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

Summary and Analysis of Comments

United States
Environmental Protection
Agency

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

Summary and Analysis of Comments

Assessment and Standards Division
Office of Transportation and Air Quality
U.S. Environmental Protection Agency

NOTICE

This technical report does not necessarily represent final EPA decisions or positions. It is intended to present technical analysis of issues using data that are currently available. The purpose in the release of such reports is to facilitate the exchange of technical information and to inform the public of technical developments.

EPA United States Environmental Protection Agency

EPA-420-R-14-004
March 2014

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Southern California Association of Governments	SCAG	EPA-HQ-OAR-2011-0135-4352
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U.S. Coalition for Advanced Diesel Cars		EPA-HQ-OAR-2011-0135-4759
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Wyoming Refining		EPA-HQ-OAR-2011-0135-4460

1- Docket Number EPA-HQ-OAR-2011-0135-4731 is testimony from the Chicago, IL public hearing on April 29, 2013.
2- Comments from the private citizens coordinated/facilitated by a non-governmental organization.
3- Docket Number EPA-HQ-OAR-2011-0135-4730 is testimony from the Philadelphia, PA public hearing on April 24, 2013.

Acronyms and Abbreviations

AAM	Alliance of Automobile Manufacturers
ABT	Averaging, Banking, and Trading
AECD	Auxiliary Emission Control Device
AEO	Annual Energy Outlook
A/F	air/fuel ratio
AKI	Anti-Knock Index ((R+M)/2 octane)
AQCD	Air Quality Criteria Document
ARV	Accepted Reference Value
ASTM	ASTM International (*formerly American Society for Testing Materials*)
bbl	Barrel
BC	Black Carbon (*commonly referred to as "soot"*)
BOB	Blendstock for Oxygenate Blending
BTU	British Thermal Unit
bpcd	Barrels per Calendar Day
BTEX	Benzene, Toluene, Ethylbenzene, and Xylene
CAA	Clean Air Act
CaRFG3	California's Phase 3 Reformulated Gasoline (Program)
CBOB	Conventional Blendstock for Oxygenate Blending
CAFE	Corporate Average Fuel Economy
CARB (or ARB)	California Air Resources Board
CASAC	Clean Air Science Advisory Committee
CBA	Cost Benefit Analysis
CBI	Confidential Business Information
CCD	Combustion Chamber Deposit
CCR	California Code of Regulations
CFR	Code of Federal Regulations
CG	Conventional Gasoline
CMAQ	Community Multi-scale Air Quality Model
CNG	Compressed Natural Gasoline
CO	Carbon Monoxide
CO_2	Carbon Dioxide
COA	Certificate of Analysis
CR	Compression Ratio
CRC	Coordinating Research Council
CREE	Carbon Related Exhaust Emissions
DALYs	Disability Adjusted Life Years
DFE	Denatured Fuel Ethanol
DI	Direct Injection
DoE, DOE	U.S. Department of Energy
DOR	Direct Ozone Reduction
DPF	Diesel Particulate Filter
DRIA	Draft Regulatory Impact Analysis

DTC	Diagnostic Trouble Codes
E10	Gasoline containing 10 percent ethanol by volume
E15	Gasoline containing 15 percent ethanol by volume
E30	Gasoline-ethanol blend containing 30 percent ethanol by volume
E16-50	Gasoline-ethanol blends containing 16 to 50 percent ethanol by volume
E51-83	Gasoline-ethanol blends containing 51-83 percent ethanol by volume
E85	Common name for gasoline-ethanol blends containing 51-83 percent ethanol by volume
EFTA	European Free Trade Association
EIA	Energy Information Administration
EISA	Energy Independence and Security Act of 2007
EJ	Environmental Justice
EMTS	EPA Moderated Trading System
EO	Executive Order
EPA	Environmental Protection Agency
EPAct	Energy Policy Act of 2005
ETBE	Ethyl Tertiary Butyl Ether
ETW	Emission Test Weight
EU	European Union
FCC	Fluid Catalytic Cracker
FCEV	Fuel Cell Electric Vehicle
FE	Fuel Economy
FID	Flame Ionization Detector
FID	Fuel Injector Deposit
FFV	Flex-Fuel Vehicle
FR	Federal Register
FRM	Final Rulemaking
FTP	Federal Test Procedure
FWP	Fuel Warming Potential
GDI	Gasoline Direct Injection
GHG	Greenhouse Gas
GTAB	Gasoline Treated as Blendstock
GVWR	Gross Vehicle Weight Rating
H6C	Harvard Six Cities Study
HAP	Hazardous Air Pollutant
HC	Hydrocarbon
HDCC	High Density Close Coupled
HDGV	Heavy-duty Gasoline Vehicle
HDV	Heavy-duty Vehicle
HEI	Health Effects Institute
HHDGV	Heavy Heavy-duty Gasoline Vehicle
HIA	Health Impact Assessment
ICE	Internal Combustion Engine
ICI	Independent Commercial Importer

ILCP	Inter-laboratory Cross-check Program
IUVP	In-Use Verification Program
IRS	Internal Revenue Service
ISA	Integrated Science Assessment
ISBL	Inside Battery Limits
ISO	International Standards Organization
IVD	Intake Valve Deposit
LAC	Lowest Additive Concentration
LBT	Lean Best Torque
LDV	Light-duty Vehicle
LDT	Light-duty Truck
LEV	Low Emission Vehicle
LHDGV	Light Heavy-duty Gasoline Vehicle
LML	Lowest Measured Level
LNG	Liquefied Natural Gas
LPG	Liquefied Propane Gas
LVW	Loaded Vehicle Weight
MBT	Minimum spark advance for Best Torque
MDPV	Medium-duty Passenger Vehicle
mg/kg	Milligram per kilogram
MLEB	Mid-level Ethanol Blend
MMT	Methylcyclopentadienyl Manganese Tricarbonyl
MPG	Miles Per Gallon
MSAT	EPA's Mobile Source Air Toxics Rule
MTBE	Methyl Tertiary Butyl Ether
MY	Model Year
NAAQS	National Ambient Air Quality Standard
NATA	National Air Toxics Assessment
NGL	Natural Gas Liquids
NGO	Non-governmental Organization
NHTSA	National Highway Transportation Safety Administration
NLEV	National Low Emission Vehicle
NMHC	Non-methane Hydrocarbon
NMMAPS	National Morbidity, Mortality, and Air Pollution Study
NMOG	Non-methane Organic Gas
NOx	Oxides of Nitrogen; Nitrogen Oxides
Non-VCSB	Non-Voluntary consensus-based standards body
NPRM	Notice of Proposed Rulemaking
NRC	National Research Council
NSR	New Source Review
O3	Ozone
O3 AQCD	Ozone Air Quality Criteria Document
OBD	Onboard Diagnostics
OEM	Original Equipment Manufacturer
OMB	(White House) Office of Management and Budget

ON	Octane Number
OTAQ	Office of Transportation and Air Quality
ORVR	Onboard Refueling Vapor Recovery
OSBL	Outside Battery Limit
PAHs	Polycyclic Aromatic Hydrocarbons
PHEV	Plug-In Hybrid Electric Vehicle
PBMS	Performance-Based Measurement System
P.E.	Professional Engineer
PFI	Port Fuel Injected
PFID	Port Fuel Injector Deposit
PM	Particulate Matter
PN	Particle Number
POM	Polycyclic Organic Matter
Ppm	Parts Per Million
PR	Precision Ratio
PSI	Pounds per Square Inch (pressure)
PTD	Product Transfer Document
QALYs	Quality-Adjusted Life Years
R&D	Research and Development
RBOB	Reformulated Blendstock for Oxygenate Blending
RFA	Regulatory Flexibility Analysis
RFG	Reformulated Gasoline
RFS	Renewable Fuel Standard
RIA	Regulatory Impact Analysis
RICE	Reciprocating Internal Combustion Engine
RIN	Renewable Identification Number
RSD	Remote Sensing Device
RVP	Reid Vapor Pressure
S&A	Summary and Analysis of Comments for Control of Air Pollution from Motor Vehicles: Tier 3 Motor Vehicle Emission and Fuel Standards (this document)
SAB	Science Advisory Board
SAB-Council	SAB Advisory Council on Clean Air Compliance Analysis
SAB-EEAC	Environmental Economics Advisory Committee of the SAB
SAE	Society of Automotive Engineers
SBA	Small Business Administration
SBAR Panel	Small Business Advocacy Review Panel
SBREFA	Small Business Regulatory Enforcement Fairness Act
SCF	Standard Cubic Feet
SCR	Selective Catalytic Reduction
SFTP	Supplemental Federal Test Procedure
SHED	Sealed Housing for Evaporative Determination
SIP	State Implementation Plan
SO2	Sulfur Dioxide
SOA	Secondary Organic Aerosol

SRM	Standard Reference Material
SVM	Small Volume Manufacturer
THC	Total Hydrocarbon
TPI	Test Performance Index
TTB	Tax and Trade Bureau
TZEV	True Zero Emission Vehicle
ULSD	Ultra-low Sulfur Diesel
UFP	Ultrafine Particulates
USC	United States Code
VCSB	Voluntary Consensus-based Standards Body
VMT	Vehicle Miles Traveled
VOC	Volatile Organic Compound
VRR	Value of a Risk Reduction
VSL	Value of Statistical Life
VSLY	Value of Statistical Life Year
WOT	Wide Open Throttle
WTO	World Trade Organization
WTP	Willingness to Pay

Table of Contents

1. General

The following comments relate in general to the Notice of Proposed Rulemaking (NPRM). The comments in this chapter are not on any specific aspect of the proposed rule; rather, they are directed to the general substance of the proposal. More detailed comments on specific provisions of the proposal can be found in later chapters of this Summary and Analysis of Comments.

For more information on the proposed rule, see the Federal Register at 78 FR 29816, published on May 21, 2013. The public comments submitted on this rule can be viewed online at www.regulations.gov (the public docket for this rulemaking is docket number EPA-HQ-OAR-2011-0135).

1.1. General Support for the Proposed Standards

What Commenters Said:

We received many comments supporting the proposed rule, which generally stated that they support the rule itself and/or efforts to reduce pollution from motor vehicles and reduce sulfur in gasoline. Commenters additionally expressed support for various aspects of the rule, including: the systems approach of regulating vehicles and fuel together, harmonization with California low emission vehicle (LEV) III standards, coordination with EPA's light-duty Greenhouse Gas (GHG) standards, low sulfur fuels enabling advanced vehicle technologies, help for states in meeting National Ambient Air Quality Standards (NAAQS), and finalizing the rule by the end of 2013 (in order to retain a January 1, 2017 program start date).

However, many of these commenters also stated that, although they support the rule, they believe that additional work should be done before the rule is finalized. Commenters offered various suggestions on how they believe that the rule could be improved, and those specific comments can be found throughout this Summary and Analysis of Comments document.

Our Response:

We appreciate the support we have received from these commenters and many other parties during the development of the Tier 3 final rule. The Tier 3 program will establish more stringent vehicle emissions standards and will reduce the sulfur content of gasoline beginning in 2017, as part of a systems approach to addressing the impacts of motor vehicles and fuels on air quality and public health. As described in the preamble to the final rule, we continue to believe that the Tier 3 program is necessary, and is technologically and economically feasible in the time frame allowed.

For responses to specific issues raised in public comments, please see the separate chapters of this Summary and Analysis of Comments document.

1.2. General Opposition to the Proposed Standards

What Commenters Said:

We also received comments expressing opposition to the proposed rule. These comments listed various concerns such as flawed analyses or processes, and cost/supply impacts. These comments are generally summarized below, and are discussed in more detail in later chapters of this Summary and Analysis of Comments Document.

Some commenters stated that they believe the rule is unnecessary because EPA failed to provide an adequate scientific justification, technical need, or cost effectiveness for the rule. These commenters further stated that the rule would impact fuel domestic supplies and affect energy security.

Several commenters raised the concern that they believe the rule will result in higher costs to the refining and/or vehicle manufacturing industry, and thus raise consumer costs. Some of these commenters noted concerns about impacts on jobs in these industries, and a number of these commenters further stated that the costs would result in little environmental benefit.

Individual commenters also stated that they do not agree with EPA's assessments of the magnitude to which vehicle emissions cause air pollution, or the health benefits of the rule. We also received a number of comments raising concerns that the rulemaking is an example of government intrusion.

Commenters:
American Energy Alliance
American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM)
Dresser Trap Rock, Inc.
ExxonMobil
Flint Hills Resources, LP (FHR)
Marathon
Monroe Energy, LLC
Private Citizens
Refinery Automation Institute, LLC
Sunoco Logistics Partners L.P.
United States Congress, House of Representatives, Pennsylvania, 7th District

Our Response:

We have in fact taken the comments we received on the proposal into account and made changes to some of the programmatic requirements, where appropriate, which should ease implementation (e.g., gasoline sulfur ABT program design) without jeopardizing the benefits of the program. We believe that the final rule implements the Tier 3 program in a manner consistent with our legal obligations, with sound science, and with sound environmental, energy, and economic policy.

For responses to specific issues raised in public comments, please see the separate chapters of this Summary and Analysis of Comments document.

2. Authority Under the Clean Air Act and Need for the Tier 3 Standards

2.1. Authority

2.1.1. Use of Authority

What Commenters Said:

Commenter: Mercatus Center at George Mason University

Additionally, the EPA regulates both PM and Ozone under the National Ambient Air Quality Standards (NAAQS), which makes the proposed regulation an indirect, and perhaps impractical, way to achieve the EPA's objectives.

There are also several unusual aspects to this rule worth mentioning. First, a revision of the ozone NAAQS standards was recently returned to the EPA by the Administrator of the Office of Information and Regulatory Affairs (13). The EPA was urged to reconsider its ozone proposal until after a new review of the scientific literature has been conducted by the Clean Air Science Advisory Committee (CASAC). The EPA may want to consider following the same advice for this regulation since it is also related to ozone.

Another unusual aspect of the regulation is that one outcome the agency identifies as a basis for regulating is to help states and localities comply with other EPA regulations. The Notice of Proposed Rulemaking (NPRM) states, "these reductions would help state and local agencies in their effort to attain and maintain health-based National Ambient Air Quality Standards (NAAQS)" (14). The EPA should allow states flexibility to achieve standards in ways they think are best, rather than mandating how to comply through further regulations.

It seems odd to use Tier 3 gasoline standards to reduce PM levels when the EPA has the authority to reduce PM directly through the NAAQS.

The EPA has issued this regulation as a result of the authority granted it by the Clean Air Act. Given that this regulation is not required by statute, the EPA would be well advised to consider holding off on issuing such a regulation until the benefits are more certain.

Our Response:

The commenter states that "the EPA regulates both PM and Ozone under the National Ambient Air Quality Standards (NAAQS), which makes the proposed regulation an indirect, and perhaps impractical, way to achieve the EPA's objectives." The commenter also states that EPA's Tier 3 rulemaking is "a basis for regulating is to help states and localities comply with other EPA regulations." These statements appear to confuse the setting of the NAAQS with EPA's authority to finalize national rulemakings under Clean Air Act Title II. Section 109 (42 U.S.C. 7409) of the Clean Air Act directs the Administrator to propose and promulgate "primary" and "secondary" NAAQS for criteria pollutants (identified under section 108). The Act defines primary standards as "ambient air quality standards the attainment and maintenance of which in the judgment of the Administrator, based on [air quality] criteria and allowing an adequate margin of safety, are requisite to protect the public health." In setting primary ambient air quality standards, the EPA's responsibility under the law is to establish standards that protect public health, without regard to the costs of implementing those new standards. How States choose to achieve the NAAQS is not prescribed when the NAAQS is promulgated - the NAAQS do not reduce criteria pollutant levels by themselves.

The Clean Air Act also authorizes EPA to establish emissions standards for motor vehicles to address air pollution that may reasonably be anticipated to endanger public health or welfare (section 202). EPA also has authority to establish fuel controls to address such air pollution as well as fuels emissions products that may impair vehicle emissions controls (section 211). The EPA's exercise of these authorities in promulgating the Tier 3 rule does not conflict with States' authority and flexibility in choosing control measures for their plans to attain and maintain the NAAQS. Indeed, as noted by the commenter, emission reductions resulting from the Tier 3 rule will assist state and local agencies in their efforts to attain and maintain health-based NAAQS "as expeditiously as practicable" (Section 172(a)2). We received several comments from states supporting the Tier 3 program, as described elsewhere in this document. The final Tier 3 rulemaking will provide the public with very significant health benefits that are achieved at a reasonable cost (refer to Chapter 8 of this Summary and Analysis of Comments document for specific responses to comments regarding the size and certainty associated with the Tier 3 rule's estimated benefits).

We also disagree with the commenter's suggestion that EPA should reconsider its current action on the Tier 3 rulemaking based on the delay of most recent ozone NAAQS. This advice is irrelevant in the current circumstances due to the very different nature of the two actions – the setting of a NAAQS and the promulgation of a national mobile-source air quality rule. The overwhelming consensus of the scientific literature finds human exposure to ozone to be harmful. The final Tier 3 rule will reduce emissions related to ozone formation and will lead to a significant public health benefit.

2.1.2 Authority for Gasoline Sulfur Standards

What Commenters Said:

Commenter: American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM)

API opposes the requirement to further reduce average gasoline sulfur with this Tier 3 regulation. This rulemaking is discretionary, and API has serious doubts as to the Agency's justification for it.

Commenter: Monroe Energy, LLC

The Tier 3 sulfur standards are not required by law.

Our Response:

Consistent with our proposal, we are adopting gasoline sulfur controls under our authority in section 211(c)(1) of the Clean Air Act. This section gives us the authority to "control or prohibit the manufacture, introduction into commerce, offering for sale, or sale" of any fuel or fuel additive for use in a motor vehicle, motor vehicle engine, or nonroad engine or nonroad vehicle (1) whose emission products, in the judgment of the Administrator, cause or contribute to air pollution which may reasonably be anticipated to endanger the public health or welfare [section 211(c)(1)(A)] or (2) whose emission products will impair to a significant degree the performance of any emission control device or system which is in general use, or which the Administrator finds has been developed to a point where in a reasonable time it would be in general use were the fuel control or prohibition adopted [section 211(c)(1)(B)]. Consistent with our proposal, we are finalizing controls on gasoline sulfur levels based on both of the Clean Air Act criteria.

We believe that the final rule implements the Tier 3 program in a manner consistent with our legal obligations, with sound science, and with sound environmental, energy, and economic policy, and we disagree with comments suggesting that the Tier 3 rule is not justified. The Tier 3 program, including the gasoline sulfur standards, will reduce ambient levels of air pollution that endanger public health and welfare and will provide important benefits to the public such as preventing PM- and ozone-related premature deaths. The Tier 3 Preamble very clearly explains the need for the Tier 3 standards in Section II, our technical justification for the vehicle emission controls in Section IV, and technical justification for the fuel standards in Section V. A vast body of underlying technical analyses supporting the Tier 3 standards can be found in our Regulatory Impacts Analysis, which reflects the best methods, data and assumptions available at the time of the rulemaking analysis.

2.1.3 General Support

What Commenters Said:

Commenter: American Lung Association

The Clean Air Act grants EPA the authority to set standards for vehicles and fuels and to reduce air pollution that threatens public health under Section 211. The Clean Air Act grants the EPA administrator the authority to limit the sulfur and gasoline which reduces the efficiency of emission control technologies, and leads to greater tailpipe pollution. When pollution from motor vehicles endangers public health, Section 202 of the Act requires the EPA administrator to take necessary action.

Commenter: Mid-Atlantic Regional Air Management Association Inc. (MARAMA)

State and local air pollution control agencies have very limited authority to control motor vehicle emissions and fuels. Section 177 of the Clean Air Act authorizes states to opt into California's

Low Emissions Vehicle tailpipe standards, but Section 211 of the Clean Air Act limits states' ability to establish clean gasoline standards.

Commenter: Sierra Club

Under both provisions, the statutory threshold for determining endangerment is precautionary in nature, allowing for regulatory action before the threatened harm occurs.[13] “Indeed, the very existence of such precautionary legislation would seem to demand that regulatory action precede, and, optimally, prevent, the perceived threat.” Moreover, the Administrator’s endangerment determination is entitled to great deference, so long as the Administrator provides adequate public endangerment justification.[15] The statute “allows for a somewhat attenuated chain of causation ... Regulation may be premised on a determination that an air pollutant emitted from a new automobile is likely to contribute to air pollution which endangers the public health.[16] The Administrator’s charge of protecting the public from danger, dictates that the Administrator “be accorded flexibility, a flexibility that recognizes the special judicial interest in favor of protection of the health and welfare of people, even in areas where certainty does not exist.”[17]

Upon making its threshold endangerment determination, as EPA has appropriately done here, the agency has an explicit duty to promulgate standards under Section 202. The statute provides further direction on the stringency of such standards.

[R]egulations ... applicable to emissions of hydrocarbons, carbon monoxide, oxides of nitrogen, and particulate matter from classes or categories of heavy-duty vehicles or engines ... *shall contain standards which reflect the greatest degree of emission reduction achievable* through the application of technology which the Administrator determines will be available for the model year to which such standards apply, giving appropriate consideration to cost, energy, and safety factors associated with the application of such technology.

And further: The Administrator *shall* promulgate ... regulations applicable to evaporative emissions of hydrocarbons from all gasoline-fueled motor vehicles ... *shall take effect as expeditiously as possible and shall require the greatest degree of emission reduction achievable* by means reasonably expected to be available for production during any model year to which the regulations apply.

Section 202’s mandatory duty requires EPA to assess “the greatest degree of emission reduction” that is “achievable”; that assessment should be informed by the authority conferred to it under Section 211 of the Act. Section 211 authorizes the Administrator to “regulat[e], control or prohibit” motor vehicle fuels and fuel additives if the subject fuel or fuel additive or any emission product from it may contribute to the endangerment of public health or welfare, or if the emission products of such fuel or fuel additive will impair to a significant degree the performance of any emission control device or system which is in general use or has been developed to a point where in a reasonable time it would be in general use if such regulation were adopted. As described above, EPA has met its initial threshold consideration by providing strong evidence of public health and welfare endangerment.[38] EPA also proposes the integrative Tier 3 standard based on evidence that gasoline sulfur impairs the emissions control systems of vehicles.[39] Accordingly, EPA should exercise its authority to regulate pursuant to Section 211, and should use this authority to inform the stringency of pollution control limits that are "achievable" under Section 202.

EPA Demonstrates that the Proposed Rule is Technologically and Economically Feasible: Moreover, in assessing "achievability," EPA fulfills its obligation to appropriately consider technological feasibility, economic feasibility and energy impacts. EPA is entitled to significant deference in demonstrating feasibility in light of the complex scientific and technical analysis it must undertake. "EPA need only show that technology will be available in the lead time provided, not that the technology is currently available." "EPA will have demonstrated the reasonableness of its basis for prediction [that standards are feasible] if it answers any theoretical objections ..., identifies the major steps necessary in refinement of the [technology], and offers plausible reasons for believing that each of those steps can be completed in the time available."[46] In addition, cost is a consideration but should not be an obstacle for promulgating technology forcing regulation.[47][EPA-HQ-OAR-2011-0135-4311-A1 p. 9]

In sum, EPA's record amply demonstrates the pollutant reduction levels and fuel quality controls comprising the proposed Tier 3 Rule are technologically and economically feasible. Indeed, EPA properly uses its authority to protect public health from motor vehicle air pollution by proposing an all-system, integrative Tier 3 standard, and Sierra Club urges EPA to finalize the rule without delay.

Sierra Club applauds the U.S. Environmental Protection Agency for exercising its Clean Air Act authority to promulgate the all-system integrative Tier 3 motor vehicle pollution and fuel content standards. The proposed Tier 3 standards will achieve significant air pollution reductions that will provide very real public health benefits, that cannot be achieved without the Rule's proposed low sulfur gasoline standard. On behalf of Sierra Club's millions of members and supporters, we urge EPA to finalize these standards before December 31, 2013.

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[12] 42 U.S.C. § 7521(c).
[13] *Ethyl Corp. v. Envtl. Prot. Agency*, 541 F.2d 1. 13 (D.C. Cir. 1976).
[15] *Train v. Natural Resources Defense Council, Inc*., 421 U.S. 60, 75, 95 (1975); *Nat'l Petrochemical & Refiners Ass'n v. EPA*, 287 f.3d 1130 (D.C. Cir. 2002).
[16] *Ethyl Corp.* at 16.
[17] *Id.* (referencing *Environmental Defense Fund, Inc. v. Ruckelshaus*, 439 F.2d 584, 598 (1971).).
[38] *Ethyl Corps .v. Envtl. Prot. Agency*, 541 F.2d 1, 23-23 (D.C. Cir. 1976) (endangerment threshold must be based on assessment of risk and proof of facts).
[39] *Id*. (threshold determination must be factually based). EPA's research demonstrates significant reductions in NOx, CO, and total HC for Tier 2 vehicles as a result of sulfur content 10 ppm and lower. EPA makes the case that the proposed standard is an inseparable and indispensable component of achieving meaningful air quality benefits. Lowering the sulfur content of fuels both "enable[s] vehicles designed to the proposed Tier 3 tailpipe exhaust standards to meet these standards for the duration of their useful life, and [] facilitate[s] immediate emission reductions from all the vehicles on the road at the time the sulfur controls are implemented." *Control of Air Pollution from Motor Vehicles: Tier 3 Motor Vehicle Emission and Fuel Standards*. U.S. Environmental Protection Agency, Proposed Rule, RIN 2060-AQ86 at 67 (Mar. 29, 2013)(hereinafter "Proposed Rule"). Without the proposed sulfur content standards, the Tier 3 pollution reductions cannot be achieved. *Id*.
[46] *NRDC v. EPA*, 655 F.2d 318, 328, 333 (D.C. Cir. 1981); *See also Husqvarna v. EPA*, 254 R.3d 195, 201 (EPA not obliged to provide detailed solutions to every engineering problem, but only need to identify the major steps for improvement and give plausible reasons for its belief that the industry will be

able to solve those problems in the time remaining); *NRDC v. Thomas*, 805 F.2d 410, 429-430 (D.C. Cir. 1986).
[47] *Husqvarna AB v. E.P.A.*, 254 F.3d 195, 201 (D.C. Cir. 2001)("In construing similar language included in CAA section 202, we explained in *NRDC v. Thomas* that the mere fact that the provisions 'seek to promote technological advances while also accounting for cost does not detract from their categorization as technology-forcing standards.' 805 F.2d at 428 n. 30. The 'Congress intended the agency to project future advances in pollution control capability. It was 'expected to press for development and application of improved technology rather than be limited by that which exists today.' *NRDC v. EPA,* 655 F.2d 318, 328 (D.C.Cir.1981) (quoting S.Rep. No. 91-1196, at 24 (1970))."

Commenter: Sierra Club

Similarly, Section 211 authorizes the Administrator to regulate and/or prohibit fuels or fuel additives if the fuel or fuel additive, or emission product of the fuel causes or contributes to air pollution that may reasonably be anticipated to endanger the public health or welfare. The statute states:

The Administrator may, on the basis of information ... by regulation, control or prohibit the manufacture, introduction into commerce, offering for sale, or sale of any fuel or fuel additive for use in a motor vehicle, motor vehicle engine ... if, in the judgment of the Administrator, any fuel or fuel additive or any emission product of such fuel or fuel additive causes, or contributes, to air pollution or water pollution ... that may reasonably be anticipated to endanger the public health or welfare, or (B) if emission products of such fuel or fuel additive will impair to a significant degree the performance of any emission control device or system which is in general use, or which the Administrator finds has been developed to a point where in a reasonable time it would be in general use were such regulation to be promulgated.[12]

12. 42 U.S.C. § 7521(c).

Commenter: Union of Concerned Scientists (UCS)

Additionally, Section 211 of the Clean Air Act allows EPA to establish a fuel standard if emissions from fuel combustion cause or contribute to pollution that endangers public health or the fuel impairs the performance of the emissions control device or system. EPA is using both authorities in promulgating this rule.

Commenter: Sierra Club

EPA Makes an Appropriate Threshold Determination that Motor Vehicle Pollution Endangers Public Health

Clean Air Act Sections 202 and 212 Require Regulation Where Pollution Endangers Public Health or Welfare

Clean Air Act Sections 202 and 212 provide broad authority to the Environmental Protection Agency to regulate motor vehicle pollution and fuel quality to reduce pollution that may reasonably be anticipated to endanger public health or welfare. Specifically, Section 202 requires the Administrator to regulate motor vehicle pollutant emissions upon making a public endangerment determination. The statute states: [EPA-HQ-OAR-2011-0135-4311-A1 p. 3]

The Administrator *shall* by regulation prescribe (and from time to time revise) in accordance with the provisions of this section, standards applicable to the emission of any air pollutant from any class or classes of new motor vehicles or new motor vehicle engines, which in his judgment cause, or contribute to, air pollution which may reasonably be anticipated to endanger public health or welfare ...regulations ... shall contain standards which reflect the greatest degree of emission reduction achievable through the application of technology which the Administrator determines will be available for the model year to which such standards apply, giving appropriate consideration to cost, energy, and safety factors associated with the application of such technology.[11]

11 42 U.S.C. §7521 (a)(1),(3) at 2511–29.

Commenter: Union of Concerned Scientists (UCS)

Section 202 of the Clean Air Act requires that the Administrator of the Environmental Protection Agency (EPA) set emission standards from motor vehicles if reductions from vehicles are needed and cost-effective. President Obama directed the EPA to promulgate the Tier 3 standards at the same time that he asked for the greenhouse gas standards for passenger vehicles in a Presidential memorandum released May 21, 2010 (3). [EPA-HQ-OAR-2011-0135-4317-A1, p. 2]

3 - The White House. 2010. Presidential Memorandum Regarding Fuel Efficiency Standards. Online at http://www.whitehouse.gov/the-press-office/presidential-memorandum-regarding-fuel-efficiency-standards accessed on June 28, 2013

Our Response:

We acknowledge the comments and their support of our authority for the Tier 3 rulemaking.

