecycle basis for gasoline and ethanol air quality impacts

EPA focused only on the vehicle/fuel system (use emissions) and ignored the fuel production emissions. According to the National Academy of Sciences (NAS) report ("Renewable Fuel Standard: Potential Economic and Environmental Effects of U.S. Biofuel Policy", October 2011), ethanol has higher overall emissions than gasoline (see graphs below). This is a result of significantly higher production emissions for ethanol arising from production, which includes agriculture and the biorefinery. Note the relatively small differences between gasoline and ethanol in tailpipe emissions (use). Figure 11 summarizes the NAS report findings.

As the volume of ethanol increases significantly in EPA's baseline between 2017 and 2025, EPA does not make adjustments to the air quality impact of ethanol emissions. As a result the air quality benefits of the proposed Tier 3 rule are overstated.

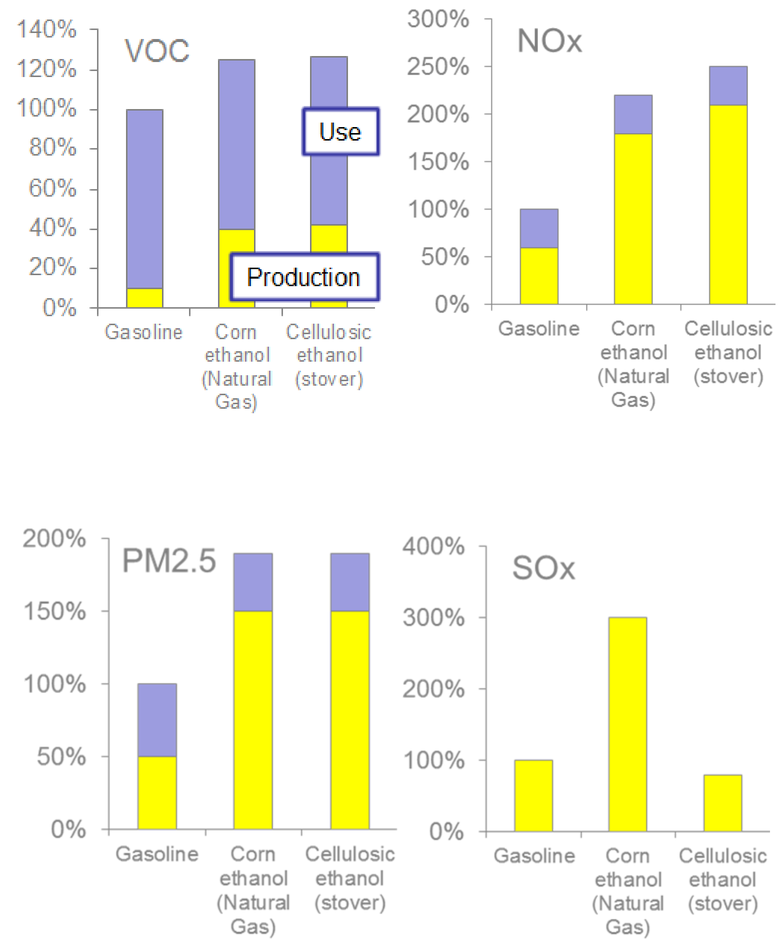

Figure 11: Lifecycle Emissions from gasoline, dry mill corn-grain ethanol produced using natural gas at the biorefinery and cellulosic ethanol from corn stover.

EPA should correct a number of deficiencies in the methods incorporated into the MOVES model which lead to an overstatement of the emissions inventory benefits of Tier 3

A recent assessment of the version of MOVES used by EPA to estimate the emissions benefits of the Tier 3 proposal identified several key issues with this model, including the following:

- The FTP driving cycle used by EPA in its sulfur test program to develop fuel sulfur correction factors to implement in the MOVES model for adjusting the exhaust emissions of Tier 2 and newer light-duty vehicles is a mild cycle that does not cover the full range of accelerations in-use and does not include high-speed operation. In fact, the FTP test represents only a small fraction of the running exhaust emissions, particularly for Tier 2 vehicles. Consequently, the fuel sulfur impacts for running exhaust emissions which EPA developed based on the FTP cycle are not representative of the vehicle operating modes that produce the bulk of the exhaust emissions, and this renders the adjustments for 2004 and later model years in the version of MOVES used for the NPRM highly questionable.

- There are numerous inconsistencies between the EPA evaluation of the EPAct test data as documented in EPA-420-R-13-002 and the methods incorporated into MOVES for estimating non-sulfur fuel effects for 2004-and-later model years. It is unclear if errors were made in reporting or in the incorporation of methods into MOVES.
- The model inappropriately extrapolates log-log sulfur corrections towards the zero asymptote for key sectors of the 2003-and-older model year fleet in order to evaluate proposed sulfur requirements. The result is large changes in exhaust emissions that are not confirmed by actual data.
- Tier 0 exhaust impact equations, for modeling fuel effects, are extrapolated to E15, which is not supported by data.
- The extrapolation of Tier 0 Non-sulfur fuel effects to Tier 1 through NLEV technologies has not been properly validated.
- The model does not restrict E15 usage to the fleet legally allowed to use the fuel (2001-and-later model year light-duty vehicles). Rather all gasoline vehicles were modeled as operating on E15 at a uniform market share.
- RVP impacts on exhaust have critical flaws, primarily in winter season modeling, due to excessive RVP extrapolation and a failure to evaluate temperature interactions.
- EPA assumes that the proposed evaporative emission standards reduce permeation emissions by 75%, emissions from vapor leaks by 70%, and emissions from liquid leaks by 30-45%. These assumptions are based on simple engineering estimates and are uncertain. EPA estimates that the proposed evaporative emission standards will provide 34% of the total VOC emission reductions expected from the Tier 3 proposal by 2030; however, the MOVES model does not assume any reduction in permeation emissions from Tier 2 vehicles relative to earlier vehicle technologies. In contrast, data from the CRC Project E-77 studies[17] [18] [19]on evaporative permeation show that some Tier 2 vehicles have much lower permeation emissions than pre-Tier 3 vehicles (e.g., vehicles certified to California's "Zero Evaporative Emission Standards"). Therefore, it is likely that a portion of the assumed permeation benefit for Tier 3 already is occurring in Tier 2 vehicles. Thus, the benefits of the proposed Tier 3 evaporative emission standards are overstated.

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[17] Haskew, H. and Liberty, T, *Enhanced Evaporative Emission Vehicles*, CRC Project E-77-2, March 2010

[18] Haskew, H. and Liberty, T, *Vehicle Evaporative Emission Mechanism: A Pilot Study*, CRC Project E-77, June 24, 2008

[19] Haskew, H. and Liberty, T, CRC Project E-77-2c, *Study to Determine Evaporative Emission Breakdown, Including Perm4ation Effects and Diurnal Emissions Using E20 Fuels on Aging Enhance Evaporative Emissions Certified Vehicles*, December, 2010

- The method by which exhaust basic emission rates were developed for Tier 3 vehicles, based on the ratio of exhaust standards, failed to account for the different certification fuels inherent in those standards.

These issues are discussed in detail in a comprehensive assessment of the emissions benefits of the Tier 3 proposal that was prepared by Sierra Research that is attached to these comments (Attachment No. 13) and submitted for the record.[20]

c) Implausible health benefits due to highly conservative, unrealistic assumptions

Using more realistic assumptions per existing references, the economic benefits of this proposed rule would be markedly reduced lower than the costs in the proposed rule. Additionally, the DRIA does not comply with various sections of the OMB Circular A-4 guidelines. The references used in this section can be found in the Appendix.

We recommend that EPA withdraws the DRIA and develops/resubmits a DRIA that is consistent with OMB guidelines.

<u>Over-estimated mortality attributed to small changes in $PM_{2.5}$</u>[21]

Similar to recent EPA air-related rules, most of the economic benefits of the proposed Tier 3 rule (well over 95%) accrue from preventing "premature mortality" attributed to small reductions in ambient $PM_{2.5}$ and ozone. EPA assumes with 100% certainty that exposure to any level of PM and ozone, whether far above or far below the current national standards, causes mortality. If EPA's assumptions on mortality are not correct, and mortality does not occur at all or does not occur at lower levels, the benefits of the Tier 3 rule would be markedly reduced and the costs of the rule would exceed the benefits.

Nearly a decade ago, the National Research Council recommended that EPA discontinue using both the American Cancer Society (ACS) and Harvard Six Cities (H6C) cohorts for decision-making (NRC, 2004). This recommendation was based on the concern for the age of the cohorts and fact that the individual and group factors used to adjust air pollution mortality risks were collected over 20 years ago and were never been updated. Today, the average ages of these cohorts is now 87 and the individual and group risk factors are over 30 years out of date.

According to data provided by the Centers for Disease Control, cardiovascular mortality rates in the United States have been steadily decreasing (Kochanek et al. 2009; Danaei *et al.* 2009). In just one year, 2008 to 2009, the age-adjusted death rate for diseases of the heart decreased by 3.7 % (Kochanek et al. 2009). The key factors responsible for this trend include reduction in

[20] Sierra Research, *Assessment of the Emissions Benefits of U.S. EPA's Proposed Tier 3 Motor Vehicle Emission and Fuel Standards*, June, 2013

[21] The references used in this section can be found in the Appendix.

smoking rates, various efforts to control blood pressure, and changes in diets (Danaei et al. 2009). These factors for cardiovascular risk, called covariates in epidemiology studies, have changed markedly over the last three decades. For example, when the ACS and Harvard Six Cities cohorts were enrolled in the late 1970's to early 1980's, smoking rates were 33-37% (CDC, 2012). Today, these rates have fallen to under 20%. Various updates and reanalysis of the ACS and Harvard Six Cities studies inappropriately assume that the much higher rates were constant or proportional over the 30 years of study follow-up.

Similarly, other key cardiovascular risk factors including control of high blood pressure and low density and total cholesterol, intake of salt and omega 3 fatty acids, have markedly changed over the last 30 years (Danaei *et al.* 2009). By not considering these national trends in well accepted risk factors for cardiovascular disease, the reduction in cardiovascular mortality that has been occurring in the U.S. has been inappropriately assigned by EPA to the coincident reduction in ambient $PM_{2.5}$ in the U.S.

Despite the recommendations of the NRC and the well-known changes in risk factors responsible for the decline of cardiovascular mortality in the U.S., in the DRIA for the Tier 3 rule, EPA once again exclusively relied on studies using these two aged cohorts to estimate chronic mortality attributed to $PM_{2.5}$ exposure. EPA ignored studies that used more modern cohorts or that reported a different spectrum of results (Greven *et al.*, 2011; Krewski *et al.* 2000; Enstrom 2005; Beelen *et al.* 2008; Janes *et al.* 2007). EPA also ignored studies that reported a threshold for mortality (Abrahamowicz *et al.* 2003; Nicolich and Gamble 1999; Smith *et al*. 2000; Stylinaou and Nicolich 2009; Gamble and Nicolich 2006) and other studies that challenge EPA's no threshold approach to risk assessment for PM (Koop and Tole 2006; Roberts and Martin 2006).[22]

In the draft DRIA, over two-thirds of the economic benefits are attributed to a small (0.05 $\mu g/m^3$) reduction in $PM_{2.5}$ and most of these benefits are attributed to mortality. For the primary regulatory scenario that EPA presents in the DRIA, the number of PM mortalities estimated to be prevented ranged from 800 using Pope *et al.* (2002) to 2,100 using Laden *et al.* (2006). By comparison, the estimated ozone mortalities avoided were 170 to 770.

EPA used a single range of mortality coefficients (Pope to Laden) for $PM_{2.5}$ and applied them across the U.S., even though significant regional heterogeneity has been reported in recent studies (Peng *et al*. 2005; Dominici *et al.* 2006, 2007; Enstrom 2005). In this manner, EPA does not address the issue that the benefits in various regions of the country differ widely. Since OMB guidelines encourage exploring regional variations in benefits (Circular A-4 page 8), EPA's draft DRIA for the Tier 3 rule is deficient in this area.

Over 90% of the benefits result from reducing ambient levels of $PM_{2.5}$ well below the NAAQS level (see Figure 12 below). Since a large fraction of the U.S. population lives in areas where the

[22] We incorporate by reference these studies in these comments, and ask the Agency to include them in the administrative record.

$PM_{2.5}$ levels are well below EPA's recently revised NAAQS, EPA assumes that ambient exposures even near background present an equal risk. EPA should not calculate mortality or other health benefits below the NAAQS for PM and ozone, levels.

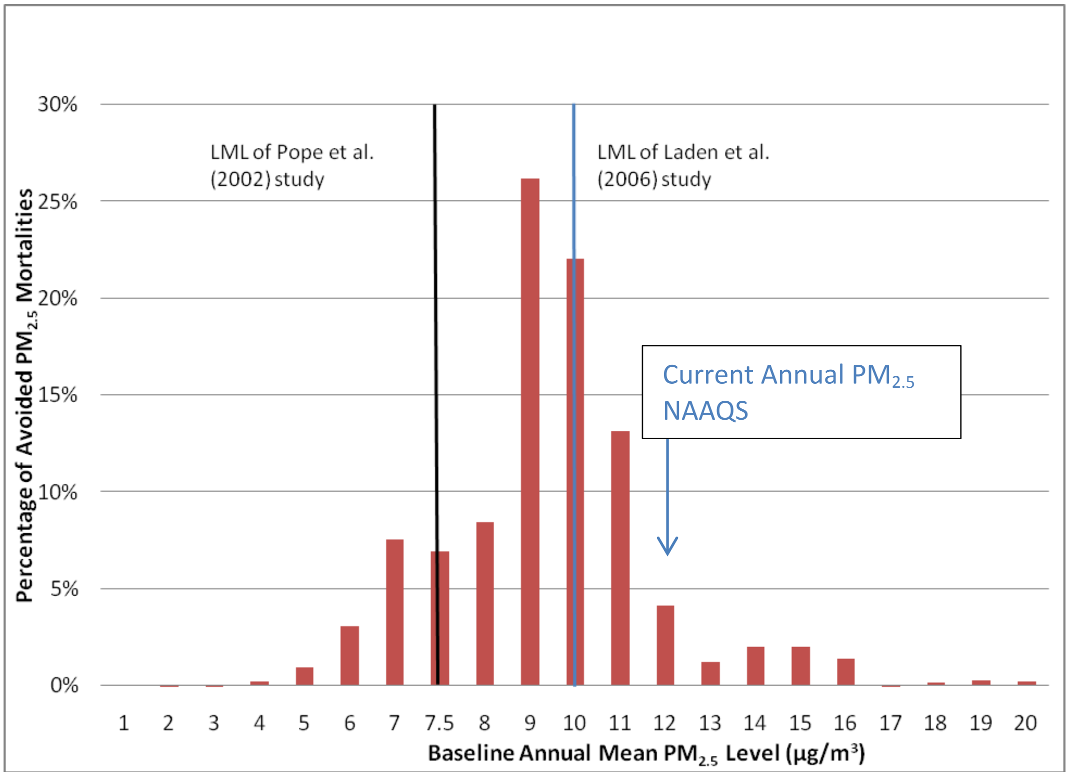

Figure 12: Percentage of Total PM-related Mortalities Avoided by Baseline Air Quality Level

If EPA set aside the economic benefits of the Tier 3 rule that are estimated below the NAAQS for PM and ozone, and ignored all of the other changes suggested here, the benefits of this rule would be markedly reduced (90% reduction) and would fall in the range of $0.8-2.3 billion. In this case, EPA's estimated costs of the rule ($3.4 billion) would exceed the benefits by about 1.5-4 fold.

<u>Dismissed chemistry differences in PM toxicity potential</u>[23]

Similar to EPA's air-related rules, most of the chemistry of PM reduction from the Tier 3 rule is soluble secondary inorganic sulfate and nitrate PM that exhibits low toxicity potential in animal and human clinical studies (Schlesinger et. *al*. 2003; Amdur *et al*. 1998). By 2017, EPA estimated this rule will result in reduction of 284,381 tons of nitrogen oxides and 16,261 tons of sulfur oxides. EPA predicted much of these gaseous emissions will be converted to PM. By comparison, in the executive summary of the DRIA, EPA estimated the rule will produce a small (121 ton) reduction in directly emitted $PM_{2.5}$ whereas in another section 7.1.3.2.2, EPA predicts

[23] The references used in this section can be found in the Appendix.

the rule will produce an increase in directly emitted $PM_{2.5}$. In either case, the rule will have little impact on ambient levels of directly emitted $PM_{2.5}$ in the U.S. Thus, the large economic benefits EPA estimated for this rule are highly dependent on the assumption that soluble sulfate and nitrate PM exhibit the same remarkably high mortality producing potential as claims for $PM_{2.5}$, the form of PM evaluated in the underlying health studies that EPA relied on.