2.2. Need for the Tier 3 Standards

What Commenters Said:

EPA received numerous comments that affirm the need for the emissions reductions, air quality improvements, and health benefits that will result from the Tier 3 program. These comments are from a broad range of stakeholders, including state and local governments, emissions control suppliers, environmental organizations, health organizations, consumer groups, labor groups, private citizens, and others. The following list illustrates the breadth and variety of commenters that have expressed the need for the Tier 3 standards:

Advanced Engine Systems Institute (AESI)
American Academy of Pediatrics
American Lung Association
American Lung Association District of Columbia

American Lung Association Illinois
American Lung Association in Greater Chicago
American Lung Association in Massachusetts et al.
American Lung Association Lehigh Valley, Pennsylvania
American Lung Association Maryland
American Lung Association North Carolina
American Lung Association of the Mid-Atlantic
American Lung Association South Central Pennsylvania
American Lung Association State and Local Chapters
American Lung Association Virginia
American Lung Association, Regional Leadership Council in Northeast Ohio
American Public Health Association
American Thoracic Society
Appalachian Mountain Club
Asthma and Allergy Foundation of America
Attorneys General of New York, Connecticut, Delaware, Maryland, Massachusetts, Maine, New Hampshire, North Carolina, Oregon, Rhode Island, Vermont, Washington, Washington D.C., New York City, and Chicago
BlueGreen Alliance
Boulder County Board of Commissioners and Boulder County Board of Health
Business for Innovative Climate and Energy Policy (BICEP)
Ceres Investor Network on Climate Risk
Chesapeake Bay Foundation
Chrysler Group LLC
Chicago Metropolitan Agency for Planning
Children's Environmental Health Network
City of Philadelphia Department of Public Health Management Services (AMS)
Clean Air Council
Consumers Union (CU)
Delaware Department of Natural Resources
Emissions Control Technology Association (ECTA)
Environmental Defense Fund
Environmental Law and Policy Center (ELPC)
HEAL Utah on behalf of members of the Utah Legislature
Health Care without Harm
Kentucky Division for Air Quality
Maryland Department of the Environment
Maryland Department of Transportation
Medical Advocates for Healthy Air and Clean Air Carolina
Metropolitan Washington Air Quality Committee
Mid-Atlantic Regional Air Management Association (MARAMA)
Mom's Clean Air Force
National Association of Clean Air Agencies (NACAA)
National Association of City and County Health Officials
Natural Resources Defense Council (NRDC)
Navigant Economics

New York State Department of Environmental Conservation (NY DEP)
Northeast States for Coordinated Air Use Management (NESCAUM)
Office of County Executive, Anne Arundel County, Maryland
Ozone Transport Commission (OTC)
PennFuture
Pennsylvania Department of Environmental Protection (PA DEP)
Philadelphia Physicians for Social Responsibility
Private Citizens (over 170,000 comments)
Sierra Club
Sierra Club Southeastern Pennsylvania Group
State of Utah
Sugar House Community Council
Trust for America's Health
U.S. Coalition for Advance Diesel Cars
Union of Concerned Scientists (UCS)
United Steelworkers Union (USW)
Utah Air Quality Board
WE ACT for Environmental Justice
Wespath Investment Management

Many comments submitted by the organizations listed above include extensive discussion of why the Tier 3 standards are needed both nationally and for the particular locales represented by the commenters. In general, commenters made the following points regarding the need for the Tier 3 standards:

- Tier 3 will significantly reduce tailpipe emissions of harmful pollutants such as particulate matter and gaseous pollution, including nitrogen oxides and volatile organic compounds which are ozone precursors. For example:
    - In addition to citing EPA's analyses of emission reductions from the proposed Tier 3 standards, many commenters cite a 2011 study by the National Association of Clean Air Agencies (NACAA) that estimated the costs and air quality benefits of a Tier 3 program modeled on California's Low Emissions Vehicle (LEV III) program, including tighter vehicle emissions standards and an average gasoline sulfur standard of 10 ppm. According to the NACAA study, the proposed Tier 3 standards would to cut emissions of NOx, CO and VOCs by 29%, 38% and 26% respectively by 2030.
- Emission reductions from the Tier 3 gasoline sulfur standards will be immediate for the existing fleet. For example:
    - Commenters again cite the 2011 NACAA study showing that reducing the sulfur content of gasoline would have an immediate effect in 2017, with an expected 260,000 ton reduction of NOx. The NACAA study estimates that is the equivalent of taking 33 million cars off the nation's roads for a year.
- The Tier 3 standards are needed to improve air quality, both nationally and locally. For example:

    - Commenters cited EPA's proposed Tier 3 analyses and the American Lung Association's State of the Air 2013 report, which found that nearly 132 million people, or 42 percent of the nation's population, live in areas where ozone and particulate matter are at levels that are "unhealthful."
        - Commenters expressed concern for the general public and especially for sensitive populations such as children, older adults, those with existing conditions such as asthma, reduced lung function, chronic obstructive pulmonary disease, heart disease and diabetes.
    - Commenters from specific locales often mentioned specific examples of poor air quality in their areas, or reported failing grades for various measurements of ozone and particle pollution in the air according to ALA's State of the Air 2013 report.
- The Tier 3 standards are critical to helping areas to attain the National Ambient Air Quality Standards (NAAQS), as well as assisting areas in staying in attainment. For example:
    - Numerous state commenters report on their difficulty in achieving and maintaining the current NAAQS and express concerns over meeting potentially tighter future standards. They call for national Tier 3 standards to help bring needed emission reductions to their states, especially in those areas affected by pollutant transport.
    - The Ozone Transport Commission (OTC) concluded based on its own modeling that "attainment of the 2008 health-based ozone standard will be impossible in the OTR without additional emission reductions from highway vehicles and other mobile sources."
    - Some commenters point out that their states have already implemented many stringent controls, and in the absence of national Tier 3 program, areas needing additional emission reductions may have to implement more expensive, less cost-effective measures, including additional controls on stationary sources (including already controlled sources) to meet their statutory clean air obligations.
        - Achieving equivalent emission reductions of the magnitude that will result from Tier 3 could be extremely difficult, if not impossible, in areas where stationary sources are already highly controlled and there are not enough other sources to implement controls.
- Tier 3 will provide substantial health benefits, including preventing instances of premature deaths, respiratory related ER visits and hospitalizations, acute respiratory symptom days, including asthma attacks, and missed days of work or school. The Tier 3 standards will also save health care costs. For example:
    - Many commenters cited the American Lung Association's report, "A Penny for Prevention: The Case for Cleaner Gasoline and Vehicle Standards," which estimated the full implementation of cleaner gasoline and vehicles in 2030. For the eastern half of the United States only, the report projected that Tier 3 would prevent more than 2,500 premature deaths each year, avoid more than 15,000 asthma attacks each year, and avert more than 3.1 million missed work and school

days each year. The monetized health and economic benefits would range between $8.5 billion and $22 billion annually.

- Some commenters also cite a study by Navigant Economics showing that the health benefits of the Tier 3 program have an estimated value of $5 to $6 billion annually by 2020, and $10 to $11 billion annually by 2030.

- The Tier 3 program is worth the cost. For example:
  - Many commenters make two related points: the Tier 3 program can be achieved at a reasonable cost, and the benefits of the Tier 3 program far outweigh the costs. Commenters cite analyses such as EPA's Regulatory Impact Analysis of the Tier 3 (noting that the costs analyses are corroborated by independent experts), the American Lung Association's report, "A Penny for Prevention: The Case for Cleaner Gasoline and Vehicle Standards," and the Navigant Economics study.
- Tier 3 is important for reducing near-roadway concentrations of vehicle emissions
  - Commenters pointed to studies linking roadway-related air pollution with increased risks and rates of asthma and other respiratory illnesses, such as the 2010 report by the Health Effects Institute (HEI), which showed that near-roadway exposure to traffic pollution is high and affects a larger population than previously thought.
  - Commenters also expressed that traffic-related air pollution and the health impacts associated with such pollution raise significant environmental justice concerns.
- The Tier 3 standards have important environmental benefits. For example:
  - Commenters note that pollutants from motor vehicle emissions (NOx, particulate matter, ozone) contribute to the acidification of lakes and streams, the loss of native species, poor air quality, and poor visibility. Emission reductions due to the Tier 3 standards will reduce damage caused by acid deposition, reduce eutrophication, and reduce visibility impairment
  - Some commenters cite specific examples of areas where such environmental benefits are especially important, e.g., national parks, the Chesapeake Bay.
- Tier 3 provides economic and employment benefits. For example:
  - Some commenters point to the high cost of health care, especially emergency room visits and hospital admissions, and applaud the expected cost savings projected by EPA's analyses, the American Lung Association's report, "A Penny for Prevention: The Case for Cleaner Gasoline and Vehicle Standards," and the Navigant Economics study, as illustrated above.
  - Some commenters note that Tier 3 will create jobs at refineries and at high-tech companies developing and deploying state of the art emission control equipment for vehicles, according to the same Navigant Economics study
  - Some commenters also express concerns about the economic burden that would be placed on local industries and businesses in areas that cannot meet their statutory clean air obligations without the Tier 3 standards

- The Tier 3 rule should be implemented as soon as possible. For example:
    - Many commenters expressed their strong desire for the EPA to issue the final Tier 3 standards by the end of 2013 and implement the standards starting in 2017 as proposed, in order to realize the emission reductions, air quality improvements, and health benefits of the Tier 3 standards as soon as possible.
    - Some commenters specifically expressed concerns about lost benefits due to any delay in the standards.

EPA also received comments from oil industry commenters questioning the need for the Tier 3 standards. The commenters include:

American Petroleum Institute (API)
Association of Fuel & Petrochemical Manufacturers (AFPM)
Chevron
Flint Hills Resources, LP (FHR)
Marathon Petroleum Company LP (MPC)
Monroe Energy LLC

Commenters claim that EPA has not demonstrated the need for the Tier 3 gasoline sulfur standards and make the following general points. These points are expounded upon in the commenter's detailed comments and thus are also addressed throughout this Summary and Analysis of Comments document:

- The environmental benefits of the Tier 3 are negligible with respect to both reductions in emissions inventories and improvements in air quality. For example:
    - Commenters cite two-API sponsored studies conducted by ENVIRON which showed that in 2022, the summertime ozone precursor emissions of volatile organic compounds (VOCs), oxides of nitrogen (NOx), and carbon monoxide (CO) from gasoline-fueled light-duty vehicles are projected to be reduced by 8%, 11% and 7%, respectively, due to Tier 3. ENVIRON also found that, in 2022, Tier 3 would yield a maximum ozone benefit of about less than 1 ppb and mean monthly summer 2022 PM2.5 concentrations of no more than 0.1 $\mu g/m^3$. The commenters point out that EPA's modeling calculates Tier 3 reductions in ozone of 0.5 - 1.35 ppb and in PM2.5 of 0 - 0.05 $\mu g/m^3$ in years 2017 - 2030. The commenters conclude that reductions of this magnitude are "negligible."
- The benefits of the Tier 3 program are not worth the cost. For example:
    - The commenters claim that EPA's analyses of the impacts of the Tier 3 as described in the Draft Regulatory Impact Analysis are flawed and conclude that "the issues below, when taken collectively, demonstrate that the costs of the Tier 3 proposed rule are greater than the benefits."
        - A flawed baseline
        - Underestimated costs
        - Overestimated emissions benefits

        - Implausible health benefits due to highly conservative, unrealistic assumptions
    - The commenters further suggest that EPA should withdraw and resubmit a new DRIA consistent with OMB guidelines.
- Implementation of the gasoline sulfur standards in 2017 is not necessary. For example:
    - Some commenters argue that a January 1, 2017 start date for implementation of the gasoline sulfur standards is not necessary to reduce emissions from the in-use vehicle fleet. The commenters:
        - Question that the Tier 3 standards will have immediate emission reductions for the existing vehicle fleet
        - Point to the ENVIRON studies of Tier 3 impacts mentioned above to argue that the emissions impacts of reducing gasoline sulfur will have only a *de minimis* impact on air quality.
        - Further claim that the implementing the rule on January 1, 2017 will not help nonattainment areas reach attainment of the NAAQS.

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Our Response:

We agree with the majority of commenters that there is a significant need for the emissions reductions, air quality improvements, and health benefits provided by the Tier 3 standards, and we disagree with comments from the fuel industry arguing that we have not clearly demonstrated that need. As documented in our Regulatory Impacts Analysis (RIA) of the Tier 3 rule (Chapters 7 and 8) and described in the Preamble (Sections II, III, and VIII), the Tier 3 program will significantly reduce motor vehicle emissions, leading to significant air quality improvements and helping state and local areas attain and maintain the existing health-based air quality standards in a cost-effective and timely way. The breadth and variety of comments we received describe the importance of Tier 3's expected impacts from the perspective of states, environmental and health organizations, and the public further demonstrates that the air quality improvements and health benefits that will result from the Tier 3 standards are needed.

With respect to the commenters' points about the expected emission impacts of the standards, we agree with the majority of commenters that Tier 3 standards will significantly reduce tailpipe emissions of nitrogen oxides (NO_X), Volatile Organic Compounds (VOC), particulate matter ($PM_{2.5}$), and air toxics. For example, our emissions and air quality analyses of the final Tier 3 standards (Section III of the Preamble, Chapter 7 of the RIA) show that in 2030, NO_X and VOC emissions from on-highway vehicles will be reduced by about 330,000 tons and 170,000 tons, respectively, or about 25% and 16% of emissions from on-highway vehicles. These reductions will continue beyond 2030 as more of the fleet turns over; by 2050, when Tier 3 vehicles would make up almost the entire fleet, NO_X and VOC will be reduced by nearly 31% for on-highway vehicles. Moreover, immediate reductions are expected in 2017 when the gasoline sulfur standards take effect. The gasoline sulfur standards, which take effect in 2017, will provide large immediate reductions in NO_X emissions from existing gasoline vehicles and engines on the road today, e.g., NO_X emissions will be reduced by about 260,000 tons, or about 10% of emissions from on-highway vehicles, in 2018 alone. Given these important emission reductions, we disagree with fuels industry commenters that the emission reductions due to Tier 3 are "negligible." We respond to more specific comments on our emissions inventory modeling and estimated emissions reductions in Chapter 3.1 of this Summary and Analysis of Comments document.

Similarly, we agree with the majority of commenters that the Tier 3 standards will significantly improve air quality and that they are critical to helping areas attain and maintain the National Ambient Air Quality Standards (NAAQS). As demonstrated in Sections II and III of the Preamble, and Chapter 7 of the RIA, the emissions reductions from the Tier 3 standards are projected to lead to significant decreases in ambient concentrations of ozone, $PM_{2.5}$ and air toxics (including notable nationwide reductions in benzene concentrations) by 2030, and will immediately reduce ozone when the sulfur controls take effect in 2017. Over 149 million people currently live in areas designated nonattainment for one or more of the current NAAQS. In the absence of additional controls such as Tier 3 standards, many areas will continue to have ambient ozone and $PM_{2.5}$ concentrations exceeding the NAAQS in the future. Our air quality modeling indicates this action will meaningfully decrease ozone concentrations in many areas of the country. Furthermore, numerous state air quality agencies and organizations representing geographic groups of these state agencies have affirmed in their comments that air quality improvements from Tier 3 will be a critical part of areas' strategies to attain and maintain the NAAQS. Our analysis of the air quality impacts of the Tier 3 standards clearly shows that these improvements are significant, and the need for these improvements is corroborated by the majority of comments themselves as well as other studies of Tier 3's impacts presented in these comments. Thus, we disagree with fuel industry comments that the air quality improvements due to Tier 3 are "negligible," Our responses to specific claims about our air quality analysis are found in Chapter 3.2 of this document.

We agree with the many commenters who stated that the final Tier 3 rulemaking will provide the public with very significant health benefits that are achieved in a cost-effective manner. Our analysis of the final rulemaking (Preamble Section VIII and RIA Chapter 8) estimates that by 2030, the annual emission reductions of the Tier 3 vehicle and fuel standards will annually prevent between 660 and 1,500 PM-related premature deaths, between 110 and 500 ozone-related premature deaths, 2,200 hospital admissions and asthma-related emergency room visits, 19,000 asthma exacerbations, 30,000 upper and lower respiratory symptoms in children, and 1.3 million lost school days, work days, and minor restricted activity days. Given the expected health benefits stemming from air quality improvements due to Tier 3's expected emissions reductions, we again conclude that Tier 3's emission and air quality impacts are not "negligible" as the fuel industry commenters claim. The estimated annual monetized health benefits of the Tier 3 standards in 2030 (2011$) will be between $7.4 and $19 billion, assuming a 3-percent discount rate (or between $6.7 billion and $18 billion assuming a 7-percent discount rate). We project the final fuel standards to cost on average 0.65 cent (i.e., less than a penny) per gallon of gasoline, and the final vehicle standards to have an average cost that increases in proportion to the increase in stringency during the phase-in period, from $28 per vehicle in 2017 to $72 per vehicle in 2025, when the standards are fully phased in (our cost analyses can be found in Preamble Section VII and RIA Chapters 2, 5 and 8). Costs in 2030 are estimated to be approximately $1.5 billion. Using the more conservative benefits estimate, the 2030 benefits outweigh the costs by a factor of 4.5. Using the upper end of the benefits range, the benefits outweigh the costs by a factor of 13. Thus, even taking the most conservative benefits assumptions, benefits of the final standards clearly outweigh the costs.

We therefore disagree with comments suggesting that the benefits of the Tier 3 program are not worth the cost. We further disagree with each of the fuel industry commenters' specific points that our baseline is flawed, that we underestimate costs and overestimate benefits, and that estimated health benefits are implausible due to unrealistic assumptions. Our methods have been thoroughly peer reviewed and reflect the best methods, data and assumptions available at the time of the rulemaking analysis. Furthermore, these methods are consistent with OMB and internal EPA guidelines for analyzing the impacts of a national-level rulemaking, and we reject the claim made by fuel industry commenters that EPA should withdraw and resubmit a new Regulatory Impacts Analysis. Chapters 3, 4, 5, 7, 8 and 10 of this document contain more detailed responses to the commenters' specific claims.

With respect to comments on other impacts of the Tier 3 standards, we agree with the many commenters who stated that Tier 3 is important for reducing near-roadway concentrations of vehicle emissions and that Tier 3 has significant environmental benefits. Tier 3 will reduce exposure to vehicle pollution for the millions of people living, working, and going to school near major roads, and thus delivering significant emissions benefits to communities across the U.S. beginning in 2017 when the gasoline sulfur standards take effect. The reduction in air pollutants resulting from the Tier 3 program will also have environmental, or "welfare," co-benefits in addition to human health benefits, including changes in visibility, materials damage, ecological effects from PM deposition, ecological effects from nitrogen and sulfur emissions, vegetation effects from ozone exposure, and climate effects. For example, our analysis shows that the Tier 3 standards will provide improvements in visibility and sulfur deposition, as well as substantial decreases in nitrogen deposition as a result of the standards (Preamble Section III and RIA Chapter 7). We note that despite our goal to quantify and monetize as many of the benefits as possible for the final rulemaking, the welfare co-benefits of the Tier 3 standards remain unquantified and non-monetized in this RIA due to data, methodology, and resource limitations. As a result, the benefits quantified in this analysis are likely underestimates of the total benefits attributable to the final program.

While some commenters point to employment as another benefit of the Tier 3 standards, as discussed in Preamble Section X.D and RIA Chapters 9.2.2 and 9.3.2, EPA expects the employment effects of these standards to be small. Some commenters argue that the standards may increase, rather than decrease, employment (see Chapter 9.3 of this Summary and Analysis of Comments document); EPA does not quantify most of the employment impacts of the standards and thus does not evaluate these estimates.

Given the important emissions reductions, air quality improvements, and health benefits that Tier 3 will deliver, we agree with the majority of commenters that the Tier 3 standards should be implemented as soon as possible. We are finalizing a Tier 3 program that, as proposed, begins with model year 2017 for vehicle emission controls and with calendar year 2017 for the gasoline sulfur standards. As described briefly above and in Section III of the Preamble and Chapter 7 of the RIA, the Tier 3 standards will provide immediate and meaningful emission reductions and air quality improvements starting in 2017 due to the sulfur standards. We reject the fuel industry commenters' claims to the contrary, and address their specific points (e.g., that 2017 implementation will not help ozone NAAQS attainment) in Chapters 3 and 5 of this document.

3. Emissions and Air Quality Emissions Impacts

The comments in this chapter correspond to Section III of the preamble to the proposed rule and address the emissions and air quality impacts of the program. The comments received and our responses to those comments are located below.

3.1 Emission Impacts of the Proposed Program

What Commenters Said:

Commenter: American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM); Marathon

Overestimated emissions benefits. We recommend that EPA uses EIA's AEO 2013 as the baseline to account for declining gasoline demand. 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 Figure 10 [EPA-HQ-OAR-2011-0135-4276-A2] 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.

Our Response:

For purposes of this final rule, we estimated emissions reductions compared to a reference case that assumed renewable fuel volumes and ethanol blends based on the U.S. Energy Information Administration's Annual Energy Outlook 2013 (AEO2013). Furthermore, the future year projections of vehicle population and vehicle miles travelled were updated to reflect the latest estimates from AEO2013 as well. Additional details can be found in Section III of the preamble for the final rule.

3.1.1. Emissions Inventory Modeling Methodology

What Commenters Said:

Commenter: American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM); Marathon Petroleum Company LP (MPC)

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.

The 2003 and older model year methods also rely on FTP-based measurements and the concerns about the representativeness of the FTP cycle for sulfur effects modeling are already described above.

Our Response:

The FTP driving cycle used in the in-use sulfur program was chosen to represent the type of driving that manufacturers must cover in their certification testing to evaluate the in-use emissions performance. The commenter raises a valid argument that the contributions of emissions are expected to vary by vehicle operating modes and that the effect of sulfur on exhaust emissions for the high-speed operations, not covered by FTP cycle, may not perform similarly to the FTP cycle. However, the commenter failed to acknowledge that the CRC E-60 study cited by the commenter suggests that the magnitude of the fuel sulfur effects over the US06 cycle for NMHC and NOx was found to be larger than that found for the FTP cycle. In fact, the effects of sulfur going from 30 ppm to 5 ppm observed in the study on US06 cycle (statistically significant reduction of 40% and 44% for NMHC and NOx, respectively) are larger than the effects on FTP composite observed from the in-use sulfur study (statistically significant reduction of 11% and 23% for NMHC and NOx, respectively). When using predictive models to support rules, EPA has to make judgments regarding what modeling information is available and whether the information is of adequate quality to support the conclusion being reached. Thus, in this instance, although it may be difficult to compare the results from two different test programs due to methodological differences, the finding does suggest that the application of the results from FTP cycle to broader ranges of vehicle operation is a reasonable approach for modeling the effects of sulfur on Tier 2 and newer vehicles.

What Commenters Said:

The review described here focused on the integration of the EPAct data into the NPRM MOVES model. The EPAct-based equations form the basis for all 2004 and newer model year exhaust corrections (for both Tier 2 and Tier 3 certified vehicles). Two items addressed in this discussion are (1) inconsistencies in equation coefficients between EPA references and (2) the representativeness of the EPAct Program test fleet.

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 first discrepancy found was that the EPAct analysis report developed equations for two forms of reduced models, as described in Section 5 of this report: the 11-term reduced models and the 16-term reduced models. The report goes into detail as to why the 11-term reduced models are statistically preferable, and the 11-term reduced models are the only form of the equations provided in the Executive Summary of the report. This becomes a discrepancy because it is the 16-term reduced models that were programmed into NPRM MOVES for all pollutants and process combinations except one (NOx start exhaust equations in NPRM MOVES are based on the 11-term reduced model). EPA needs to provide the technical justification for the selection of the NPRM MOVES model equations and why those differ from the recommendations of the EPAct Program analysis report.

Our Response:

The coefficients used in the NPRM application of MOVES, and reported in the docket memorandum[1], reflect the state of analysis at the time it needed to be completed for the NPRM. However, following the initiation of inventory generation and air-quality modeling supporting the NPRM, analysis of the EPAct dataset continued through October, 2012. The sets of coefficients used in the FRM application of MOVES reflect the subsequent developments and analysis described in the final report.[2] The sets of coefficients used in the NPRM could be considered as “draft” versions, and those used in the FRM as “updated” or final versions based on the analyses described in the final report.

What Commenters Said:

The second discrepancy is that the THC running exhaust equation coefficients shown in Table 6-6 do not appear anywhere in the EPA Program analysis report. These THC equation coefficients used by NPRM MOVES are undocumented. It is presumed that these are some variation of the 16-term reduced model of the EPAct Program analysis report based on which parameters have a non-zero coefficient.

Our Response:

These coefficients are documented in the docket memorandum as are the other coefficients[1]. The commenter correctly notes that this set of coefficients is a version of the 16-term model. However, they can be considered a “draft” version, reflecting model fitting using all 15 vehicles. Those in the final report reflect additional quality assurance, as described in

[1] U.S. EPA, 2013. “Memorandum to Docket: Updates to MOVES for the Tier 3 NPRM”

[2] U.S. EPA, 2013. *Assessing the Effect of Five Gasoline Properties on Exhaust Emissions from Light-Duty Vehicles Certified to Tier-2 Standards: Analysis of Data from EPAct Phase 3 (EPAct/V2/E-89). Final Report*. EPA-420-R-13-002. Assessment and Standards Division, Office of Transportation and Air Quality. Ann Arbor, MI.

Chapter 6 of the Report. As a result, two vehicles were dropped before final model fitting, leading to small changes in the coefficients. However, the qualitative relationships among the terms in both the draft and final models are similar.

In addition, the coefficients used in the NPRM are documented in the final report in Appendix E "Preliminary Reduced Models," as noted in 5.4 (page 100).[2] These preliminary models were used to identify influential vehicles, as described in 5.5.

What Commenters Said:

The third discrepancy is that three instances were found in which coefficients were inconsistently assigned to a given fuel parameter. These are shown in Table 6-7. It is not clear if the EPAct reporting is in error or if the MOVES modeling equations are in error.

Our Response:

The commenter has correctly noted an editorial error in the report.

In the report tables for the 16-term models, the effects are not listed in the correct order, as in the Appendices. For THC Start emissions, the commenter has noted an editorial error in Table 57. In this table, the labels for the model terms etOHxT50, etOHxT90 are not listed in the correct order, leading to incorrect associations of coefficients with model terms. The correct order should be etOHxRVP, etOHxT50, etOHxT90.

The same editorial error applies to the CO start term listed in Table 6-7 above. In report table 65, it is incorrectly associated with the etOHxT90 effect, rather than the etOHxT50 effect.

However, in both these cases, the editorial errors are not germane to the FRM application of the model, as the terms used in MOVES for the FRM analysis are those for the 11-term models listed in the previous tables (Table 56 for THC, Table 64 for CO). The terms are listed in correct order in these report tables.

What Commenters Said:

The fourth discrepancy, albeit a minor one, was that there were a number of instances where the equation coefficients differed between NPRM MOVES and the EPAct Program analysis report and the difference was not due to round off error.[79] For example, the CO running exhaust T50 term is 0.024856 in NPRM MOVES and 0.02484 in the EPAct Program analysis report.

Our Response:

The commenter correctly lists the term used in the NPRM model, as well as that from the 16-term CO model, listed in Table 65. Again, the small difference highlighted is not germane to the model applied in the FRM, which is that listed in Table 64. In this model, the T50 term is 0.0261, slightly larger than that in the 16-term model. However, numeric values of coefficients nearly always have differences between models fit starting with 11 vs. 16 terms. This outcome is routine and expected.

What Commenters Said:

The second issue concerns the representativeness of the EPAct Program test fleet, which was also discussed in Section 5 [EPA-HQ-OAR-2011-0135-4276-A13].

Our Response:

The comment is premised on an assumption that fuel effects would or should differ between vehicles or groups of vehicles with differing emission levels, whether due to technology or to age. In fact, evidence suggests that fuel effects among vehicles with different emissions levels will differ in absolute terms (i.e., g/mi) but tend to be similar in relative terms (i.e., ratios, percents). That is to say, fuel effects (as well as other effects) are multiplicative rather than additive.

One example that illustrates the point is available in the EPAct dataset itself. The first plot (Figure 3-1) shows the data for cold-start NOx, averaged by aromatics level and by vehicle. If we look at the trend for the Altima, we can see that its NOx increases from about 0.13 to 0.178 g/mi as aromatics increases from 15% to 35%, giving an absolute difference of nearly 0.05 g/mi. In contrast, the corresponding increase for the cleanest vehicle, the Sienna, is about 0.002 g/mi (0.0081 – 0.0059 g/mi). Thus, start emissions for the Altima are 21-22 times higher than those for the Sienna at both aromatics levels.

The second plot (Figure 3-2) shows the same data plotted on a natural-log scale. What immediately strikes the viewer is the similarity in logarithmic trends for all the vehicles across the entire range of emissions, allowing for statistical variability. Again focusing on the Altima and Sienna, examination shows that the slopes of the trends are nearly identical for these two vehicles; that is to say, the logarithmic differences are extremely close. As differences in logarithms can be interpreted as ratios, the implication is that the effect of aromatics for these two vehicles, expressed as a ratio, i.e., multiplicatively, is nearly identical. Examination of plots for the various emissions, as shown in the body of the report, as well as in the Appendices, shows that this pattern is typical of emissions behavior in relation to changing fuel effects.

As the models developed from these data are fitted to logarithmic transforms of the emission results, the various coefficients can be viewed as representing multiplicative effects of the changing fuel properties. Similarly, the models are applied in MOVES so as to generate multiplicative effects. On this basis, we find it reasonable to apply the multiplicative effects across groups of vehicles of differing standards and different ages, with the realization that projected differences in emissions related to changes in fuel properties will be proportional to the projected emission levels. As previously explained, EPA has to make judgments regarding what modeling information is available and whether the information is of adequate quality to support the conclusion being reached. Thus, based on available evidence, it is reasonable to assume that the fact that the EPAct sample comprised relatively young and clean (Tier 2) vehicles does not impair the applicability of the models to the Tier 2 fleet as these vehicles age and acquire mileage.

Figure 3-1 ***Linear effects plot for cold-start NOx vs. aromatics, with data averaged by two aromatics levels and by vehicle (Source: EPAct Phase 3)***

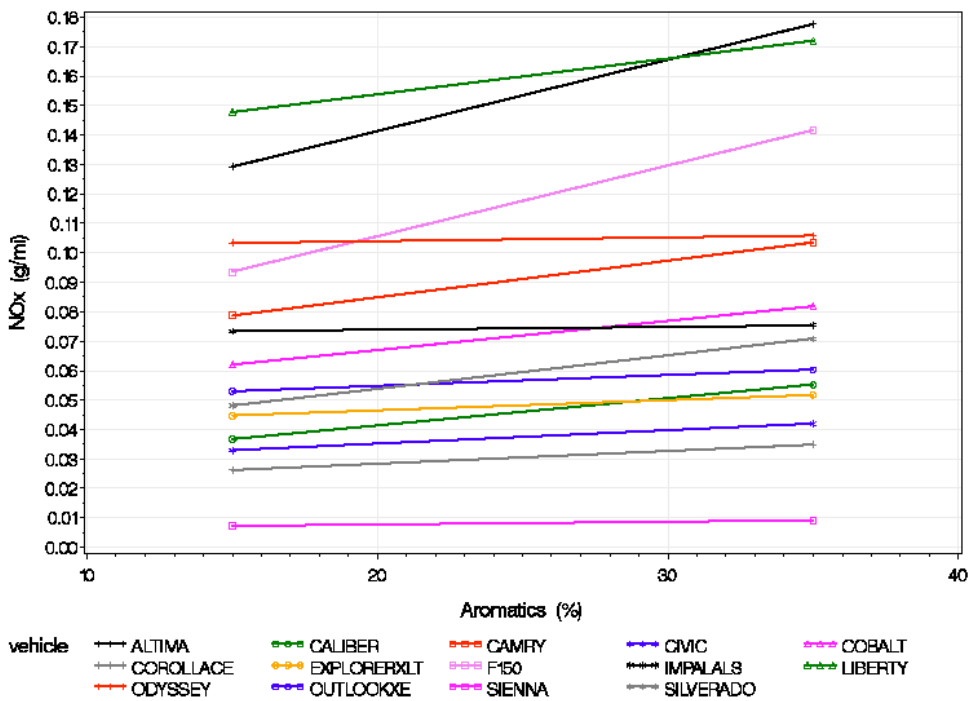
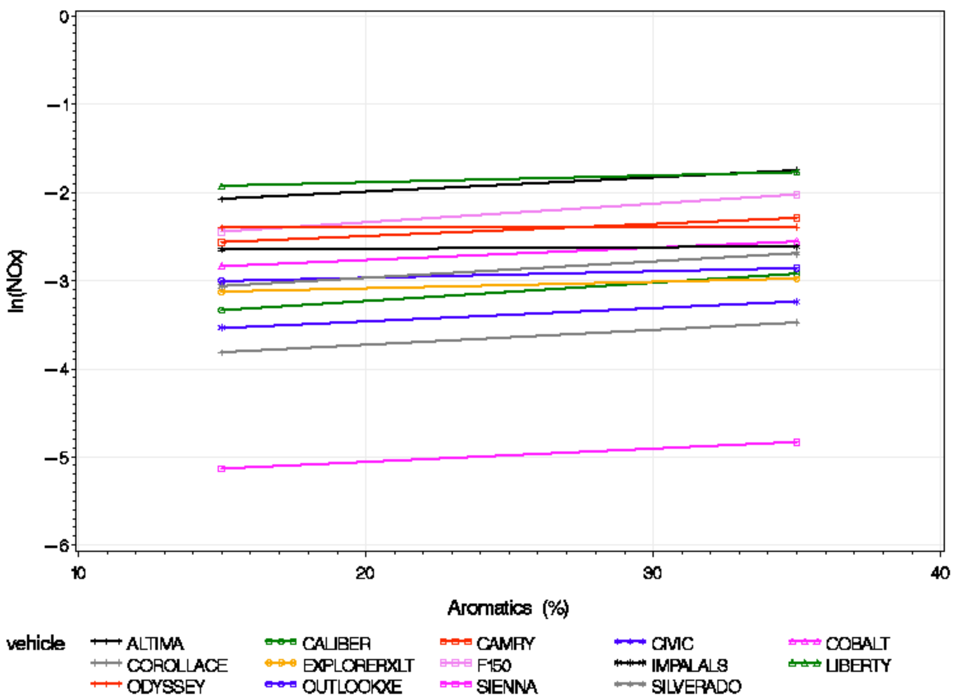


Figure 3-2 ***Linear effects plot for cold-start ln(NOx) vs. aromatics, with data averaged by two aromatics levels and by vehicle (Source: EPAct Phase 3)***



What Commenters Said:

The extrapolation of Tier 0 Non-sulfur fuel effects to Tier 1 through NLEV technologies has not been properly validated.

Our Response:

The commenter is correct that the Complex and Predictive models were developed using data from Tier 0 vehicles and that the resulting models are applied to Tier 1 vehicles in MOVES. Similarly, it is correct that the EPAct models were developed using a set of low-mileage Tier 2 vehicles, and that in MOVES, the models are applied to Tier 2 vehicles as they age and acquire mileage. Nonetheless, we argue that these extrapolations are reasonable and appropriate given the ways in which the models were developed and the fuel adjustments applied.

The comment is premised on an assumption that fuel effects should differ in some way between vehicles of differing technologies ages or "high-emitter" status. As mentioned above, fuel effects are represented in MOVES as multiplicative effects that are proportional to base emission levels. We agree with the commenter that when fuel effects are expressed as absolute changes in mass (e.g., g, g/mi, g/kg, etc.), vehicles of different technologies or ages will differ strongly. We do, however, assume that proportional, or relative fuel effects (expressed as fractions, ratios or logarithmic differences), can be seen as similar, and thus transferrable on average across technology groups and ages.

The data available to directly evaluate this assumption are limited. Nonetheless, a limited volume of data can be compiled from the results of the EPAct program, as described below.

The models applied in MOVES were developed from the results of EPAct Phase 3, in which 15 Tier 2 vehicles were measured on 27 fuels. In addition, in EPAct Phase 5, three vehicles manufactured in the 1990's were measured on three fuels used in Phase 3. Thus, using these results, it is possible to make a direct comparison of emissions for sets of pre-Tier 2 and Tier 2 vehicles measured on the same fuels (at 75°F).

The three 1990's vehicles are briefly described in Table 3-1. Note that these vehicles range from 10-17 years in age and that all had presumably accumulated over 150,000 mi.

In terms of fuels, we limited the comparison to 2 fuels with 0% and 10% ethanol content, respectively. These two fuels are closely matched in terms of RVP and aromatics levels, and differ slightly in T50. However, they differ widely in T90, which is not expected to strongly affect NOx emissions, but is expected to influence HC, CO and PM emissions. The properties of these fuels are summarized in Table 3-2. Note that emissions on both fuels were acquired for only two of the three vehicles.

Table 3-1 ***Characteristics of three "high-mileage" pre-Tier 2 vehicles measured in EPAct Phase 5***

Make/Model	**Engine**	**Model Year**	**Odometer (mi)**
Chevrolet Tahoe	V8 – 5.7 L	1997	221,000
Ford Taurus	V6 – 3.0 L	1990	X90,400[3]
Dodge Dakota		1993	229,000

Table 3-2 ***Selected properties of two fuels measured in EPAct (Phase 5)***

Fuel No.	Ethanol (vol. %)	Aromatics (vol. %)	RVP (psi)	T50 (°F)	T90 (°F)
6	10.56	15.0	7.24	188.5	340.4
7	<0.10	17.0	7.15	193.1	298.4

At the outset, we averaged the results by vehicle and fuel, and plotted the results for both cold-start and hot-running phases of the LA92 cycle. Results for NOx, THC and PM are shown

[3] The odometer for this vehicle is assumed to have been rolled over.

below in Figures Figure 3-3Figure 3-5. Note that the results are shown on a logarithmic scale (base 10). This view of the data facilitates showing the results for all the vehicles in one plot. In addition, differences in logarithms can be interpreted as proportional or relative differences between the fuels for the various vehicles.

Aside from the fact that their emissions are higher, the differences in logarithms between the two fuels are not obvious for the older "high-mileage" vehicles. Although the sample of older vehicles is small, a qualitative view of the plots suggests that no clear and obvious differences between Tier 0, Tier 1 and Tier 2 vehicles are evident.

It is helpful to follow up with a closer examination of this subset of results. As mentioned, differences in logarithms represent ratios, e.g., log a – log b = log(a/b). However, for purposes of summary, it is more intuitive to express the results as percent differences between fuels 6 and 7 (relative to fuel 7). Accordingly, mean percent differences for the set of vehicles are presented below in Figure 3-3 through Figure 3-5 for NOx, THC and PM, respectively. In each plot, the differences are ranked from smallest to largest, meaning that the ordering of the vehicles differs in each chart.

In reviewing the charts, it is clear that when the differences in emissions between the two fuels are viewed as fractions, there are no clear or obvious differences between the 1990's vintage high-mileage vehicles and the MY 2008 Tier 2 compliant low-mileage vehicles. Generally, the two high-mileage vehicles differ in the signs of their effects, with one vehicle showing a positive and the other a negative change. Cold-start PM is the only case in which both vehicles have negative effects and have low rankings. Hot-running THC also stands out as the only case in which the two older vehicles have the largest and smallest fractional effects. In the remaining cases the older vehicles are distributed evenly across the rank order.

Overall, the available evidence suggests that when fuel effects are expressed as relative multiplicative factors, as they are in both the EPAct analyses, and in their applications in MOVES, it is reasonable to assume that the proportional effects are transferrable across different vehicle technologies, as well as across other factors such as age, mileage or "high-emitter" status. Furthermore, "That a model is limited or imperfect is not, in itself a reason to remand agency decisions based upon it." Appalachian Power Company v. EPA, 251 F.3d 1026, 1051 (D.C. Cir. 2001)(internal citations omitted). "It is only when the model bears no rational relationship to the characteristics of the data to which it is applied that [courts] will hold that the use of the model is arbitrary and capricious." Appalachian Power Company v. EPA, 135 F.3d 791, 802 (D.C. Cir. 1998)(internal citations omitted).

Figure 3-3 *Mean percent difference in NOx cold-Start (top) and hot-running (bottom) emissions from 14 Tier 2 and 2 pre-Tier 2 vehicles measured on two fuels*

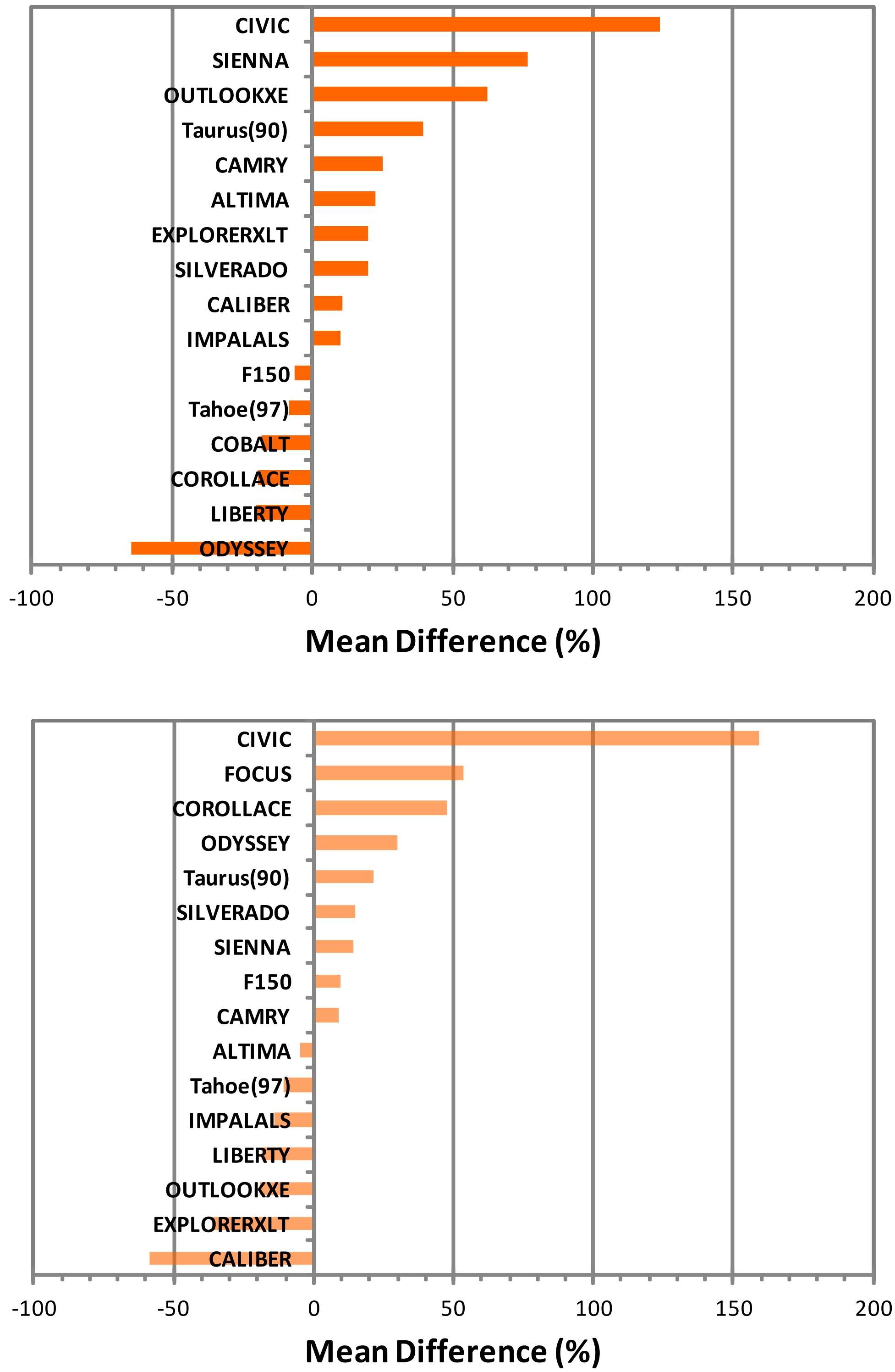


Figure 3-4 *Mean percent difference in THC cold-start (top) and hot-running (bottom) emissions from 14 Tier 2 and 2 pre-Tier 2 vehicles measured on two fuels*

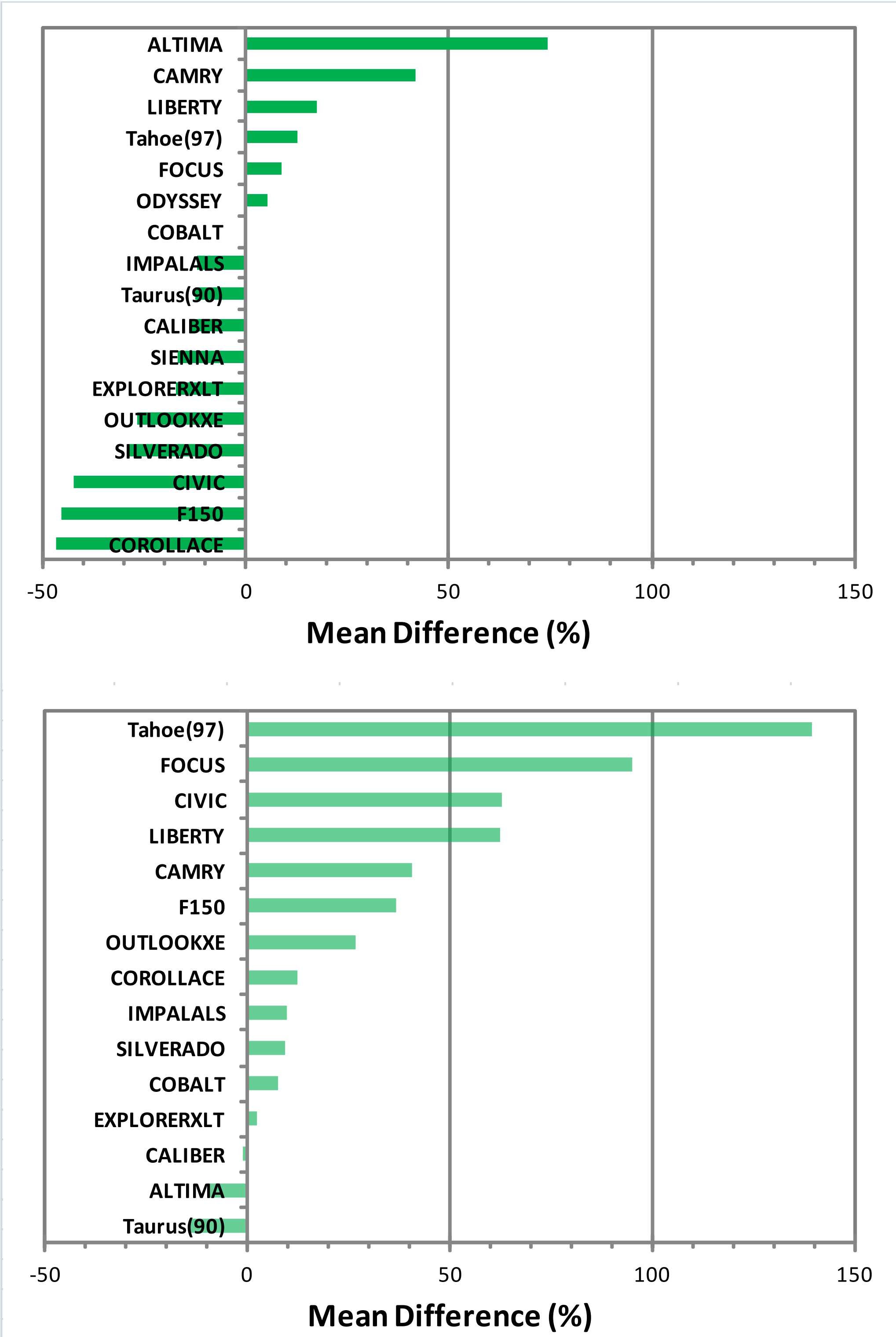
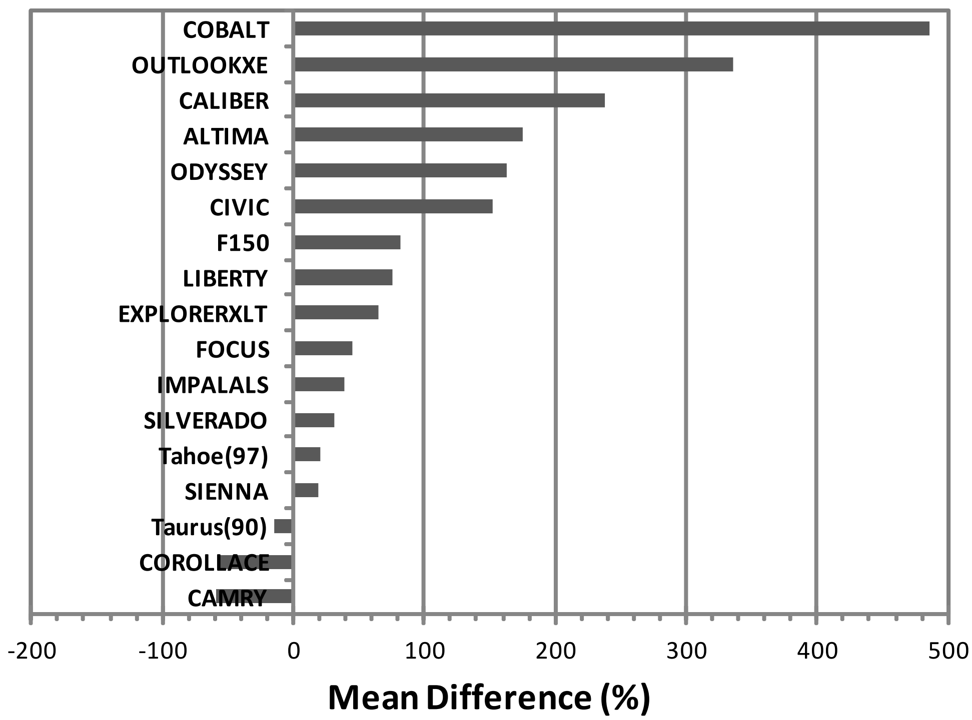
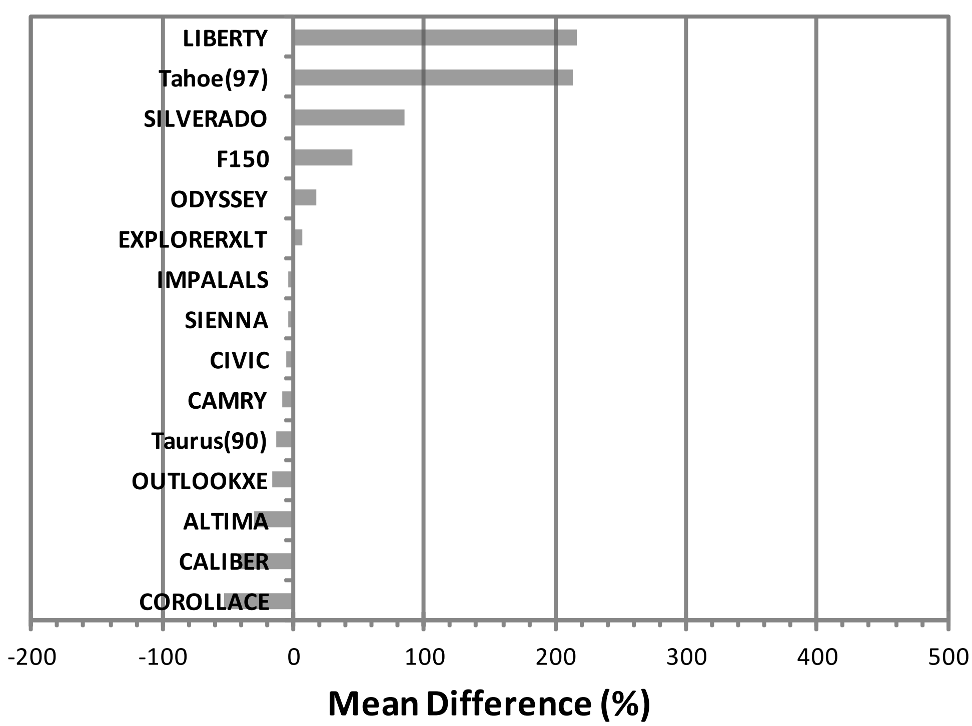


Figure 3-5 ***Mean percent difference in PM cold-start (top) and hot-running (bottom) emissions from 14 Tier 2 and 2 pre-Tier 2 vehicles measured on two fuels***





What Commenters Said:

Tier 0 exhaust impact equations, for modeling fuel effects, are extrapolated to E15, which is not supported by data.

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.

Our Response:

The MOVES model is not currently capable of partitioning a fuel supply market share differently based on vehicle model year. This indeed leads to modeling pre-2001 vehicles with an E10/E15 fuel supply, using the Complex model to apply fuel effects on these vehicles. We do not mean to imply that pre-2001 vehicles would be fueling with E15 in the future; this outcome is rather an artifact of how fuel supplies are partitioned inherently in the MOVES model. In the interest of completeness, we performed further analysis using a fuel supply that does not contain E15. As shown in Figure 3-6, the application of adjustments based on the Complex model results in only minor fuel effect differences between E10 and E15, as this model is not as sensitive to ethanol level as the fuel effects model used in later model years (based on EPAct Program). We do not believe that this difference contributes significantly to the overall emissions inventories used in the Tier 3 modeling.

Figure 3-6 NOx start emissions based on the Complex model for mix of E10/E15 and E10 only

What Commenters Said:

The NPRM MOVES has two severe flaws in the manner by which RVP impacts are modeled: (1) predictive equations are extrapolated far outside the range of RVP measured in the underlying test data; and (2) temperature interactions with RVP are not addressed.

RVP impacts on exhaust have critical flaws, primarily in winter season modeling, due to excessive RVP extrapolation and a failure to evaluate temperature interactions.

Our Response:

The commenter is correct in pointing out that the fuel effects applied in the MOVES modeling do extrapolate beyond the RVP range spanned by the data underlying the models used to estimate fuel-effect adjustments i.e., 7-10 psi.

Despite the implication that this approach would result in large errors, we believe that it is reasonable to assume that the relationships between log(Emissions) and RVP can be extrapolated linearly from the range from 7-13 psi. This extrapolation, while not necessarily exact, can be presumed to yield reasonable approximations over both summer and winter RVP ranges.

Evidence supporting this assumption is available from the same study cited by the commenter, namely, CRC E-74b.

This study measured emissions of the three gaseous pollutants on 15 vehicles (MY 1994-2004), spanning various vehicle technologies and emission standards. Measurements were conducted on the FTP cycle at two temperatures (50 and 75 °F). Selection of study fuels attempted to focus on varying ethanol and RVP while maintaining other important properties constant (e.g., aromatics, T50 and T90), with the goal of assessing interactions between temperature and RVP effects over the temperature range applicable to the southwestern U.S.

We performed a simple re-analysis of the study results, focusing on a subset of the data allowing assessment of the linearity of relationships between log-transformed emissions and RVP. We thus examined results for a subset of five fuels spanning ethanol levels on the range from 0-10 vol. %, and RVP on a range from 7-13 psi. This subset was also restricted to a temperature of 75 °F, as the fuels with 7 psi RVP were not measured at the lower temperature. In addition, we examined results for Bags 1 and 2 of the FTP, as the calculations in MOVES handle start and running emissions separately.

Emissions vs. RVP are presented on logarithmic scales for Cold-start and Hot-running FTP emissions in Figures Figure 3-7Figure 3-9 below. In this presentation, the data are averaged by RVP and vehicle. For each vehicle, a linear trend line is shown. An overview of the results suggests that while some uncertainty exists as to whether some of the trends with RVP have a small degree of curvature, linear extrapolation over the measured range can be expected to give reasonable results.

The graphic results were followed up with statistical modeling. We modeling the natural-log transform of the emissions versus ethanol, RVP, a quadratic term for RVP (to test for curvature) and an ethanol RVP interaction. For modeling purposes, the fuel properties were standardized to neutralize collinearity between the 1st and 2nd order terms. “Mixed modeling” techniques were used with random intercepts fit for each vehicle to isolate the effects of fuel properties from the substantial variability contributed by the vehicles.

The results are briefly summarized in Table 3-3 below. A statistically significant RVP×RVP interaction was evident only for CO Cold-start emissions (Bag 1), suggesting some degree of curvature in the relationship over the range of 7-13 psi. In addition, significant linear trends for RVP were apparent only for CO and NOx running emissions. In the remaining cases, no significant relationships between exhaust emissions and RVP were apparent, either linear or quadratic.

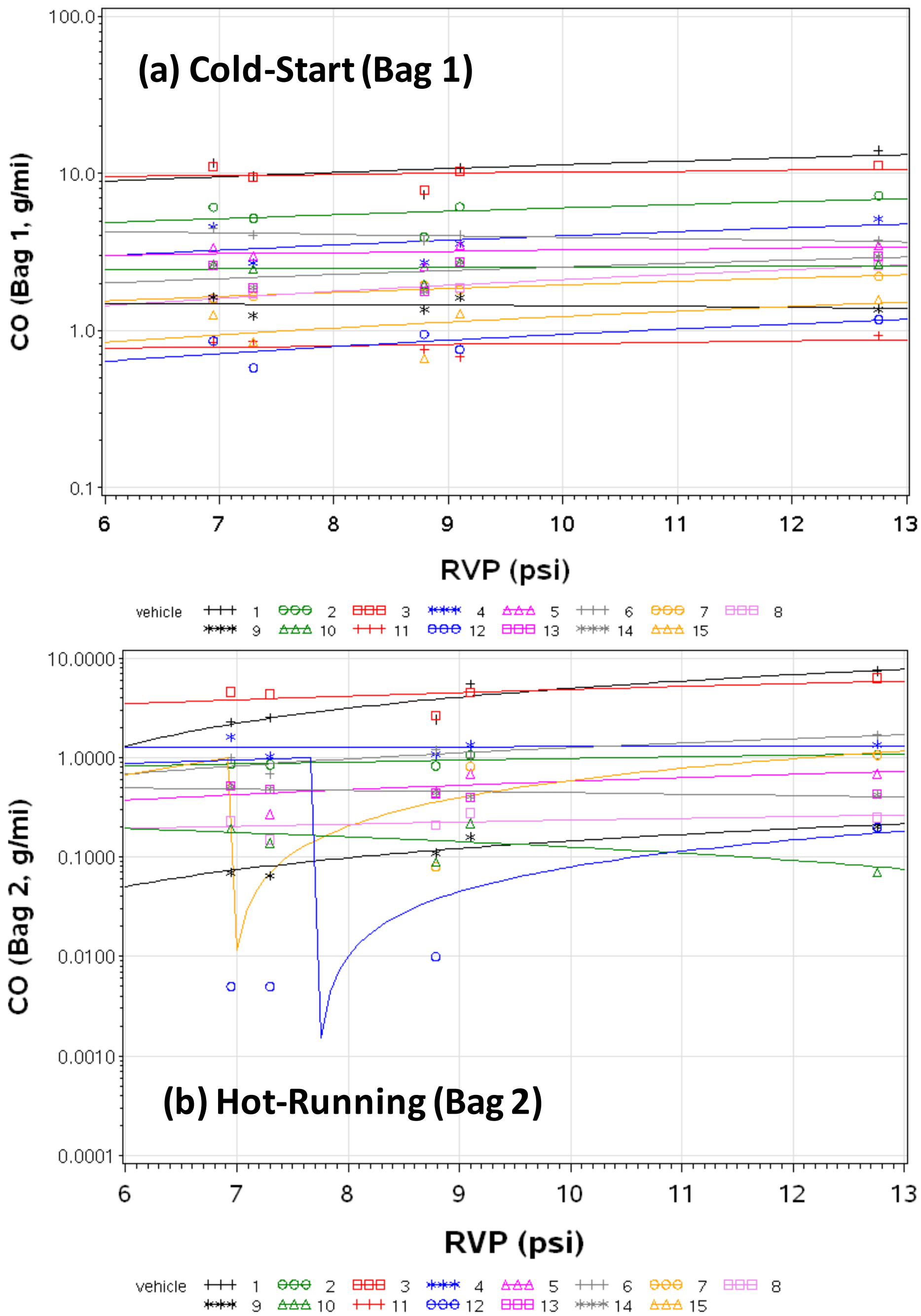
In the case of CO start emissions, models were fit with and without the quadratic term, and the difference in projected emissions estimated at 7 and 13 psi for E10 gasoline. The differences between the two models are approximately 3% at 7 psi and 7% at 13 psi. Obviously, there is no suggestion of curvilinearity in the relationship between emissions and RVP for any the remaining emissions or test phases.

On the whole, we conclude that the available evidence gives no suggestion of strong curvilinearity in the relationship between RVP and logarithms of emissions. Accordingly, pending further evidence, we consider it reasonable to extrapolate these trends linearly from the "summer RVP range" (7-10 psi) to the "winter range" (10-13 psi).

Table 3-3 ***Summary of statistical modeling of ethanol and RVP effects on FTP emissions (Source: CRC E-74b, results measured at 75 F on E0 and E10 fuels)***

Emission	*Phase*	*Model term*			
		Ethanol	*RVP*	*RVP×RVP*	*Ethanol×RVP*
CO	*1*	●	---	●	---
	2	●	●	---	---
HC	*1*	●	---	---	---
	2	●	---	---	---
NOx	*1*	---	---	---	---
	2	---	●	---	---

Figure 3-7 ***CO emissions vs. RVP at 75°F, measured on the FTP cycle (Source E-74b)***



[92] For example, winter season RVP caps for controlling CO exhaust.

[93] This may be due to the limited temperatures evaluated (50 and 75 degrees Fahrenheit).