EPA's assumption that soluble sulfate and nitrate PM produce mortality with no threshold is inconsistent with published scientific information. Despite numerous attempts to encourage EPA to recognize that a long term epidemiology study has evaluated this key issue, EPA again ignored the study by Abrahamowicz *et al.* (2003) which reported no mortality at sulfate concentrations less than 12 $\mu g/m^3$. This level is far above current ambient levels of sulfate PM in the U.S. Although soluble nitrate PM has not been evaluated in long term epidemiology studies, based on physical chemical properties, a similar result would be expected. Thus, the results of Abrahamowicz *et al*. suggest reducing secondary sulfate levels further by a fraction of 1 $\mu g/m^3$ as proposed in this rule will not result in any decrease in mortality. Therefore most of the mortality related benefits that EPA claims will result from this rule are not expected to occur.

<u>Over-estimated mortality assumptions from small changes in ozone</u>[24]

To estimate acute mortality attributed to ozone exposure, EPA used the study by Bell *et al.* (2004) and Levy *et al.* (2005) to characterize the low end and high end range, respectively, of the available literature. In this manner, EPA only used studies that reported a positive association between ozone and mortality. EPA excluded other studies that reported no clear association and confounding by particular matter (Smith *et al.* 2009, Franklin *et al.* 2007; Katsouyianni *et al.* 2009). EPA also excluded epidemiology studies that report a threshold for ozone mortality (Stylianou *et al*. 2009) as well as other studies that conclude it is not possible to determine whether or not thresholds exist at low ozone levels with observational data given the poor ambient to personal exposure correlation and high exposure misclassification (Brauer *et al*. 2002). It is hard to understand how EPA could use anything other than zero for the low end.

EPA's reliance on the meta analysis study by Levy *et al.* is not appropriate and significantly inflated the ozone mortality values. EPA's use of this study is inconsistent with the conclusion the Agency reached in Integrated Science Assessment (ISA) for ozone. In the ISA, EPA recognized the risk estimates reported by Levy were biased high. Levy *et al.* only considered positive studies and there is inherent positive study publication bias in the time-series literature.

In the draft DRIA, EPA calculated U.S. wide ozone mortality using a single range of "national" risk coefficients (Bell to Levy) and applied this range across the United States. EPA excluded published studies that report clear regional heterogeneity in the ozone mortality association

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[24] The references used in this section can be found in the Appendix.

(Smith *et al*. 2009; Bell and Dominici 2008; Bell *et al.* 2007). In many regions of the U.S., no ozone mortality association is observed. Therefore, there is no valid national risk coefficient. In this manner, EPA avoided the issue that the benefits in various regions of the country will differ widely. Again, EPA's approach did not conform to OMB guidelines that encourage exploring regional variation in benefits (OMB Circular A-4 page 8).

Inflated economic benefits based on "avoided or premature mortality"[25]

To monetize the mortality related benefits, EPA continues to use the inappropriate metric of "avoided deaths" and the Value of a Statistical Life (VSL). This approach is inconsistent with the older age of the population most impacted by air pollution (Sunstein *et al*. 2004; Rabl *et al*. 2003 and 2006; Leksell and Rabl 2001). EPA VSL-only approach is also inconsistent with OMB guidelines which call for the presentation of results of mortality valuation using both the value of statistical life year (VSLY) or similar metric such as value of a life year (VOLY) and VSL (OMB Circular A-4, page 30). This single factor resulted in an approximate 5-fold over estimation of the mortality benefits versus those that would have been resulted if EPA used a VOLY figure such as the one from Aldi and Viscusi (2007). If EPA used the VOLY or a similar approach as recommended by OMB and held all other assumptions constant, the costs and benefits of the rule would be about the same.

It is worth noting that EPA is the only regulatory authority worldwide that uses a VSL only approach to assess the economic impacts of mortality attributed to air pollution. In the European Union, both the VSL and VOLY approaches are used. The VOLY is the approach preferred by UK Institute of Occupational Medicine, the group that develops health component of the cost benefit analysis for the Clean Air for Europe program. The World Health Organization uses a quality adjusted life year approach to assess impacts of air pollution.

Even though hedonic wage studies are not applicable for air pollution control policy development, EPA inappropriately used them to derive recommended VSL for the Tier 3 DRIA. As noted by Fraas and Lutter (2012), the inclusion of hedonic wage studies results in a two-fold inflation of the VSL figure currently used by EPA.

EPA also inappropriately scaled up the VSL over time based on the assumption that there will be a continuing increase in real income in the United States. As a result, in the draft DRIA, EPA used a VSL figure that grew from $8.0 million in 2000 to $9.9 million in 2030. EPA's assumption defies recent economic trends as reported by the United States Census Bureau (2012). Adjusted for inflation, the average median household income in the United States has steadily declined each year over the last four years, falling from $54,489 in 2007 to $50,054 in 2011.

EPA's 8.0 to 9.9 M$ VSL figures are by far the highest used worldwide and nearly an order of magnitude higher than the 1 M Euro figure used to assess the economic impacts/ benefits of air

[25] The references used in this section can be found in the Appendix.

pollution reduction policies in Europe, a region with an economy and population characteristics similar to the U.S.

Inappropriately monetized health effects not caused by $PM_{2.5}$[26]

In this DRIA as per all recent air related RIAs, EPA monetized a large number of health effects that have clearly not been established to be caused by PM or ozone. The most significant of these from an economic perspective is chronic bronchitis attributed to exposure to $PM_{2.5}$.

To estimate the incidence of chronic bronchitis, EPA relied on a very poor quality and outdated study (Abbey *et al.* (1999). This study examined oxidative air pollution in southern California over three decades ago. Abbey et al. did not evaluate fine PM but rather a different NAAQS pollutant, total suspended particulates. EPA inappropriately converted the risks attributed to course PM in Abbey *et al*. to fine PM. With this approach, EPA ignored well-known medical knowledge that bronchitis is a disease of the upper airway where larger particles deposit. It is unlikely that exposure to fine PM influence the development of bronchitis. Since Abbey *et al.* did not report a statistically significant increase in bronchitis due to exposure to PM, EPA used a non-statistically significant finding to estimate bronchitis incidence due to fine PM exposure.

No estimates of Tier 3 impacts on urban populations[27]

In the DRIA, EPA did not provide information on how the Tier 3 rule and changes in ozone levels may result in a disproportionate impact on populations in urban centers. In their recent report on the Benefits and Costs of the Clean Air Act (EPA, 2011), EPA noted that in many urban areas, the ozone levels were 15 to 20 ppb *higher* with the Clean Air Act Amendments (CAAA) than without. EPA attributed this to NO_x scavenging whereby nitrogen oxides, while participating as an ozone precursor, can also serve to scavenge or reduce ozone, particularly during the peak ozone season and in urban centers where ozone levels might otherwise be quite high. Thus, the effect of the CAAA controls was to suppress NO_x scavenging in the city centers, where "dis-benefits" of the CAAA are the largest. A similar phenomenon may occur when the Tier 3 rule is implemented. Since OMB's guidelines call for regulatory agencies to assess distributional effects, EPA's DRIA is deficient in this area (OMB Circular A-4, page 14).

Insufficient quantification of key uncertainties in claimed benefits[28]

The quantitative treatment of uncertainty was extremely limited. As has become standard for all recent EPA RIAs, here EPA only presented a simple range of figures based on whether they used the results of Pope et al. (2002) or Laden *et al*. (2006) to assess chronic PM mortality. EPA did not address the full range of uncertainty in this single factor, i.e. the PM mortality

[26] The references used in this section can be found in the Appendix.
[27] The references used in this section can be found in the Appendix.
[28] The references used in this section can be found in the Appendix.

concentration response relationship. As noted above, EPA excluded from consideration many other studies that report a different range of results.

Similarly, for ozone, the only uncertainty EPA attempted to address quantitatively was the magnitude of the acute ozone mortality risk function. Again, EPA did not address this issue thoroughly. Rather, EPA selected two positive studies and excluded from consideration many other studies that provided a different spectrum of results.

As pointed out by Frass and Lutter (2012), EPA's current approach to assess uncertainties focuses narrowly on the PM and ozone mortality concentration response functions; as such it does not meet the National Research Council recommendations (NRC, 2002). Similarly, the approach used by EPA does not meet the requirements of OMB (OMB Circular A-4, page 40-41). For rules for which the costs are projected to exceed $1 billion annual threshold OMB requires a formal quantitative analysis of the relevant uncertainties including, if possible, probability distributions.

EPA again used the same limited approach to assess uncertainty and did not provide a quantitative analysis of the key uncertainties that drive the very high benefits figures. Some of the key uncertainties that were not addressed include: 1) the quantitative impact of using other studies besides the outdated ACS Pope and Harvard Six Cities Laden to estimate PM mortality; 2) the quantitative impact of using studies besides Bell and Levy to estimate ozone mortality; 3) the quantitative impact of varying particle chemistry on the PM mortality risk functions and benefits; 4) the impact of extrapolating mortality and other health effects to far below levels deemed safe by EPA to near or below background; 4) the impact of using a high end versus a more central VSL and the impact of using the more policy relevant VOLY metric to monetize loss of life expectancy.

Cost effectiveness analysis inconsistent with OMB guidelines

OMB states that the three basic elements of a good regulatory analysis should include: 1) a statement of the need for the proposed action; 2) an examination of alternative approaches, and; 3) an examination of benefits and costs of the proposed action and the main alternatives (OMB Circular A-4, page 2). EPA's DRIA does not include an examination of alternative approaches and fails to meet the above basic criteria.

For major rule-makings, OMB recommends providing both a benefit cost analysis (BCA) and a cost-effectiveness analysis (CEA) (OMB Circular A-4, page 9). Even though Tier 3 is a major rule, EPA did not provide a CEA that addresses alternative measures to reduce $PM_{2.5}$ and ozone air pollution, costs of alternate measures, and cost comparisons. Without a CEA, EPA cannot determine if the Tier 3 rule is the most cost effective way to reduce $PM_{2.5}$ or ozone air pollution.

Furthermore, OMB recommends that agencies use multiple measures of effectiveness (OMB Circular A-4, page 13) including at least one integrated measure of effectiveness such as Quality Adjusted Life Year if the rule claims both mortality and morbidity benefits (Circular A-4, page 12). As mentioned above, EPA only used a VSL to monetize mortality in this rule and the draft rule does claim morbidity benefits. Therefore, EPA's VSL only approach does not comply with two separate sections of OMB guidelines as described in Circular A-4.

II. Proposed Fuel Program:

As the data and analysis in Section I clearly show, EPA has not demonstrated the need for Tier 3. API and AFPM recommend that EPA a) provides a technically sound justification absent the analytical data gaps in the current proposal, which we highlighted in Section I.A; and b) withdraws and resubmits a new DRIA consistent with OMB guidelines as outlined in section I.C. Should EPA decide to proceed with the Tier 3 rulemaking, the sections that follow provide our industry's recommendations.

A. Five year lead time is necessary for implementation

EPA asserts that it is necessary to implement the 10 ppm annual average gasoline sulfur standard on January 1, 2017 to help heavy duty vehicles meet the Tier 3 vehicle emission standards throughout their useful life, to enable new vehicle technologies to improve fuel efficiency, and to reduce emissions from the current vehicle fleet. EPA also asserts that 3 years of lead time (assuming this rule is finalized by January 1, 2014) provides more than sufficient lead time for the refining industry to make the changes necessary to reduce gasoline sulfur levels to 10 ppm on average. However, as explained in more detail below, implementation on January 1, 2017 is not necessary, and does not provide sufficient lead time. Rather than the 3 years EPA proposes, *if* EPA decides to proceed with the Tier 3 rulemaking, **EPA should provide 5 years of lead time to implement any changes to the average gasoline sulfur requirement.**

1. January 1, 2017 implementation is not necessary

In the proposal, EPA asserts that reducing the sulfur content of gasoline to 10 ppm has three primary benefits: a) enabling heavy duty vehicles to meet NMOG and NO_x standards throughout their useful life; b) enabling the development of lower cost technologies to improve fuel economy; and, c) reducing emissions from the in-use vehicle fleet. Each of these claims are discussed below. None of these claimed benefits justify a January 1, 2017 effective date for the 10 ppm gasoline sulfur standard.

a) Heavy duty vehicles and new 30 mg/mi fleet average standard

EPA asserts that lowering gasoline sulfur to 10 ppm is necessary to enable larger vehicles and trucks to reduce the NMOG+NO_x low enough to comply with the 30 mg/mi fleet-average standard vehicle emission standards over the useful life of the vehicles. Even if reducing gasoline sulfur to 10 ppm does help such vehicles comply with the standard over their useful life, as EPA's own proposal makes clear, that does not justify January 1, 2017 implementation. The vehicle standards for vehicles and trucks exceeding 6000 lbs. GVWR is not even effective until the 2018 model year. Thus, clearly, January 1, 2017 implementation is not necessary.

Numerous other provisions of the proposed rule support the conclusion that implementation on January 1, 2017 is not necessary. In particular, the provisions for generation of early credits for compliance with the vehicle standards, the schedule for phase in of the vehicle standards, the small refiner/refinery exemption until 2020, the per-gallon gasoline sulfur cap, and the early credit program for the gasoline sulfur program all demonstrate that EPA is unnecessarily rushing implementation of this rule by proposing a January 1, 2017 implementation. Furthermore, because the impact of sulfur on vehicle catalysts is reversible, providing more lead time will not prevent vehicles from meeting the vehicle emission standards over their useful life. Each of these issues is discussed below.

Early credits for vehicle manufacturers

EPA proposes to allow vehicle manufacturers to generate early federal credits against the current Tier 2 Bin 5 requirement in MYs 2015 and 2016 for vehicles under 6,000 lbs. GVWR and MYs 2016 and 2017 for vehicles greater than 6,000 lbs. GVWR. These early federal credits can be used without limitation for MY 2017. In other words, the vehicles are not required to meet the Tier 3 vehicle emission standards at the start of the program. See 78 Federal Register 29867-68. As such, it is clearly not necessary to reduce the gasoline sulfur level to 10 ppm on January 1, 2017.

Phase in of vehicle standards

In addition to the ability to delay implementation of the vehicle standards through the generation of early credits, the program for vehicle manufacturers also contains phase-in schedules that make clear that it is not necessary to implement the 10 ppm gasoline sulfur requirement on January 1, 2017. As noted above, EPA maintains that reducing gasoline sulfur to 10 ppm is necessary to help heavy duty vehicles meet the NMOG + NO_x standards over their useful life. Even if that is true, as noted above, the vehicles standards do not even apply to vehicles above 6000 lbs. GVWR until MY 2018. Moreover, EPA is considering not even requiring vehicle manufactures to meet the standards until MY 2019. See 78 Federal Register 29876.

Small refiner/refinery exemptions/per-gallon cap/early gasoline sulfur credit program

Numerous aspects of the proposed gasoline sulfur rule make clear that January 1, 2017 implementation is not necessary to enable vehicles to meet the emission standards and that EPA is unnecessarily rushing implementation of the rule.

Although EPA proposes to make the 10 ppm gasoline sulfur standard generally effective January 1, 2017, EPA proposes to allow small refiners and small refineries to continue to produce gasoline under the existing Tier 2 rules – i.e., 30 ppm annual average standard/80 ppm per-gallon cap – until January 1, 2020.

Similarly, EPA proposes to maintain the existing Tier 2 per-gallon cap of 80 ppm, under the Tier 3 rules, at least until 2020. This too demonstrates that EPA does not believe that January 1, 2017 implementation of the 10 ppm sulfur standard is necessary for vehicles to meet the Tier 3 standards.

The early credit provisions under the gasoline sulfur program demonstrate the same thing. As EPA explains in the proposal, the effect of the early credit program is to delay the implementation of the 10 ppm annual average standard. We believe the early credit provision is an important part of the proposal and we support it. However, it does demonstrate that January 1, 2017 of the 10 ppm sulfur standard is not necessary for vehicles to meet the Tier 3 standards.

In all of the above situations, EPA places no restrictions on the use of such Tier 2 gasoline to prohibit its use in newer vehicles that are required to comply with the new vehicle standards, demonstrating that January 1, 2017 implementation is not necessary.

Sulfur's impact on catalysts is reversible, delaying rule implementation will not prevent vehicles from meeting the Tier 3 standards throughout their useful life.