Figure 3-8 ***THC emissions vs. RVP at 75°F, measured on the FTP cycle (Source E-74b)***

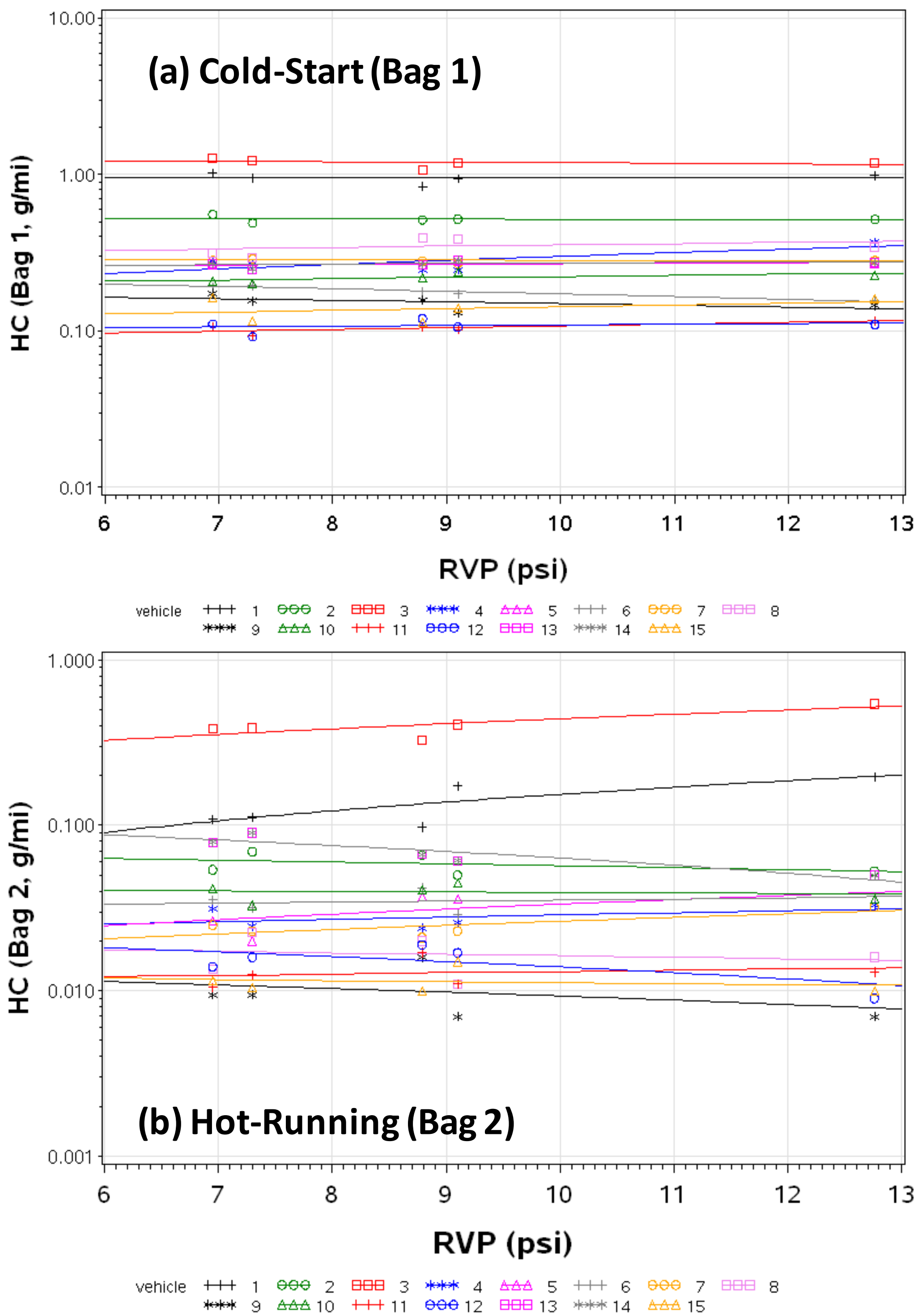
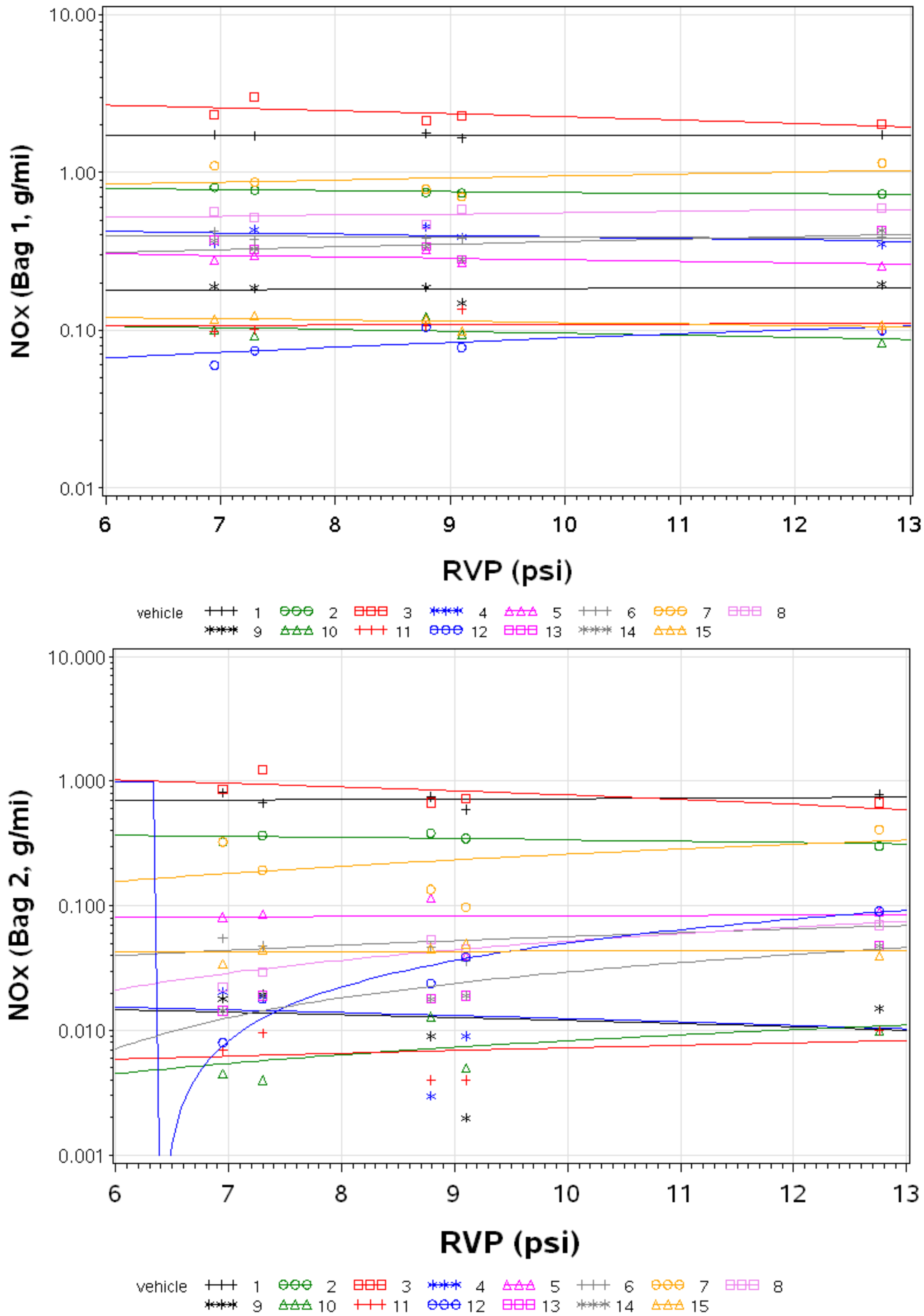


Figure 3-9 ***NOx emissions vs. RVP at 75°F, measured on the FTP cycle (Source E-74b)***



With respect to the interaction between temperature and RVP, the commenter notes correctly that the datasets used to estimate fuel effects did not incorporate the effect of temperature.

At the outset, we can point out that MOVES does not apply temperature adjustments to hot-running CO, THC or NOx emissions, thus obviating the need to consider interactions between temperature and fuel effects. It is widely accepted that the effect of temperature on hot-running gaseous emissions is negligible.

For start emissions of CO, THC and NOx, however, MOVES applies both temperature and fuel effects, under an assumption that they can be applied multiplicatively and independently. However, when multiplicative effects are jointly applied to mass emissions (in “linear” as opposed to logarithmic space), the results appear “interactive” in that the different effects either reinforce or damp each other. For example, start emissions increase substantially as temperature declines, implying that fuel effects are amplified at lower temperature, whether positive or negative. The net result can be either increased or decreased emissions, depending on the nature of the fuel effects.

We can focus on start CO as an example. For CO, fuel effects are calculated using the Complex model for 2000 and earlier model years[4], and using the EPAct models for 2001 and later model years. In both cases, the results applied are broadly consistent with those of the study cited by the commenter (CRC E-74b)[5]. As the two studies applied differing approaches to statistical analysis, the respective model coefficients cannot be compared in terms of magnitude. However, they may be compared qualitatively in terms of sign.

For cold-start CO emissions (Bag 1), the Complex Model has a small but positive linear-effect coefficient for RVP. This result is directionally similar to the E-74b Composite CO model, which also has positive RVP coefficients, as well as a positive interaction between RVP and temperature. This result implies that for “cold” temperatures below 50°F, increasing RVP should increase CO, with the effect amplified by decreasing temperature. The application of the Complex Model in MOVES gives qualitatively similar results with a positive RVP coefficient amplified by the multiplicative temperature adjustment.

For MY2001 and later, the EPAct models can be applied to start emissions specifically. The CO start model has a negative linear coefficient for RVP, (meaning that emissions decline as RVP increases). In E-74b, a piece-wise fit was used, giving negative and positive coefficients for RVP < 9 and > 9 psi, respectively. In addition, a positive interaction term was included in the reduced model (Table 5-14, page 64). As expected, the temperature coefficient is negative, suggesting that an “interference” interaction applies, i.e., that the combined effects of RVP and temperature would have a mutual “damping” effect. The net results of the E-74b model are shown in Figure 5-1 (page 76) of the CRC report. At temperatures below 50 °F, the trends portrayed show an “interference” effect, i.e., that increasing RVP decreases CO start emissions,

[4] For THC and NOx, analogous effects are calculated using applications of the EPA Predictive Model.
[5] Coordinating Research Council. *Effects of Vapor Pressure, Oxygen Content, and Temperature on CO Exhaust Emissions*. CRC Report E-74b. Alpharetta, Georgia, (Prepared by Sierra Research, Inc. Sacramento, CA), May, 2009.

with the absolute margin (in g/mi) increasing with declining temperature. As mentioned, despite the differences in underlying data and modeling approaches, the application of independent RVP and temperature effects in MOVES gives similar results. This outcome results from the multiplicative combination of a negative temperature effect (CO increases and T decreases) with a negative RVP effect (CO decreases as RVP increases). The net result is that the temperature effect is reduced by increasing RVP at lower temperatures, which is directionally similar to the result obtained in E-74b, and suggested by the commenter as a correct representation of CO behavior in relation to RVP and "cold" temperature.

Results for THC and NOx are similar. The models applied in MOVES do not contain temperature effects, but multiplicative combinations of the fuel and temperature effects results in interaction effects in the projected emission volumes. Thus, on the whole, we conclude that the multiplicative combination of temperature and fuel effects as applied in MOVES does allow for interactions between these effects.

What Commenters Said:

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.

Our Response:

The evaporative emissions modeling for the FRM has been significantly updated based on completion of additional test programs and peer review comments. The NPRM modeling for the Tier 3 control case was based on an engineering analysis; the revised modeling for the final rule incorporates the latest data and has been improved to reflect more real-world physical processes.

What Commenters Said:

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.

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 Permeation Effects and Diurnal Emissions Using E20 Fuels on Aging Enhance Evaporative Emissions Certified Vehicles, December, 2010

Our Response:

Data from the CRC E-77 programs show that pre-Tier 2 technologies have higher permeation emission rates than Tier 2 vehicles. The CRC E-77 test data indicate that the Tier 2 permeation rates in the version of MOVES used for the Tier 3 FRM analysis properly reflect the data, but pre-Tier 2 rates are underestimated. Our Tier 3 analysis is not ascribing emissions benefits to Tier 3 that are already occurring, and Tier 3 benefits are not being overstated.

What Commenters Said:

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.

One key concern noted was that within EPA's ratioing method for NPRM MOVES, the difference in certification fuels between Tier 1 and Tier 3 vehicles was not accounted for in the calculation of exhaust basic emission rates. This is problematic as the differences in certification fuel in terms of sulfur content and oxygenate level are significant for the Tier 3 case. Because of certification fuel differences, the application of ratios based on strict numeric exhaust standards is flawed if fuel differences are not explicitly factored in.

Our Response:

We agree that this question was relevant to the NPRM MOVES analysis. However, for the FRM analysis, we addressed the question of changing certification fuels by incorporating fuel adjustments in the "GeneralFuelRatioExpression" calculations to account for the adoption of Tier 3 certification fuel starting in MY2017. One such adjustment accounts for reduction in fuel sulfur to 10 ppm and is calculated by re-centering the preexisting sulfur model around a new base sulfur calculation at 10 ppm. A second adjustment accounts for the adoption of E10 certification fuel and is calculated modifying the existing adjustments using the EPAct models by assigning the Tier 3 certification fuel as the "base" fuel for MY2017 and later. With these adjustments in place, Tier 3 vehicles operating on in-use fuel with 10 ppm sulfur would show no sulfur effect, as the in-use and certification levels match. Similarly, Tier 3 vehicles operating on an in-use fuel with the same non-sulfur properties as the Tier 3 certification fuel would have no fuel adjustment for the non-sulfur fuel properties. Conversely, emissions for Tier 3 vehicles operating on fuels with properties differing from the E10 certification fuel are adjusted appropriately relative to the certification fuel.

What Commenters Said:

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.

Our Response:

The estimated emissions impacts from the updated sulfur model are presented in a separate memorandum to the docket.[6]

3.1.1.1. Additional Comments from Sierra Research Submitted as a Part of API/AFPM Comments

What Commenters Said:

An assessment of the emissions benefits of the Tier 3 proposal was prepared by Sierra Research and attached to API/AFPM's comments (Attachment No. 13).

The linear correction factor implemented in NPRM MOVES conflicts with the EPA analysis of the in-use sulfur program to develop the percent changes.

Our Response:

As described in a separate memo to the docket[7], since the results from the in-use sulfur program based on log-transformation were reverse-transformed to linear space prior to being incorporated into MOVES, we believe that the percent changes from the mixed model were correctly applied. Furthermore, the relationship between changes in gasoline sulfur content and NOx, HC, NMHC and NMOG emissions is typically linear. The linearity of sulfur impacts on NOx, NMHC and NMOG emissions is supported by past studies with multiple fuel sulfur levels all of which compare gasoline with differing sulfur levels that are below approximately 100 ppm (e.g., CRC E-60 and 2001 AAM/AIAM programs as well as comments submitted to this rulemaking by MECA cited within Preamble IV.A.6). As stated within Preamble IV.A.6 of the Tier 3 final rule, the relative linearity of the effect of gasoline sulfur level on NMOG and NOx emissions allows exhaust emissions results generated within EPA and other studies of gasoline sulfur at levels immediately above or below either 10 ppm or 30 ppm to be normalized to either 10 ppm sulfur or to 30 ppm sulfur. This allowed EPA to evaluate vehicle emission control

[6] U.S. EPA. 2014. Memorandum to Docket: Updates to MOVES for the Tier 3 FRM Analysis

[7] U.S. EPA. 2013. "Memorandum to Docket: Updates to MOVES for the Tier 3 NPRM"

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 of 30 ppm S.

What Commenters Said:

The NPRM MOVES sulfur correction update for light-duty Tier 2 vehicles does not account for the difference between normal and high-emitting vehicles, whereas distinct sulfur impacts for normal and high emitters are accounted for in the preexisting MOVES sulfur corrections for 2003 and older model year vehicles.[68] The average odometer of the in-use test program on which this update is based is about 30,000 miles compared to an approximate odometer level of 120,000 miles for the average on-road vehicle.[69] Therefore, this new method is biased high due to absence of a high emitter adjustment in NPRM MOVES given that the test fleet on which it is based is newer than the average in-use fleet. This issue of high emitters should have been apparent to EPA, as previous sulfur studies have evaluated both new and aged catalysts given the clear importance of the representativeness of the vehicle catalyst.[70, 71]

[68] High emitters are generally less sensitive to fuel sulfur content.
[69] As per Footnote 43, the average vehicle in the on-road light-duty fleet is 10.8 years old (calendar year 2011 estimate) with an approximate odometer reading of just under 120,000 miles.
[70] T. D. Durbin, J. W. Miller, J. T. Pisano, T. Y. Younglove, C. G. Sauer, S. H. Rhee, T. Huai, and G. I. MacKay, "The Effect of Fuel Sulfur on NH3 and Other Emissions from 2000-2001 Model Year Vehicles, CRC Project E-60," May 2003, available at *www.crcao.com*.
[71] "Summary: CRC Sulfur/LEV Program," Coordinating Research Council Report, CRC Project No. E-42, December 22, 1997.

Our Response:

The commenter claimed that the absence of high emitter adjustment for 2004-and-later vehicles in MOVES would result in overestimation of the effects of sulfur on emissions based on two studies. However, we do not believe that these studies provide support for the commenter's claim. The first study by Durbin et al. concluded that for both NMHC and NOx, the effects of catalyst age on FTP composite emissions were not statistically significant for the tested fleet. The CRC Sulfur/LEV study showed that when sulfur was reduced from 600 to 40 ppm, aged catalysts demonstrated slightly lower but similar magnitudes of sulfur effect on FTP composite emissions as compared to the new catalysts.

What Commenters Said:

The correction factors listed in Table 6-2 for "all other types" represent those applied by the model for heavy-duty gasoline vehicle types. The documentation wholly omits any discussion of the derivation of these values. EPA needs to document how these values were derived before they can be reviewed.

Our Response:

The MOVES docket memo for the Tier 3 FRM analysis[8] presents the derivation of the sulfur coefficients for heavy-duty gasoline vehicles.

What Commenters Said:

For motorcycles, the method assumes no impact from fuel sulfur (see Table 6-2). EPA has no data from motorcycles on fuel sulfur effects; however, for model years 2003 and older, the model maps motorcycle fuel corrections to those of light-duty gasoline vehicles. So in this instance, the new method (to have no sulfur impact for motorcycle exhaust) is inconsistent with the method applied to all other model year motorcycles. This is a minor point since the contribution of motorcycles to the on-road inventory is minor.

Our Response:

In modeling the emissions impact from the proposed rule, we did not attempt to update the fuel sulfur algorithm in MOVES for the legacy vehicles (pre-2004 model year vehicles) including motorcycles, since (as the commenter pointed out) the emissions contribution from them is very small. The contribution of pre-2004 model year motorcycles to the on-road inventory for all criteria pollutants is less than 0.5% in 2018 and less than 0.1% in 2030. In terms of the total Tier 3 emission reductions, pre-2004 model year motorcycles account for 0.1% and 0.0% of the Tier 3 emission reductions in 2018 and 2030, respectively, for all criteria pollutants. For 2004-and-later model year vehicles, the fuel sulfur algorithm was updated based on the latest data from the in-use sulfur program only for cars and trucks. We believe that the changes in assumption of no sulfur impact for 2004-and-later model year motorcycles is justified due to lack of data and because both methodologies result in consistent outcome of almost no impact of fuel sulfur from motorcycles on national emissions inventories.

What Commenters Said:

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.

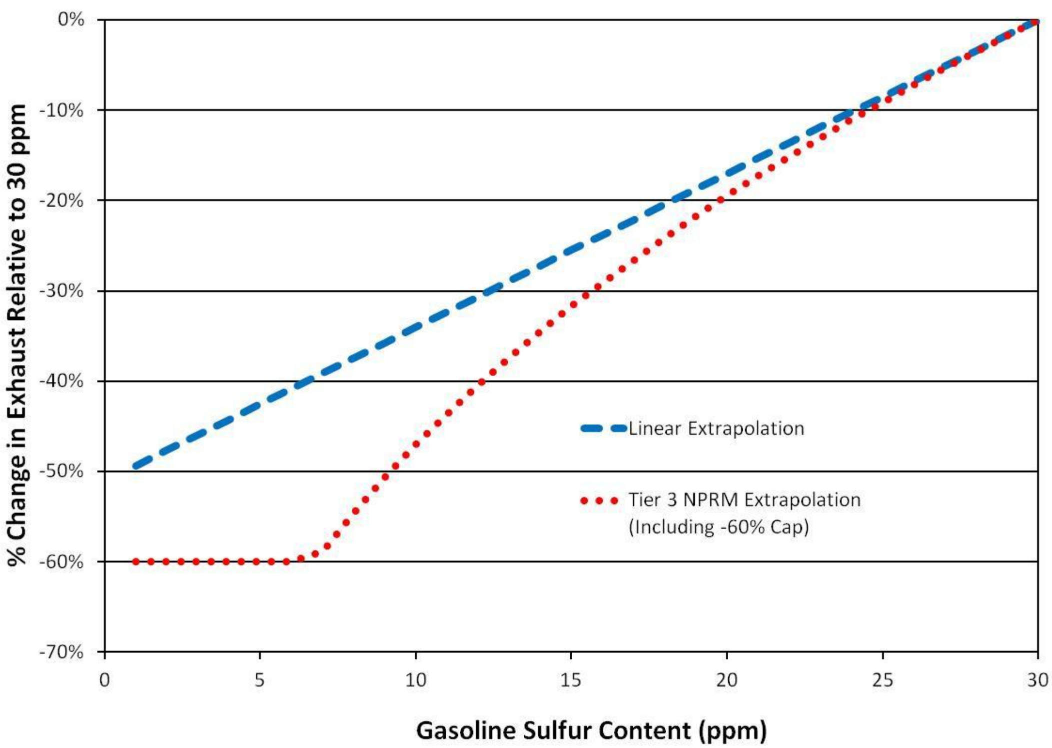
NPRM MOVES incorporated no new data for estimating 2003 and older model year vehicle fuel sulfur impacts. In order to evaluate fuel sulfur levels at or below 10 ppm as part of the regulatory evaluation, the model simply extrapolates preexisting sulfur adjustment equations present in the public version of MOVES. Thereby, the NPRM MOVES model methods are that of MOVES2010a with one minor change. Because this sulfur correction is an extrapolation (most of the underlying methods developed did not contain any fuels below 30 ppm S, see Table 6-5), EPA programmed in a cap at the maximum allowable exhaust reduction due to sulfur below 30 ppm. In MOVES2010a that cap is 15 percent (defined relative to 30

[8] U.S. EPA. 2014. Memorandum to Docket: Updates to MOVES for the Tier 3 FRM Analysis, Chapter II.A.

ppm fuel); in NPRM MOVES that cap is 60 percent (defined relative to 30 ppm fuel).[72] EPA's justification is that the in-use sulfur test program with Tier 2 vehicles showed reductions up to 60 percent; therefore, greater reductions should be permissible when extrapolating previous test programs beyond the lower sulfur limit tested.

Figure 6-3 presents an example of how the linear extrapolation compares to that used by NPRM MOVES for NOx emissions from normal emitting NLEVs (passenger cars).

Figure 6-3
NPRM MOVES NLEV (Passenger Car) Sulfur Impact
Running Exhaust NOx, Normal Emitter



[72] The 15 percent cap in MOVES2010a was present, because the model already did permit the extrapolation of fuel sulfur effects below 30 ppm as part of emission inventory development calculations.

Our Response:

In modeling the emissions impact from the proposed rule, we did not attempt to update the fuel sulfur algorithm in MOVES for the pre-2004 model year vehicles because we were not aware of any additional data that provided information on fuel sulfur below 30 ppm for the legacy vehicles. Therefore, the commenter is correct that the effects of sulfur for pre-2004 model year vehicles are based on extrapolation.

However, the commenter did not accurately characterize the effect of extrapolation in the plot they presented above. Figure 3-10 through Figure 3-13 show the effect of sulfur on running exhaust emissions from pre-2004 model year vehicles for sulfur levels below 30 ppm, based on MOVES. The red lines represent the old sulfur floor of 15 percent, previously in MOVES2010a, and the blue lines represent the new sulfur floor of 60 percent in Tier 3 NPRM version of MOVES. For all pollutants, the lines lie on top of each other for sulfur level at or above 10 ppm, the average in-use sulfur level modeled in the Tier 3 rule. The two lines start to diverge only below 10 ppm. These trends are also true for the sulfur effects on starts. The plots indicate that the modification made to the sulfur floor in the Tier 3 NPRM version of MOVES did not affect the sulfur adjustment and thus, did not impact the emissions inventories estimated in the rule.

Lastly, the effects of lowering sulfur level on emission for pre-2004 model year vehicles are less than 2% for all criteria pollutants in both 2018 and 2030, contrary to the commenter's claim that the effects based on extrapolation would result in large changes. In terms of the emissions reductions estimated from the Tier 3 standards, the contribution from pre-2004 model year vehicles represent 4% and 8% of the total reductions in 2018 for NOx and VOC, respectively, and 0.1% and 0% in 2030 for NOx and VOC, respectively.

Figure 3-10 Effect of sulfur on running exhaust NOx emissions from pre-2004 model year vehicles in MOVES

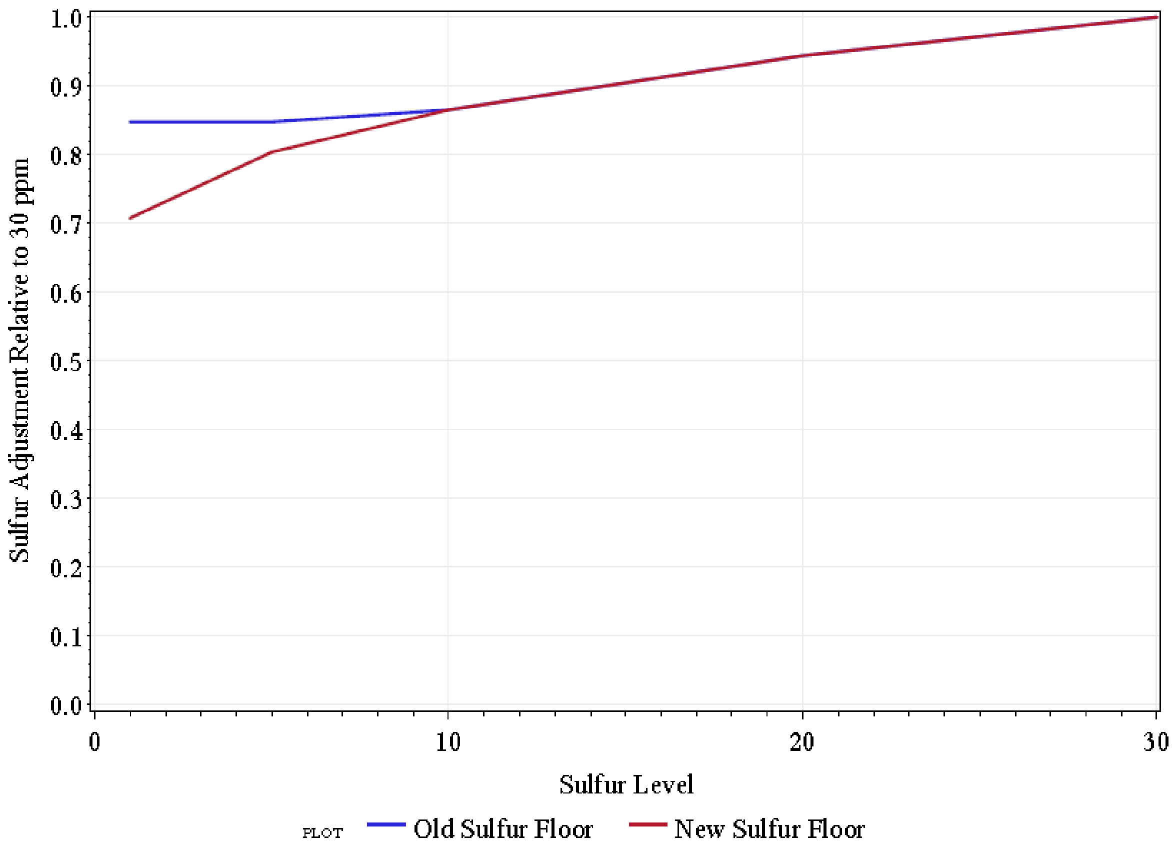


Figure 3-11 Effect of sulfur on running exhaust THC emissions from pre-2004 model year vehicles in MOVES

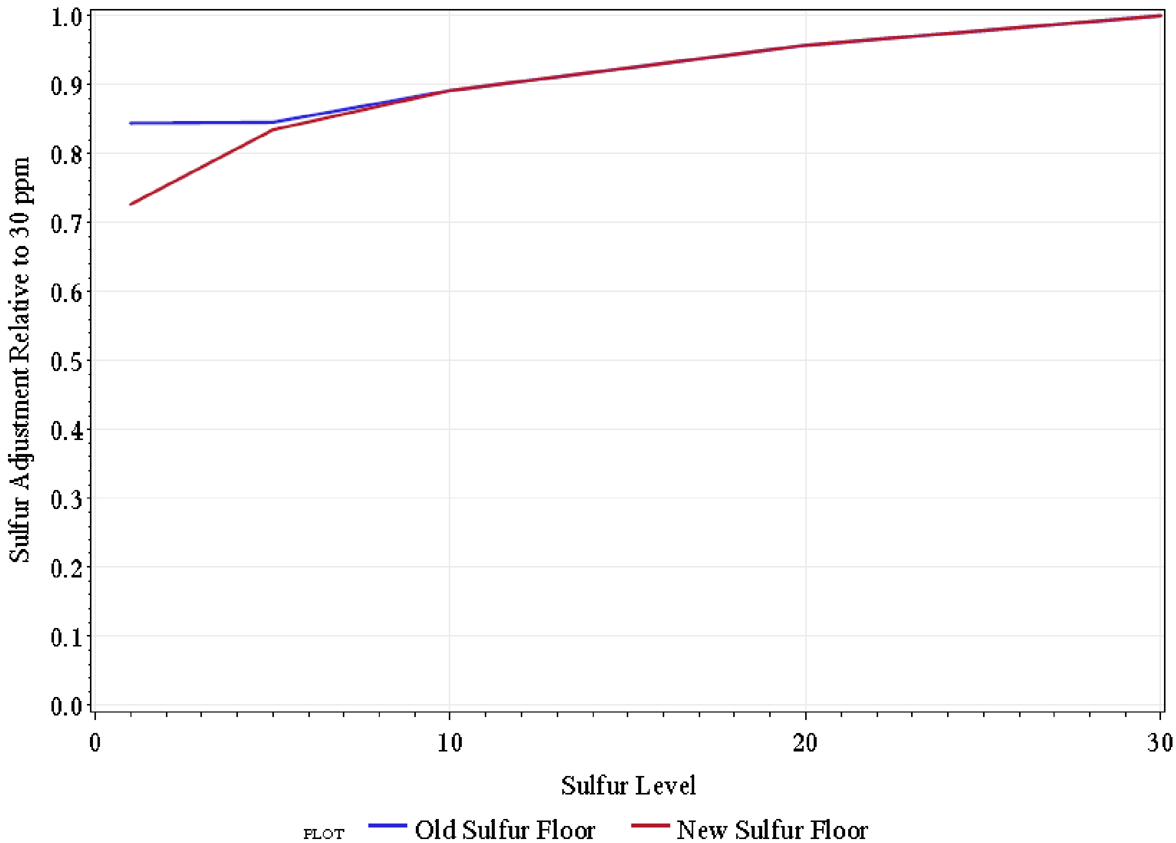


Figure 3-12 Effect of sulfur on running exhaust CO emissions from pre-2004 model year vehicles in MOVES

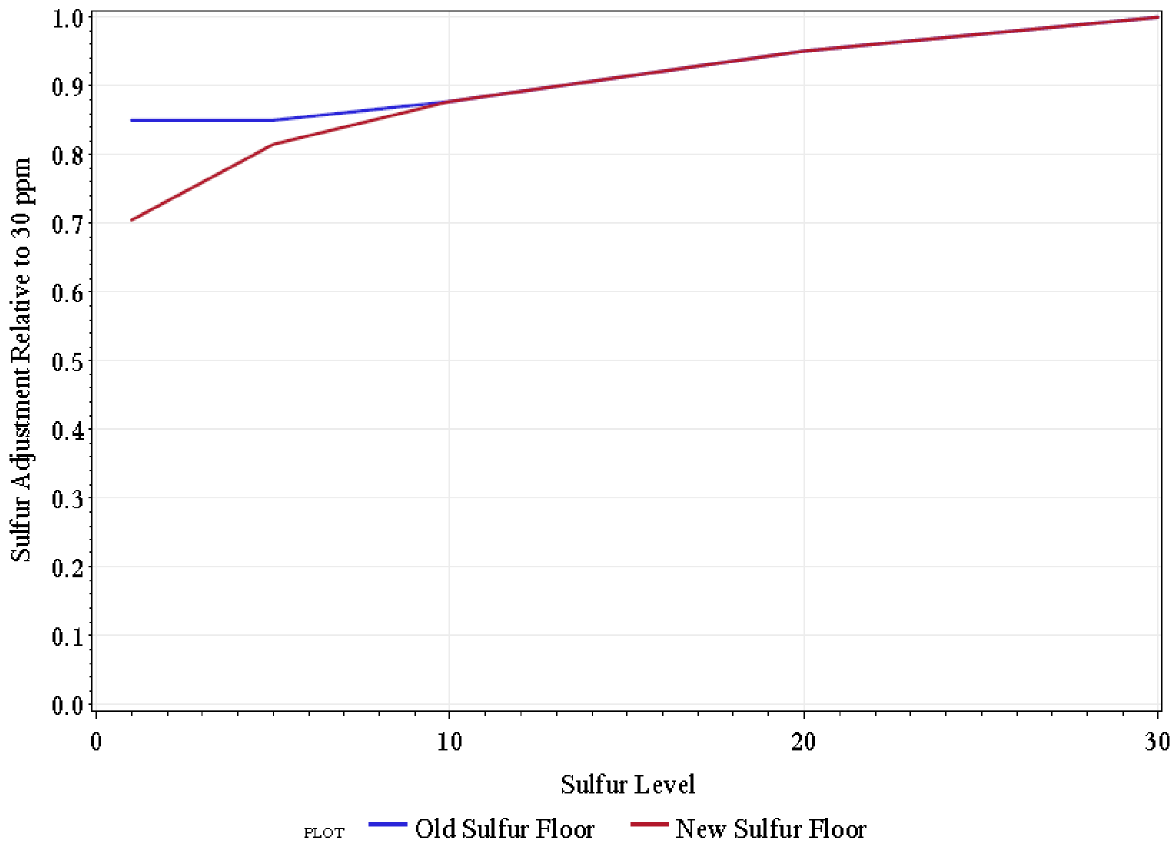
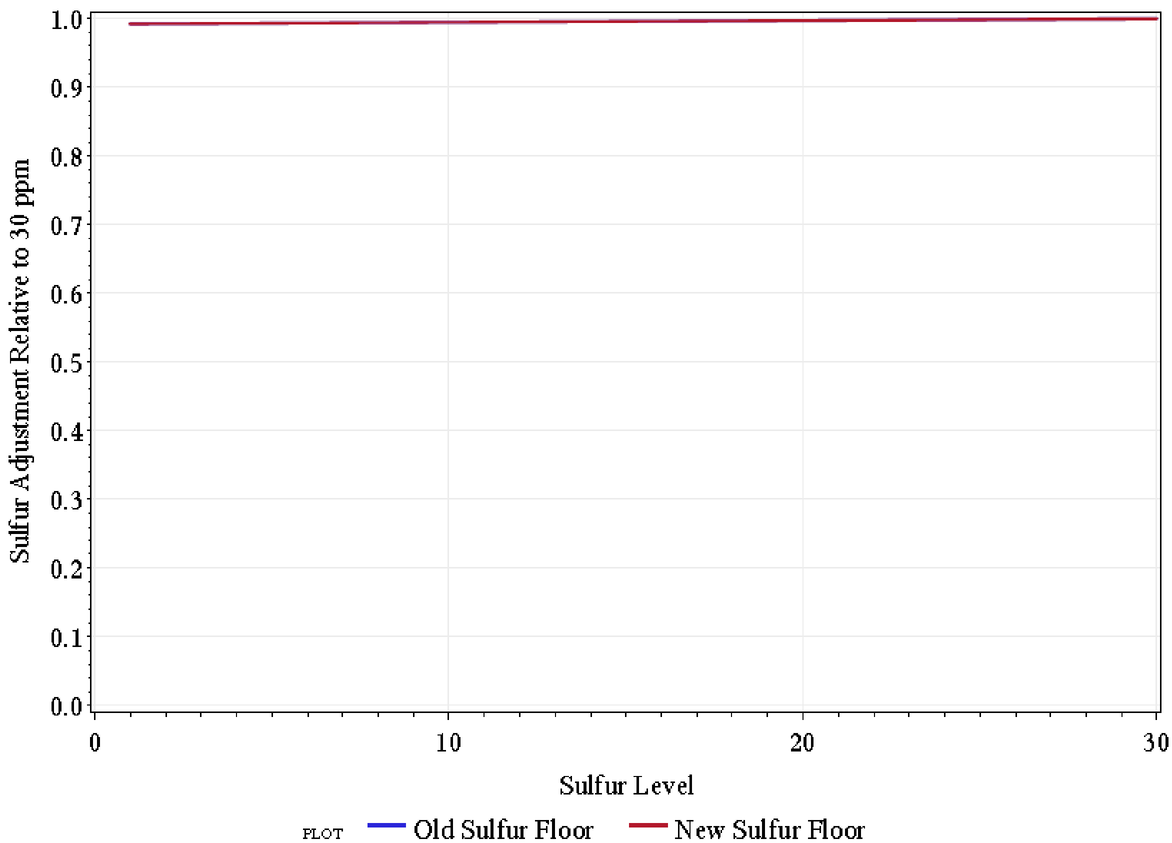


Figure 3-13 Effect of sulfur on running exhaust PM2.5 emissions from pre-2004 model year vehicles in MOVES



What Commenters Said:

The 2003 and older model year methods assign light-duty corrections directly to motorcycles and heavy-duty vehicles. The method assumes all sulfur impacts are equivalent across vehicle classes mapped by model year. Therefore, the sulfur correction for a 2003 model year light-duty vehicle (meeting the NLEV standard) is that applied by the model to a 2003 motorcycle and a 2003 heavy-duty gasoline vehicle. The lack of vehicle class specific impacts is problematic for motorcycles and heavy trucks as the underlying data are based on light-duty gasoline vehicles only (and the catalyst technology employed is not constant across vehicle classes for any given model year). This lack of vehicle class specificity is inconsistent with the 2004 and later model year approach that has distinct corrections by vehicle class as shown in Table 6-2.

Our Response:

We believe that the modeling approach that applies distinct sulfur effects by vehicle type for 2004-and-later model year vehicles is an improvement over what was done previously. We acknowledge that the fuel sulfur effect for pre-2004 model year motorcycles and heavy-duty gasoline vehicles were based on the effect from light-duty vehicles, but we do not expect the effect of sulfur on heavy-duty gasoline vehicles to be significantly different than that of light-duty since the combustion and exhaust aftertreatment systems are similar in principle. The impact on emissions is minimal; the contributions to the total inventory from pre-2004 model year motorcycles and heavy-duty gasoline vehicles are less than 1.8% in 2018 and 0.1% in 2030 for VOC and NOx. Again as previously explained, when using predictive models to support rules, EPA has to make judgments regarding what modeling information is available and whether the information is of adequate quality to support the conclusion being reached.

What Commenters Said:

EPA revised the estimated proportion of fuel sulfur emitted as exhaust sulfate PM for NPRM MOVES. The exhaust sulfate PM is the only exhaust PM component impacted by fuel sulfur. The revised approach basically halved the amount of fuel sulfur coming out as exhaust sulfate. The sulfate correction to PM exhaust was not developed using data below 30 ppm and was a linear extrapolation assuming no lube oil contribution as the method presumes no sulfate exhaust at zero ppm S fuel. The method should address the sulfate component due to lube oil, especially at ultra-low sulfur levels assumed. However, this methodological issue is a minor point as the sulfate portion of PM exhaust is minor.

Our Response:

Due to limited data on lubricating oil contributions to fuel sulfur for gasoline vehicles, and the small contribution of sulfate to PM from gasoline vehicles (as the commenter pointed out), no changes were made to the methodology for modeling sulfate emissions in the final rule.

What Commenters Said:

Finally, EPA's analysis of the In-Use Study data suggests that there is no effect of gasoline sulfur content on PM emissions. However, the MOVES model used by EPA to compute the benefits of the proposed Tier 3 regulation assumes that reducing sulfur content will reduce PM emissions.

Our Response:

No sulfur effect on PM emissions was modeled in MOVES for Tier 2 and later vehicles, consistent with the results from the In-Use Sulfur Program.

What Commenters Said:

All NLEV through Tier 3 exhaust basic emission rates are ratioed from Tier 1 vehicles in MOVES. Ratios are separate for low-to-mid power range (ratioed to FTP) and high power range (ratioed to US06). These power ranges were illustrated previously in Figure 6-1. Tier 1 was the latest technology for which EPA felt it had a full enough record of data across the vehicle useful life to estimate deterioration in the original release of MOVES2010. For NPRM MOVES, no attempt was made to update NLEV and Tier 2 basic emission rates with new data available since the original MOVES2010 development, nor was an attempt made to validate the extrapolation assumptions such as the proportions of emissions by exhaust mode and deterioration rates.[96]

[94] J. Warila, "Developing Emission Rates Representing the Effect of Proposed Tier 3 Standards on Gaseous Emissions from Gasoline-Powered Light-duty Vehicles (HC/CO/NOx)," EPA OTAQ memorandum to the Docket Number EPA-HQ-OAR-2011-0135, December 2011.
[95] "Development of Emission Rates for Light-Duty Vehicles in the Motor Vehicle Emissions Simulator (MOVES2010)," EPA-420-R-11-011, August 2011.

Our Response:

As the MOVES documentation[9] and docket memorandum[10] make clear, emission rates for NLEV, Tier 2 and Tier 3 vehicles are scaled relative to rates for Tier 1 vehicles, with scaling factors assigned using FTP and US06 results from the In-use Verification Program. As the documentation also describes, we estimate deterioration for these vehicles using proportional scaling applied by a log-linear trend (through nine years of age), in which slopes in ln(Emissions) are assumed to be similar. Beyond nine years, deterioration is assigned through a set of proportional factors. Based on examination of large volumes of data for Tier 1 and earlier vehicles, we believe that this assumption is reasonable. Note that under these multiplicative or "logarithmic" assumptions, late-model year (e.g., 2013) vehicles show much lower absolute deterioration than previous model year (e.g., 2001) vehicles; that is, the late-model year vehicles have much less absolute increase in the average emission rate over a given period of time (in g/hr, g/mi, etc.). In addition, the multiplicative deterioration model, which we believe to be technically appropriate, assigns far lower deterioration to Tier 2 or Tier 3 vehicles than some alternative models, such as assuming that deterioration in start emissions could be estimated as a fixed additive increment. Again, the consistent patterns in multiplicative scaling seen in data for Tier 1 and earlier vehicles give a reasonable expectation that similar patterns would apply to NLEV and Tier 2 vehicles.

With regard to assumptions regarding the proportions of emissions in various operating modes, we disagree that we "extrapolate" these assumptions in developing emission rates. In fact, the questions of time fraction in operating modes and the emission rates for differing technologies do not intersect. As the operating modes for running operation are defined in terms of speed and acceleration, rather than vehicle technology or emissions standards, they are influenced by vehicle weight and driving patterns. We would not expect changes in rates, however they are assigned, to give associated changes in operating–mode fractions.

What Commenters Said:

[9] U.S. EPA. 2011. *Development of Emission Rates for Light-Duty Vehicles in the Motor Vehicle Emissions Simulator (MOVES2010)*. EPA-420-R-11-011. Assessment and Standards Division, Office of Transportation and Air Quality, Ann Arbor, MI.
[10] U.S. EPA. 2013. "Memorandum to Docket: Updates to MOVES for the Tier 3 NPRM"

EPA updated estimates of the impact of fuel system leaks on evaporative emissions using data from a Colorado field program. This program provided data on the incidence of vehicles with leaks in the evaporative emission control system and in emissions associated with these vehicles. While this database is suitable for use in updating emission inventories, there remains considerable uncertainty in projecting emissions associated with "leakers" due to uncertainty in incidence and emission impact of leakers. This leads to uncertainty in projected evaporative emissions and benefits of the Tier 3 proposal.

Our Response:

The analysis and report determining the leak prevalence rates underwent significant revisions between the NPRM and FRM and was therefore sent out for a second peer review. The second review did not result in revisions to the analysis, but did have some minor updates to the report.[11] The analysis revisions included uncertainties for prevalence rates and are shown in the report.

What Commenters Said:

Vapor venting algorithms used to estimate evaporative emissions for multi-day diurnals and for vehicles with leaks were updated for the Tier 3 analysis with the DELTA model. Although the model is an improvement over the previous method of estimating vapor growth by accounting for canister capacity, back purge, and multiple day diurnals, a peer review found weaknesses in the model, most importantly in assumptions about evaporative canister back-purge,[100] which leads to additional uncertainties regarding EPA's estimates of evaporative emission benefits for the Tier 3 proposal.

Our Response:

For the NPRM, EPA used an estimate for back-purge based on a marine study. The FRM modeling, using the DELTA model for diurnal emissions, now includes a revised back-purge estimate based on the completed multi-day diurnal test program of nine vehicles representing top sales of the national fleet, tested over fourteen days of diurnals in a SHED.[12]

What Commenters Said:

As part of the NPRM MOVES development, EPA reviewed the permeation impact of ethanol-containing gasoline. EPA's evaluation found, based on several CRC studies[103] that the permeation impact for E15 is not statistically different from E10. The conclusion that ethanol-related permeation impact does not vary by ethanol content (for the range of

[11] DeFries, T., Palacios, C., Weatherby, M., Stanard, A., Kishan, S. (2013) Estimated Summer Hot-Soak Distributions for Denver's Ken Caryl I/M Station Fleet.
[12] Lindner, J, Sabisch, M., Glinsky, G., Stewart, J., St. Denis, M., Roeschen, J. (2013) Multi-Day Diurnal Testing

6 to 20 percent by volume) is supported by the CRC studies and the review completed as part of CRC Project A-73-1.[104] Given this finding, NPRM MOVES used the previously estimated E10 permeation impact for E15 gasoline in the RIA methods.[105]

[101] "Mobile Source Hydrocarbon Speciation Profiles for the Tier 3 Rule NPRM and Anti-backsliding Study AQ Modeling," U.S. EPA memorandum, Docket EPA-HQ-OAR-2011-0135, January 2013.
[102] "Hydrocarbon Composition of Gasoline Vapor Emissions from Enclosed Fuel Tanks – Draft,", EPA-420-R-11-018, 2011.
[103] M. Beardsley, "Updates to MOVES for the Tier 3 NPRM Analysis," EPA OTAQ memorandum to the Docket Number EPA-HQ-OAR-2011-0135, March 2013.
[104] "Development of Inventory and Speciation Inputs for Ethanol Blends," CRC Report No. A-73-1, Report No. SR2012-04-01, prepared by Sierra Research for Coordinating Research Council, May 2012.
[105] It was noted that the NPRM MOVES memorandum contained a typo for the discussion on this subject matter. The memo reports the ethanol permeation increase for vehicles meeting enhanced evaporative standards (and newer) as "213 percent increase for newer technology vehicles." The correct value used by the model is an increase of 113.8 percent (or a multiplicative adjustment of 213.8).

There are two aspects, outlined below, in which the model's permeation impacts due to ethanol could be improved upon.

1. If the permeation impacts of E6 to E20 are not statistically different, then the modeled permeation increase could be based on the data collected from all ethanol blends. The NPRM MOVES impact is based only on E6 to E10 fuels.

Our Response:

Analysis of the E-77 program using this approach (including E6-E20 fuels) affects the ethanol effect on permeation by less than 10%. This will have very small effects on modeling results.

2. An examination of the available data shows that vehicles meeting Tier 2 or LEV II evaporative standards are statistically distinct from vehicles meeting enhanced evaporative standards. The NPRM MOVES treats all vehicles meeting enhanced evaporative and subsequent standards as a single group.

Our Response:

Performing a mixed-model regression on all data available from E-77 test programs shows no significant interaction effect for vehicle standard and ethanol.[13] The version of MOVES used for the Tier 3 final rule's analysis continues to treat all vehicles meeting enhanced evaporative and subsequent standards as a single group with regard to the effect of ethanol in fuel.

What Commenters Said:

[13] U.S. EPA, 2014, "Development of Evaporative Emissions Calculations for Tier 3 FRM" memorandum to the Tier 3 docket.

CRC A-73-1 completed the analyses to address (1) and (2) above. The analyses showed that the presence of ethanol in gasoline increased permeation by 116 and 75 percent, respectively, for vehicles certified to enhanced evaporative and Tier 2/LEV II standards. This compares to the 114 percent increase modeled by NPRM MOVES for both sets of standards. As such, the NPRM MOVES ethanol permeation impact is overstated for the newest technology vehicles.

Our Response:

Our analysis differs from A-73-1[13]. We did not find a statistical significance in ethanol effects for different vehicle standards in the E-77 data sets whether we use the E20 tests or not in the analysis.

What Commenters Said:

Commenter: Governors' Biofuels Coalition

EPA must ensure that its fuel models are updated to reflect new science and the realistic emissions from the combustion of commercial gasoline (as opposed to unrealistic certification fuels).

Our Response:

EPA agrees with the commenter. Accordingly, the emissions model used to estimate the emissions reduction from the proposed rule included updated fuel-effects model incorporating the latest researches on the effects of fuel properties on on-road emissions.[14,15,16]

What Commenters Said:

Commenter: Pennsylvania Department of Environmental Protection (DEP)

Nevertheless, DEP has concerns about ... potential gaps or flaws in the emissions modeling.

Our Response:

EPA disagrees with the assertion that there are potential gaps or flaws in the emissions modeling, especially since the commenter did not provide any detail about the areas of concern.

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[14] U.S. EPA, 2013. Assessing the Effect of Five Gasoline Properties on Exhaust Emissions from Light-Duty Vehicles certified to Tier 2 Standards: Analysis of Data from EPAct Phase 3 (EPAct/V2/E-89). Final Report. EPA-420-R-13-002.

[15] The Effects of Ultra-Low Sulfur Gasoline on Emissions from Tier 2 Vehicles in the In-Use Fleet, EPA-420-R-14-002.

[16] U.S. EPA. 2014. Memorandum to Docket: Updates to MOVES for the Tier 3 FRM Analysis

Again as previously explained, EPA recognizes that any modeling analysis, and any projection of future conditions, inherently has uncertainties. But "[i]t is only when the model bears no rational relationship to the characteristics of the data to which it is applied that [courts] will hold that the use of the model is arbitrary and capricious." Appalachian Power Company v. EPA, 135 F.3d 791, 802 (D.C. Cir. 1998)(internal citations omitted).

What Commenters Said:

The EPA should explain in greater detail the methodology for obtaining the emission reduction estimates that would immediately occur when 10 ppm sulfur average levels at the refinery gate become available to the nation's fleet.

Our Response:

We disagree with the commenter that our methodology for estimating emissions reductions from 10 ppm sulfur was not adequately explained. Our modeling methodology is clearly documented in Chapter 7 of the RIA, and the Emissions Modeling Technical Support Document. The underlying peer-reviewed study of the effects of sulfur on Tier 2 vehicles are described in Section IV of the Preamble and in Chapter 1 of the Regulatory Impact Analysis. Furthermore, the memorandum to the docket on updates to MOVES describes how the results from the in-use sulfur study were incorporated into the MOVES model used for the air quality and inventory analyses.

What Commenters Said:

Aviation fuel; gasoline subject to the averaging, banking, and trading program; diesel fuel; and home heating oil in the liquid fuels transportation network all can lead to contamination of Tier 3 gasoline. As EPA states in the proposed rule in reference to a 10 ppm cap, 'The U.S. gasoline distribution system poses contamination challenges that make it difficult to set and enforce such a tight downstream per-gallon sulfur standard.' (78 FR 29927). *It* is quite possible during the first three years of this program that the 10 ppm refinery gate average could be much higher downstream of the refinery when the fuel reaches the Northeastern United States. The EPA should explain what will be the average downstream level of sulfur in gasoline available to the motoring public and indicate that the emissions modeling is based off this realistic sulfur level. As indicated in the previous comment, even levels of sulfur near 15 ppm will have deleterious effects on gasoline. Further, fuels available in terminals in Pennsylvania today exceed the current 30 ppm Tier 2 sulfur fuel standard. Some gasoline sulfur levels in Pennsylvania approach 50 ppm. The modeled emission reductions and monetized health benefits should be based on what gasoline sulfur level will actually reach the consumer.

The EPA should verify the accuracy of the emissions modeling results if intra-company sulfur credit trading is allowed. If refineries can use intra-company sulfur credit trading, how does the varying average sulfur content of gas affect modeling assumptions? It seems likely that gasoline sulfur levels will vary largely by producer, region, and even batch. If the average sulfur content varies widely, emission reductions could vary widely by region which means that some areas will not achieve the reductions promised by this program while other achieve higher reductions than promised. This is important to quantify to allow an accurate representation of the monetized benefits.

Our Response:

The emissions modeling assumed 10 ppm sulfur everywhere nationwide, because there is too much uncertainty associated with the individual refinery compliance decisions and the movement of fuel through the fuel distribution system to predict in-use sulfur levels in specific geographic areas. This is consistent with our expectation of what the national average in-use sulfur levels will be at retail. Potential contamination downstream of the refinery, or increases in sulfur due to small volume additives are expected to be minor, and offset by minor downstream decreases from downstream blending of lower sulfur blendstocks. As the commenter notes, the averaging, banking, and trading program means that some gasoline could be above 10 ppm sulfur and some gasoline could be below 10 ppm sulfur. However, because refineries generating credits and using credits are interspersed across the country, and because most areas receive a considerable portion of their fuel by pipeline, barge, rail or truck from refineries in other areas, we expect the variation in average sulfur levels across the country to be limited.

EPA is committed to monitor and further evaluate in-use sulfur levels and their impact on vehicle emissions. Such ongoing evaluation will include analyses of: in-use fuel surveys; batch data that refineries are required to submit; and the sulfur credit market. It will also include evaluation of any issues or concerns that might arise during implementation of the program. Finally, we will also carry out an ongoing evaluation of data submitted by the vehicle manufacturers on the performance of their Tier 3 vehicles in-use.

3.1.2. Criteria and Toxic Pollutant Emission Impacts

What Commenters Said:

Commenter: Chevron Products Company

Impact on Emissions and Air Quality: The NPRM indicates that by 2050, the proposed Tier 3 program would reduce NOx and VOC emissions by nearly 40% from the level of emissions projected without Tier 3 controls. Missing from EPA's assessment is a reference point that allows the comparison of Tier 3 to other similar control measures. Although a 40% reduction is large on a percentage basis, this reduction is off of a relatively low Tier 2 baseline, and it gives the reader an incomplete picture of the absolute emissions reductions from the proposal.

Our Response:

In Chapter 7 of the Regulatory Impact Analysis for the proposal, in addition to providing the reduction in percent space, the estimates of absolute emissions reductions (in U.S. Short Tons) were also presented.

What Commenters Said:

Commenter: Refinery Automation Institute, LLC

1) Using EPA's own Complex Model Phase 2 tool, the decrease in going from the current 30ppm S to 10 ppm S in the levels of VOC, Toxics, and NOX is very small, less than 1% (Attachment I).

Our Response:

We disagree with the comment. To estimate the emissions reduction from the Tier 3 standard, substantial updates have been made in MOVES, including replacing the Complex Model with a new fuel-effects model for 2001-and-later model year vehicles, based on recent research on the effects of fuel properties on on-road emissions.[17,18,19] However, for pre-2001 model year vehicles, the Complex Model is still used. Based on the model results, we expect substantial emissions reductions in many harmful pollutants with the Tier 3 rule (see Section III of the preamble to the final rule).

3.1.3. Greenhouse Gas Emission Impacts

What Commenters Said:

Commenter: Environmental Defense Fund (EDF)

Tier 3 Rule Will Result in a Net Decrease in GHG Emissions:
EPA has estimated that the proposed Tier 3 standards will result in net GHG reductions. The proposed sulfur and tailpipe standards are projected to reduce nitrous oxide and methane emissions, which are both potent greenhouse gases. Higher energy use will be required to remove sulfur at refineries, which will marginally increase CO2 refinery emissions, but this modest increase is expected to be offset by reductions in vehicle emissions of more potent greenhouse gases, including nitrous oxide and methane.

Our Response:

EPA agrees that Tier 3 will result in a net decrease in GHG emissions.

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[17] U.S. EPA, 2013. Assessing the Effect of Five Gasoline Properties on Exhaust Emissions from Light-Duty Vehicles certified to Tier 2 Standards: Analysis of Data from EPAct Phase 3 (EPAct/V2/E-89). Final Report. EPA-420-R-13-002.

[18] The Effects of Ultra-Low Sulfur Gasoline on Emissions from Tier 2 Vehicles in the In-Use Fleet, EPA-420-R-14-002.

[19] U.S. EPA. 2014. Memorandum to Docket: Updates to MOVES for the Tier 3 FRM Analysis

What Commenters Said:

Commenter: Marathon Petroleum Company LP (MPC)

In section III B.7., EPA states that 'We do not expect the Tier 3 vehicle standards to result in any discernible changes in vehicle CO2 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 MMTCO2e 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.

Our Response:

The EPA statement that is quoted in this comment is referring to per-vehicle CO_2 emissions and vehicle fuel efficiency. We are not aware of any technological reasons that vehicle emission controls responding to the Tier 3 vehicle standards would affect vehicle CO_2 emissions or fuel economy in any significant way.

As the commenter notes, we also considered the CO_2 emissions from refineries, and the non- CO_2 greenhouse gas emissions (CH_4 and N_2O) from vehicles. We believe that the potential increase in GHG emissions from the Tier 3 standards would primarily come from refinery emissions. However, we expect the combined impact of CH_4 and N_2O emission reductions from the vehicles and CO_2 emission increases from the refineries would result in a slight net decrease on a CO_2-equivalent basis in 2018, and by 2030 a larger net decrease of between 2.5 to 2.7 $MMTCO_2e$ (see Section III of the preamble for additional detail).

What Commenters Said:

Commenter: WE ACT for Environmental Justice

And last but certainly not least, the importance of this rule on climate change. While the rule documentation specifically states that an increase or decrease in greenhouse gas emissions cannot be ascertained with certainty at this point because of the expected emissions increases in the refinery process to reduce the amount of sulfur in the fuel, what you are proposing here will ultimately, whether now or in the near future, reduce GHG emissions. As an engineer that worked in refineries and many other chemical facilities, I am confident that technology will advance accordingly so we can say - with confidence - that one day, there will be a net reduction in CO2 emissions and subsequently a net reduction in negative health impacts. That is why it is especially important that we take every step to improve our air quality, especially for those that suffer respiratory and cardiovascular challenges during extremely hot weather or periods of 'heat waves' that we will continue to experience more frequently due to our changing climate.

Our Response:

We appreciate the comment. We expect the combined impact of CH_4 and N_2O emission reductions from the vehicles and CO_2 emission increases from the refineries to show a slight net decrease in 2018 on a CO_2 equivalent basis. While still small, this net decrease grows to a range between 2.5 to 2.7 $MMTCO_2e$ by 2030.

3.2. Air Quality Impacts of the Proposed Program

3.2.1. January 1, 2017 Implementation is Not Necessary To Help Areas Attain the Ozone NAAQS

We received comments reflecting two views: 1) that the standards, in the proposed timeframe, are not needed by states and others to attain the NAAQS; and 2) that the standards are important to the states for attaining the NAAQS and that the proposed timing is relevant for them.

What Commenters Said:

American Fuel & Petrochemical Manufacturers (AFPM), American Petroleum Institute (API) and Marathon Petroleum Company LP (MPC):

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.

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.

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.

The Agency claims that this proposed Tier 3 standard is necessary for States to attain the existing ozone NAAQS. Last year, EPA promulgated nonattainment areas for the 2008 ozone NAAQS. Most -- 36 are marginal out of 46 total nonattainment areas -- must be in compliance by 2015 based on monitoring data for 2013, 2014, and 2015. Tier 3 will not help these 36 marginal nonattainment areas because it will not be effective before 2017.

Commenter: American Lung Association of the Mid-Atlantic

Indeed, as the October 2011 report on this subject by the National Association of Clean Air Agencies very plainly points out, the ability of States and localities to attain the 2008 ozone standard is tied directly to timely promulgation and implementation of Tier 3 standards.

Commenter: American Lung Association Illinois

Recently the National Association of Clean Air Agencies also pointed out that the ability of States and localities to attain these standards is tied directly to the timely promulgation and implementation of Tier 3.

Commenter: Appalachian Mountain Club (AMC)

Many states, especially here in the Mid -Atlantic, may have difficulties attaining or maintaining the National Ambient Air Quality Standards for ozone in coming years, without Tier 3.

Commenter: Attorney General of Connecticut, et.al; Attorney General of New York, et.al

By setting more stringent emission standards for new passenger cars and trucks and cutting the allowable sulfur content in gasoline, the Tier 3 standards would reduce nitrogen oxides and volatile organic compounds by 80 percent and particulate matter by 70 percent. These reductions would go a long way toward limiting the production of smog. As EPA recognized, "[i]n the absence of additional controls, many areas will continue to have ambient ozone concentrations exceeding the NAAQS in the future." 78 Fed. Reg. at 29,819.

As EPA aptly noted in the preamble to the proposed rule, "few other national strategies exist that would deliver the same magnitude of multi-pollutant reductions projected to result from the proposed Tier 3 standards." 78 Fed. Reg. at 29,819. Therefore, we strongly support the adoption of the proposed Tier 3 standards and urge that they be finalized by the end of the year so that our States and cities may realize their benefits as soon as possible. Thank you for your consideration of our comments on this important matter.

Commenter: Chicago Metropolitan Agency for Planning

However, CMAP's actions alone will not bring the region into attainment of air quality standards. National action is required to bring overall mobile source emission rates down. This will have a significant effect both on emissions within the region and pollutants transported from other parts of the country. Transport in particular is a serious issue – the background monitors in the region are almost at the nonattainment level, indicating that out-of-region sources are a dominant contributor to the region's air quality problems.

Previous motor vehicle emission and fuel standards have had a major impact on air quality. Standards are becoming tighter as scientific understanding of air pollution's impact on people and the environment improves, and rightly so. In order to meet the new standards, tighter motor vehicle emission and fuel standards are required; the proposed Tier 3 standards should be adopted.

Commenter: City of Philadelphia Department of Public Health Management Services (AMS)

The Tier 3 would reduce nitrogen oxide, volatile organic compound, emission by eight and three percent by 2017, by 2030 by 28 and 23 percent, respectively. The approximate emission of benzene and total air emissions would be reduced by four and three percent by 2017, and 36 and 23 percent by 2030. These reductions will significantly improve to help benefit Philadelphians, and as well help us to meet the National Ambient Air Quality Standards.

Commenter: Delaware Department of Natural Resources (DNRC)

The proposed Tier 3 standards will improve the effectiveness of motor vehicle emissions controls and help Delaware to meet and maintain compliance with the current ozone standard and any potentially tighter future standard.

Delaware has been in non-attainment for the pollutant ozone since the standard was first established in 1971. Over the past 40 years, Delaware has reduced the impacts of ozone on our citizens through the adoption of numerous control measures. Delaware control measures adopted since 1990 have reduced ozone precursor pollutants, volatile organic compounds (VOC) and oxides of nitrogen (NOx), by 70%; yet Delaware's air quality remains unhealthy. EPA has designated portions of the State of Delaware as non-attainment for the health based 2008 75 ppb ozone standard, and in 2012 Delaware's air monitors recorded 39 exceedances of the standard, with one exceedance being 40% above the standard. In Delaware, mobile sources emitted 64% of state-wide NOx emissions for 2008.

Delaware has very limited authority to control motor vehicle emissions and fuels. As a result, Delaware has chosen to exercise the authority provided in Section 177 of the Clean Air and has adopted California's Low Emissions Vehicle tailpipe standards, but Section 211 of the Clean Air Act limits Delaware's ability to establish clean gasoline standards.