As explained above, January 1, 2017 implementation of the 10 ppm gasoline sulfur requirement is not necessary to enable vehicles to meet the NMOG + NO_x standards. But, even if it is true as EPA claims that sulfur will negatively impact catalyst performance on such vehicles, that does not justify the January 1, 2017 implementation date, because the effect of sulfur on catalysts is reversible. A new study (described in detail in Section II.B of these comments) demonstrates that exposure to gasoline fuels containing sulfur levels of 80 ppm sulfur has no lasting impact on the performance of exhaust emission control systems on modern vehicles operated on 10 ppm sulfur gasoline.

b) EPA has failed to demonstrate that reducing gasoline sulfur levels to 10 ppm is necessary to enable newer technologies that EPA claims could improve fuel economy

This issue was addressed at length in Section I.A. EPA boldly asserts that reducing gasoline sulfur levels to 10 ppm will enable newer technologies that could improve fuel economy. 78 Federal Register 29820. EPA claims this benefit in a single sentence in the proposed rule concerning lean-burn engines without any rationale or justification whatsoever. Similarly, the draft RIA contains exactly one sentence regarding lean-burn engines with no supporting data or evidence. DRIA at 1-31. This cannot be taken seriously as a justification for the proposed reduction of sulfur to 10 ppm. If EPA does seriously intend for this to be a justification for the rule, EPA should re-issue the proposal providing its rationale and data for such an assertion so that it can be properly evaluated and commented upon by the public, as required by section 307(d) of the Clean Air Act.

In any event, there is no basis to claim that lean-burn technology is likely to expand in the U.S. and that lowering gasoline sulfur will enable such expansion. In other regions of the world where such technology has been introduced, the automobile manufacturers have indeed been scaling back its use, not expanding its use.[29]

c) January 1, 2017 implementation is not necessary to help areas attain the Ozone NAAQS

EPA asserts that reducing gasoline sulfur to 10 ppm on January 1, 2017 will have immediate benefits for the existing vehicle fleet by reducing emissions from Tier 2 vehicles. Even if that is true, that does not justify January 1, 2017 implementation of the 10 ppm gasoline sulfur standard. As explained earlier in section I.B of these comments, even if lowering sulfur to 10 ppm reduces emissions to a small degree, that does not mean it will improve air quality. Recent studies by ENVIRON demonstrate that the impact of reducing gasoline sulfur from 30 ppm to 10 ppm will have a *de minimis* impact on air quality.[30] [31]

Furthermore, implementing the rule on January 1, 2017 will not help nonattainment areas reach attainment. For the current ozone NAAQS (promulgated in 2008), the Agency defined the classifications of nonattainment designations as: marginal, moderate, serious, severe, or extreme, and set deadlines for these areas to come within attainment for each category. These ozone nonattainment areas need to come in attainment by the following dates:

- Marginal – 36 areas – must be in attainment by December 31, 2015
- Moderate – 3 areas – must be in attainment by December 31, 2018
- Serious – 2 areas – must be in attainment by December 31, 2021
- Severe – 3 areas – must be in attainment by December 31, 2027
- Extreme – 2 areas – must be in attainment by December 31, 2032

The only way to attain by the end of 2015 is to have the 2013-2015 summers be clean. Similarly, the Moderate areas need the 2016 summer to be clean to be reclassified as attainment. Tier 3 is too late for the Marginal and Moderate areas. In contrast, taking EPA's claims of emissions reductions benefits as true, Tier 3 could benefit the Serious, Severe, and Extreme areas, but January 1, 2017 implementation is not necessary to help these areas reach attainment by December 31, 2021. We suggest, consistent with the need to provide 5 years of lead time as described below, and the requirements for the Serious areas to demonstrate attainment, that EPA implement this rule on January 1, 2019.

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[29] McMahon, K., Selecman, C., Botzem, F., and Stablein, B., "Lean GDI Technology Cost and Adoption Forecast: The Impact of Ultra-Low Sulfur Gasoline Standards," SAE Technical Paper 2011-01-1226, 2011, doi:10.4271/2011-01-1226.

[30] ENVIRON, *Effects of Light-duty Vehicle Emissions Standards and Gasoline Sulfur Level on Ambient Ozone*, Final Report, prepared for the American Petroleum Institute, September 2012

[31] ENVIRON, *Effects of Light-duty Vehicle Emissions Standards and Gasoline Sulfur Level on Ambient Fine Particulate Matter*, Draft Final Report, prepared for the American Petroleum Institute, June 2013

2. Five year lead time from publication of Final Rule is required for implementation

EPA asserts that 3 years of lead time is more than sufficient for the petroleum industry to implement the 10 ppm gasoline sulfur requirement. 78 Federal Register 29923. We disagree. EPA needs to provide 5 years of lead time. As discussed above, rushing implementation of the gasoline sulfur requirement is not necessary. Rushing implementation will unnecessarily raise the cost to implement the program. Rushing implementation undermines the ability of the industry to adequately plan projects, secure contractors and equipment at competitive rates, optimize solutions, and align construction projects with existing maintenance turn-around schedules. In addition, air permits will be necessary at many refineries, and EPA has been challenged in issuing permits in a timely fashion (as is discussed in further detail in section VII.F of these comments.) All of these factors will tend to increase compliance costs.

In the proposal, EPA puts forth Table V-3 with a timeline that the Agency believes illustrates the time needed to implement the 10 ppm gasoline sulfur requirement at a refinery. 78 Federal Register 29925. We disagree with EPA's suggested timeline. We believe that a more accurate amount of time needed to implement major new rules like the 10 ppm gasoline sulfur requirement is at least five years. The Tier 2 rules were finalized in February 2000, with compliance required to phase in from 2004-06 (with compliance flexibilities that had a more meaningful impact, as discussed below). Ultra Low Sulfur Diesel (ULSD) rules were finalized in January 2001; with a compliance phase-in period requiring that 15 ppm sulfur diesel constitute 80% of the highway pool in mid-2006. Compliance lead times need to be longer than these two significant rulemakings to reduce sulfur because of new GHG requirements at refiners, and the increased reliability of refining equipment has extended refinery turn-around time to approximately 5 years. These recent changes for refiners add complexities that warrant additional Tier 3 compliance lead time.

In the proposal, EPA suggests that 3 years of lead time is feasible, in part, because EPA began talking to refiners about the possibility of regulating gasoline sulfur a couple of years ago. This is inappropriate because EPA decisions concerning key aspects of this rule are not yet final. EPA understands that there can be many changes made from the time a rule is proposed until it is finalized in response to comments submitted by the public, and that therefore there is too much uncertainty to make detailed implementation plans until the final rule is issued. In this case, for example, we do not yet know whether EPA will actually require a reduction in gasoline sulfur given the high costs and *de minimis* environmental benefits, we do not know when the rule will be effective, we do not know whether EPA will leave the per-gallon cap at 80 ppm, etc. Based on this, it is unreasonable, and arguably a violation of the Administrative Procedures Act, for EPA to assert that refiners had sufficient notice of this rule's requirements two years before it was even proposed to begin implementing the rule. In this rulemaking, as with all rules, EPA must consider whether lead time is adequate from the date of promulgation of a final rule, not from the time that EPA starts thinking about possibly issuing a proposed rule.

B. Maintain 80 ppm per-gallon sulfur cap

API and AFPM support EPA's first proposed option for maintaining the current per gallon sulfur caps: 80-ppm refinery gate sulfur cap and 95-ppm downstream sulfur cap. As EPA notes, the annual average sulfur standard is a factor that limits the amount of sulfur in gasoline, and also that per gallon caps have an important role. Beyond the refinery gate, the introduction of sulfur into gasoline occurs during pipeline shipment through multiproduct pipelines and back-to-back shipments with higher sulfur content jet fuel.

However, it is important to understand potential impacts of tighter per gallon sulfur caps on compliance cost and supply impacts. A tighter per gallon sulfur cap, either with the current annual average sulfur limit or a tighter standard as proposed for Tier 3, results in less flexibility and could lead to supply reductions. This is because that in addition to downstream sulfur introduction into gasoline, increased sulfur can occur inside the refinery gate due to planned or unplanned upsets, unit turnarounds or unit shutdowns.

Another advantage of maintaining the current per gallon sulfur cap standard is that it allows current transmix operations to continue. As noted by the EPA in the Tier 3 proposed rule, transmix that occurs from pipeline shipping accounts for only a small amount of gasoline consumption and most transmix batches of gasoline are approximately only 10 ppm above the current Tier 2, 30-ppm refinery sulfur average.[32] This indicates that sulfur content in transmix is relatively small, even in the context of current refinery annual average sulfur standard.

API engaged Turner, Mason & Company (TM&C) to evaluate the economic, supply, and overall gasoline pool quality implications for imposing more stringent per-gallon sulfur caps on U.S. gasoline in addition to the assumed reduction in the annual average sulfur limit to 10 ppm.[33] The complete TM&C report titled "Economic and Supply Impacts of a Reduced Cap on Gasoline Sulfur" has been submitted as Attachment No. 12 for EPA's review.

TM&C's conclusions are summarized below:

- The cost to manufacture gasoline will increase as the sulfur cap is reduced from the current 80 ppm standard; capital costs range from approximately $2 billion to over $6 billion and annual operating costs are estimated at $900 million for a 20 ppm cap. These costs are in addition to those required to meet a 10 ppm annual average limit.
- Overall potential loss of gasoline supply will increase tenfold as the sulfur cap is reduced from the current 80 ppm standard, resulting in 130 MBPD of supply loss at a 20 ppm cap.
- Regions served by just a few refineries could experience shortages of 25% - 50% during outages of gasoline sulfur reduction units at a 20 ppm cap, while outages would be minimized at sulfur caps exceeding 50 ppm.

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[32] 78 *Federal Register* 29928, May 21, 2013

[33] Auers, J.R. *et al.*Turner, Mason & Company Consulting Engineers, *Economic and Supply Impacts of a Reduced Cap on Gasoline Sulfur Content*, February 2013.

The automakers have expressed concern about potential impacts on emissions performance if individual vehicles are exposed to gasoline above 10 ppm S. We believe that this concern is unfounded. The per-gallon limits on the concentration of sulfur in gasoline should not be changed from the current levels of 80 ppm at the refinery gate and 95 ppm downstream. Research recently completed by SGS Environmental Testing Corp. indicates that the increase in exhaust emissions from late model vehicles exposed to as much as 80 ppm S in gasoline is fully reversible within a short period of time (i.e., ~70 miles of driving) following a return to operation on gasoline containing 10 ppm S.[34] The study has been submitted as Attachment No. 11 for EPA's review.

The API study focused on six passenger cars, of which five were certified to California SULEV II/PZEV emissions standards, and one vehicle which complied with the federal Tier 2/Bin 5 exhaust emissions standard. The test vehicles represented a range of emission control and engine technologies and were equipped with catalytic convertors that had been aged to the equivalent of 120,000 to 150,000 miles of driving. The reversibility test sequence included: (a) four baseline emissions tests run on 10 ppm S fuel, (b) three tests using 80 ppm S gasoline following 300 miles of operation on this high sulfur fuel, and (c) three tests after the vehicles were switched back to 10 ppm S fuel. The base fuel was a California LEVIII certification gasoline containing 10% ethanol by volume. The 80 ppm S fuel was produced by doping the base fuel with a representative mixture of sulfur compounds.

Figure 13 (below) evaluates the reversibility of the sulfur effects by comparing emissions before and after the exposure to 80 ppm fuel. The mean emissions after the exposure to the high sulfur fuel are subtracted from the mean emissions for the initial baseline on 10 ppm sulfur fuel, 95% confidence intervals are calculated for the difference, and the results are plotted for each of the six individual test vehicles and for the fleet as a whole. If the confidence interval for the emissions difference does not include zero, then emissions on 10 ppm sulfur fuel after exposure to 80 ppm fuel are statistically different from the initial 10 ppm baseline. If the entire confidence interval is less than zero then emissions are statistically higher after exposure to 80 ppm sulfur, indicating that sulfur effects are not fully reversible. If the confidence interval includes zero, then mean emissions before and after exposure to the 80 ppm fuel are not statistically different and the hypothesis that the sulfur effects on emissions were irreversible would be rejected.

Based on the statistical analysis of the results as summarized in Figure 13, the study concluded that, for each vehicle tested and for the test fleet as a whole, the change in NMOG, NO_x, CO, Soot and PM emissions resulting from exposure to 80 ppm S fuel was quickly reversed upon returning to operation on 10 ppm S gasoline. There was greater than 95% confidence that the differences in the mean emissions values measured before and after the high sulfur fuel exposure were not statistically different.

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[34] SGS Environmental Testing Corp., *Reversibility of Gasoline Sulfur Effects on Exhaust Emissions From Late Model Vehicles*, prepared for American Petroleum Institute, June 2013

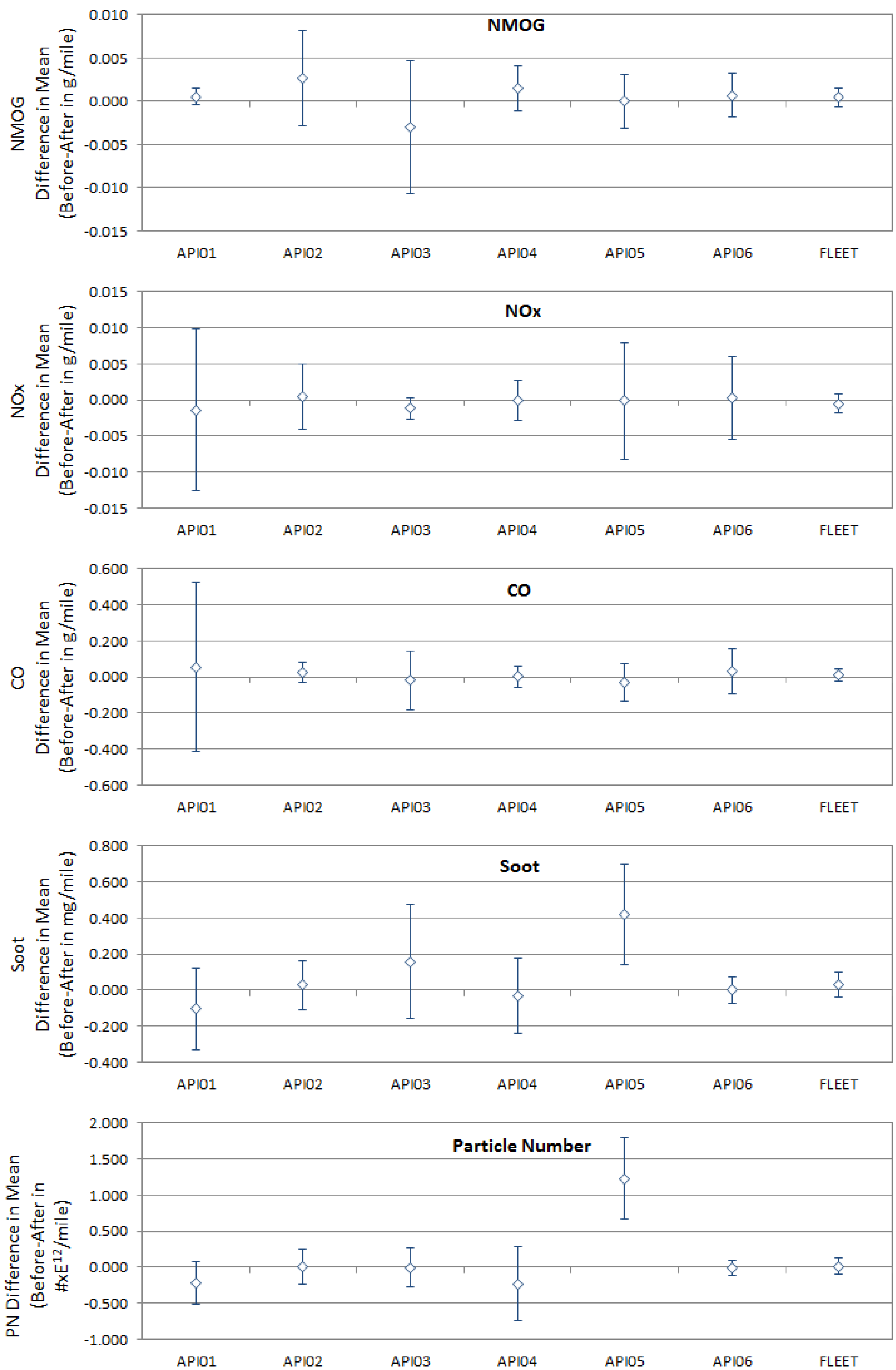

Figure 13: Reversibility of Gasoline Sulfur Effects on Exhaust Emissions from Late Model Vehicles

C. Support Averaging, Banking, and Trading (ABT) Program

API and AFPM support the inclusion of an ABT program as part of the Tier 3 regulations.