Ozone remains a major challenge, and motor vehicles are a major source of air pollution in Delaware, and in areas upwind of Delaware. We urge the EPA to finalize this proposal.

Commenter: Environmental Defense Fund (EDF)

More than 158 million people in the U.S. currently live in areas that have been designated as nonattainment for one or more of the NAAQS, which are health-based national pollution standards. Achieving and maintaining the NAAQS has been particularly challenging for high-growth areas that are experiencing a significant increase in vehicle use. Tier 3 will yield significant emission reductions in fine particulates and ozone, improving air quality across the nation and assisting states in meeting their obligations under the NAAQS program.

Over 138 million people currently live in ozone nonattainment areas, which include many major population centers. EPA's analysis found that decreases in ozone, likely due to tailpipe reductions in NOx and VOCs as a result of Tier 3 exhaust and fuel standards, will be dramatic enough in some areas to lower ozone levels from above the 2008 8-hour standard to below it. This has important implications for the 46 areas (representing 27 full or partial counties) that were designated as nonattainment areas in 2012 for the 2008 ozone standard. Specifically, EPA projects that, in 2017, ozone design values in Bucks County, Pennsylvania, Arlington County, Virginia, and St. Louis County, Missouri – with a total population of almost 2 million people – will move from being above the standard to below. And by 2030, EPA has modeled that Hudson

County, New Jersey and Brazoria County, Texas – with a projected population in 2030 of over 1 million people – will have ozone design values reduced from above the standard to below as a result of the proposed rule. And, in 2030, more than 200 counties are projected to have ozone design value (DV) decreases of greater than 1.5 ppb.

Additionally, EPA estimates that in 2030, 60 counties in the U.S. will move from above 60 ppb to at or below 60 ppb under the Tier 3 scenario, compared to the reference case. This indicates that the reductions made by Tier 3 could also be vital in helping states meet a strengthened ozone standard.

EPA also projects that the emissions reductions resulting from the Tier 3 program would help states attain and maintain the PM2.5 NAAQS. In 2030, over 100 counties are projected to have fine particulate design value decreases of greater than 0.05 micrograms per cubic meter.

Commenter: HEAL Utah on behalf of Jeff Miller et al:, and on behalf of Utah State Legislators

As members of the Utah Legislature, we have regularly heard from our state environmental regulators about the challenges they face in meeting EPA air quality standards, such as the National Ambient Air Quality Standards for PM 2.5. Our regulators have passed dozens of new rules, instituted public education programs and tightened controls on industry, yet still struggle to meet those standards.

One of the main culprits, particularly for our wintertime inversion episodes, is our transportation sector. Our regulators estimate that 57 percent of the pollutants that plague us during those poor air quality winter days come from tailpipe emissions.

Along Utah’s Wasatch Front, we have boosted investment in transit and put in place programs to encourage alternative fuel vehicles, such as CNG cars and trucks. Yet tailpipe emissions remain a significant polluter.

Thus, it was with great interest, that we have learned of your agency’s proposed Tier 3 Vehicle Emission and Fuel Standards Program, which would require lower--sulfur gasoline and more advance vehicle pollution control systems. We believe these safeguards would have a major impact on Utah’s poor air quality.

Commenter: Kentucky Division for Air Quality

Currently, Kentucky has a number of areas that need to improve air quality to meet the 2008 8-hour ozone National Ambient Air Quality Standard (NAAQS). Tier 3 is a vital program that will assist urban areas in Kentucky and in other states in meeting and attaining the ozone NAAQS. Specifically, by 2030, the proposed Tier 3 program would result in reductions in on-road mobile source emissions of nitrogen oxides (NOx), volatile organic compounds (VOC) and carbon monoxide of at least 25 percent from current levels. Further, the Tier 3 program would reduce on-highway emissions of NOx and VOC nearly 40 percent by 2050, when Tier 3 vehicles would comprise almost the entire fleet, greatly assisting our heavily populated urban areas in realizing clean air. Additionally, the program would reduce sulfur dioxide (SO2) by 16,621 tons in 2017 and by 17,267 tons in 2030. Direct particulate matter (PM2.5) would be reduced by 121 tons in 2017 and 7,458 tons in 2030.

More than 158 million people across the nation currently live in areas where the air they breathe violates at least one of the health-based NAAQS. Although interstate transport has in the past been a major contributor to air quality problems in some areas, programs and controls have been put in place to address this concern. Mobile source emissions, including those from the passenger cars and light trucks that are the focus of this proposal, are a primary contributor to these violations, playing an especially central role in elevated levels of ozone and fine particulate matter (PM2.5). The vehicles to be affected by Tier 3 standards contribute to other air quality problems as well, including toxic air pollution, regional haze and the eutrophication of water bodies.

Commenter: Metropolitan Washington Air Quality Committee (MWAQC)

The Washington region has made great strides in cleaning the air thereby, reducing the health impacts of poor air quality, which cause a number of respiratory problems (e.g., asthma) and premature death. It has done so by lowering emissions of pollutants that produce Smog and fine particles in the atmosphere. As a result, the region has met the annual fine particle standards, which-were published in 1997 (15 µg/m3) and 2013 (12 µg/m3) as well as daily fine particle standards, which were published in 1997 (65 µg/m3) and 2006 (35 µg/m3). Besides this, the region has also met the previous 1-hour ozone standard (0.12 ppm) published in 1979. However, there are tougher challenges ahead for the Washington region. The region needs to meet the current ozone standard (0.075 ppm) by 2015 and also needs to make sure that the region remains in attainment for the current fine particle standards (annual: 12 µg/m3, daily: 35 µg/m3). EPA is also planning to propose a possibly tougher ozone standard this year. EPA may also further tighten the fine particle standard in the future.

In view of the challenges ahead for meeting and/or maintaining the tougher federal ozone and fine particle standards, the Washington region needs to reduce the emissions of pollutants producing ozone and fine particles (VOC, NOx, PM2.5, and SO2) significantly. The Tier 3 rule will help the Washington region immensely as it will provide cleaner gasoline and vehicles. This will also help the three jurisdictions in this region as they implement strategies to meet and/or maintain the above mentioned federal standards.

Passenger vehicles are the largest emitters of nitrogen oxides (NOx) and one of the largest emitters of volatile organic compounds (VOCs), carbon monoxide (CO), and PM2.5 in the Washington region. A study by the National Association of Clean Air Agencies (NACAA) estimated that the Tier 3 program can reduce gasoline vehicle emissions of nitrogen oxides, carbon monoxide, and volatile organic compounds by 29, 38 and 26 percent respectively.

Reductions in emissions of the above pollutants will cause reduction in the levels of ozone, fine particles, and carbon monoxide. Clearly, implementation of the Tier 3 rule will lead to significantly cleaner air in the Washington region, providing important health benefits to millions of people.

Commenter: Mid-Atlantic Regional Air Management Association Inc. (MARAMA)

Northeast States for Coordinated Air Use Management released their Assessment of Clean Gasoline in the Northeast and Mid-Atlantic States.

Over the first decade of the 21st century. the Mid-Atlantic region achieved significant improvements in air quality. Ozone remains a major challenge, and motor vehicles are a major source of air pollution in our region. We encourage actions to cost-effectively reduce air pollution from motor vehicles as soon as reasonable, enabling the public to breathe healthy air. In the absence of a national Tier 3 program, areas needing additional emission reductions may have no choice but to turn to other, more expensive, less cost-effective measures, including additional controls on stationary sources (including already controlled sources) to meet their statutory clean air obligations. This would place an unfair economic burden on local industries and businesses when a more cost-effective national program which directly affects the contributing sources is available. Moreover, achieving equivalent emission reductions of the magnitude that will result from Tier 3 could be extremely difficult, if not impossible, in areas where stationary sources are already highly controlled and there aren't enough other sources to implement controls.

Commenter: National Association of Clean Air Agencies (NACAA)

State and local air pollution control agencies are relying on EPA to adopt the Tier 3 rule. Section 177 of the Clean Air Act authorizes states to opt into California's LEV III tailpipe standards, but not all states are able to take advantage of this opportunity. Moreover, the Clean Air Act precludes all states except California from adopting low-sulfur gasoline standards. Therefore, it is imperative that the federal government take action this year to adopt Tier 3. If the rule is not promulgated by December 31, 2013, Tier 3 may not apply to the 2017 model year of vehicles and an entire year of benefits will be lost. This delay will have a serious and adverse impact on human health and welfare.

Commenter: Natural Resources Defense Council (NRDC)

In the proposed rulemaking, EPA notes that over 158 million people, or half of the U.S. population, live in areas that fail to meet one or more National Ambient Air Quality Standards (NAAQS). Emissions from motor vehicles are a particularly important contributor to NAAQS non-attainment. EPA projects that by 2014 "in many nonattainment areas, cars and light trucks will contribute 30–45 percent of total nitrogen oxides (NOX) emissions, 20–25 percent of total volatile organic compound (VOC) emissions, and 5–10 percent of total direct particulate matter (PM2.5) emissions". By reducing these compounds through the Tier 3 rules, meaningful and necessary reductions in ozone, PM and other air pollution can be achieved. EPA projects that the Tier 3 proposal will bring many counties from above to below the ozone NAAQS.

Commenter: Northeast States for Coordinated Air Use Management (NESCAUM)

Even with the projected benefits associated with programs currently in effect, many of our most populous areas are predicted to be nonattainment for the current 0.075 ppm ozone NAAQS in

2015. Current nonattainment designations of the ozone NAAQS fail to capture the extent of the ozone pollution problem in the eastern United States. When EPA determined the attainment status of areas in the U.S., it based its determinations on ozone monitoring data collected during either 2008-2010 or 2009-2011. In the eastern states (Texas to North Dakota and to the east), there were 99 monitors measuring ozone levels in violation of the 0.075 ppm NAAQS during these years. This, however, presents a misleading picture of the extent of the air pollution problem facing the states. In contrast to the time periods used by EPA to designate ozone nonattainment areas, during 2010-2012 there were 252 monitors measuring violations of the ozone NAAQS in these same states, an increase of over 150% in the number of violating monitors. Many of these monitors are in cities, towns, and counties that EPA did not originally identify as having ozone pollution problems.

Attaining the standard in these areas will require additional NOx reductions within our region as well as in upwind areas that contribute to the region's pollution burden. Tier 3 is the most significant strategy that the federal government could implement to help states attain and maintain the NAAQS for ozone. The combined near-term benefits of the low sulfur gasoline provisions and the increasing benefits of the tailpipe standards would help areas that need additional reductions to attain, and assist other areas to stay in attainment.

The NESCAUM region, home to over 42 million people, is subject to episodes of poor air quality resulting from ground-level ozone and fine particle pollution. During severe events, the scale of the problem can extend beyond NESCAUM's borders and include over 200,000 square miles across the eastern United States. Local and regional sources as well as air pollution transported hundreds of miles from distant sources outside the region contribute to elevated ozone and fine particle concentrations in the region.

NOx emissions contribute to a number of adverse public health and environmental outcomes. NOx is the most important contributor to regional ozone concentrations and an important precursor to fine particulate matter formation. These two pollutants are responsible for tens of thousands of premature deaths, hospital admissions, and lost work and school days in the U.S. annually. NOx is also a key factor in a number of environmental problems that affect the Northeast.

Ozone remains a persistent pollution problem in parts of the NESCAUM region during warm weather months. The evolution of severe ozone episodes often begins with the passage of a large high pressure area from the Midwest to the middle or southern Atlantic states. Three primary pollution transport pathways affect air quality in the region: long-range, mid-level, and near-surface. During severe ozone episodes associated with high-pressure systems, these pathways converge on the Mid-Atlantic area, where sea and bay breezes act as a barrier and funnel ozone and other air pollutants up the Northeast Corridor.

Collectively, NOx emissions and ambient ozone concentrations in the region have dropped significantly since 1997, along with the frequency and magnitude of exceedances of the health-based ozone NAAQS. Despite this demonstrated progress, many of the most populous areas of the region continue to violate the current 0.075 ppm ozone NAAQS. Attaining the standard in these areas will require significant additional NOx reductions within the Northeast and in upwind areas. Federal measures such as the Tier 3/low sulfur gasoline program will significantly reduce NOx emissions and help states achieve the requisite reductions.

Looking toward the future, additional NOx reductions will be critical to ozone attainment in a broader swath of the region if EPA were to adopt a more health protective ozone NAAQS in the range of 0.060 – 0.070 ppm as recommended by EPA's Clean Air Scientific Advisory Committee (CASAC).

Commenter: Sierra Club

Further, the proposed rule will improve air quality across the country, especially those regions in non-attainment with the health-based National Ambient Air Quality Standards ("NAAQS"). As the RIA demonstrates, without Tier 3, several counties will continue to violate the 8-hour ozone standard. Specifically, without the benefits of the Tier 3 controls, in 2017, 40 counties, with a projected population of almost 50 million people, would experience levels of ozone that exceed the 2008 8-hour ozone standard of 75 ppb. Tier 3 will assist those areas with attainment in 2017 and beyond, including some counties that would reduce ozone design values from above the level of the standard to below it as a result of pollution reductions achieved solely by the proposed rule. Moreover, the benefits of reduced ozone resulting from the proposed rule will help fill the regulatory gap created by EPA's overdue review of the 2008 ozone standards.

Similarly, the proposed Tier 3 standard will assist many regions of the country that are currently designated nonattainment for PM2.5 to come into compliance with the NAAQS. At present, there are 50 PM2.5 nonattainment areas (for the 2006 NAAQS) with a population totaling over 105 million people. EPA provides evidence that 24-hour PM2.5 will decrease for many counties by 2030 as a result of the proposed rule's projected emissions reductions of PM2.5, NOx SOx, and VOCs.

The proposed rule also will decrease ambient levels of NO2. Reductions in NO2 resulting from Tier 3 will "help any potential nonattainment areas to attain and maintain the standard," thereby facilitating compliance with the health-based NAAQS. Moreover, reductions in NO2 will be greatest in urban areas, helping to prevent the adverse health effects of NO2 exposure.

Commenter: State of Utah

Utah currently has three non-attainment areas for the PM2.5 NAAQS. In those areas, Nitrogen Oxides (NOx) and Volatile Organic Compounds (VOCs) from on-road mobile sources are a primary contributor to the PM2.5 in our air. Preempted by federal statute, Utah is unable to set its own vehicle emission standards. The proposed Tier 3 Program, therefore, presents a promising strategy to reduce NOx, VOCs, and direct PM2.5 from on-road mobile sources. If EPA's projections are accurate, the proposed Tier 3 Program, in conjunction with new mileage efficiency standards for vehicles, will reduce combined NO, and non-methane organic gas emissions by 80 percent on a fleet average basis and particulate emissions by 70 percent on a per-vehicle basis by the year 2030.

Commenter: Utah Air Quality Board

Utah faces recurrent episodic air quality challenges for ozone and PM2.5. The state currently has three non-attainment areas for the PM2.5 NAAQS. In those areas, on-road mobile sources are currently one of the largest source categories for emissions of NOx and Volatile Organic Compounds (VOCs). However, by federal statute, the state is preempted from setting vehicle emission standards, leaving us with limited options for reducing on-road mobile source emissions. The proposed Tier 3 Program fills this gap by providing a means of greatly reducing NOx, VOCs, and direct from onroad mobile sources. Specifically, the proposed Tier 3 Program will reduce combined NOx and nonmethane organic gas (NMOG, a subset of VOC) emission standards by 80 percent on a fleet average basis and particulate emission standards by 70 percent on a per-vehicle basis.

Commenter: Respiratory Health Association (RHA)

Anyone who has trouble breathing or has limited lung capacity will benefit from cleaner, less polluted air. The Tier 3 rule will help achieve the drastic ozone reductions still needed to achieve the current inadequate ozone standard. A strong Tier 3 standard will also be extremely helpful in meeting an ozone standard based on science that the EPA should establish later this year.
As the ozone standard still isn't correctly set, the reality is that the number is certainly higher than the 158 million people EPA says are exposed to unhealthy levels of air pollution. Far too many people do not even know that their air is not meeting standards that will protect their health.

Commenter: Ozone Transport Commission (OTC)

Motor vehicles are the Ozone Transport Region's largest source of NOX, which is the most important contributor to elevated regional ozone concentrations. EPA's Tier 3 proposal would reduce NOX.

EPA is required under the Clean Air Act to set NAAQS that are protective of human health and welfare. EPA lowered the health-based 8-hour ozone NAAQS to 75 parts per billion in 2008 and is anticipated to promulgate a more stringent standard in 2014. The OTC's modeling efforts demonstrate that gasoline-powered vehicles remain a significant contributor to ground level ozone. Based on this modeling demonstration, attainment of the 2008 health-based ozone standard will be impossible in the OTR without additional emission reductions from highway vehicles and other mobile sources. Ozone precursor emissions from mobile sources are the largest contributor to ozone levels within the OTR. As stated in the Preamble for EPA's proposed rule 'Control of Air Pollution From Motor Vehicles: Tier 3 Motor Vehicle Emission and Fuel Standards,' the vehicle emission standards, combined with the proposed reduction of gasoline sulfur content from the current 30 parts per million (ppm) average down to a 10-ppm average, is expected to result in a dramatic emission reduction of NOR, VOC, direct PM2.5, carbon monoxide and air toxics. (78 Fed. Reg. 29816). Cleaner vehicles under the Tier 3 program will significantly reduce ozone precursor emissions and other pollutants as these vehicles replace the existing vehicle fleet. Cleaner fuels will have the significant added advantage of reducing emissions from the in-use fleet by enabling catalytic converters to reduce pollution from all gasoline-powered vehicles by limiting 'NOR creep' associated with sulfur build up in the catalyst. Without clean gasoline, existing and improved vehicle emission standards will not be as effective.

The Ozone Transport Commission (OTC) member states call on the U.S. Environmental Protection Agency (EPA) to significantly reduce pollution from gasoline-powered motor vehicles by promulgating stringent vehicle emission standards and lower sulfur content standards for gasoline. Adoption of federal 'Control of Air Pollution from Motor Vehicles: Tier 3 Motor Vehicle Emission and Fuel Standards' as proposed by EPA on March 29, 2013 will reduce ozone and ozone precursors in the Northeast and Mid-Atlantic states, as well as in upwind states, that significantly contribute to nonattainment of the ozone National Ambient Air Quality Standards (NAAQS) in the Ozone Transport Region (OTR).

Commenter: Maryland Department of Transportation

Many counties in Maryland have been designated nonattainment for ozone and/or particulate matter, which concerns us greatly. Maryland has already implemented many stringent controls, costly transit improvements, and mobile source emission reduction strategies. However, we need more effective programs that provide additional reductions of harmful emissions. We believe that the Tier 3 Program is a positive step forward in efforts to reduce emissions from motor vehicles and a logical progression of the work initiated in the Tier I Program and enhanced by the Tier 2 Program. We strongly support the immediate benefits that will accrue to our region as soon as the near term reduction of sulfur in fuels takes place and the longer term benefits that will be realized as new technology (Tier 3) vehicles are introduced.

Commenter: New York State Department of Environmental Conservation

Air pollutant concentrations continue to exceed health-based National Ambient Air Quality Standards in much of the United States, including portions of New York. Mobile sources, particularly light duty vehicles, are often the dominant emission source for ozone precursors. EPA's analysis suggests that in 2030, on-road mobile source emissions of oxides of nitrogen (NOx) and volatile organic compounds (VOCs) will be reduced by 28% and 23% respectively. These ozone precursor emission reductions will help reduce the incidence of adverse health impacts from cardiovascular and respiratory illnesses and conditions known to be associated with exposure to elevated levels of ozone.

The benefits of reducing average gasoline sulfur content to 10 ppm are not limited to future Tier 3 and LEV III vehicles. EPA's emissions modeling suggests that roughly half of the NOx reductions associated with full implementation of Tier 3 occurs immediately in 2017 due to emission reductions from the existing vehicle fleet, attributable to enhanced operation of existing emission control equipment.

If the reductions associated with Tier 3 are not realized, alternative reductions will be necessary across much of the country. There may not be sufficient feasible alternatives, and even if feasible, any such alternatives will likely be more expensive and more disruptive. This is the lowest hanging fruit remaining on the tree.

The sulfur standards and the vehicle standards they facilitate are vital to providing clean, healthy, air to millions of New Yorkers.

These reductions are critical because there are two nonattainment areas in New York State for the 2008 ozone national ambient air quality standard (New York-N. New Jersey-Long Island, NY-NJ-CT and Jamestown, NY) that are required pursuant to EPA's designation to attain by December 31, 2015.

Specifically, the United States Environmental Protection Agency (EPA) designated the New York — Northern New Jersey — Long Island, NY-NJ-CT area 'nonattainment' of the 2008 ozone national ambient air quality standard (NAAQS) of 0.075 parts per million (ppm) on May 21, 2012 with a 'marginal' classification. The DEC submitted an official reclassification request to the EPA on June 20, 2012. The DEC requested to be reclassified pursuant to Clean Air Act (CAA) section 181(a)(4) because the New York —Northern New Jersey — Long Island, NY-NJ-CT ozone nonattainment area's design value of 0.084 ppm is within five percent of the 'moderate' classification threshold of 0.085 ppm. In the alternative, the DEC requested a 'voluntary' reclassification to 'moderate' pursuant to CAA section 181(b)(3). A voluntary reclassification under section 181(b)(3) of the CAA is a non-discretionary EPA action; the statute provides that '[t]he Administrator shall grant the request of any State to reclassify a nonattainment area in that State... to a higher classification.' EPA, however, has not taken any action because it questions its authority to grant a voluntary reclassification of the multi-state region without the support of Connecticut and New Jersey. It should be noted that the Administrator seemingly has the authority under CAA section 107(d)(3) to revise the designation of an area if 'available information indicates that the designation of any area or portion of an area within the State or interstate area should be revised.' In that regard, monitoring data for 2012 indicates the New York City metropolitan areas design value of 0.086 ppm is above the threshold for a 'moderate' classification. DEC screening modeling also predicts non-attaining ozone design values of 0.082 ppm in 2015 and 0.076 ppm in 2018.

Therefore, the reductions associated with the Tier 3 gasoline sulfur control and vehicle emissions standards, estimated below, will be critical in meeting the emission reduction requirements of a moderate nonattainment area.

EPA provides national emission reductions (from MOVES), but does not break them down by state. Using a VMT ratio (4.3%, from data on the FHWA web site (1)) yields an estimate of 11,000 tons per year NOx in 2017 from the existing fleet and 22,000 tons of NOx in 2030. VOC emission reductions are estimated at 1700 tons in 2017 and 9700 tons in 2030. PM2.5 is 5 and 320 and benzene is 70 and 370 respectively. These additional reductions, on top of what is already being achieved, are significant relative to programs that the State has adopted and plans to adopt as it deals with ozone nonattainment. NOx reductions in the range of 30 and 60 tons per day in 2017 and 2030 respectively, coupled with VOC reductions in the same timeframe of 4.6 and 26 tons per day would contribute to the State's continued effort to control ozone precursor emissions.

New York, through its adoption of California's LEV III vehicle standards, will receive some of the emission reductions described above.

Alternatives are less feasible, more expensive, and more disruptive.

The air quality impacts of the emissions from motor vehicles can't be placed in a compartment separate from other emission sources. If the necessary emissions reductions from this proposed rule are not realized, then they will have to be obtained in some other manner from other sectors as the Department develops State Implementation Plans to address nonattainment issues within the state.

Each year the Department works to identify strategies that result in meaningful State Implementation Plan reductions. While these efforts have identified areas for significant reduction in the past (NOx RACT, NOx SIP Call, Consumer Products, AIM Coatings, etc.) work continues on identifying what, if any, additional reductions are available from these program categories. If the reductions from Tier 3 are not realized, the Department is concerned that there are not enough source categories left to regulate to make up the difference.
And just to point out that metropolitan New York is in non-attainment for the 2008 ozone standard, and we have, in fact, based on actual monitored data requested a bump up of that non-attainment status to moderate.

Well, again, Tier 3 for New York by itself – Tier 3 by itself doesn't do all that much for us because we have the California program, and, in fact, New Jersey has the California program as well. But we will certainly see the transport benefits associated with it as we get improvement in air quality upwind from Tier 3.

Our issues are we're – we are non-attainment based on current monitoring data, based on 2012 data. We're still non-attainment. In fact, 2012 made us worse because it got rid of a cool summer. So when we look at our current non-attainment status and the fact that we've requested a bump up to moderate. We need to get the reductions to get into attainment in the 2018 time frame, which would be required. 2015 looks virtually impossible.

While the emissions benefits associated with the Tier 3 standards won't fully accrue until the fleet turnover, the environmental benefits from gasoline sulfur reductions will also improve the effectiveness of millions of catalytic converters already in the field. We know that some of the effects of sulfur on catalysts is reversible, so as soon as it goes into effect, we get benefits. Your documents suggest 284,000 tons of NOx nationally in 2017. That's probably in the order of 10,000 tons of NOx for New York.

And to illustrate some of that impact, I looked at data – I/M data for 2012 in New York, and we had 17,000 vehicles fail initial I/M tests for catalytic converter. And we don't know how many might've been repaired before they were tested, so we know that sulfur improvements would reduce that catalyst impact, and, therefore, not only save some money for the owners for catalyst repairs, but also give us environmental benefits.

The real big bite occurs with the fuel sulfur benefit that allows us to get immediate improvement and, you know, just doing a little pro rata of EPA's numbers, it looks like 10,000 tons of NOx for New York. So, yeah, we can use that.

Commenter: American Lung Association

On March 29, 2013, EPA proposed an implementation rule for the 2008 ozone National Ambient Air Quality Standards (NAAQS). EPA assumed a Tier 3 program with strong low sulfur gasoline standards in its baseline analysis for attainment of the ozone NAAQS adopted in 2008. State and local governments are also preparing to meet NAAQS for particulate matter, nitrogen dioxide, and sulfur dioxide. Tier 3 will be a critical tool for local and state governments to meet these clean air goals. In absence of Federal Tier 3 standards, state and local governments will have to turn to other measures. In most areas, mobile sources comprise a large percentage of the emission inventory across the nation. Finding pollution reductions equal to those that would have come from a Federal Tier 3 program will be difficult.

Commenter: Environmental Defense Fund (EDF)

Tier 3 will make significant and immediate progress to reduce the pollution that forms harmful ozone. The emission reductions made under this program are a crucial piece of what must be a multipronged strategy to reduce ozone. Tier 3 will help states meet the 2008 Ozone NAAQS and prepare to meet the expected 2013 Ozone NAAQS.

Our Response:

Chapter 7 of the RIA and Section III of the preamble to the final rule include EPA projections of emission reductions and air quality improvements from the Tier 3 standards. EPA believes that the emissions reductions and air quality improvements from the Tier 3 standards will help states to attain and maintain the NAAQS "as expeditiously as practicable." (Sections 172(a)(2) and 181 of the CAA). The Tier 3 emissions reductions and air quality improvements occur in a timeframe that is relevant for 2008 ozone nonattainment areas classified as moderate, serious, severe and extreme. By beginning the program in 2017, it will aid attainment of the NAAQS in moderate areas by December 2018. Furthermore, the Tier 3 standards will help any areas that attain the NAAQS (including current marginal nonattainment areas) to maintain that NAAQS in the future. EPA received numerous comments from states and other groups indicating that the emission reductions and air quality improvements need to occur as soon as possible. Timely implementation of Tier 3 will both provide public health benefits as soon as possible, and also assist states as they develop attainment and maintenance plans (to avoid the need for other, more costly state/local measures).

3.2.2. Air Quality Impacts of the Tier 3 Standards are Negligible

Three commenters, API, AFPM and Marathon, reference two studies done by Environ to assert that the air quality benefits of the Tier 3 rule are negligible.[20,21] Another commenter, EDF, noted

[20] 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

[21] 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

that the Environ studies underestimate the benefits of the Tier 3 program because they analyze 2022, which is an interim year when the benefits of Tier 3 are not fully realized. Another commenter, ECTA, hired Navigant Economics to compare the Environ studies and the EPA analysis of Tier 3 impacts and concluded that the results, although not directly comparable, are largely consistent and that the projected incremental benefits of Tier 3 vastly exceed the incremental costs. Another commenter, Alliance and Global, noted that both the June 2013 Environ study and a 2013 Bloomberg Government ("BGOV") "Regulatory Analysis of EPA's Tier 3 rule" focus on one co-benefit of sulfur reduction without addressing the totality of other co-benefits.

What Commenters Said:

Commenter: American Fuel & Petrochemical Manufacturers (AFPM); American Petroleum Institute (API); Marathon Petroleum Company LP (MPC)

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 PM2.5 concentrations of no more than 0.1 μg/m3 in contrast to a maximum incremental reduction of 2.7 μg/m3 in mean monthly PM2.5 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 PM2.5 of 0 - 0.05 μg/m3 in years 2017 - 2030. It should be mentioned that the current ozone and PM2.5 NAAQS are 75 ppb and 12 μg/m3, 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.

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 (NOx), 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, NOx 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 SO2 and direct PM2.5 of 92% and 19%, respectively, attributable to the adoption of Tier 2, compared with additional reductions in SO2 and direct PM2.5 of 64% and 5%, respectively, as a result of Tier 3. It should be noted that the absolute level of SO2 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 occurred (and are expected to continue) as a result of Tier 2. 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.

Similarly, ENVIRON concluded that incremental reductions in the monthly mean of ambient PM2.5 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 PM2.5 concentrations of no more than 0.1 µg/m3 in contrast to a maximum incremental reduction of 2.7 µg/m3 in mean monthly PM2.5 ambient levels under the federal Tier 2 program.

Commenter: Emissions Control Technology Association (ECTA)

Most recently, on June 6, 2013, the American Petroleum Institute (API) released a study prepared by ENVIRON International Corporation which concluded that relative to Tier 2, Tier 3 would only deliver small benefits in terms of PM2.5 reduction. The implication is that Tier 3 is not justified because it will deliver small marginal environmental benefits. We strongly disagree with this conclusion.

At ECTA's request, Dr. Hal Singer of Navigant Economics performed a review of ENVIRON's study to assess its creditability. Dr. Singer compared the ENVIRON analysis with EPA's analysis presented in the proposed rule and concluded that the results are largely consistent. He also concluded that the point estimate of 2022 used in the ENVIRON study is misleading because it does not reflect the full environmental benefit of PM2.5 reductions achieved under the rule. Only a portion of the fleet will be upgraded to tighter Tier 3 standards by 2022. EPA's analysis shows that a significant environmental benefit from Tier 3, in terms of PM2.5 reductions, will not be achieved until 2030 when 80% of the light-duty fleet is Tier 3 compliant. ENVIRON was silent on the projected benefits from Tier 3 in 2030.

At your request, I have reviewed ENVIRON's study of the projected benefits from Tier 3, and I compared its major results against those of the EPA. ENVIRON estimates that relative to emissions reduction attributable to Tier 2, by 2022Tier 3 would reduce emissions from PM2.5 by only 3 percent, and would reduce the monthly mean 24-hour PM2.5 concentrations in the Eastern portion of the United States by less than 0.1 micrograms per cubic meter (µg/m3). Because these incremental reductions in PM2.5 are relatively smaller than the reductions achieved by Tier 2, the ENVIRON study gives the impression that Tier 3 might not be justified.

To survive a cost-benefit test, however, there is no reason why Tier 3 must deliver the same benefits as Tier 2; rather, Tier 3 need only deliver incremental benefits in excess of incremental costs. EPA's analysis shows that the proposed benefits of Tier 3 by 2030 would exceed the proposed costs by between $4 and $20 billion. Thus, opponents of Tier 3 need to show that EPA's benefits by 2030 are overstated by between $4 and $20 billion. Yet the ENVIRON study is silent about the projected benefits from Tier 3 in 2030.