We do not agree with EPA's statement in the preamble that credit generation should be limited to refiners who produce gasoline from crude oil. Instead, any refiner that meets the definition of 80.2(i), which includes parties who combine blendstocks to produce gasoline, should be eligible to generate both early and standard Tier 3 credits. We note that the regulatory text at 80.1615(a)(1) does not appear to restrict credit generation to refiners who produce gasoline from crude oil. Therefore, we believe the preamble should be changed to remove the reference to producing gasoline by processing crude oil. Refiners who produce gasoline by combining components are allowed to generate credits under Tier 2. The Tier 3 program should not remove this provision since component blenders should be incentivized to produce gasoline that over-complies with the Tier 3 standard.

We do agree that U.S. importers of gasoline should be eligible to generate both early and standard credits. Other parties who are not refiners or importers of gasoline should not be eligible to generate credits. We believe that including other parties, like ethanol producers and oxygenate blenders, will add needless complexity to the program without generating any benefits. All of the gasoline entering the U.S. market can be covered under the proposed program structure. Similarly, we support the prohibition against ownership of credits by any party who is not a registered refiner or importer.

1. ABT program structure

We agree with the proposal that gasoline designated for export and California gasoline should both be excluded from the Tier 3 program and should not be allowed to generate credits. While some California gasoline could generate Tier 3 credits and provide some compliance flexibility, imposing a 10 ppm sulfur average on California gasoline adds an additional blending constraint to supplying the challenging California market. We do not believe that the additional Tier 3 flexibility justifies this additional burden for the producers of California gasoline. Gasoline refined in California and shipped to another state under Tier 3 should be subject to the same regulatory framework that currently exists today.

We generally agree with the structure of the standard credit generation program, allowing credits to be generated for gasoline that over-complies with the 10 ppm annual average standard. Credits should be generated annually on a calendar year compliance period. Standard credit generation by small refiners and small volume refineries should be allowed during the 2017-2019 period. The preamble suggests that small refiners would have to voluntarily opt in to the Tier 3 program. We note that the proposed regulations do not include any obvious reference to this opt-in mechanism. We are not able to comment on whether this opt-in would be appropriate without having the regulatory text available to understand how it would be implemented.

We support the inclusion of a special period of credit generation from 2014 to 2016 to facilitate the transition from Tier 2 to Tier 3. We agree that the program should be available to refiners and importers, and agree with the structure of generating credits against the current 30 ppm standard with no individual refinery baseline. However, the ability to generate credits during this period does not guarantee that sufficient credits will be available to allow refiners to broadly defer investments past the proposed January 1, 2017 implementation date. EPA has described a very optimistic scenario for refineries to generate credits by operating existing pre-treaters and post-treaters at sub-30 ppm gasoline levels in 2014-16. If refineries fail to meet these optimistic predictions, credit availability might be limited and will hinder the industry transition to the 10 ppm standard in 2017.

During the 2014-2016 period, we do not agree with the proposed structure of the early credit program and instead recommend a different program structure to transition from the current Tier 2 program to the start of the Tier 3 program. We believe that any refinery should be able to generate credits against the 30 ppm standard during the 2014-2016 period, and that these credits should have a 5 year life. Credit generators should not have to designate these credits as either Tier 2 or Tier 3 credits. The party who holds a credit generated in 2014-2016 should be able to use the credit for compliance with Tier 2 standards or bank the credit for future use with Tier 3. By granting these credits a 5 year life and by allowing a party to bank these credits for future Tier 3 use, the refiner or importer is incentivized to reduce the sulfur content of their gasoline pool. This could maximize the removal of sulfur from the pool even in advance of the Tier 3 program. No transition from Tier 2 Standard Credits to Tier 3 Early Credits to Tier 3 Standard Credits would be required. This single credit program would be easier for EPA to manage and enforce compared to implementation of an early credit program.

If EPA finalizes the early credit program as proposed, we do not agree that refiners should have to designate credits generated from 2014 to 2016 as either Tier 2 credits or Tier 3 early credits. We believe that these credits, generated against the 30 ppm standard, should be allowed to be used for either Tier 2 or Tier 3 compliance without prior designation by the generating party. Generated credits could accrue undesignated in the party's account and should be available to be freely used for Tier 2 compliance, Tier 3 early compliance, or traded to other parties who could use them for either program. Refiners will not be able to exactly predict their future credit requirements and should not be penalized by over or under-designating credits for either program.

In addition, we believe that any party holding Tier 2 credits at the end of 2016 should be allowed to convert these Tier 2 credits to Tier 3 early credits, which could be used through 2019. Tier 2 credits represent real sulfur reductions against the existing standard which are a benefit to the environment. The owners of these credits should be able to preserve their value by applying them in the early years of the Tier 3 program.

Should EPA decide to proceed with the proposed credit designation of Tier 2 or Tier 3 during the early generation credit period, we recommend that such declaration is made by February 28th of the following year, consistent with compliance reporting.

2. Credit Life

We agree with the 5 year standard credit life as proposed, but, as explained above, we believe that the proposed 3 year early credit life should be extended to 5 years. And, we believe that the program should acknowledge the transition from Tier 2 to Tier 3 by allowing unused Tier 2 credits to be converted to Tier 3 credits after 2016. Under the current proposal, all Tier 2 credits will become stranded if they are not used by the end of the 2016 compliance year. The Tier 2 credits represent real sulfur reductions in gasoline below the required standard which in turn generated environmental benefits beyond the requirements of Tier 2. Refiners and importers should not lose the benefit of these credits that were generated by their over-compliance with the sulfur standard.

If EPA implements a small refiner/refinery extension, we recommend that any small refiner/refinery holding Tier 2 credits at the end of 2019 should be able to convert these credits to Tier 3 credits. Again, these Tier 2 credits represent over-compliance with the Tier 2 standard and would have created a benefit for the environment. The value of these credits should not be lost due to expiration. Refiners should not be penalized for failing to predict their exact Tier 2 credit requirements prior to the end of 2019.

3. Credit Trading

We do not believe the maximum two trade limitation on sulfur credits is required. The credit program is primarily protected by limiting participation in the credit program to refiners and importers. The two trade limitation reduces market liquidity without providing a significant enforcement benefit. Multiple sales transactions of the same credits within this small community can be adequately tracked with commercial documentation and EPA reporting. To maintain integrity of the sulfur credit program, the prohibition on outside parties taking ownership of credits should absolutely be preserved, but the two trade limitation could be eliminated.

Should EPA decide to proceed with two trade limitation, we recommend that EPA clarifies and clearly states that there are no restrictions to transferring credits within a refiner/refining company.

4. Deficit Carry-forward

The deficit carry-forward is an important regulatory flexibility mechanism that is included in the Tier 3 regulations but is not discussed in the preamble. We support the inclusion of a deficit carry-forward provision in Tier 3. However, we suggest that the deficit carry-forward be extended to three years from the current one year. Compliance with the 10 ppm annual average will be very challenging for the average refinery. The ability to reduce sulfur significantly below 10 ppm to make up a compliance deficit in a single year may not be possible, depending on the technology and process configuration of the refinery. Credits may or may not be available in the market for the refinery to supplement their production of low sulfur gasoline. Extending the deficit from one to three years allows the refinery to manage their sulfur production within reasonable limits and still maintain the overall integrity of the Tier 3 program.

In addition, we believe the deficit carry-forward language at 80.1616(a)(6) is in error. It states that a refiner should use all available credits before recording a compliance deficit. We believe that this requirement should apply to an individual refinery and not to a refiner. A refiner should be allowed to carry a deficit at one refinery while having a surplus of credits at another refinery, if they so choose. We request EPA to make this correction in the regulations.

III. Emissions certification fuel

EPA proposes to change the gasoline test fuel for light-duty and heavy-duty vehicles from E0 fuel to E15 fuel. 78 Fed. Reg. at 29825. EPA does not state its legal basis for designating test fuels, and instead asserts in a conclusory way that "we believe we have discretion under the statute to transition from E0 to E15 test fuel…." *Id.* at 29910.

EPA presents essentially no factual basis for this proposed change to E15. According to EPA, "[i]n-use gasoline has changed considerably since EPA's fuel specifications for emissions testing of light- and heavy-duty gasoline vehicles were last set and first revised." *Id.* at 29908. EPA predicts that the second iteration of the federal renewable fuels standard program ("RFS2") will lead to further changes in in-use fuel, including "expansion of the number of retailers that offer E15." *Id.* In response to changes in in-use fuel that EPA alleges have already occurred, as well as "forward-looking" predictions about the ethanol and sulfur content of future in-use fuels, EPA proposes to update the gasoline test fuel provisions of 40 C.F.R. § 1065.710. *Id.* EPA proposes to make this change despite its admission that "E15 is only commercially available at a limited number of fuel retailers" at present. *Id.* at 29909. EPA's prediction about increased E15 fuel availability in the future is premised on "instability in crude oil pricing and growing RFS2 renewable fuel requirements." *Id.*

EPA seeks comment on its proposed approach of changing the test fuel from E0 to E15, including the "forward-looking nature" of this proposal. *Id.* at 29910. Additionally, EPA seeks comment on potential alternative approaches, including designation of E10 as the test fuel and later "transition[] to E15 as the market further transitions to E15 in use." *Id.*

API and AFPM offer the following comments on the certification fuel proposal.

A. EPA should specify E10 as the certification fuel

The CAA requires EPA "to insure that vehicles are tested under circumstances which reflect the actual current driving conditions under which motor vehicles are used, including conditions relating to fuel, temperature, acceleration, and altitude." CAA § 206(h). Accordingly, test fuels must "reflect ***current*** driving conditions." *Id*. (emphasis added).

In keeping with this clear statutory requirement, we agree with EPA that the certification fuel should be switched to an ethanol containing blend because ethanol blends are the most prevalent type of gasoline currently in the market place. However, we disagree with the proposed selection of E15. As was stated in the RIA, most gasoline in the United States contains 10% ethanol by volume. The certification fuel should represent the most common grade of fuel sold, which is E10. Likewise, the octane rating should coincide with the dominant grade which is 87 AKI regular unleaded. The only exception should be for engines that require premium unleaded fuel as stipulated in the vehicle owners' manual.

We disagree with EPA's proposal to select a fuel that is "forward looking with respect to the maximum gasoline ethanol concentration Tier 3 vehicles could expect to encounter." *Id*. This creates two fundamental legal problems.

First, establishing a "forward looking" test fuel violates the statute because a "forward looking" fuel such as E15 does not accurately or reasonably reflect the "current" fuels used by affected vehicles. The plain language of the statute does not permit EPA to substitute the phrase "forward looking" for "current." EPA's own analysis shows that E10 is the most prevalent ethanol blend in the market today. Thus, E10 is the only ethanol blend that may be specified as a test fuel at this time.

Second, even if the statute could be construed (*arguendo*) as authorizing EPA to set a "forward looking" test fuel, EPA has not put forward adequate factual justification to do so in this case. EPA's proposed "forward looking" E15 test fuel is based on the assertion that E15 "could become a major gasoline blend over the next 10-15 years." *Id.* at 29909. However, there are no data or analyses in the proposal or underlying record that support this prediction. Absent such factual support, adopting E15 as a test fuel would be arbitrary and capricious.

Notably, even if the Agency attempted to assemble factual justification for a "forward looking" E15 test fuel, it could not do so. Given the lack of announced E15 compatible vehicles, automobile manufacturer warranty statements, lack of refueling infrastructure and the 15 to 18 year timeframe to turn over the vehicle fleet, E10 will continue to reflect "current driving conditions" over the timeframe under consideration by EPA.

In light of these problems, the only legally-viable course would be to select E10 as the certification fuel and transition to E15 if and when E15 become the most prevalent fuel in the market. We support a market review at some point in the future after 2017 to gauge E15 usage and growth projections. This review could coincide with the technology review for the CAFE standards. The certification fuel should not switch to E15 until it becomes the dominant fuel in the marketplace.

Lastly, if EPA ultimately decides to switch to E15, that switch must be accomplished through notice and comment rulemaking. EPA suggests in the proposal that such a switch might be accomplished automatically in the future by establishing "a ''trigger point'' (e.g., 30 percent of gasoline is E15) in the Tier 3 final rule to prompt an automatic move to E15 after a certain period of time, e.g., two or three years." *Id.* at 29910. EPA alternatively suggests that it "could simply set a future date (e.g., 2020) with sufficient time for transitioning to E15 test fuel." *Id*. Neither of these approaches is legally viable.

Switching to E15 based on a 30% trigger would require a future factual determination that the 30% trigger has been exceeded. Such a determination constitutes "factual data" that must be set out in a proposed rule before EPA may take a final action based on those data. CAA § 307(d)(3). Switching to E15 at a fixed point in the future based on a current prediction of when E15 will become the prevalent fuel is problematic because, as explained above, EPA has not set out sufficient data or analyses to justify a prediction as to when E15 might become the most prevalent gasoline. Thus, the only viable way to establish E15 as a test fuel is to do so through notice and comment rulemaking at the point when E15 become the prevalent ethanol blend in the market.

B. Test fuel specifications should be consistent with ASTM D4814

The specifications of the test fuel should match up with the specifications set by ASTM in D4814. To match up to ASTM D4814 the following changes should be made:

- The test fuel vapor pressure should be set at 10 psi dry vapor pressure to reflect the 1 psi waiver afforded to fuels containing 9% to 10% ethanol found in the Clean Air Act.
- The T_{50} minimum distillation temperature should be 150^{o}F for E10. The proposed T_{50} temperature of 170 to 190^{o} F is too high given the boiling point depression caused by the formation of an azeotrope between the hydrocarbons and the ethanol. Addition of the ethanol depresses the T_{50} point by 20 to 35^{o} F.

C. Further test fuel details and recommendation

1. EPA proposed the following key changes to the fuel properties:

Ethanol content

EPA proposes to increase ethanol content from zero to 15 volume percent. EPA believes that this level is forward-looking with respect to the maximum gasoline ethanol content Tier 3 vehicles could expect to encounter. Concerns with vehicle fuel system compatibility still need to be addressed in advance of its introduction into commerce. This level of ethanol is also not aligned with CARB LEV III test fuel which is set at 10 volume percent. To ensure the most effective evaporative emissions control system for in-use operation we would suggest that EPA considers setting the ethanol content at 10 volume percent and then adjusting the RVP requirement of the certification fuel to account for the allowed 1 psi waiver. Only until vehicle manufacturers all warrant their vehicles for E15, and E15 represents a dominant portion of the overall market (including California) would it would be appropriate for EPA to consider shifting to an E15 certification fuel while ensuring no loss of effectiveness of the emission control systems.

Octane

EPA proposes to change the measurement approach from RON to AKI and lower the octane requirement to be consistent with regular unleaded fuel at 87.0 (R+M)/2. EPA also proposes to allow manufacturers to test on a fuel with a minimum octane rating of 91 (R+M)/2 for those vehicles where operation on high-octane gasoline is required by the manufacturer. EPA is seeking comment on the need for limiting the maximum octane of gasoline used in the certification of premium-required engines and vehicles. As we will note in other comments, EPA needs to limit the range of certification fuels to those that are readily found in the marketplace. As such, a high-octane fuel specification should be limited to 91 (R+M)/2. While higher octane fuels exist in the marketplace, they are not available on a nation-wide basis and several significant regions offer 91 (R+M)/2 premium gasolines as the highest level available. These regions include California, Arizona and Nevada where a significant number of premium vehicles are sold by the manufacturers. Increasing the minimum octane of premium to satisfy these vehicles and support their certification would add significantly to the cost of this regulation. Another related issue is the requirements that would need to be put on the vehicles to insure that only premium fuel is used in these vehicles. Will there be a requirement for special nozzles? Will the "Check Engine" light illuminate? This special accommodation makes no sense unless EPA has some way of insuring that this fuel is used in the field if it is required for emissions or other regulatory performance attributes (e.g. CAFE compliance). Finally, if a consumer fills a "premium" vehicle with regular, does that constitute misfueling?

The octane level for high altitude test fuels is not mentioned in the text, but rather shown in Table IV-21, where EPA is proposing that the octane be set at 87.0 minimum (R+M)/2. Market fuels in high altitude regions currently meet an 85 minimum (R+M)/2 ; we question the need to raise the octane for the high altitude certification fuel if EPA is indeed looking "to better match today's in-use fuel". Again, increasing the minimum octane to satisfy these vehicles and support their high altitude certification would add significantly to the cost of this regulation.

Distillation temperatures

EPA proposes to adjust the gasoline distillation temperatures to better reflect today's in-use gasoline / E10. We question EPA's approach to determining market fuel quality levels as they "relied heavily on the AAM North American Fuel Survey trends" which are limited in scope and confounded by lumping all fuel grades in to one analysis. EPA also used 2009 refinery compliance data to assist in setting specifications. Using more recent data, and to be consistent with ASTM specifications, we believe EPA should revisit the distillation properties with suggested T_{10} in the range of 110°F to 130°F and more importantly a relaxation of the minimum T_{50} to 150°F.

Sulfur

EPA is proposing to lower the sulfur content of the test fuel to 8-11 ppm to be consistent with the proposed Tier 3 standards. We cover comments on acceptability in the technical justification section of these comments (section I.A).

Aromatics

EPA is proposing to reduce the aromatics content to better match today's in-use gasoline/E10. As stated before, EPA is using limited AAM data and historic refinery compliance data to support their conclusion on market fuel quality. In addition, Figure 3-4 in the RIA shows refinery batch data for olefin levels and not aromatics. Based on our own data analysis, average aromatics content for E10 blends during the past two summer seasons was 25 volume percent.

Olefins

Similar to aromatics, average olefin content for E10 blends during the past two summer seasons was 9 volume percent.

Aromatics distribution

EPA is proposing to include a distribution of aromatics in the certification fuel to ensure that it is more representative of in-use gasoline. We do not have recent data on composition distributions for aromatics in market fuel but would note the sum of the distributed aromatics maximum is less than the "Total Aromatic Hydrocarbons" maximum (24.4 versus 24.5).

2. Updates to gasoline test methods

EPA proposes to update some of the gasoline test procedures which we encourage them to do, noting that some of the procedures may not be appropriate for E15 test fuels (e.g. D525 does not include E15). We also suggest EPA use the latest versions of the following tests: D2699, D2700, D5191, D86, D5453, D3237, D130, D381, and D512 as these all have 2012 releases.

3. Proliferation of Test Fuels

Part of EPA's goal in modifying the certification fuel for Tier 3 was to reduce the number of certification fuels manufacturers would need to use to test their vehicle fleet. This goal seems to be lost as EPA is proposing to "allow vehicle manufacturers to request approval for an alternative certification fuel such as a high-octane 30 percent ethanol by volume (E30) blend for vehicles they might design or optimize for use on such a fuel. This could help manufacturers that 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 (2017 LD GHG). This in turn could help provide a market incentive to increase ethanol use beyond E10 by overcoming the disincentive of lower fuel economy associated with increasing ethanol concentrations in fuel, and enhance the environmental performance of ethanol as a transportation fuel by using it to enable more fuel efficient engines." Allowing each manufacturer the option to request approval of an alternative certification fuel could have significant impact on market dynamics. One can imagine a proliferation of boutique fuels necessary to support each individual manufacturer so that their vehicles can actually deliver the fuel efficiency as tested. This approach does not fit with the extensive, fungible fuel system that currently exists nor does it account for the limited fuel options available at service stations due to underground storage tank configuration and space availability. How does EPA expect to steward such a program and who would be responsible for determining the cost, well-to-wheel emissions, etc? One could image an engine that is optimized on an alternative certification fuel but would not deliver anywhere near the efficiency on in-use fuels so regarding alternative fuel availability, what would be the market threshold for EPA to consider allowing a manufacturer to use an alternative certification fuel?

4. CNG and LPG Emissions Test Fuel:

EPA seeks comment on the inclusion of sulfur standards for the test fuel used in natural gas engines and certifying liquefied petroleum gas (LPG) vehicles. EPA is also seeking comment on the appropriateness of aligning the sulfur specifications with those that apply for gasoline test fuel (LPG test fuel sulfur levels are at 80 ppm max for heavy-duty highway engines and for nonroad engines). The changes would also need to be consistent with in-use fuels. Lacking any data from the in-use distribution system, we don't see how EPA can make changes to either of these test fuel standards at this time.

5. Nonroad, Motorcycle and Heavy-Duty Engine Emissions Test Fuel

EPA believes it is important that the emissions test fuel for these other categories reflect real-world fuel qualities but has elected to defer moving forward now pending additional analysis of the impacts of changing the test fuel specifications for the wide range of engines, vehicles, equipment and fuel system components that could be impacted. We would suggest that one benefit of moving to an E10 test fuel, instead of E15, would be that EPA can then identify a single certification fuel for all gasoline engines and vehicles.

6. Recommendation

From an overall standpoint, we would recommend that EPA consider moving to an E10 regular unleaded certification fuel that adequately describes the current in-use fuel quality while also ensuring enough severity that Tier 3 emissions standards provide substantive emissions changes versus Tier 2. To that end we would suggest the following key certification fuel properties:

Ethanol Content	9.8 to 10.2 volume %
Octane	87 to 88.4 (R+M)/2
DVPE	9.7 to 10.2 psi
T_{10}	110°F to 130°F
T_{50}	150°F to 170°F
T_{90}	310°F to 330°F
FBP	380°F to 420°F
Aromatics	21.5 to 26.5 volume %
Olefins	6 to 12 volume %

Finally, EPA should indicate that the certification test fuel properties should in no way be interpreted as limiting for in-use fuels. Rather the narrow range of fuel properties provides consistency for EPA and industry when evaluating results from standard emissions tests and other certification test programs.

D. API and AFPM support EPA's proposed approach for FFV test fuel

With regards to the Flexible Fuel Vehicle Test Fuel, we agree with EPA's proposal to make the fuel by blending the gasoline emission test fuel base stock with higher levels of ethanol to produce the test fuel and trim the resulting fuel with normal butane to achieve the necessary vapor pressure.

E. Legal justification for new test fuel

1. EPA has failed to explain the legal basis for its test fuel proposal

EPA asserts that the primary legal authorities for the proposed rule are CAA §§ 202, 206, and 211. 78 Fed. Reg. at 29828-29. EPA rulemaking pursuant to these provisions is subject to the requirements of CAA § 307(d). *See* § 307(d)(1)(E), and (K). Pursuant to § 307(d)(3), EPA is required to include in the proposal the "statement of its basis and purpose" for the action, which must include "the major legal interpretations … underlying the proposed rule."

Yet, EPA does not include any discussion in the proposal of the legal basis for the proposed test fuel provisions. For example, there is no explanation of what section or sections of the statute authorize it to designate a new test fuel. Similarly, there is no discussion of the scope and extent of the Agency's authority to establish test fuels and specify particular parameters that such fuels must meet. The Agency simply asserts that "we believe we have discretion under the statute to transition from E0 to E15 test fuel." 78 Fed. Reg. at 29910.

Because EPA has not provided any explanation of the statutory authority on which it relies for the proposed test fuel provisions, API has no opportunity to comment on that key issue and any rule promulgated would be contrary to the Clean Air Act and unlawful. To try and resolve this problem, EPA must re-propose the rule to provide an opportunity to comment on the Agency's legal basis for designating a new gasoline test fuel.

2. EPA has failed to consider fully the CAA § 211(f) implications of its test fuel proposal

Section 211(f) limits the fuels and fuel additives that a manufacturer may lawfully "introduce into commerce, or [] increase the concentration in use of." Pursuant to § 211(f)(1) and (2), only those fuels and fuel additives that are "*substantially similar* to any fuel or fuel additive utilized in the certification of any model year 1975, or subsequent model year, vehicle or engine under section [206 of the CAA]" may enter commerce for general use in light duty vehicles, or for use by any person in *any* motor vehicles, manufactured model year 1974 or later. (Emphasis added.) EPA may grant a § 211(f)(4) waiver from these commercial limitations if the requested waiver "will not cause or contribute to a failure of any emission control device or system (over the useful life of the motor vehicle, motor vehicle engine, nonroad engine or nonroad vehicle in which such device or system is used) to achieve compliance by the vehicle or engine with the emission standards with respect to which it has been certified under pursuant to sections [206 and 213(a)]."

As EPA explains in the preamble to the proposed rule, pursuant to § 211(f)(4), EPA granted a partial waiver for use of E15 by light-duty vehicles model year 2007 and later, and then extended the waiver to include model year 2001-2006 light-duty vehicles. 78 Fed. Reg. at 29909 n. 320 (citing 75 Fed. Reg. 68094 (Nov. 4, 2010) and 76 Fed. Reg. 4662 (Jan. 26, 2011)); *see also id.* at 29911. EPA also concluded at the time that E10 was not a certification fuel for purposes of determining whether mid-level blends could be put into commerce under the authority of § 211(f)(1) (under a "substantially similar" determination) rather than pursuant to a waiver issued under § 211(f)(4). 75 Fed. Reg. at 68143. In issuing those partial waivers, EPA placed conditions designed to, among other things, minimize potential misfueling. EPA complemented those conditions through a later rule, known as the "E15 Misfueling Mitigation Measures Rule," which included misfueling prohibition, fuel pump labeling, PTDs, and ongoing implementation survey requirements as a "direct and efficient way to *further* reduce the potential for misfueling and the emission increases that would result from misfueling." 76 Fed. Reg. 44406, 44411 (July 25, 2011) (emphasis added); *see also* 78 Fed. Reg. at 29911. EPA stated that these additional requirements were directed to "E15 that is introduced into commerce in accordance with the partial waivers" and thereby operated "*collectively and in tandem with the partial waiver conditions* [to] maximize the likelihood that E15 is used only in motor vehicles covered by the partial waivers and minimize the potential for emissions increases that might otherwise occur." *Id.* (emphasis added).

EPA proposes to establish E15 as a certification fuel for purposes of implementing the Tier 3 standards. This raises two legal issues that EPA has failed to address in the proposal: (1) will establishing E15 as a certification fuel authorize E15 to be put into commerce pursuant to § 211(f)(1); and (2) if so, what effect does this have on the previously-issued E15 partial waivers and corresponding misfueling mitigation rule? EPA's failure to address these key questions violates its rulemaking obligations under § 307(d)(3) and renders the proposed rule arbitrary and capricious due to the Agency's failure to identify and address key policy and legal implications of designating E15 as a certification rule.

On the question of whether establishing E15 as a certification fuel authorizes E15 to be put into commerce pursuant to § 211(f)(1), language in the preamble seems to suggest that in EPA's view, once EPA designates E15 as a test fuel under § 206, E15 could be introduced into commerce *only* for the vehicle type(s) for which E15 were specifically authorized for use as a test fuel. For example, manufacturers could introduce into commerce E15 for use into heavy-duty vehicles without a § 211(f)(4) waiver "[i]f . . . new heavy-duty gasoline vehicles or engines begin testing on E15 for certification." 78 Fed. Reg. at 29911. Under this implied legal analysis, commenters are left to guess about many key aspects of this important issue. For example, does EPA believe this is how the statute *must* be interpreted? If not, what other interpretations did EPA consider and why were alternative interpretations rejected?

For example, some might suggest that, under Section § 211(f)(1), if E15 were designated a new § 206 test fuel, E15 could be introduced into commerce for use in *any* vehicle without a § 211(f)(4) waiver. This view might be supported by the assertion that Section 211(f)(1) does not appear to place any limitation on the vehicle types for which a fuel can be introduced into commerce once that fuel is designated as a test fuel under § 206. Therefore, assuming *arguendo* that E15 were designated as a test fuel *only* for light-duty vehicles, it could still be introduced into commerce as a fuel for use in *any* vehicle under § 211(f)(1). We would view such an approach as not authorized by the Clean Air Act and therefore unlawful, yet, EPA does not explain how the sweeping language of § 211(f)(1) can or should be construed as being as highly constrained as it appears to suggest. Thus, EPA's treatment of this key issue falls far short of the Agency's § 307(d)(3) obligation to clearly set out "the major legal interpretations and policy considerations underlying the proposed rule."

As importantly, EPA also essentially failed to explore the obvious and important implications of introducing E15 into commerce under § 211(f)(1) with regard to the previously-issued E15 partial waivers and misfueling mitigation rule. For example, if E15 may be put into commerce under § 211(f)(1), do the previously-issued E15 partial waivers continue to have relevance, meaning, or legal applicability? Would the waivers essentially be rendered moot (if E15 may be introduced into commerce under § 211(f)(1) by virtue of E15 becoming a certification fuel), and does EPA have authority to limit the types of engines/vehicles that may use E15, as it did under § 211(f)(4) by issuing the so-called "partial waivers"? Similarly, does the misfueling mitigation rule have any force or effect, given that it was issued for purposes of facilitating implementation of the E15 partial waivers? If it does remain in effect, is the misfueling mitigation rule adequate given that it was designed to be implemented in conjunction with the misfueling mitigation measures required to be implemented as a condition of using the E15 partial waivers? These are just a few examples of the many important questions that arise by virtue of designating E15 as a certification fuel.

We certainly reserve our ability to challenge each and every one of these issues and the most that EPA says on these important issues is in its discussion of the potential use of E15 in heavy-duty vehicles, where the Agency notes that the potential for misfueling in heavy-duty vehicles would be addressed in a future action. 78 Fed. Reg. at 29911. Thus, EPA's treatment of this key issue falls far short of the Agency's § 307(d)(3) obligation to clearly set out "the major legal interpretations and policy considerations underlying the proposed rule." As a result, EPA must re-propose the rule and set forth a clear interpretation of §§ 206, 211(f)(1), and 211(f)(4). EPA must explain what effect the proposed rule would have on the E15 partial waivers and misfueling mitigation rule and propose provisions to fill any potential regulatory gaps that are created by designating E15 a certification fuel. And, EPA must also address the major policy considerations that flow from these key legal issues. EPA's proceeding with a final test fuel rule for E15 at this time would clearly be unlawful under the Clean Air Act. We seriously question whether E15 can be lawfully made a test fuel under current circumstances for the reasons we have stated but certainly the Agency must do a far more thorough job of legal analysis in a re-proposal before it could seriously propose E15 as a test fuel.

IV. Performance-Based Measurement Systems (PBMS)

We commend EPA for embracing a performance-based approach to specifying analytical testing requirements for fuel property measurements, as doing so allows for flexibility and encourages innovation. While we broadly support the adoption of a PBMS for fuels as proposed by EPA, we do have a number of questions and concerns regarding the specific details as spelled out in the Notice of Proposed Rulemaking. Briefly, several of our main concerns include:

- A 1 year grace period for ASTM D6708 Assessments on Voluntary Consensus-based Standards Body (VCSB) Alternate Method Candidates for Method-Defined Fuel Parameters is Inadequate
- EPA Should Not Extrapolate Precision Qualification Criteria for Absolute Parameters to those used for Method-Defined Parameters
- EPA's Proposed Accuracy Qualification Requirements for Reference Installations are Overly Restrictive
- The Proposed Qualification Criteria for Designated Method Installations Used to Qualify Method-Defined Parameter Instruments Should be Relaxed to be More Realistically Achievable
- Sites Should Be Granted Greater Flexibility in the Choice of Procedures to Comply with the Proposed Statistical Quality Control (SQC) Requirements

These concerns (and other comments) are further discussed in the material below.

1. One year grace period is inadequate

We believe that the one year grace period to perform ASTM D6708 assessments on VCSB alternate method candidates for method-defined parameters is inadequate. **We suggest a minimum grace period of 18 months**, given the time it takes to complete such an endeavor, especially when considering EPA's proposed requirement to qualify reference installations "for at least 5 months prior to application."

2. EPA should not extrapolate precision qualification criteria for absolute parameters to those used for method-defined parameters (78 Federal Register p. 29957)[35]

We disagree with extrapolating the same precision qualification criteria for absolute parameters based on published method repeatability (r) to method-defined parameters. The basis for our disagreement is similar to EPA basis for recognizing the need for method-defined parameters. Specifically, the precision criteria of method-defined parameters are sensitive to the matrix of the material. This degree of sensitivity is different for different test methods / techniques / instrumentation that claim to measure the same property. **We recommend that the precision standard deviation qualification criterion for method-defined parameters be based on a Test Performance Index (TPI) approach as per ASTM D 6792 *Standard Practice for Quality System in Petroleum Products and Lubricants Testing Laboratories.*** Using the TPI as outlined in ASTM D6792 also is consistent with OMB Circular 119 which directs agencies to use voluntary consensus standards in lieu of government-unique standards except where inconsistent with law or otherwise impractical. The TPI approach in ASTM D6792 sets minimum site precision performance criteria based on test method reproducibility (R) and the Precision Ratio (PR) of the published test method.[36] An example is provided below to assist EPA in understanding the TPI approach:

ASTM method	Property	Precision ratio (R/r)	ASTM D 6792 minimum TPI = (R/R')	max. acceptable site precision (R')	Suggested Method-defined Site Precision Standard Deviation Qualification = R'/2.77
D1319	Olefins	3.2	1.2	0.83R	0.3R
D1319	Aromatics	2.8	1.2	0.83R	0.3R
D5599	Oxygenates	6.8	2.4	0.42R	0.15R
D5191	Vapor Pressure	1.9	1.2	0.83R	0.3R
D3606	Benzene	4.6	2.4	0.42R	0.15R

Figure 14: Example Test Performance Index table

Table VI-6 (on p. 29958) lists EPA's proposed precision criteria for Method-Defined Fuel Parameters with no Alternatives to the Designated Test Method. For the gasoline distillation fuel parameter, we recommend that EPA specify ASTM D86-07 for the following reasons:

- The precisions as published in later versions are not consistently supportable by actual ASTM ILCP program data; this is clearly stated in Note 31 of the current ASTM D86 test method:

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[35] All page number references in Section IV refer to the version of the Tier 3 notice of proposed rulemaking published in the Federal Register: 78FR29816 May 21, 2013

[36] Test Performance Index (TPI) is defined in ASTM D6792 as follows: "an approximate measure of a laboratory's testing capability, defined as the ratio of test method reproducibility to site precision."