Moreover, the ENVIRON study does not even imply that Tier 3-related benefits by 2030 would be significantly less than EPA's estimated benefits. As demonstrated below, there appears to be no material difference in the projected incremental benefits of Tier 3 (relative to Tier 2) between the ENVIRON study and the EPA study. Because ENVIRON's estimated reductions by 2022 are larger than those of EPA by 2017 but smaller than those of EPA by 2030 (with the exception of NOx), it is conceivable that the implied social benefits from the ENVIRON study in 2030 exceed those of EPA.

For whatever reasons, the ENVIRON study focused on environmental benefits achieved by 2022, just five years after the implementation of the proposed rules in 2017. As EPA correctly explained, however, it is mistake to look for PM2.5-related benefits before Tier 3-compliant vehicles represents a majority of the fleet: "Reductions in direct emissions of PM2.5are projected to result solely from the proposed vehicle tailpipe standards, so meaningful reductions are realized mainly as the fleet turns over". Indeed, the ENVIRON study expressly allows for the possibility of further reductions in PM2.5 after 2022, yielding larger social benefits: "The main limitation of this study is introduced by the lack of complete phase-in of the LEV III standard by 2022, the basis year for comparing emission standards. Some additional improvements in PM2.5 beyond 2022 are expected as the LEV III standard fully matures". By providing benefits for 2022 only, the ENVIRON study makes it difficult to compare its results with those of EPA, which presented benefits in 2017 (the first year of implementation) and in 2030 (when 80 percent of the light-duty fleet are Tier 3-compliant).

With this caveat in mind, it is possible to compare the projected benefits across the two studies. The ENVIRON study estimates incremental benefits by 2022 with partial LEV III technology penetration of 8%, 7%, 11%, 64% and 5% in VOC, CO, NOx, SO2, and PM2.5 emissions, respectively, from CONUS emissions of light-duty vehicles. The projected reductions in emissions decline to 6%, 7%, 5%, 50%, and 3% in VOC, CO, NOx, SO2, and PM2.5, respectively, when expressed as a share of emissions from all "on-road vehicles". By comparison, the EPA projects reductions by 2017 of 3%, 4%, 8%, 51%, and 0.1% in VOC, CO, NOx, SO2, and PM2.5 emissions, respectively; by 2030, EPA projects reductions of 23%, 30%, 28%, 51% and 10% in VOC, CO, NOx, SO2, and PM2.5 emissions, respectively.

Accordingly, ENVIRON's projected 3% decline in PM2.5 emissions by 2022 is consistent with EPA's estimates of 0.1% decline by 2017 and 10% decline by 2030.The same is true of ENVIRON's projected declines in VOC and CO emissions, which also are larger than EPA's estimates for 2017 but smaller than EPA's estimates for 2030. There is effectively no difference in the two estimates for SO2. Accordingly, the only so-called inconsistency across the two studies is for NOx; but even here the projected differences are small (5% for ENVIRON in 2022 versus 8% for EPA in 2017).

In summary, unless and until ENVIRON produces emission-reduction estimates for 2030 attributable to Tier 3, it is difficult to compare the projections of the two models. As the record currently stands, the two models are largely consistent, and the projected incremental benefits of Tier 3 still vastly exceed the incremental costs.

Commenter: Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

In the past few weeks, two analyses have been published that critique EPA's Proposed Tier 3 and Proposed Gasoline Sulfur Standards. Both of these analyses are flawed because they "cherry pick" one co-benefit of sulfur reduction and over-focus on it, without addressing the totality of other co-benefits.

Automaker Response to ENVIRON Modeling Study on EPA Tier 3 Impact on PM2.5 Air Quality – On June 20, 2013, API announced a new modeling study by ENVIRON International Corporation which concludes that pending EPA Tier 3 regulations, including the proposed reduction of one part of the current EPA market gasoline sulfur standard (the "refinery annual average" limit) from 30 to 10 ppm, would do little to reduce fine particulates (PM2.5) by 2022, at least in summertime in the U.S. eastern states:
"Overall, the modeling results suggest that large improvements in summertime ambient ground-level PM2.5 concentrations occur in the eastern US as a result of the switch from Tier 1 to Tier 2 standards. However, relatively small additional reductions in 2022 PM2.5 concentrations are predicted to result from the transition to a Federal standard similar to the California LEV III standard, even when considering emissions reductions due to a lower gasoline sulfur content in the LEV III scenario. These results are due to one or both of the following factors depending on the pollutant: (1) the change in emissions between the Tier 2 and LEV III scenarios is relatively small compared to the change between the Tier 1 and Tier 2 scenarios, and (2) the Tier 2 LDV emissions of PM2.5 precursors constitute a relatively small fraction of the total inventory. In particular, in the case of the PM2.5 precursor that experiences the largest relative reduction from the Tier 2 to LEV III scenarios, SO2, on-road LDV emissions constitute only 0.2% of the total anthropogenic inventory and hence SO2 LDV emission reductions result in small ambient PM2.5 benefits.

The main limitation of this study is introduced by the lack of complete phase-in of the LEV III standard by 2022, the basis year for comparing emission standards. Some additional improvements in PM 2.5 beyond 2022 are expected as the LEV III standard fully matures. In addition, this study does not address wintertime PM2.5 benefits."

(Emphasis added), Sec. 3.2, p. 19, 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, Project No. 06-31891A.

ENVIRON's Conclusion Fails to Address Full Co-benefits of Tier 3 and Reduced Gasoline Sulfur: In addition to the very important limitations of the ENVIRON study acknowledged at the end of the report's conclusion, it is misleading to focus on only one co-benefit of market gasoline sulfur reduction (in this case reduction of S02 as a precursor to PM2.5 vehicle emissions) without acknowledging the entire suite of significant additional co-benefits resulting from EPA's proposed Tier 3 standard and more stringent market gasoline sulfur standard. These include reducing various other vehicle emissions of concern, and enabling more fuel efficient vehicle technologies. Use of ENVIRON's findings requires appropriate additional context. Likewise, discussions of regulatory costs must be viewed in terms of the totality of the benefits.

ENVIRON's modeling analysis compares the effects of EPA emission standards and reductions in market gasoline sulfur on PM2.5 precursor exhaust emissions in Tier 1 vs. Tier 2 standards, compared with Tier 2 vs. proposed Tier 3 (represented by California LEV III) scenarios for one season and one geographic area. Unfortunately, the conclusion focuses on only one among many co-benefits.

SO2, as one precursor to PM2.5, will in fact increase year round, if the sulfur content of the fuel is enough to "poison" the catalyst. Sulfur coats the surface and also chemically impairs the catalyst action on the exhaust, preventing it from capturing three other key exhaust emissions, NOX (Nitrous Oxides), CO (Carbon Monoxide), and VOCs (Volatile Organic Compounds -- precursors for Ozone and smog formation in the atmosphere) and converting them into nitrogen, carbon dioxide and water. Reliable catalytic converter action is critical to meeting tough new vehicle tailpipe emission limits. EPA's own new study data confirm the benefits of reducing gasoline sulfur for in use Tier 2 vehicles, even below the new reductions EPA has proposed (See EPA Regulatory Impact Analysis, Draft EPA 420-D-13-003). Tier 3 would bring national gasoline sulfur closer to California, Japan, and EU levels.

Finally, the proportion of SO2 as a PM2.5 precursor from vehicle emissions was reduced under the study's modeling scenarios by 92% between Tier 1 and 2, and by 64% between Tier 2 and 3, both considerable achievements for air quality across the nation. In any event, under both sets of scenarios, the vehicle emission contributions to PM2.5 have always been overshadowed by other anthropomorphic sources, so there is nothing really new here from an EPA policy standpoint. In addition, when you also consider the cumulative outcome adding ENVIRON's own Tier 3 projections of other reductions in vehicle emissions, 11% for NOX, 7% for CO, and 8% for VOCs, and 5% for PM2.5 (and only to 2022, not even later years when additional reductions would occur) plus the vehicle technology advancements promoted by reduction of gasoline sulfur from Tier 3, the error in highlighting just SO2 or PM2.5 outcomes becomes obvious. That said, we agree that NAAQS and State Implementation Plans should continue to include reductions from stationary sources where the cost/benefit is justified.

Automaker Response to BGOV Regulatory Analysis of EPA's Tier 3 Rule: On June 13, 2013, a Bloomberg Government ("BGOV") "Regulatory Analysis of EPA's Tier 3 rule" © Bloomberg 2013, Bloomberg Finance LP, was published that, among other things, found "...SO2 reductions achieved by Tier 3 will be relatively expensive, with a cost of nearly $76,500 a ton of S02 reduced" and ends saying "Bloomberg Government's analysis finds that Tier 3 will have a costly but minimal impact on certain pollutants targeted by the rule and that the health benefits are possibly overstated based on recent academic research. Also, viewing sulfur independently, would yield more cost-effective ways of meeting Tier 3's proposed requirements."

As with the ENVIRON report conclusion, you cannot disaggregate one co-benefit of gasoline sulfur reduction for analysis (e.g., its reduction of SO2 vehicle emissions) from the entirety of all the emission benefits from reducing sulfur in marketplace gasoline. Since you cannot logically isolate the benefits for only one component of the exhaust without counting the benefits for the other components, it is erroneous to assign the entire annualized cost of the sulfur reduction to just one component benefit (i.e., taking $1.3B \17,000 tons of SO2 reduction to reach $76,500) which strongly overstates the proportionate cost. The Tier 3 benefits of reducing sulfur would not only enable prospective reductions for future vehicles, the reduction in market fuel would also reduce emissions in the existing fleet and in other types of engines.

Commenter: Environmental Defense Fund (EDF)

In addition to overstating the costs of Tier 3, API erroneously claims that Tier 3 will not generate any health benefits. Despite numerous independent, credible analyses, API has said that there would be no benefits in reduced ozone or PM2.5 from Tier 3 versus Tier 2. However, their ozone and PM assessments, conducted by ENVIRON International Corp., are seriously flawed and misleading, and both underestimate the significant benefits of the Tier 3 program. Both analyses estimate the benefits for the year 2022, instead of 2030 when the benefits of Tier 3 will be more fully realized.

Commenter: National Association of Clean Air Agencies (NACAA)

NACAA strongly supports EPA's Tier 3 proposal to further strengthen the federal program to regulate emissions from passenger cars and light trucks and lower sulfur levels in gasoline. We are so supportive because we know of no other strategy that can achieve such substantial, immediate and cost-effective reductions in air pollution as Tier 3.

Our Response:

The air quality impacts predicted to result from the Tier 3 rule are significant. As NACAA pointed out, these air quality improvements are greater than could be achieved by any other known, practical measure in the same timeframe. As described in Chapter 8 of the RIA, these air quality improvements will provide the public with very significant health benefits and the benefits of the final standards clearly outweigh the costs. In addition, as pointed out by the Alliance and Global, the benefits of the rule come from the entire suite of emissions reductions due to reducing sulfur in fuel, not just the reduction in SO_2 from on-road vehicles.

3.2.3. Inadequate Technical Justification - Air Quality Impacts

What Commenters Said:

Commenter: American Fuel & Petrochemical Manufacturers (AFPM), American Petroleum Institute (API) and Marathon Petroleum Company LP (MPC)

API and AFPM submitted a report from Sierra Research in support for their comments.[22] The Sierra report included two comments on Air Quality Impacts (see Section 7 of Sierra report). The first comment pertains to EPA's model performance evaluation and the second comment pertains to the grid size for EPA's air quality analysis.

Based on the data presented by EPA, the agency's evaluation of model performance shows that the model generated acceptable predictions of overall ozone and PM concentrations. However, EPA failed to evaluate how well the model predicts VOC to NOx ratios or model responsiveness to reductions in VOC, NOx, and/or PM emissions. This is an important issue because uncertainty and compensating errors in the emission inventories and other inputs to the air quality model make it possible for model performance in predicting ozone and PM concentrations to be acceptable even if the model cannot accurately predict responses to emission reductions. Given that the point of the modeling analysis is to assess the air quality impacts of the emission reductions estimated to result from the Tier 3 proposal, EPA's failure to perform this evaluation is a major flaw.

That there are large uncertainties in projected mobile source emission inventories is highlighted by the large changes in those inventories whenever emission modeling software is updated. Most recently, the release of the MOVES model increased motor vehicle emissions considerably and altered VOC/NOx emission ratios. Uncertainty in emissions and in model response to emission reductions is largest in urban areas where motor vehicle emissions are concentrated, so the ability of the Tier 3 modeling to adequately respond to Tier 3 emission reductions is also very uncertain in the absence of a meaningful evaluation of this issue by EPA. In addition to failing to evaluate the performance of the model in response to changes in emissions, EPA also failed to assess the role and relative importance of NOx or VOC emission reductions in reducing ambient ozone concentrations or the role of PM, VOC, and NOx emission reductions in reducing ambient concentrations of PM2.5. As is well known, depending on the VOC/NOx ratio, NOx emission reductions can either increase or decrease ambient ozone concentrations. In addition, NOx emission reductions can significantly impact PM2.5 formation. In the absence of any assessment of the role and importance of NOx emission reductions, it is impossible to determine the air quality benefits of the Tier 3 proposal in general and the proposed reductions in gasoline sulfur levels in particular.

The motor vehicle NOx emissions targeted by the Tier 3 proposal are concentrated in urban centers where NOx reductions are less effective in reducing ozone; therefore, understanding the model's response to NOx is particularly important for this rulemaking. An example of how the complicated relationship between NOx and ozone, ozone trends, and sensitivity to hydrocarbon emission control could have been evaluated by EPA can be seen in an evaluation conducted in Atlanta, Georgia. That analysis found a local source of ozone produced by the Atlanta urban area superimposed on an elevated regional background. Effects of NOx reductions were complicated and dependent on meteorology and location. NOx control was judged effective in reducing the regional background, but VOC control was more effective in controlling ozone produced locally in the urban plume. Again, EPA's failure to assess this issue makes it impossible to determine the air quality benefits of the Tier 3 proposal.

[22] Sierra Research, June 2013/. Assessment of the Emission Benefits of U.S. EPA's Proposed Tier 3 Motor Vehicle Emissions and Fuel Standards. Prepared for: American Petroleum Institute.

Another approach to evaluating the performance of the model in responding to changes in emissions is to focus on the variation of emissions from weekdays to weekends, which provides a real-world test of emission inventories and modeling. Emissions of ozone precursors are lower on weekends, primarily due to changes in the patterns of motor vehicle use. Observations of weekend and weekday ozone provide very relevant real-world data with which to evaluate the impact of motor vehicle emissions on air quality, yet the Tier 3 RIA does not even include any discussion of weekend/weekday ozone, much less an assessment. The potential impact of this approach can be seen in a recent study of Detroit and Atlanta motor vehicle emissions with the MOVES model, which found that motor vehicle emissions of NOx were 23.7% lower on Saturdays and 49.9% lower on Sundays in compared to weekdays, while VOC decreased by 7% on Saturdays and 20% on Sundays. These weekend motor vehicle NOx emission reductions are of the same order as those projected by the Tier 3 regulations. Another recent modeling study of the weekend/weekday phenomena in the Midwest found that weekend emissions generally resulted in lower ozone over most of the modeling domain, but higher ozone locally in two urban areas, and that NOx reductions on the weekend were responsible for the weekend/weekday ozone differences.

Weekend ozone levels have decreased relative to weekday levels recently, and there is now little difference in weekend and weekday ozone in most areas of the country as noted in a recent study completed by Environ. The study authors note that precursors of ozone have decreased significantly and that NOx emission reductions have been larger, leading to an increase in VOC/NOx ratios. The faster decline in NOx emissions is a result of regulations that targeted the largest stationary NOx sources in the eastern half of the U.S. (acid rain rules, NOx SIP call, CAIR rules). Currently, most urban areas have similar ozone on weekends and weekdays even though NOx emissions from motor vehicles are much lower on weekends. This indicates that mobile source NOx emission reductions do not have a large effect on ozone near urban areas, which is a critical issue with respect to the Tier 3 proposal that EPA has failed to address.

Our Response:

The CMAQ model evaluation performed for the Tier 3 rule is consistent with prior agency rulemakings, such as the 2017-2025 Light-Duty Vehicle Greenhouse Gas Emission Standards Final Rule (77 FR 62624, October 15, 2012).

There is no independent way to evaluate the impact of VOC and NOx emissions sensitivities on CMAQ projections since they cannot be isolated in the real world. However, there have been several studies which evaluate the sensitivity of the system as a whole to emissions reductions (called dynamic evaluation). Numerous dynamic evaluations of CMAQ's ability to simulate the change in air quality resulting from emissions reductions have been conducted and summarized in the peer-reviewed literature. For instance, Napelenok et al (2011) concluded that the CMAQ model "is able to reproduce the observed change in daily maximum 8-hour ozone levels" at the majority of locations when emissions uncertainty is considered. Other dynamic evaluations (Zhou et al., 2013, Godowitch et al., 2010, Gilliland et al., 2008, Godowitch et al., 2007) have suggested that CMAQ may be a conservative estimate of the air quality improvements resulting from emissions reductions. Overall, the ozone, $PM_{2.5}$, air toxics concentrations and nitrate and sulfate deposition model performance results for the 2005 CMAQ simulations performed for the Tier 3 proposed rule are within the range or close to that found in other recent applications. The model performance results, as described in this report, give us confidence that our applications of CMAQ using this 2005 modeling platform provide a scientifically credible approach for assessing ozone and PM2.5 concentrations for the purposes of the Tier 3 rule.

EPA and other community modeling efforts have long-established that NOx controls are the primary mechanism for reducing ozone levels regionally and that VOC reductions can lead to more local reductions within specific urban areas (NRC 1991, US EPA 2010, and US EPA 2013). This finding points to the need for a combined NOx and VOC reduction strategy to reduce ozone levels over the U.S. The Tier 3 proposal has been shown by EPA's fully-evaluated modeling analyses to reduce ozone in a significant way over large parts of the U.S.

In addition, the recently released second draft of the ozone Risk and Exposure Assessment (available at: http://www.epa.gov/ttn/naaqs/standards/ozone/s_o3_2008_rea.html) evaluated ozone changes that would occur with NOx reductions alone versus what would occur with combined NOx and VOC reductions.

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What Commenters Said:

Commenter: American Fuel & Petrochemical Manufacturers (AFPM), American Petroleum Institute (API) and Marathon Petroleum Company LP (MPC)

Many studies have shown that ozone formation and sensitivity to NOx control depend on the size of the modeling grid. In the Tier 3 NPRM modeling analysis, a uniform 12 km modeling grid is used to cover the entire United States. The effect of modeling grid size on model predictions was not evaluated by EPA.

The 12 km grid is likely to be adequate outside of urban areas and large point sources where pollutant gradients are weak. However, the 12 km grid is inadequate to resolve pollutant concentrations in urban areas where spatial gradients are large. This leads to an overestimation of mixing in urban centers and an underestimation of NOx inhibition effects. Higher grid resolution is particularly important for the Tier 3 NPRM because strong motor vehicle emission sources—such as major highways and urban centers—are poorly resolved by a 12 km grid and the benefits of NOx control near motor vehicle emission sources is likely to be overestimated. This overestimation will be carried over into the population exposure modeling and amplified due to the large population density in the poorly resolved urban areas.

Our Response:

The use of a 12km grid resolution is appropriate when evaluating regional- to national-scale emission reduction impacts (http://www.epa.gov/ttn/scram/guidance/guide/final-03-pm-rh-guidance.pdf) as was done in the Tier 3 analysis. Use of a 12 km grid resolution is also consistent with prior agency rulemakings, such as the NOx SIP Call rulemaking. (63 FR 57356, (October 27, 1998).(See also, Michigan v. EPA, 663 F.3d 663 (D.C. Cir., 2000). The credible model performance reported in the operation model evaluation (http://www.epa.gov/otaq/documents/tier3/454r13006.pdf) confirms that 12km resolution modeling provides a good representation of the physical and chemical processes important to simulating ozone concentrations. Recent work analyzing the accuracy of 12km resolution 2007 CMAQ simulations compared to equivalent 4km resolution simulations showed no systematic improvement in model performance at the finer 4km resolution compared to the 12km resolution (Dolwick et al, 2013). An additional study analyzing ozone response to NOx emissions reductions at 12km and 4km resolutions (Simon et al, 2013), showed similar regional patterns in ozone changes at the two resolutions and also did not show any systematic difference in ozone response to NOx cuts at 12 vs. 4 km resolutions when looking across all sites in the Northeastern US over the entire 2007 ozone season.

References:
Dolwick, P., Baker, K., Kelly, J., Misenis, C., Phillips, S., Possiel, N., Simon, H., Timin, B. Comparison of CMAQ model performance over the Northeast United States as a function of grid resolution (12km vs 4km) for a 2007 annual model simulation, Community Modeling and Analysis Annual Conference, Chapel Hill, NC, October 2013: http://cmascenter.org/conference/2013/agenda.cfm
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What Commenters Said:

Commenter: American Fuel & Petrochemical Manufacturers (AFPM), American Petroleum Institute (API) and Marathon Petroleum Company LP (MPC)

API and AFPM submitted a report from Sierra Research in support for their comments.[23] The Sierra report included the following comment on speciation profiles, see Section 6.3.2 of Sierra report, which we've addressed here.

Another area of importance are the speciation profiles for headspace vapors of E0, E10, and E15 that were used by EPA in conjunction with the air quality modeling analysis. EPA developed new speciation profiles for the Tier 3 analysis[101,102] using headspace measurements from a subset of EPAct test program fuels. No attempt was made, however, to determine if these research fuels are representative of commercial fuels.

The E0, E10, and E15 headspace profiles were each created by averaging headspace measurements from two of the EPAct fuels. One fuel in each pair was low in aromatics (15 vol.% nominal) and the other high (35% vol. nominal). The E10 and E15 headspace profiles were also used to create the E15 evaporative emissions profile by taking the ratio of E15/E10 for each hydrocarbon species and applying the ratio to the existing E10 profile.

Unfortunately, there are differences in the detailed composition of the EPAct fuels that cause speciation differences that are not related to ethanol content. These differences could create a bias when comparing air quality impacts of E0, E10, and E15. The distribution of individual aromatics differs between fuels in an unexpected manner. For instance, the E15 fuel has higher benzene and toluene headspace concentrations compared to the E10 fuel, but lower concentrations of other aromatics like propyl- benzene. It would be preferable to generate the profiles from composited commercial fuels or to perform a simple correction based on ethanol content.

Our Response:

This rule does not compare air quality impacts of different ethanol blends so this comment is beyond the scope of this rule.

3.2.4. Tier 3 Proposal Analysis Overstates the Air Quality Benefits of Reducing Vehicular NOx Emissions in Urban Areas

What Commenters Said:

Commenter: American Fuel & Petrochemical Manufacturers (AFPM), American Petroleum Institute (API) and Marathon Petroleum Company LP (MPC)

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

[23] Sierra Research, June 2013/. Assessment of the Emission Benefits of U.S. EPA's Proposed Tier 3 Motor Vehicle Emissions and Fuel Standards. Prepared for: American Petroleum Institute.

(CAAA) than without. EPA attributed this to NOx 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 NOx 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).

Our Response:

The CMAQ model used to project changes in ozone from the Tier 3 standards accounts for interactions between photochemistry, background concentrations of ozone, VOC and NO_X, local emissions and meteorology. As described in Chapter 7.2.4.1.1 of the RIA, there is one county in 2018 that is projected to have an increase in modeled ozone design value concentration (Cuyahoga County, OH, where Cleveland is located). When NO_X levels are relatively high and VOC levels relatively low, NO_X forms inorganic nitrates (*i.e.*, particles) but relatively little ozone. In addition, NOx can react directly with ozone resulting in suppressed ozone concentrations near NOx emissions sources. Such conditions are called "NO_X-saturated." Under these conditions, VOC reductions are effective in reducing ozone, but NO_X reductions can actually increase local ozone under certain circumstances. We believe that this is the case in Cuyahoga County in 2018. In 2030, when the fleet would be composed of vehicles meeting the new standards and the NO_X and VOC emissions reductions are larger, this ozone disbenefit is eliminated, and the design values for all the modeled counties are decreasing.

Our analysis is consistent with OMB and internal guidelines for conducting national-level regulatory impact analyses.

3.2.5. Tier 3 Rule will Increase PM2.5 Levels in 10 Nonattainment Counties

What Commenters Said:

Commenter: Chevron

By 2030, the Tier 3 rulemaking will actually increase PM2.5 levels in 10 nonattainment counties. This 'disbenefit' effect is due to reductions in reactive precursor species (like NOx) which can often result in increases in the secondary pollutants ozone and PM.

Our Response:

The increases in PM levels that were reported in the proposed rule were due to a series of conservative assumptions and uncertainties related to fuel parameters in 2017, and also an emissions processing issue which erroneously increased direct PM emissions in about one third of modeled counties, see Chapters 7.2.4.2.3 and 7.1.3.2.2 of the DRIA for the proposed rule. EPA noted that we did not believe these increases would actually occur. This was corrected for the final rule and as noted in Chapter 7.2.4.2.3 of the RIA, we do not expect that any increases in $PM_{2.5}$ will occur.

3.2.6. Mobile Source Air Toxics Reductions are Based on Antiquated Data

What Commenters Said:

Commenter: American Fuel & Petrochemical Manufacturers (AFPM), American Petroleum Institute (API) and Marathon Petroleum Company LP (MPC); Truck and Engine Manufacturers Association (EMA):

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 a 2005 National Air Toxic Assessment (2005 NATA) 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.

The second error of note is EPA's allocation of the percentage of outdoor air toxics that can be ascribed to mobile sources. EPA cites the 2005 NATA in claiming that mobile sources account for "43 percent of outdoor toxic emissions and over 50 percent of the cancer risk and non-cancer hazard associated with primary emissions." (*See* 78 Fed. Reg. at 29837.) As in the case of EPA's erroneous premise pertaining to UFPs, EPA's assertion regarding the percentage of air toxics associated with mobile sources is premised on outdated and overstated data.

More specifically, in attempting to justify a contemporary rulemaking using 2005 data, EPA is, in effect, ignoring the remarkable advancements that have been made in reducing motor vehicle emissions, especially heavy-duty vehicle emissions, subsequent to 2005. As evidenced by the findings of Phases 1 and 2 of the Advanced Collaborative Emissions Study (ACES), of which EPA is a co-funder, emissions of criteria pollutants and air toxics have been reduced across the board by up to 99% from new technology diesel engines ("NTDEs"). (*See*, *e.g.*, Presentation of Imad Khalek (SwRI) to the CRC Real World Emissions Workshop, April 2013.)

Moreover, of the more than 14 million on-road diesel vehicles in operation today, more than 40% are NTDEs, and more than 60% of the miles driven by diesel vehicles are driven by NTDEs. (*See*, *e.g.*, Presentation of Dan Greenbaum at HEI Annual Conference, April 2013.) That remarkable rate of penetration of NTDEs since 2007 (the date of introduction for most NTDEs) has had a very significant effect on the aggregate emissions of air toxics that can be ascribed to mobile sources. EPA should account for these developments as they significantly undercut (as the Agency should have hoped) the premise for the current rulemaking.

Our Response:

Contrary to the commenters' assertions, the reductions in mobile source air toxics estimated to result from the Tier 3 standards are not derived from the 2005 NATA database. They were modeled for this rule using the MOVES model, taking into account impacts of Tier 2 vehicle and fuel standards, MSAT2 regulations, and all other mobile source programs currently in place. See Chapter 7.1.2 of the draft RIA for a list of rules included in the inventory analysis for the proposed rule and Memorandum to Docket: Updates to MOVES for the Tier 3 NPRM Analysis (March 11, 2013, Docket EPA-HQ-OAR-2011-0135) for information on the air toxics updates included in MOVES for the proposed rule. Furthermore, the version of the MOVES model used in the Tier 3 analysis relies on emissions data from the ACES program to model toxic emissions from 2007 and later diesel engines.

3.2.7. Mobile Source Air Toxics Tables are Confusing

What Commenters Said:

Commenter: American Fuel & Petrochemical Manufacturers (AFPM), American Petroleum Institute (API) and Marathon Petroleum Company LP (MPC)

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.

Our Response:

Table III-1 presents reductions in onroad inventories and Table III-12 presents changes in ambient concentrations of pollutants. Table III-12 is presenting the percentage of the population that is projected to experience various percent changes in ambient concentrations of each of the air toxics due to the Tier 3 standards. Adding the rows in the benzene column that are associated with a percent change of at least 2.5 % gives an answer of 81%.

3.2.8. EPA Should Use a Well-to-wheels, Lifecycle Basis for Gasoline and Ethanol Air Quality Impacts

What Commenters Said:

Commenter: American Fuel & Petrochemical Manufacturers (AFPM), American Petroleum Institute (API) and Marathon Petroleum Company LP (MPC)

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 [EPA-HQ-OAR-2011-0135-4276-A2] 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.

Our Response:

EPA did use a well-to-wheels approach, and accounted for impacts of increased use of ethanol on emissions associated with fuel production and distribution. Details of the approach can be found in a memorandum to the docket (Development of Air Quality Reference Case Upstream and Portable Fuel Container Inventories for Tier 3 Proposal, Memorandum from Rich Cook, December 12, 2012). The commenter also recommends EPA use AEO 2013. EPA is using AEO 2013 for its final rule analysis. EPA disagrees with the assertion that it has overstated the Tier 3 benefits.

3.2.9. State of Hawaii Should be Exempted from the Standards

What Commenter Said:

Commenter: Chevron:

Additionally, Tier 3 requirements are not justified by expected air quality improvements in certain unique climates like that of Hawaii. We propose that, because the Tier 3 requirements are costly and are highly unlikely to have a beneficial impact to the air quality, the state of Hawaii should be exempted from the program.

Our Response:

The Tier 3 rule will reduce emissions of NOx, SOx, PM and VOCs in Hawaii. These emission reductions are expected to reduce ambient concentrations of ozone, PM, NOx and SOx which will positively impact human health as well as visibility, deposition and ozone-related harm to vegetation. Air quality impacts were not able to be modeled in HI due to the size of the air quality modeling domain, not because we thought that air quality improvements were unlikely.

3.3. Health and Environmental Effects of Criteria and Air Toxics Pollutants

3.3.1. Tailpipe Reductions Will be Offset by Increases in Emissions from Refineries

What Commenters Said:

The commenter is concerned about increases in emissions near refineries, particularly in environmental justice communities. This commenter is concerned that tailpipe reductions will be offset by emissions increases from refineries. The commenter is also specifically concerned that the sulfur removed from gasoline will be emitted to the air as SO2.

Commenter: Concerned Citizens Around Murphy

Our Response:

Overall, the Tier 3 rule will deliver significant emissions and air quality benefits to communities across the U.S., including environmental justice communities, especially as a result of the near-roadway emissions reductions that will begin occurring in 2017.

While Tier 3 standards will result in very large emission reductions from both new and existing vehicles, the additional gasoline hydrotreating will also cause a relatively small increase in emissions at the refinery. EPA analyzed these impacts in detail using our refinery-by-refinery analysis and concluded that even in the worst case, the emissions would be sufficient to cause only a small number of refineries to trigger the need for new permits (see Section V.K of the preamble and Chapter 5.4 of the RIA). Concerns that the sulfur removed from the gasoline might increase emissions of SO2 are unfounded, as the process of desulfurizing the gasoline results in elemental (solid) sulfur being removed, which is then sold as a byproduct by the refinery for other purposes.