- "NOTE 31—A new inter laboratory study is being planned to address concerns that laboratories are not able to meet the precision for percent evaporated temperature at fifty percent."

A plausible explanation is that the ILS study used to derive the current precision required several runs on the ILS material to select the heating profile, and hence does not reflect how the method is actually conducted in routine production environment. In addition, the ILS study sample set may not adequately cover the range of real world production gasoline available.

- There is general consensus that the precision of this test method is sensitive to the slope of the boiling curve; hence, a constant precision as articulated in the cited ASTM D86-12 method may not be appropriate as a 'one-size-fit-all' measure for gasolines with different matrices and volatility properties (winter versus summer). Directionally, based on on-going discussions in ASTM, it appears that the ASTM test method precision may revert to a boiling curve slope based approach, similar to version ASTM D86-07.
- For gasoline containing 10% ethanol by volume (herein referred to as E-10), the boiling curve slope and hence precision is impacted by the location of the azeotrope point relative to the distillation points of interest (T_{10},T_{50}, and T_{90}). The azeotrope point is a function of the base stock (neat gasoline) composition, and therefore can vary with different matrices. We believe that precision function as stated in D86-07 is a more realistic representation for E-10 gasoline precision with different neat matrices.

To support our concern that use of D86-12 precision and 1.5r is too restrictive, see the example below of control chart data supplied by a producer.

	IBP	E10	E50	E90	FBP
Avg F	103.65	151.32	224.88	351.44	417.16
StDev F	1.93	1.66	1.36	1.22	2.66
Avg C	39.81	66.29	107.16	177.47	213.98
StDev C	1.07	0.92	0.75	0.68	1.48
EPA precision criteria	1.54	0.72	0.40	0.97	1.80

IBP	10%	50%	90%	FBP
107.7	153.4	226.9	352.7	422
105.1	152.4	226.6	351.5	416.8
106.6	154	227.3	352.2	417.8
106.1	154.3	227	351.9	420.5
106.8	154.5	227	351.5	421.9
102.6	150	224.3	351.1	411.7
103.1	148.7	223.6	351.8	414.7
101.5	150	223.1	351	416.2
101.7	149.2	223.6	351.5	414.9
104.7	151.2	225.8	350.9	416
103.8	151	225	349.1	416.3
99.5	147.4	221.3	349	418.3
104.5	150.8	224.3	352.9	422.9
104	150.6	224.8	351.1	414.9
101.2	150	223.5	351.2	416.2
102.8	150.7	223.5	351.5	416.4
106.4	152.6	225.1	351.2	415.6
103.3	152	224.8	350.6	416.1
104.1	152.6	225.5	352	419.8
102.3	150.9	224.3	351.3	418.9
103.9	151.4	224.9	351.7	414.4
103.7	150.6	224.2	350.3	415.3
105	151.4	225.1	352	419
101.4	153.1	226	354.7	419.4
103.1	150.4	224.2	349.6	416.6
101.8	150.3	224.6	351.1	418.6
102.7	151.8	225.2	351	415.1
102.8	151.6	225.2	354	414.2

Figure 15: Example control chart data

3. EPA's proposed accuracy qualification requirements for reference installations are overly restrictive (78 Federal Register p. 29958)

For a single entity that wishes to qualify alternate test methods per ASTM D6708 by using a single reference installation, we believe that the 'middle 50 percent' requirement as proposed by EPA is a reasonable requirement to impose on the single reference installation. However, we are concerned that the proposed requirement to stay within the middle 50% of the distribution of measurements of the industry monthly inter-laboratory crosscheck program for at least 5 months is overly restrictive. Based on a work up (provided as a separate attachment to these comments) of the proposed requirements (as we understand them) using ASTM D5599 Total Oxygen results on eleven RFG distributions, RFG1205 through RFG1303, we note that less than 15% of the participants met EPA requirement of staying within the central 50 percent for 5 successive exchanges. We specifically note that the EPA lab (lab 47) failed to meet this requirement. Therefore, **we suggest a requirement of 3 out of 5 successive exchanges is more realistically achievable**. We have attached the spreadsheet and description of the work up with these comments. See Attachments No. 4 and 5 for documentation.

For the situations where ILCP (such as those conducted by ASTM CS92) data and summary statistics for VCSB designated and alternate methods exist for the same materials, we believe that the summary statistics (mean and standard error = standard deviation / square root [no. of results]) from these ILCP data can be used as is, i.e., without imposing the reference installation criteria, to conduct an ASTM D6708 assessment on VCSB alternate test methods, provided that the number of non-outlying results is $\geq$16 for both designated and alternate methods, since this is the current de facto methodology for determination of ARV of check standards as specified in ASTM D6299, clause 6.2.2.1 and Note 7. Therefore, per OMB Circular 119, we suggest that the ASTM D6299 protocol for establishing ARV be followed. We note also that in actual fact, ASTM ILCP data for the method-defined parameters of interest exceeds this number (16) significantly.

We note that it is neither necessary nor is it statistically justified to apply the reference installation precision and 'middle 50 percent' criteria to the ILCP data for designated test method because the relevant ILCP statistics are calculated using outlier-free data, and, the number of data points is large, hence providing a better statistical 'sample' of the laboratory population. The mean calculated using the full ILCP, outlier-free data set is a 'truer' representation of the population parameter (μ) than the mean calculated using only the middle 50 percent. We note the standard error for the arithmetic mean calculated using the full ILCP data set is significantly reduced due to the square root [number of non-outlying results] term in the denominator for calculation of standard error.

We urge that EPA clearly state that the use of ILCP data as described above is suitable for an ASTM D6708 assessment of VCSB alternate test methods.

We request that EPA provide a worked example of what the Agency deems to be an acceptable ASTM D6708 assessment. Doing so will provide valuable guidance to the regulated community with respect to understanding and implementing the provisions of the PBMS as outlined in the proposed rule.

Finally, we note that the current 'robust' outlier treatment methodology for the ASTM CS92 ILCP program will be replaced with a statistically more rigorous approach using the Generalized Extreme Studentized Deviation (GESD) technique.[37] **We suggest that EPA remove the term 'robust' from the Regulation (and Preamble) wording.**

4. The proposed qualification criteria for designated method installations used to qualify method-defined parameter instruments should be relaxed to be more realistically achievable (78 Federal Register p. 29960)

We support in principle the qualification criteria described in the Preamble (at Section VI.3.e) for sites that intend to qualify other Method-Defined parameters using only a single designated method installation. However, as per our comment above in section IV.2 on Precision

[37] Rosner, Technometrics, Vol. 25, May 1983

Qualification criteria, we believe that a more appropriate and realistically achievable standard deviation under site precision conditions for the method-defined parameter for both the designated method and alternate method installation, even by a 'good' lab, should be set based on the TPI approach in ASTM D 6792.

We agree in principle with the additional accuracy requirement for a single Designated Method installation used to qualify alternate method-defined parameter instruments. However, as noted in an earlier comment above, we disagree with the requirement of staying in the middle 50 percent for a minimum of 5 successive exchanges, and we suggest that 3 out of 5 successive exchange requirements is more realistically achievable.

5. Sites should be granted greater flexibility in the choice of procedures to comply with the proposed Statistical Quality Control (SQC) requirements (78 Federal Register p. 29962)

We agree in principle with the SQC requirements, and that each instrument should be under its own SQC oversight. We note that in ASTM D6299, for the handling of QC material batch transition, the Q-procedure is intended to be an alternate approach to the concurrent testing (overlap) protocol. **We suggest that the site should be given the option of using either one of the two procedures**, and not mandated to use both. The Q-procedure is technically equivalent to the I-procedure. We suggest that for sites opting to use the Q-procedure, the very first run on the new QC batch should be validated by either an overlap in-control result of the old batch, or, by a single execution of an accompanying SRM. The new result is considered validated if the single result of the SRM is within the established site precision (R') of the ARV.

We suggest that because the standard error of the ARV in consensus-named fuels may not in all cases be negligible when compared to 0.75R, the expanded uncertainty of the ARV should be incorporated into the accuracy qualification criterion as follows:

Accuracy qualification criterion = sqrt [(0.75R)^2 + (0.75R)^2/L], where L = the number of single results obtained from different labs used to calculate the consensus ARV.

6. EPA should expand PBMS to include sampling or in-line blending methods

Extension of the PBMS to sampling and in-line blending is a logical extension of this performance-based approach to the sampling and analysis of physical and chemical properties. We note that most if not all in-line analytical instrumentation is equal or superior to laboratory-based test methods in terms of precision as well as provision of a more representative analysis for the complete batch, as opposed to a laboratory analysis on an aliquot of a batch taken from a tank. Superiority in precision as well as overall representativeness of the batch is achieved by virtue of taking the average of many in-line analytical results during the manufacturing process.

We note that there is a series of ASTM Standard Practices and Guides that prescribes industry-consensus best practices associated with the automated sampling and in-line analysis using process analyzers. See ASTM D7825 Standard Guide for Generating a Process Stream Property Value through the Application of a Process Stream Analyzer. **We urge EPA to expedite its effort in extending PBMS to on-line analytics and automated sampling.**

7. Categorization of fuel parameters as absolute or method defined

We support the proposed categorization of fuel parameters. We further support designation of Sulfur as the only Absolute parameter.

We appreciate the effort undertaken by EPA to develop flowchart examples of qualification requirements for Absolute Fuel Parameters and Method Defined Fuel Parameters and to place this material in the Docket for public comment. (See EPA-HQ-OAR-2011-0135-17841.) While these flowcharts are helpful, we urge EPA to develop more detailed schematics for inclusion in the final rule, as such information will be extremely helpful in assisting our members to implement the PBMS provisions. We also note that there is an error in the flowchart labeled "Flow Chart Example: Absolute Fuel Parameter (Absolute) – Sulfur in Gasoline" in Docket item EPA-HQ-OAR-2011-0135-17841. Specifically, the Precision and Accuracy box in this flow chart contains the statement:

> "**Accuracy** – the average of 10 consecutive results on a 1-10 ppm gravimetric sulfur standard cannot be more than 0.71 ppm and the average of 10 consecutive results on a 10-20 ppm gravimetric sulfur standard cannot more than 1.00 ppm."

To be consistent with the language in the NPRM, this statement should be revised as follows:

> "**Accuracy** – the average of 10 consecutive results on a 1-10 ppm gravimetric sulfur standard cannot ~~be~~ differ by more than 0.71 ppm from the ARV of the standard and the average of 10 consecutive results on a 10-20 ppm gravimetric sulfur standard cannot differ by more than 1.00 ppm from the ARV of the standard." [Note: ~~Strikeout~~ = deleted text. Underline = added text.]

We support in principle the notion of requiring laboratories to meet prescribed qualification requirements for specifically cited measurement data quality assurance. We suggest that this can be further streamlined by selecting a subset of the regulated parameters for the purpose of demonstrating to the agency measurement capability, with the expectation that the quality assurance work process and oversight for this subset of parameters are extended to all methods used to take measurement for regulatory purposes.

The Preamble and the proposed Regulatory language are inconsistent with respect to the exemptions from the precision criteria for approval of the method defined fuel parameters granted for test methods in use prior to May 30, 2014. We support the exemption language stated in the proposed regulatory text at §80.47(b)(3), §80.47(c)(3), §80.47(d)(2), §80.47(e)(2), §80.47(f)(2), §80.47(g)(2). §80.47(h)(2), §80.47(h)(2), §80.47(i)(2), and §80.47(j)(2) and we suggest that the Preamble be revised in the final rule to more clearly reflect this wording.

The proposed regulatory language exempting VCSB method-defined parameter test methods in use prior to May 30, 2013 (§80.47(l)(4)) is different than the May 30, 2014 date specified in all of the other precision criteria exemptions contained in the proposed regulatory text at §80.47 and noted above. Is this different date intentional?

8. Requirement for Test Method Qualification Applications to include a complete operational description of the test method in question

If a VCSB method is used to measure and qualify either an absolute or a method-defined fuel parameter, we believe that a simple citing of the VCSB Test Method Number and Title should provide EPA with sufficient documentation with respect to its operational description We note that there is an inconsistency between the language of the preamble and that of the proposed regulation: the proposed regulation requires full documentation (see §80.47(l)(1)), while the preamble suggests otherwise. **The final rule should specify that Test Method Qualification Applications need only to cite the VCSB by test method number and title**.

9. Temporal distribution of precision tests (78 Federal Register p. 29957)

We support option 2 (arranging tests into no fewer than five batches of five or fewer tests each, with only one such batch allowed per day) since it provides the most flexibility and is easier to implement.

10. Statistical control requirements governing the operation of reference installations (78 Federal Register p. 29957)

We support EPA's proposal that the reference installation "…must be shown to be in statistical control, as provided for in ASTM D6299-10e1 … and that the applicant must submit control charts showing a record of in-control operation for at least five months" <u>but only with the proviso that</u>:

- Regular maintenance and/or re-calibration conducted during the 5 month in-control qualification period is considered as part of in-control normal operation, and
- If an assignable cause for 'out of control' is found, mitigated, and the system is brought back in-control during the period that the reference installation is attempting to meet the 5 month in-statistical-control requirement, the 'clock' for the 5 month period does not re-start. In other words, the system is still considered as being 'in control'.

11. Use of reference materials in qualifying and maintaining alternative analytical techniques (78 Federal Register p. 29960)

We support the philosophy and principle behind the use of the three types of Standard Reference Materials (SRMs) as discussed in the proposed rule. We suggest that for the

Consensus-named fuels (SRM), EPA confirms that the relevant clauses described in ASTM D6299 (6.2) are acceptable in the determination of the Accepted Reference Value (ARV).

12. Qualification criteria for designated test method installations that are "Method-Defined" parameters instruments and not used to qualify other "Method-Defined" methods (78 Federal Register p. 29961)

We agree with EPA's proposal for only requiring implementation of a Statistical Quality Control (SQC) program as the sole qualification criterion for Designated Test Method installations that are not used to qualify alternate method-defined parameter instruments.

13. Qualification criteria for method defined parameter instruments other than designated test methods (78 Federal Register p. 29961)

We agree with the proposed qualification criteria for Method Defined Parameter Instruments for VCSB Method-Defined Parameter Test Methods.

We also agree with the proposed qualification criteria for Method Defined Parameter Instruments for non-VCSB Method-Defined Parameters. However, we believe that in addition to having the degrees in Chemistry or Statistics, qualifications for third party oversight service providers should also have a good working knowledge of ASTM D6708 and ASTM D6299. In addition, believe that limiting the third party oversight qualification to only US degree holders will exclude non-US degreed subject matter experts with equivalent knowledge and qualification. We suggest that the wording be expanded to include non-US equivalent degreed or industry recognized subject matter experts.

14. Statistical Quality Control for non-VCSB methods used to measure method-defined parameters

We support the proposal of requiring Agency Approval for only non-VCSB methods.

The dates and timing stated in the Preamble discussion section entitled "Agency Approval of Only Non-VCSB Methods" and the dates contained in the proposed regulatory text on this topic, for the two sections are confusing and inconsistent. In addition, the exemption language in the two sections is not clear. Specifically, the Preamble states "We are also proposing to exempt existing (i.e., in use for six months prior to publication of this proposal) installations of designated test methods that are method-defined parameters from the qualification requirement." We support the exemption clause as stated in the proposed regulatory language in §80.47 and suggest that the Preamble be written more clearly in order to properly reflect this text.

15. Comment on whether the Agency should require qualification of all analytical test methods for the fuel parameters at 40 CFR 80. (78 Federal Register p. 29965)

We do not support qualification requirement for all analytical test methods as suggested above.

V. Proposed standards for denatured fuel ethanol and other oxygenates

In the event that EPA finalizes a more stringent 10-ppm refinery average sulfur standard, API and AFPM support EPA's proposal within new §80.1610(a)(1) that producers of denatured fuel ethanol (DFE), or other oxygenates, for use by oxygenate blenders be required to meet a 10-ppm sulfur cap, as determined in accordance with the test requirements for refiners and importers.

API and AFPM do not support EPA's proposal within new §80.1603(d)(3) that anyone adding oxygenate downstream from a refinery or import facility to assume the sulfur content to be 10.00 ppm. API and AFPM recommend modifying the proposed rule to allow the downstream blender of DFE into conventional gasoline to either use the actual commercial ethanol sulfur value or allow laboratory hand blends, as similarly provided for RBOB/RFG in §80.69(a).

API and AFPM do not support EPA's proposal to restrict the number of available denaturants within new §80.1610(a)(3) to gasoline, RBOB, CBOB or natural gas liquids. As EPA points-out in the preamble, ASTM International Specification D4806 provides for the use of natural gasoline, gasoline blendstocks, and gasoline, as denaturants. Furthermore, the State of California also approves the use of gasoline components, as well as natural gasoline and unleaded gasoline, as DFE denaturants. Contrary to the preamble, EPA's proposal does not adopt the same specification as ASTM D4806 by restricting the scope of available gasoline blendstocks to RBOB and CBOB. This narrowing will restrict the potential supply of available denaturants for producers of denatured fuel ethanol, which are also required to meet U.S. Department of Treasury Alcohol and Tobacco Tax and Trade Bureau (TTB) denaturant requirements and State of California DFE requirements, when DFE is supplied to California. Although EPA expresses concern that denaturant limitations are needed to prevent the use of other components that "might adversely impact vehicle emission performance", data supporting this presumption is not presented. API and AFPM believe that with the combination of low denaturant concentrations (typically 2 volume percent) and TTB denaturants restrictions, any components of concern would be at very low levels and would unlikely impact vehicle emissions performance. For simplicity, API and AFPM recommend that if EPA must act, the latest version of ASTM International Specification D4806 should be adopted, and EPA should not further narrow the list of available denaturants.

API and AFPM agree with EPA's plans to not propose limits for benzene, olefins, and aromatics content of DFE. We agree that ASTM International Specification D4806 in combination with TTB denaturant requirements and low denaturant concentrations (typically 2 volume percent) would limit the benzene, olefins, and aromatics content of DFE to very low levels. We also do not support the adoption of the State of California's benzene, olefin and aromatics specifications for DFE. Limits imposed by the California Air Resources Board (CARB) address concerns specific to California, and hence should not be applied to the remainder of the country.

API and AFPM contend that EPA does not need to limit the concentration of denaturant in DFE to 2. volume percent within new §80.1610(a)(4). Under the RFS2 regulations, the denaturant level of DFE must be limited to 2 volume percent, in order for a producer to generate Renewable Identification Numbers (RINs) for each gallon of renewable fuel produced. API and AFPM fully understand that DFE producers may decide to produce DFE and not generate RINs. However, considering the mandate for RINs, it is very unlikely that a DFE producer would not generate RINs. Furthermore, the TTB restricts the denaturant concentration to 5 volume percent, which would also limit potential components of concern to very low levels and would unlikely impact vehicle emissions performance. As a result, the inclusion of a 2 volume percent requirement within the Tier 3 rules is unnecessary.

API and AFPM believe that it is unnecessary for EPA to require manufacturers of denaturants to register with EPA. We believe that requiring producers of DFE to meet the latest version of ASTM International Specification D4806 and TTB denaturant requirements, along with very low denaturant concentrations (typically 2 volume percent) would sufficiently limit the risk that denaturants might adversely impact vehicle emissions. Therefore, the proposed registration of denaturant manufacturers would not provide for any meaningful purpose.

DFE has become a significant component within the gasoline fuel pool and should be subject to requirements similar to gasoline refiners. However, API and AFPM believe that individual batch reporting for all fuels has little value. We propose that batch records be part of the recordkeeping requirements for both refiners and DFE producers but only aggregated reports be submitted to EPA. Refiners and DFE producers should be required to keep batch records that demonstrate compliance with per-gallons standards and support their annual compliance reporting, and should be required to provide records to EPA on demand, similar to how the diesel sulfur program is currently structured. However, if EPA insists on batch-level reporting of benzene and sulfur for DFE, EPA should require those batch properties be entered into EMTS at the same time RINs are generated rather than establishing an entirely new and duplicative batch reporting mechanism for DFE producers.

VI. Proposed standards for fuel used in flexible fueled vehicles

A. Standards for E16-50

API and AFPM agree that E16-50 ethanol blends for use in FFV should meet the same sulfur, RVP, and benzene standards otherwise applicable to gasoline. API and AFPM do not agree that EPA should treat E16-50 as gasoline under current regulations. In API's and AFPM's view, this action would require formal rulemaking with a waiver from the substantially similar requirements in CAA section 211(f).

EPA is proposing that gasoline deposit control requirements be removed from the E16-50 and E51-83 fuels. API and AFPM believe that it is in the best interest of the consumer to maintain a deposit control requirement for all spark-ignition fuels at a minimum level to protect the engines of consumers.

B. Standards for E51-83

EPA's preamble to the proposed Tier 3 regulations references a separate memorandum[38] that includes additional proposed regulations for which EPA seeks comments. These additional regulations include prescribing new requirements for E51- E83 for key fuel properties such as sulfur, RVP, and benzene. While API and AFPM may support EPA's effort to develop regulations for E51-E83, the process EPA used to inform the regulated community runs afoul of the federal Administrative Procedures Act (APA)[39] and the federal Clean Air Act (CAA).

The APA is clear that EPA's forum for informing the public of substantive rules, amendments, and revisions is through the Federal Register[40]. Further, the APA states "except to the extent that a person has actual and timely notice of the terms thereof, a person may not in any manner be required to resort to, or be adversely affected by, a matter required to be published in the Federal Register and not so published."[41]

Section 307(d)(3) of the CAA echoes the requirement for proposed rules to be published in the Federal Register. Among other things, the notice must "specify the period available for public comment." In addition, at the time of publication, there must be a publicly available docket that includes: (1) the factual data on which the proposal is based; (2) an explanation of how EPA collected and analyzed the data; and (3) an explanation of the major legal interpretations and policy considerations underlying the proposal.

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[38] Herzog, J. (January 2012). Possible Approach to Fuel Quality Standards for Fuels Used in Flexible-Fuel Automotive Spark-Ignition Vehicles (FFVs), Memorandum to the docket. The memorandum is referenced in footnote 388 of the pre-publication proposed rule; however, the footnote reference is to a memorandum dated January 2012 but the memorandum in the docket is dated April 8, 2013. Further, this memorandum was not in the docket at the time the proposed rules were announced on EPA's website.

[39] United States Code, Title 5, Chapter 5

[40] 5 USC 552(a)(1)

[41] 5 USC 552(a)(1)

In the instant matter, EPA describes and seeks comment on very significant potential changes to the regulations. EPA is required, by law, to publish such a proposal in the Federal Register. Posting on EPA website or including within the rulemaking docket is not an option – publication in the Federal Register means publication in the Federal Register. EPA must include all proposed changes in the proposed rule. References to documents external to the proposed rule do not give the regulated community and public the opportunity to which it is entitled to generate informed and timely comments regarding the proposed rule.

Notwithstanding the APA requirement to publish proposed rules within the Federal Register, API and AFPM would like to provide the following comments to the Jeff Herzog Memorandum dated April 8, 2013 that is posted within the docket (ID: EPA–HQ–OAR–2011–0135-0529):

API and AFPM agree that E51-83 for use in Flexible Fueled Vehicles (FFV) should be required to meet the same sulfur, maximum Reid Vapor Pressure (RVP), and benzene standards otherwise applicable to gasoline, as well as the Clean Air Act Section 211(f)(1) substantially similar provision. EPA should also allow for the use of butane or other natural gas liquids (e.g. pentane, natural gasoline, etc.) to manufacture E51-83 with sufficient volatility to meet the ASTM D5798 specifications. API and AFPM do not support limits on specific components, but do support adoption of reasonable standards to facilitate blending.

However, API and AFPM have identified a serious concern with the suggested 0.20 volume percent benzene cap for E51-83. Requiring E51-83 to meet a 0.20 volume percent benzene cap would effectively preclude the blending of gasoline blendstock and natural gasoline to manufacture E51-83. As EPA states, refiners and importers of gasoline are subject to a 0.62 volume percent annual average and 1.3 volume percent maximum average benzene standard. Furthermore, natural gasoline typically contains in excess of 1 volume percent benzene. As an example, E51-83 composed of 49 percent gasoline blendstock with 1.3 volume percent benzene and 0.01 percent natural gasoline denaturant with 1 volume percent benzene could have a resulting benzene content exceeding 0.65 volume percent. In another example, E51-83 composed of 17 percent gasoline blendstock with 1.3 volume percent benzene and 1.7 percent natural gasoline denaturant with 1 volume percent benzene could have a resulting benzene content exceeding 0.24 volume percent. Therefore, the setting of a 0.20 volume percent benzene cap would interfere with the expansion of E51-83 into the marketplace by preventing blends at the both the upper and lower range of the allowable ethanol content. To resolve this issue, API and AFPM recommend that E51-83 be required to meet the same benzene standards applicable to gasoline.

API and AFPM support EPA's suggested requirement that compliance with the Section 211(f)(1) substantially similar provision would be effectively achieved by ensuring that E51-83 be composed solely of carbon, hydrogen, nitrogen, oxygen, and sulfur.

API and AFPM agree that manufacturers of E51-83 for use in FFV should also be subject to the full responsibilities of a refiner (e.g. registration; batch sampling and testing; and reporting obligations), which is outlined as Option 1 within the Herzog Memorandum. However, if EPA wishes, as a second option, to allow oxygenate blenders to be exempt from the sampling, testing and reporting obligations of refiners, oxygenate blenders should be required to only use gasoline blendstocks, denatured fuel ethanol, natural gas liquids (NGL) and butane that meet certain specifications. API and AFPM agree with this two-option approach as a means to not restrict refiners or oxygenate blenders from choosing maximum blending flexibility by meeting the more stringent requirements, as outlined within Option 1. API and AFPM also agree that any resulting E51-83 should also be required to meet the downstream sulfur, RVP and benzene per-gallon cap standard.

API and AFPM agree that it may be possible to develop a calculative approach for E51-83 blenders to determine RVP and avoid sampling and testing. We agree that testing may be required for some period of time when a blender receives a new batch of gasoline blendstock. We also agree that RVP of different batches of DFE would not vary significantly due to TTB requirements related to denaturants and denaturant percentages, along with RFS2 requirements related to denaturant concentrations for RIN generation.

API and AFPM agree that butane used for E51-83 blending should meet the same standards as specified for butane blended into gasoline at a terminal. However, the limits on other components in E51-83 should be restricted to their total contribution toward regulated properties on the final fuel, not the same limits imposed on the components. Sources for NGLs should not be limited, provided the NGL conforms to the requirements.

Although API and AFPM do not believe that the Herzog Memorandum is a part of the proposed Tier 3 regulations since it has not been published in the Federal Register, API and AFPM provide the following specific comments to the draft regulatory text:

80.2 Definitions:

- New paragraph 80.2(cccc), which will provide the definition for E51-83, includes the reference to the ASTM D5798-11 standard for ethanol fuel blends for FFV's. This reference should be updated in the final rule to reflect the currently published version ASTM D5798-13 and it should be revised in the future if a newer version is adopted by ASTM.

80.1601 Fuels subject to the provisions of this subpart:

- EPA proposes adding item 80.1601(a)(4) to explicitly include E51-83 as being subject to the provisions of Subpart O regarding gasoline sulfur. However, we do not see an explicit addition to also include E16-50. Assuming EPA believes Subpart O regarding gasoline sulfur should also apply to E16-50, then E16-50 should explicitly also be listed in 80.1601(a).
- Under, 80.1601(b)(2), "California gasoline as defined in §80.1600 subject to the provisions of §80.1654" is not subject to the standards and requirements of Subpart O. It is unclear if and how the Subpart O requirements apply to E51-83 and/or E16-50 sold in California.

80.1608 Standards and requirements for E51-83

- Apart from the sulfur dates via the requirements in 80.1603(a)(2), paragraph 80.1608 does not specify an effective date for the standards and requirements for E51-83. EPA needs to insert a clear effective date for all of the standards and requirements for E51-83 in 80.1608. We infer this is sometime in 2017, but seek this clarity be added into the regulation.
- 80.1608(b)(2) as proposed sets the maximum benzene content of each batch of E51-83 at 0.20 volume percent maximum. This benzene limit is too low, because it is inconsistent with EPA's clear intent to allow E51-83 blenders to manufacture E51-83 using gasoline, gasoline blendstocks for oxygenate blending, denatured fuel ethanol, natural gas liquids, and/or butane per 80.1611. EPA needs to eliminate the explicit benzene limit in E51-83, when a blender manufactures this fuel under the provisions of 80.1611. Otherwise, EPA needs to increase the explicit benzene limit to reflect EPA's intent to allow E85 production using compliant RFG, RBOB, CG, and/or CBOB.
- Section 80.1608(b)(4) listing the RVP requirements for E51-83 contains the typographical error "80.1627(a)(2)" when "80.27(a)(2) is intended by EPA.
- EPA should clarify in 80.1608(b)(4) where it requires that the Reid Vapor Pressure of "each batch" of E51-83 must comply with same standards applicable for gasoline in 80.27(a)(2) that being a "batch requirement" this requirement only applies to E51-83 blenders. However, if EPA also intends for the RVP requirements to be applicable during the "high ozone season" from June 1st through September 15th of each year <u>at retail sites</u>, then EPA has to recognize and address that the potentially far slower turnover of E51-83 inventory at retail sites (relative to gasoline) may make an RVP requirement at retail sites infeasible and dissuade retailers from offering E51-83. EPA should note that ASTM recognized and addressed this issue of potentially slow moving E51-83 at retail sites by exempting the E51-83 at a retail site from ASTM's seasonal RVP requirements in ASTM's "E51-83" standard D5798 Table 2 with note1 as follows (emphasis added),

  > "This schedule, subject to agreement between the purchaser and the seller, denotes the vapor pressure class of the *<u>fuel at the time and place of bulk delivery to fuel-dispensing facilities for the end user</u>*. Shipments should anticipate this schedule."

- 80.1608(c)(3) provides the benzene standard for E51-83 when it is manufactured by a party that does not qualify as an E51-83 blender:
  1. Similar to our comments regarding the 0.20 vol% benzene limit for E51-83 <u>blenders</u> in 80.1608(b)(2) being too low. 0.20 vol% benzene listed in 80.1608(c)(3) for E51-83 <u>"refiners"</u> is also too low and should be revised consistent with our recommendations for E51-83 blenders.
  2. We believe "80.1632" is a typographical error with regard to the test requirements for benzene in E51-83 produced by a "refiner". We believe EPA means and should correct this to "80.1630" which addresses test requirements.

80.1611 Blended E51-83 requirements:

- EPA needs to insert a clear effective date for the blended E51-83 requirements in 80.1611. We infer this is sometime in 2017, but seek this clarity be added into the regulation.
- As proposed by EPA, 80.1611(a) and (b) require that only RFG or RBOB be used as the gasoline or gasoline blendstock for oxygenate blending in E51-83 intended for sale in RFG areas. EPA has not provided a basis for this limitation based on air quality impact. Absent EPA providing a reasonable basis, these requirements should be deleted from EPA's proposed rules, allowing conventional gasoline and/or CBOB to be used as well for E51-83 in RFG areas.

80.1612 Standards and requirements for natural gas liquids blendstock used by E51-83 blenders

- 80.1612(b) as proposed includes a prohibition on using E51-83 <u>made from NGL</u> in a blend with gasoline to make E16-50. We do not understand EPA's logic in this prohibition and ask that EPA explain its reasoning further to facilitate our ability to provide informed comments on this issue.

80.1662 Liability for violations under subpart O

- For a sulfur cap standard violation in 80.1660(b), paragraph 80.1662(a)(5) includes a branded refiner/importer liability as follows (emphasis added),

  > "Branded refiner/importer liability. Any refiner or importer whose corporate, trade, or brand name, or whose marketing subsidiary's corporate, trade, or brand name <u>*appeared at a facility*</u> where a violation of §80.1660(b) occurred, is deemed in violation of §80.1660(b)."

  However, this branded refiner/importer liability is too broad when EPA is now proposing to further expand the sulfur cap requirements in 80.1660(b) to include E16-50 and E51-83 fuels sold at retail sites. At retail, the branded refinery has no control on the retailer who might independently make these product offerings from source of his/her own choosing. Branded refiners should not be liable in these cases simply because their brand name "<u>appeared at a facility</u>", especially in the case where the branded refiner contractually required the retailer to identify at the dispenser that the E16-50 or E51-83 in question was not a branded product.

VII. Technical amendments to 40 CFR Part 80 and regulatory streamlining

EPA has made regulatory streamlining a priority and we appreciate the Agency's efforts. We agree that regulatory streamlining will result in more efficient and less costly compliance. We support the elimination of unnecessary and outdated provisions. These provisions are independent of Tier 3 and should be promulgated in a final rule earlier than the Tier 3 final rule. We agree with the Agency that these are straightforward and should be implemented quickly.

A. Testing and reporting for Complex Model fuel parameters[42]

EPA proposes to reduce the testing and reporting burden for individual batches of RFG and conventional gasoline (CG). Many of the tests for individual parameters are no longer needed because of the phase out of complex model standards. The complex model standard for NO_x was replaced by the Tier 2 gasoline sulfur standard. The toxics complex model standard was replaced by MSAT2.[43] The only remaining complex model standard for most refineries is summer RFG VOCs.

We support the Agency's proposal to eliminate API gravity. This is proposed to be effective on January 1, 2013 (see proposed 80.65(e)(3)). Given that the proposal was published in the Federal Register on May 21, 2013, this proposed effective date may be confusing because of its retroactive nature. Refiners recommend that the effective date remain January 1, 2013 in the final rule.

We support EPA's proposal to eliminate testing and reporting for oxygenates (unless necessary because oxygenates added downstream are used in calculations). The effective date of this elimination should be no later than the effective date of the Tier 3 final rule.

Testing for RFG, CG, RBOB and CBOB batches:

EPA proposes to allow monthly composites for winter RFG for aromatics, olefins, and distillation which is already allowed for Conventional batches. This is an example of a regulatory burden that is not needed to support out-of-date complex model standards. We propose that the requirement for aromatics, distillation, and olefins be eliminated completely for winter RFG and all Conventional batches. The effective date of this elimination should be no later than the effective date of the Tier 3 final rule.

EPA states that the "values for aromatics, distillations and olefins may continue to be determined from monthly composites" for CG. We interpret "may" to mean a refiner has the discretion to test and report or not. We see no value to test and report aromatics, distillations and olefins for monthly composites of CG or CBOB for parties that are subject to MSAT2, not the anti-dumping toxics complex model. A clear elimination would result in a reduction in

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[42] We are referring to 78 *Federal Register* at 29949-52.

[43] MSAT2 is effective for small refiners on 1/1/15 (0.62% standard) and 7/1/16 (1.3% standard).

paperwork and reporting burden. The effective date of this elimination should be no later than the effective date of the Tier 3 final rule.

We support the continuation of testing and reporting of all summer complex model parameters for summer RFG/RBOB batches because of the summer RFG VOC standard.

EPA should eliminate quarterly reporting for the RFG/RBOB batch reports. Data for all summer RFG/RBOB batches should be submitted once year with the annual RFG VOC compliance report. The Agency has proposed, and we support, the elimination of aromatics, distillations, and olefins for winter RFG/RBOB. Therefore, there is no purpose served for the first and fourth quarters. In addition, there is no point in splitting up summer RFG/RBOB between the second and third quarters.

We support EPA's proposal to set the due date for all fuel annual compliance reports at March 31. This extension will provide some flexibility for refining company personnel while having no impact on emissions, air quality or compliance with the standards.

The Agency proposes a new due date for additional reporting for refiners blending butane with RFG or RBOB at 80.75(o), March 1. This should be revised to March 31 to conform with the uniform due date above.

We support the proposed changes at 80.65(f)(5) that would allow a facility to use an alternate independent laboratory. This will provide needed flexibility when there is an unexpected problem.

Amendments to Update Test Methods:

We note that, in some instances, the test method which EPA is proposing to update in this rulemaking does not necessarily represent the most recent version adopted by ASTM International. For instance, the proposal references ASTM D4057-06 (2011) the manual sampling standard practice for petroleum and petroleum products. However, this standard practice was significantly revised and was recently re-issued as ASTM D4057-12. We strongly urge EPA to update its test method references to the most current versions available when it publishes the final rule, or, at the very least, provide a rationale for not doing so.

The Tier 3 proposal includes amendments for Previously Certified Gasoline. We support the proposed changes at 80.1235(a)(6) and 80.1347(a)(6).

B. De minimis batch volumes

We agree with the concept of including a de minimis value for reporting of batch volumes, below which a party would not be required to correct and resubmit their batch reports. However, the proposed de minimis level of the lesser of 500 gallons or 1 percent of the true batch volume is so small that it is of little practical value. A de minimis volume of 500 gallons is equivalent to approximately 12 barrels and will almost always be less that 1 percent of the true batch volume. For example, on a typical pipeline batch volume of 25,000 barrels, the 500 gallon de minimis volume represents approximately 0.05 percent of the total volume. On a large refinery production batch of 250,000 barrels, the de minimis volume of 500 gallons represents approximately 0.005 percent of the total volume. Such a small threshold value would fail to provide the intended relief and would not prevent a party from having to make inconsequential volume corrections.

We suggest that a de minimis threshold value of 0.5 percent be applied regardless of batch size. Individual batch volumes that fall within plus or minus 0.5 percent (+/- 0.005 expressed as a decimal) of the true volume would not need to be corrected. The 0.5 percent de minimis value is a practical level that will provide the intended relief for regulated parties but will still sufficiently protect the integrity of EPA reporting and compliance programs.

Regarding the impact of de minimis batch volume corrections on compliance with the benzene, sulfur, RFG, RFS and other Clean Air Act fuel standards, we recommend that EPA should delete the regulatory text at 80.10 (c) and 80.10(d). The application of a de minimis threshold implies that the small volume errors in batch reporting are truly inconsequential and do not have an impact on compliance with fuel standards. Therefore, no separate demonstration of material impact should be required. The normal, unintentional variation in batch volumes will be distributed both greater than and less than the true volume. These variations will cancel each other over time and do not represent any degradation of the standard.

C. Other items should be included in regulatory streamlining

There are additional topics that should be included in regulatory streamlining. Some are very simple and straightforward and should be implemented quickly and easily. These were suggested to EPA by API and AFPM in a memo sent to EPA on May 11, 2011 (Attachment No. 2). Although EPA addressed a few suggestions, the following issues remain.

1. Diesel blendstock

RFS2 Q&A 7.8 (diesel blendstock RVO issue)[44] suggests that any diesel blendstock or heating oil that meets the qualities of MVNRLM diesel should be included in an obligated party's obligated volume. This is in direct contradiction to § 80.1407 (e) and (f), in Preamble II F 2 (75 FR 14720 and 14721) which state that diesel fuel that is designated as heating oil, jet fuel, or any designation other than MVNRLM or a subcategory of MVNRLM will not be subject to the applicable percentage standard and will not be used to calculate the RVOs.

EPA should strike RFS2 Q&A 7.8 (diesel blendstock RVO issue).

[44] Questions and Answers on Changes to the Renewable Fuel Standard Program (RFS2). EPA Website accessed June 22, 2013: http://www.epa.gov/otaq/fuels/renewablefuels/compliancehelp/rfs2-aq.htm#7

2. RFS and gasoline or diesel exports

The regulations specify that when a refiner designates gasoline or diesel which it produces, for export, there is a commensurate reduction in that refiner's RFS RVO. This limitation will likely result in obligated parties having to purchase RINs for exported gasoline and diesel since it often happens that the party that designates product for export will be other than the refiner of that product.

EPA should allow any obligated party that "designated for export" gasoline or diesel to reduce their RVO regardless of whether that product was so designated when it was produced. Likewise, a company that changes the use of a fuel "designated for export" to domestic use would incur a RVO obligation for the volume that the use designation was changed. This ensures industry wide volume obligations are properly accounted for and attainable. This system allows a refiner to claim the RVO benefit without unnecessary tracking by designating product for export. It also ensures appropriate accounting for fuels designated for export that are later used domestically.

3. MSAT2

§80.1347(a)(3) requires that each batch of gasoline be sampled and tested for benzene content. Refiners are required to test each batch at a significant expense. The cost of a single benzene test ranges between $130 and $350, a cost which becomes disproportionate for small volume blenders. For all gasoline this program imposes averaging standards rather than any per-gallon limits. Allowing the individual batch samples to be composited prior to analysis would reduce costs and simplify reporting and recordkeeping.

4. Batch reports and the addition of oxygenates to CBOB

In section 80.69, EPA describes an alternate QA program for RBOB to confirm that the proper amount of ethanol is being added to the RBOB. That confirmation essentially enables the refiners to account for the 10% dilution of sulfur and benzene in their batch reporting. The alternate QA program addresses the situation where the RBOB is distributed through a fungible pipeline system like the one that serves the Mid-Atlantic and northeast states. If a refiner wants to account for the ethanol dilution for conventional gasoline via fungible shipments of CBOB, there is no parallel QA program allowed and EPA has declined to clearly indicate the RBOB approach for CBOB is acceptable. EPA should revisit and clarify to allow the same survey approach used for RBOB to apply to CBOB distribution systems, as well. EPA should allow refiners to account for the ethanol dilution for conventional gasoline via shipments of CBOB.

Under 40 CFR 80.101(d)(4), EPA Anti-Dumping regulations require a refiner or importer to include in its compliance calculations any conventional gasoline blendstock (CBOB) that is produced or imported which becomes conventional gasoline solely upon the addition of oxygenate. Refiners and importers must conduct a program of quality assurance testing at the downstream oxygenate blending facility in order to include the oxygenate in their compliance calculations. Under the current regulations, refiners must conduct a program of sampling and testing (quality assurance) at the downstream oxygenate blending facility in order to include the oxygenate in their compliance calculations. This rule provides an alternative QA requirement for these refiners and importers.

When oxygenate is to be added to produce a finished conventional gasoline at a downstream oxygenate blending facility, refiners produce a product called conventional gasoline blendstock for oxygenate blending, or CBOB. CBOB is certified by the refiner, or by an importer who imports CBOB, as complying with all of the conventional gasoline requirements. The oxygenate blender is responsible for complying with the oxygen requirement when the oxygenate is added to the CBOB to produce a finished conventional gasoline at the oxygenate blending facility. Oxygenates such as ethanol, have a propensity to attract water, and, as a result, cannot be added at the refinery, particularly where the finished gasoline will be shipped through a fungible pipeline on its way to terminals and retail gasoline stations. As a result, CBOB is typically produced for blending with ethanol at a blending facility downstream from the refinery that produced the CBOB.

Where a specific type and amount of oxygenate is designated for CBOB, the regulations require the refiner or importer to conduct downstream oversight sampling and testing quality assurance (QA) of the downstream oxygenate blending facility (40 CFR 101(d)(2)). This is to ensure that the specific type and amount of oxygenate that is designated and claimed by the refinery or importer for compliance, is in fact added to the CBOB by the oxygenate blender. In addition, the refiner or importer must have a contract with the oxygenate blender which requires the blender to comply with the blending procedures specified by the CBOB refiner or importer and allows the refiner or importer to conduct the required QA sampling and testing (40 CFR 80.101(d)(1)). If the refiner or importer does not meet the contractual and quality assurance requirements for CBOB, the refiner or importer may not include the oxygenate for compliance purposes.

Due to the complexities of the gasoline distribution system, it would be extremely difficult, if not impossible, to track CBOB from the refinery where it was produced to the terminal where it was blended with ethanol in order to comply with the downstream QA sampling and testing requirements specified in the regulations. In order to facilitate ethanol blending, effective August 1, 2006, EPA amended the RFG regulations to permit refiners and importers seeking to add ethanol to RBOB an alternative quality assurance and downstream sampling and testing program. This program needs to be extended to refiners and importers supplying CBOB for downstream oxygenate blending in conventional gasoline areas as well.

5. RFG Sections 80.68 and 80.79

Section 80.79 addresses liability for violations and addresses the defense elements which must be present. One of those defense elements is that the refiner must have a QA program at each of the points in a distribution system, excepting the truck carrier. Section 80.68 covers the need for retail surveys, surveys which are conducted by the RFG Survey Association for their members. A Q&A that dates back to the mid-nineties is as follows:

> 16. Question: May survey samples be used as a substitute for a refiner's quality assurance program for enforcement purposes?
>
> Answer: Surveys may not be used as a substitute for a regulated party's own quality assurance program.

Industry has been conducting independent surveys of their retail sites whereas they should be allowed to rely on the RFG Survey Association survey samples of individual brands.

D. Downstream pentane blending

EPA has asked for comment regarding allowing downstream pentane blending into gasoline using a similar construct as currently exists for butane blending. The Agency has not proposed any specific regulatory language but rather is looking for input on the concept of downstream pentane blending. Pentanes exist in the gasoline mixtures being sold today as gasoline encompasses a broad range of hydrocarbons that result from the refining and gasoline blending processes. Theoretically, it would be possible to establish pentane specifications and processes akin to the existing butane blending provisions. EPA poses additional questions regarding whether further downstream blending of pentane into PCG would have any vehicle emissions and operability effects. API does not have any specific data to respond to this specific question. However, it would seem that if the volumes of pentane expected to be blended result in concentration levels that are already found in existing gasoline blends that would provide some assurance. We would encourage EPA to look at the range of C5s contained in the gasolines being marketed today and then examine some pentane blending scenarios to determine possible C5 content of the blended gasoline. There should be a theoretical limit on the volume of C5 that could be blended based on vapor pressure and volatility limitations.

E. Fuel economy labeling

Current vehicle fuel economy labels include a smog rating ranging from 1 to 10. Vehicle labels need to convey complex information in a simple manner enabling an equitable comparison of vehicle attributes by new vehicle buyers. At no time should two differing smog rating scales be used, as it will only confuse consumers by demonstrating a false comparison. Current smog scales should be maintained until every vehicle manufactured is certified to the new Tier 3 standards, at which time, all labels can be transitioned to an adjusted smog scale.

F. Streamline the issuance of air permits

EPA purports that 17% of refineries will need New Source Review ("NSR") or Prevention of Significant Deterioration ("PSD") permits due to this proposal.[45] This value is based on a number of assumptions that might not be accurate, for example GHG permitting could be triggered over a much wider share of facilities depending on the implementation of the Title V GHG Tailoring Rule.

The Agency states that their assumed level of permitting will not be a significant obstacle to timely compliance with the program. EPA further concludes that this level of permitting, even taking into account other contemporaneous regulatory driven permit requirements, will not create competition for air permit agency resources. This positive forecast contrasts sharply with the May 22, 2013 EPA presentation at the WESTAR Spring 2013 Business Meeting in San Francisco, CA.

At the May 22, 2013 WESTAR meeting, EPA reported that approximately 241 PSD and 29 Title V permit applications have been submitted for GHG permitting over a period of more than 2 years.[46] As of April 5, 2013, only 87 PSD and 4 Title V permits have been issued. These results bring into question if EPA's speedy permit forecast is realistic.

In response to EPA's request for public comment on possible actions the Agency might be able to take to issue permits expeditiously, we recommend a thorough review of the September 14, 2012 report from the Clean Air Act Advisory Committee ("CAAAC") provided as Attachment No. 14.[47] The CAAAC formed a workgroup that was charged with identifying and evaluating various potential approaches and options for streamlining the preconstruction (PSD) and operating (Title V) permit programs used for permitting of GHG sources. EPA committed to explore streamlining options as the Agency considered lowering the emission threshold for GHG permitting. Beyond that application, the ideas contributed by both permitting agencies and industry offer a practical set of options to improve the permitting process that EPA needs to implement.

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[45] 78 *Fed. Reg.* 29,929.

[46] U.S. EPA - Office of Air Quality Planning and Standards. (May 2013). *Clean Air Updates: NAAQS and Other Implementation-Related Topics.* Available: http://www.westar.org/Docs/Business%20Meetings/Spring13/02.1%20WESTAR_v2_5_22_13.ppt. Last accessed 25 June 2013.

[47] Clean Air Act Advisory Committee. (September 14, 2012). *Air Permitting Streamlining Techniques and Approaches for Greenhouse Gases.* Available: http://www.epa.gov/air/caaac/pdfs/ghg-permit-streamlining-final-report.pdf. Last accessed 25 June 2013.

VIII. Anti-Backsliding

EPA has not provided Congress with analyses required by legislation. The Agency is required to conduct anti-backsliding studies per section 1506 of EPAct05 (draft for public comment was due summer 2009 and a final report was due summer 2010) and section 209 of EISA (due summer 2009).

In letters to Charles Drevna (AFPM) and Jack Gerard (API) dated March 6, 2012, EPA emphasized that the Tier 3 rule is independent of this upcoming anti-backsliding study. EPA repeated this in a letter to Senator Inhofe dated March 19, 2012. Gina McCarthy restated this independence on page 113 of her answers to Senator Vitter in May 2013.

We believe that the emissions benefits from the Tier 3 rule should be counted as offsets for the environmental impacts of the Renewable Fuel Standard since the RFS was effective long before Tier 3.

IX. <u>Appendix</u>

References for section I.A.2.c are listed below in alphabetical order. We incorporate these studies by reference and ask EPA to insure they are included in the administrative record for this rulemaking.

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