In all cases both minor and major NSR permit applications are subject to public comment. For any federal NSR permit applications submitted to EPA Regional Offices, we are committed to assisting members of the local EJ communities in understanding the applications and our proposed permits, in offering comment, and participating in our decisions, consistent with our EJ2014 implementation plan, Considering Environmental Justice in Permitting.

See http://www.epa.gov/environmentaljustice/resources/policy/plan-ej-2014/plan-ej-permitting-2011-09.pdf

3.3.2. Benefits of this Rule that are Based on Reduction in UFP are Erroneous

What Commenter Said:

Commenter: Truck and Engine Manufacturers Association (EMA)

As with most of its significant rulemakings impacting mobile sources, the Preamble to the Tier 3 Rule provides an overview of EPA's perspective on the potential health impacts of air pollution, including the air pollution constituents that are emitted from motor vehicles. (78 Fed. Reg. at 29829-29850.) While a detailed response to all of EPA's "overview" is beyond the scope of these comments, there are two clear errors in EPA's health impacts assessment that should be corrected and accounted for in the Agency's final rulemaking documents.

The first error relates to EPA's assertions regarding the purportedly unique health impacts that can be ascribed to ultrafine particles ("UFPs"). EPA cites its own Integrated Science Assessment ("ISA") published in 2009 as support for its assertions. (78 Fed. Reg. at 29831.) However, and contrary to EPA's claims, more recent work published by the Health Effects Institute ("HEI") in January 2013 – HEI Perspectives 3, "Understanding the Health Effects of Ambient Ultrafine Particles" – has shown that the available data do not support a conclusion that UFPs play any unique or significant role in engendering potential adverse health effects. In that regard, the overall conclusions of HEI's expert panel bear repeating:

While selected [animal exposure] studies show evidence for UFP effects, the current evidence, when considered together, is not sufficiently strong to conclude that short-term exposures to UFPs have effects that are dramatically different from those of larger particles....There are no long-term animal exposure studies of UFP health effects.

One explanation that must be considered for the [epidemiologic] results to date is weakness in the true underlying relationship between UFP exposures and adverse effects – that the null hypothesis being tested by these studies is true.

The available observational study designs have also not been able to clearly demonstrate whether UFPs have effects independent of those for related pollutants….No epidemiologic studies of long-term exposures to ambient UFPs have been conducted.

Toxicological studies in animals, controlled human exposure studies, and epidemiologic studies to date have not provided consistent findings on the effects of exposures to ambient levels of UFPs, particularly in human populations. The current evidence does not support a conclusion that exposures to UFPs alone can account in substantial ways for the adverse effects that have been associated with other ambient pollutants such as PM2.5. (HEI Perspectives 3, p. 5.)

Thus, to the extent that the proposed Tier 3 Rule is premised on any projected amelioration of the health effects ascribed to ambient exposures to UFP, that purported justification for the rulemaking is unfounded and in error, as evidenced by the scientific findings developed subsequent to EPA's 2009 ISA. As a result, EPA should correct that error in the Agency's final rulemaking record.

Our Response:

EMA comments that any projected benefits of this rule that are based on reduction in UFP are erroneous. The quantified PM-related benefits associated with this rule are based on reduction in emissions that affect ambient concentrations of PM2.5 mass, not UFP. Reduction in UFP concentrations is not a significant premise for the Tier 3 standards. However, we qualitatively summarize EPA's most current assessment of UFP health effects, reported in the 2009 ISA, as part of our broader summary of evidence related to PM health effects in Section II.B.2 of the preamble to the final rule.

EPA will consider the HEI publication as part of its review of the larger body of evidence for PM health effects when developing the next PM ISA during the next review of the PM NAAQS. The HEI study does not substantively change our assessment of the benefits associated with the Tier 3 rule.

4. Proposed Vehicle Emissions Program

4.1. LD Exhaust Standards

4.1.1. General

4.1.1.1. Comments Generally Supportive of the Proposed Standards and Program

What Commenters Said:

Consumers Union

New car buyers will also benefit. Starting in 2017, new cars will have tighter limits on tailpipe emissions, including carbon monoxide and benzene, which can linger in garages and even attached residential living space (4). The proposed rule also offers automakers an incentive to go beyond the minimum 8-year/ 80,000-mile warranty currently required for emissions control systems, and extend it to 15-years/150,000 miles for new vehicles. This move could improve reliability and lower costs to maintain emissions control systems.

Pennsylvania Department of Environmental Protection (DEP)

The proposed vehicle standards would reduce tailpipe and evaporative emissions from passenger cars, light-duty trucks, medium-duty passenger vehicles, and some heavy-duty vehicles. These proposed vehicle standards are intended to harmonize with California's Low Emission Vehicle program, creating a federal vehicle emissions program that would allow automakers to sell the same vehicles in all 50 states.

DEP supports EPA's proposed Tier 3 emission standards for vehicles. The proposed standards would be met by vehicle manufacturers beginning in model year 2017 and phasing in through later model years. Vehicles sold in states such as Pennsylvania that have adopted light-duty vehicle emission standards promulgated by California Air Resources Board (CARB) will be meeting the same standards for model year 2015 and later vehicles. States that adopted CARB light-duty vehicle standards comprise nearly 50 percent of the national market for these vehicles. Technological developments in the automotive field that have already occurred or that are in the developmental pipeline as a result of CARB and EPA efforts will allow automobile manufacturers to effectively meet these more stringent standards for NOx, VOC, and PM2.5 by the year 2021.

Southern California Association of Governments (SCAG)

SCAG supports efforts to minimize emissions from vehicles, and has included a regional clean freight corridor system in the recently adopted 2012-2035 Regional Transportation Plan/Sustainable Communities Strategy. SCAG has also been active with our partner agencies in Plug-in Electric Vehicle readiness planning.

Our Response:

EPA acknowledges the general comments in support of the proposed standards.

4.1.1.2. Harmonization with CA LEVIII Standards

Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

And I also want to thank the California Air Resources Board for its role in coordinating with EPA to help ensure harmonization of the LEV III and Tier 3 regulations.

So why do auto makers support this proposal? Well, Tier 3 brings a harmonized approach, as you've heard today. It builds upon the successes we've had in the national greenhouse gas and fuel economy programs. It stays true to the simple principle of providing the cleanest vehicles to everyone nationally. And it provides the fuels that we need.

American Honda Motor Co., Inc.

Much has been said during the past few years about the importance of regulatory harmonization. With near unanimity, the auto industry supported the 2012-2016 and 2017-2025 vehicle greenhouse gas standards, in large part because it represented a national, unified solution to a complex set of competing federal and state standards. Honda produces a wide range of vehicles for an equally wide demographic of buyers that requires multidimensional considerations about what to produce, how many to produce, the cost to produce our products, and where those models will most likely be purchased. Having to deal with competing federal and state regulatory requirements only complicates those decisions further.

As the EPA considers setting Tier 3 vehicle emissions and fuel requirements, we urge the agency to harmonize – to the greatest extent possible – with California's LEV III regulations, including certification fuel characteristics and market fuel characteristics. Doing so would enable one fleet of vehicles to meet all U.S. regulations, substantially easing both the regulatory burden and cost of complying – letting us provide our customers greater affordability – and allowing us to design our vehicles to maintain consistent performance and emissions durability across the nation.

One of the more important regulatory achievements of this administration has been its actions to harmonize the federal fuel economy and vehicle greenhouse gas regulations with those of California. A harmonized set of tailpipe emissions and fuel regulations would complement a key objective laid out by President Obama in the May 21, 2010 White House memorandum. It states: "The national program should seek to produce joint Federal standards that are harmonized with applicable State standards, with the goal of ensuring that automobile manufacturers will be able to build a single, light-duty national fleet." We couldn't agree more. Honda urges the agency to finalize a set of standards that offers the greatest degree of harmonization with state standards, as well as to ensure that the fuel operated in these vehicles will accommodate the advanced emissions control systems needed to meet the proposed standards.

Honda urges the Agency to finalize a set of standards that offers the greatest degree of harmonization with State standards, as well as to ensure that the fuel operated in these vehicles will accommodate the advanced emissions control systems needed to meet the proposed standards.

BMW of North America, LLC

BMW commends EPA for their collaboration with ARB and with the automakers toward a single national program for criteria pollutants in developing the complex regulation proposal which will substantially impact emissions for vehicles beyond a decade to 2025.

In addition to improving air quality across the country, a single national program of harmonized standards would allow for wise financial and resource investments by the auto industry, as well as increased energy security for the nation.

Through a variety of ground breaking engine technologies, BMW has substantially decreased the criteria emissions of its fleet since the adoption of Tier 2 Motor Vehicle Emission Standards. BMW has maintained a leading role in deploying innovative engineering solutions to meet the challenge of stricter emission standards: BMW engines have won numerous engine awards among others for High Precision Direct Injection, twin-scroll turbocharger, and BMW Valvetronic fully variable valve control.

To that end, compliance flexibility and adequate lead time are two key factors which can create the required boundary conditions for development of innovative and creative engineering solutions and achievement of product maturity aimed to meet ambitious emissions standards.

50-State Certification and Harmonization Tier 3 / LEV III: BMW strongly supports one of the primary goals in the Tier 3 regulation - harmonization of the federal and the California criteria emission programs. Any continuation of two different standards needs to allow the manufacturers the possibility to choose between the standards and mutual recognition. Harmonization is still needed for ARB and U.S. EPA in the areas of vehicle standards, test procedures, and certification processes in order to establish a common set of vehicle criteria emission standards nationwide.

California Air Resources Board (CARB)

The California Air Resources Board (CARB) is fully supportive of the proposed Tier 3 federal test procedure (FTP) and supplemental federal test procedure (SFTP) requirements. With a few exceptions, the proposed requirements mirror the Low- Emission Vehicle (LEV III) requirements effectively addressing manufacturers' concerns regarding compliance with both national and California emission programs. In order to further harmonize program requirements of both agencies, CARB intends to align the LEV III rule with a number of the Tier 3 FTP and SFTP requirements after Tier 3 is finalized as noted below and offers the following comments on the proposal.

CARB shares U.S. EPA's goal of reducing vehicle emissions to improve air quality. Despite significant progress in reducing smog-forming and particulate matter emissions from the passenger vehicle fleet, California needs further reductions in order to meet state and federal ambient air quality standards. To help achieve these standards, CARB adopted the Low-Emission Vehicle (LEV III) regulations last year as part of our Advanced Clean Cars program. The Advanced Clean Cars program combines the control of smog-causing pollutants and greenhouse gas emissions into a single coordinated package of requirements for model years 2015 through 2025 and assures the development of environmentally superior cars that will continue to deliver the performance, utility, and safety vehicle owners have come to expect.

CARB is mindful of the cooperative effort between CARB and U.S. EPA in the development of the new vehicle exhaust: emission standards for California's LEV III program and the federal Tier 3 program. It is our intent to evaluate the Tier 3 rule once it is finalized to determine where it is appropriate to further align the LEV III regulation with the federal rule, without sacrificing the stringency and emission benefits of the LEV III program. Since any delay in finalizing Tier 3 would potentially impact the implementation date of this important program, CARB urges U.S. EPA to proceed, expeditiously to finalize the program before the end of this year. We also look forward to continue working with U.S. EPA in an attempt to resolve any remaining differences between the two programs after the Tier 3 regulations are finalized.

Our primary goal continues to be improving air quality in California. To this end, California has a separate and unique Zero-Emission Vehicle Program, which we will, continue to pursue in order to ensure the prompt and successful deployment of advanced technology zero-emission vehicles. Accordingly, any determination of the extent to which it would be appropriate for California to incorporate elements of the Tier 3 program into our light-duty vehicle program would need to take into consideration our ability to sustain progress towards California's long term plans for transforming the vehicle fleet for reduction of criteria pollutants. In addition, any modifications to the LEV III program must be structured to assure that the emission reductions provided by the California program will be maintained.

Chrysler Group LLC

Chrysler strongly supports harmonization of the federal Tier 3 regulations with California LEV III regulations. As such, we urge EPA to make the necessary adjustments as suggested below and as suggested in the Alliance's comments to truly achieve the goal of One National Criteria Emissions Program that includes one certification fuel with harmonized test procedures and certification processes.

Cummins Inc.

In this rulemaking, EPA proposes to coordinate its Tier 3 program for reduction of tailpipe and evaporative emissions closely with California's LEV III standards and with EPA's and California's greenhouse gas requirements for light-duty vehicles. Cummins strongly supports the goal of harmonization with California and other requirements. Consistency between EPA and California programs would allow manufacturers to design products for 50 states and help avoid the additional costs of parallel design, development, calibration, and manufacturing.

Ford Motor Company (Ford)

Harmonization: Consistent with the approach taken in the One National Program (ONP) for Corporate Average Fuel Economy (CAFE) and Greenhouse Gas (GHG), the proposed Tier 3 rule is closely aligned with California's Low Emission Vehicle (LEV III) emissions program. This alignment will allow automakers to design and build a single model that can be tested once and sold nationally. We appreciate the significant efforts made by both EPA and California Air Resource Board (CARB) to harmonize the Tier 3 and LEV III requirements, and we encourage the Agencies to continue to work with Industry to minimize any remaining differences in the two programs, while retaining the interim provisions finalized in LEV III.

I want to thank EPA and the California Air Resources Board for their efforts to harmonize regulations to improve air quality. Ford supports this effort, and will continue working to improve air quality while harmonizing standards.

Tier 3, working in concert with LEV III, helps provide clean vehicles to all 50 States. It allows auto makers to design and build a single model rather than two versions meaning different requirements, test and certify a national vehicle one time. And importantly, it provides a step towards the fuels needed to meet these standards.

We appreciate the significant efforts made by EPA, both EPA and CARB, to harmonize Tier 3 and LEV III rules, and we encourage the Agency to continue to work with industry to minimize remaining differences in the two programs.

General Motors LLC (GM)

GM appreciates the efforts of EPA and the California Air Resources Board (CARB) staffs working together and with industry toward a harmonized national program for criteria emissions, with the goal of enabling manufacturers to design, develop, certify, build, and sell the same clean vehicles throughout all fifty states. This will allow our engineers to focus on a single emissions control system for criteria emissions, and builds upon the single national program for greenhouse gas (GHG) emissions and fuel economy (FE). A national approach is especially important given the scope of the challenges we are facing today to meet increasingly stringent GHG/FE standards and other regulatory requirements while simultaneously needing to meet all customer demands in an intensely competitive market.

One of the biggest challenges in integrating the California LEV III program into a national program occurs during the first couple of years of the program. Transitioning from a program covering about a third of nationwide volume to a national program covering 100% of nationwide volume presents challenges in ramping up both the exhaust and evaporative requirements to national levels.

These approaches will move us to a national program as soon as practicable and facilitate compliance based on a single 50-state fleet rather than separate compliance determinations for California/177 States versus the remaining U.S. states. GM supports such a 50-state compliance approach, not just for the FTP NMOG+NOx fleet average and the evaporative phase-in, but for other fleet averages and phase-ins as well including the SFTP fleet average, evaporative fleet average and 3 mg/mi PM phase-in.

That brings me to the key reason we are here today, working closely with the EPA and the other stakeholders to achieve a harmonized and appropriate structure Tier 3 program. The establishment of a single national standard for fuel economy and CO2 regulation was quite simply a much needed breakthrough that will enable more timely and efficient introduction of technologies customers, manufacturers, and regulators want to succeed.

We know that EPA and California are committed to further reducing tailpipe criteria emissions, and in order to achieve the level of reduction proposed, our vehicles will be so clean there will be no reason to have competing regulatory requirements.

Our precious engineering resources are already stretched thin, and requiring them to design, develop, and certify two of everything I think we can all agree is counterproductive. We need to be able to focus on developing one of everything, which we can then sell throughout the U.S. to provide everyone here the cleanest vehicles in the world. A harmonized Tier 3 program properly structured can achieve this.

Hyundai Motor Group

As you know, this harmonization is very important for us and the auto industry as it allows us to design to one national standard. Additionally, we have found it very beneficial that EPA was willing to provide many opportunities to meet with industry and other stakeholders to discuss the provisions of the rule while they were under development.

As I mentioned already, Hyundai Motor Group is pleased with EPA's efforts to align the Tier 3 rule with CARB's LEV III program. It's challenging to meet different requirements for various regulatory agencies, particularly when it comes to testing. Having one consistent national standard will increase laboratory throughput in addition to design and development cost savings.

We realize that there are challenges in adopting the same provisions as CARB, but we hope that EPA and CARB will continue to work together to try to resolve as many of the remaining differences as possible.

Manufacturers of Emission Controls Association (MECA)

MECA applauds EPA for developing a Tier 3 proposal that will establish a national set of exhaust and evaporative emission standards for light-duty and medium-duty vehicles by largely harmonizing their proposal with California's LEV III requirements.

Johnson Matthey

Furthermore, California has already set in motion its own tightened emission limits known as LEV III, which are very similar to the Tier 3 proposal. This means our industry already has no choice but to implement technologies for LEV III that will clearly also meet the Tier 3 proposed limits. Thus, the adoption of the Tier 3 proposals would bring efficiencies to the industry by having one common set of emissions to achieve for the U.S. market.

Mid-Atlantic Regional Air Management Association Inc. (MARAMA)

By harmonizing vehicle emission standards across the country, Tier 3 would facilitate compliance by automobile manufacturers. The automobile manufacturers support Tier 3 because it enables them to harness economies of scale by deploying advanced emission control technologies in all new vehicles sold nationwide.

Mitsubishi Motors R&D America, Inc (MRDA)

We believe that harmonization with the California LEV Ill Program (LEV Ill) must be EPA's top priority when finalizing this rulemaking. As EPA notes numerous times in the proposed rulemaking, it is extremely important to automotive manufacturers that a single fleet of vehicles can be designed and produced for all 50 states, and be in compliance with the Tier 3, LEV III, and Federal Greenhouse (GHG) and Corporate Average Fuel Economy (CAFE) requirements. Although EPA indicates that harmonization with LEV III is a guiding principle in developing these proposed regulations, there are still significant gaps that remain in achieving this necessary goal. A harmonized program would allow manufacturers to develop cost-effective processes and to deploy advanced technology vehicles in meeting these standards. Smaller companies, like Mitsubishi Motors, have less financial resources and fewer vehicle lines to implement major changes in a cost-effective manner, which makes the proposed compliance flexibilities (phase-ins, early credits, interim in-use standards, etc.) outlined in the NPRM extremely important.

Mitsubishi Motors supports the intent to harmonize the proposed Tier 3 program with California's LEV III program.

Motor & Equipment Manufacturers Association (MEMA)

The EPA's proposal is mindful of other regulatory frameworks and compliance regimes. Efforts to harmonize Tier 3 vehicle emission requirements nationwide and to choreograph the timing of Tier 3 implementation with the final rules for greenhouse gas (GHG) emissions and corporate average fuel economy (CAFE) standards for light-duty vehicles are critical for interconnected and highly complex vehicle manufacturing supply chains. Also, EPA's integrated systems approach to vehicles and fuels, combined with the alignment to other parallel regulations, is practical and cost-effective. Companies and government entities alike will benefit from the resulting outcomes, such as streamlined costs for R&D and production and reduced burden for multiple, overlapping testing and compliance protocols. Since the timing of this rule is critical, it is important that EPA not delay its completion. If delayed, the benefits of synchronizing the timing of the GHG emissions, CAFE standards, and other programs will be lost and may negatively impact the states in achieving their respective air quality goals.

MEMA urges EPA to fully consider the public comments, particularly from the vehicle manufacturers. In addition, EPA must continue to collaborate with states, like California, and other stakeholders to avoid divergent policy pathways and competing regulatory regimes.

MEMA recommends that the Agency promulgate a final rule by end of 2013 in order to match with other regulatory requirements standards affecting MY 2017 vehicles.

National Automobile Dealers Association (NADA)

Harmonized Emissions Mandates, Lead Time, Durability and Other Technical Standards: Last year, the California Air Resources Board (CARB) finalized its Low Emission Vehicle (LEV) III regulations. In order to minimize compliance costs and maximize compliance flexibilities, EPA's final Tier 3 regulations should encourage if not mandate that CARB harmonize with the federal scheme. Among other things, this means that fleet average emissions compliance should be based on a manufacturer's nationwide sales. (See also 4.1.5.8 re: nationwide compliance demonstration.)

New York State Department of Environmental Conservation

New York has a long history of adopting California's motor vehicle emissions control programs to achieve its air quality objectives. New York most recently adopted the California Advanced Clean Cars emissions program, which included the LEV III standards, in 2012 to achieve and maintain reductions of criteria and greenhouse gas pollutant emissions.

Tier 3 should be harmonized with LEV III as quickly as possible.

The Department strongly supports this effort to harmonize federal emissions standards with California's technology forcing LEV III standards. In order to maximize the air quality benefits of harmonization, as well as reduce the industry compliance burden, Tier 3 should reach LEV III stringency as quickly as possible.

Northeast States for Coordinated Air Use Management (NESCAUM)

By harmonizing vehicle emission standards with those in the California program, Tier 3 would facilitate compliance by automobile manufacturers, enabling them to harness economies of scale by deploying advanced emission control technologies in all new vehicles sold nationwide.

Pennsylvania Department of Environmental Protection (DEP)

DEP also supports EPA's efforts to harmonize a national emission standard program with CARB's emission standards. This harmonization will allow automobile manufacturers to design, produce and test vehicles that meet the same standard by the year 2021. The automobile manufacturers also appear to support this effort because they recognize that some cost-savings benefits will result from producing vehicles meeting the same national standard. Clearly, harmonized programs would be significantly beneficial for both the environment and consumers.

The EPA should harmonize the phase-in of light-duty vehicles in the Tier 3 program with CARB's LEV III Program. While EPA's proposal would result in the same emission standards for model year 2025, the phase-in schedule lags slightly behind the schedule finalized by California. Given the issues with fleet turnover limiting emission benefits and the fact that manufacturers would already have developed the technology for light-duty vehicles to meet the schedule that California is setting, EPA should finalize an emission standard phase-in that is harmonized nationally.

Nevertheless, DEP has concerns about ... some elements of the proposed Tier 3 program that are not harmonized with California's Low Emission Vehicle III Program. DEP requests that EPA examine and address these issues before finalizing the Tier 3 rule.

Respiratory Health Association (RHA)

Harmonizing Federal standards with California vehicle emission standards will bring deserved and equitable relief from local pollution beginning in 2017. Late is better than never, and the proposed Tier 3 rules uses a smart systems approach that treats fuel and the engine as intertwined. It is the most cost-effective way to tackle the problem posed by the emissions for millions of vehicles, and it will improve the lives and health of people living with or who face increased risk of lung disease. We need EPA to finalize the strongest Tier 3 standards possible.

Southern California Association of Governments (SCAG)

SCAG appreciates EPA's efforts to harmonize the national vehicle tailpipe and evaporative emission and gasoline fuel sulfur content standards with California standards.

SCAG also applauds EPA's close coordination with California's programs for greenhouse gas emissions from light-duty vehicles.

There appears to be some differences between the proposed Tier 3 standards and California's LEV III Regulations and California gasoline sulfur content standards. While acknowledging the complexities and nuances of these programs, harmonization of the proposed Tier 3 with the California program is important from a business and manufacturer continuity perspective. We believe that such harmonization may yield savings to California residents through the efficiencies of scale in the production of vehicles that meet one national standard.

Truck and Engine Manufacturers Association (EMA)

In this rulemaking, EPA proposes to coordinate its Tier 3 program for reduction of tailpipe and evaporative emissions closely with California's LEV III standards and with EPA's and California's greenhouse gas ("GHG") requirements for light-duty vehicles. EMA fully supports the goal of harmonization with California's standards and other emissions-related requirements. Indeed, EMA has long supported harmonized, nationwide programs for regulating emissions from heavy-duty engines and vehicles. For example, most recently, EMA supported – and continues to support – nationwide harmonization of the OBD program for heavy-duty vehicles as well as a single national program for reducing GHG emissions.

In the context of the Proposed Tier 3 Standards, EMA supports harmonization where such standards are technologically feasible and reasonable in light of the myriad requirements facing manufacturers now and in the near future. At the same time, EPA must recognize the inherent need for adequate leadtime and so must provide sufficient time for the implementation of any new, aligned standards as well as an adequate period of stability between standard changes to provide manufacturers an opportunity to recoup the investment required to meet the new standards. Consequently, EPA must continue to work with California to assure the coordinated and timely implementation of changes in California's regulations where needed to achieve desired 50-state harmonization.

- Assure full alignment between EPA and ARB standards where reasonable and feasible, while meeting EPA's obligations to finalize regulations that are both technologically feasible and provide the necessary and required leadtime and period of stability

As you know, EMA and its members have been long-time proponents of regulatory alignment in the United States and beyond. We urge ARB and CARB to work together to assure that LEV III and Tier 3 are aligned in both intent and practice.

U.S. Coalition for Advanced Diesel Cars

However, it is vitally important that the Tier 3 rule and its implementation schedule be harmonized with the California LEV 3 program so vehicle manufacturers and their suppliers can focus their innovation, investments and related efforts on delivering clean advanced technology cars and trucks to a national market.

Volvo Car Group

VCG supports the effort of the EPA to work with the California Air Resources Board (CARB) towards a possible harmonization of the Tier 3 and LEVIII program.

It is therefore extremely important that the EPA, CARB and the industry continue to work together to achieve harmonization.

Our Response:

EPA received numerous comments favoring close harmonization between the existing California LEV III program and Tier 3 from a wide range of commenters, including vehicle manufacturers, suppliers, auto dealers, states, NGOs, and private citizens. The Tier 3 standards we are finalizing are closely coordinated with the LEV III program to create a vehicle emissions program that will allow automakers to sell the same vehicles in all 50 states.[1] We have worked closely with individual vehicle manufacturers and their trade associations, who have emphasized the importance of a harmonized national program. Together, the Tier 3, 2017 LD GHG, and LEV III standards will maximize reductions in criteria pollutants, GHGs, and air toxics from motor vehicles while streamlining programs and enabling manufacturers to design a single vehicle for nationwide sales, thus reducing their costs of compliance. In this way, the Tier 3

[1] In December 2012 EPA approved a waiver of Clean Air Act preemption for the California Air Resources Board's (CARB's) LEV III program with compliance beginning in 2015. Twelve states adopted the LEV III program under Section 177 of the Clean Air Act. These states include Connecticut, Delaware, Maryland, Maine, Massachusetts, New Jersey, New York, Oregon, Pennsylvania, Rhode Island, Washington, and Vermont.

program responds to the May 21, 2010 Presidential Memorandum that requested that EPA develop a comprehensive approach toward regulating motor vehicles, including consideration of non-GHG emissions standards.[2]

We worked closely with CARB and the vehicle manufacturers, the latter both individually and through their trade associations, to align the two programs. The Tier 3 program is identical to LEV III in most major respects for light-duty vehicles (and heavy-duty vehicles, as described in the preamble and in this Summary and Analysis of Comments document). The levels and timing of the declining fleet-average NMOG+NO_X standards are identical to those in LEV III. Also, the final Tier 3 emissions bins to which manufacturers will certify individual vehicle models in order to comply with the fleet-average standards are also identical to those in LEV III. Similarly, the light-duty Tier 3 FTP PM standards and percent phase-in match those for LEV III through MY 2024.

Some commenters observed that there are a few light-duty Tier 3 and LEV III provisions that are different. For example, the LEV III program and the Tier 3 program have different light-duty PM requirements late in the program (i.e., after MY 2024 (see Section IV.A.3.b. of the preamble)), and the two programs have different final NMOG+NO_X standards for small volume manufacturers (Section IV.G.1). We are finalizing a revised SFTP (US06) PM standard, and CARB has indicated in their comments that it plans to take similar action in near future. Also, LEV III currently does not include an evaporative emissions leak test and standard; CARB has indicated in their comments that they plan to adopt such requirements after Tier 3 is finalized. CARB also indicated in their comments that they intend to consider several additional actions to further align several minor aspects of LEV III with the Tier 3 program once Tier 3 is finalized.

Beyond the provisions mentioned above, the differences between the programs are not major and most will exist only in the transitional years of the Tier 3 program. These additional differences result from the fact that the LEV III requirements begin slightly earlier and that a limited phase-in of some provisions is necessary for a smooth transition to overall aligned programs. These temporary differences include the process for how early compliance credits are generated and used (e.g., preamble Section IV.A.7.a); how quickly manufacturers will need move toward certifying all of their vehicle models to longer useful-life values (e.g., Section IV.A.7.c) and on the new test fuel (e.g., Section IV.A.7.d); and transitional emissions bins to facilitate the transition from Tier 2 to Tier 3 (Section IV A.7.n).

Because of these temporary differences between Tier 3 and LEV III, some commenters encouraged EPA to consider lead time and flexibility provisions to facilitate compliance as they relate to the period before the transitional provisions are harmonized. As discussed in the preamble and elsewhere in this document, we believe the proposed program design, as revised in light of such comments, address these concerns of the commenters.

4.1.1.3. Treating Vehicles and Fuels as a System

[2] The Presidential Memorandum is found at: http://www.whitehouse.gov/the-press-office/presidential-memorandum-regarding-fuel-efficiency-standards.

What Commenters Said:

Ford Motor Company (Ford)

Once again, I appreciate the opportunity to provide testimony today here. Ford will continue working to improve air quality while harmonizing standards in order to meet these challenging emissions control requirements. Treating fuels and vehicles as a system continues to be essential to achieving our collective air improvement goals.

Motor & Equipment Manufacturers Association (MEMA)

Also, EPA's integrated systems approach to vehicles and fuels, combined with the alignment to other parallel regulations, is practical and cost-effective. Companies and government entities alike will benefit from the resulting outcomes, such as streamlined costs for R&D and production and reduced burden for multiple, overlapping testing and compliance protocols. (See also 4.1.1.2).

Mercedes-Benz USA, LLC on behalf of Daimler AG

Treating the fuel as part of the system in total criteria emissions and Green House Gas (GHG) reduction is an important acknowledgement by the EPA that improvements proposed by the Tier 3 rulemaking are possible when all contributing factors are examined and optimized.

Our Response:

We agree with the commenters that treating vehicles and fuels as an integrated system is an important aspect of the Tier 3 program design. In fact, we believe that this "systems approach" is critical for the program to achieve its expected benefits. Section IV.A.6 of the preamble discusses in more detail the relationship between fuel sulfur levels and the ability of vehicles to meet the Tier 3 exhaust emission standards.

4.1.1.4. Interaction of Tier 3 Program with GHG Program

What Commenters Said:

Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

In many cases, GHG emissions reductions directly compete with criteria emissions reductions in the vehicle design. Recognizing the goal of aggressive, simultaneous reductions in GHGs and criteria emissions, automakers have worked with agency staff to develop a program that allows a technically feasible and cost-effective introduction of advanced technology vehicles. However, notwithstanding the research and dialogue that has taken place, it is impossible to accurately predict the pace of invention and innovation, the future fuel supply and pricing, or, most importantly, consumer purchasing behavior. Consequently, we suggest that the mid-term review for the 2017-25 GHG/CAFE rule consider how the implementation of the GHG/CAFE rule is impacting automakers' ability to achieve the Tier 3 requirements and vice-versa.

Ford Motor Company (Ford)

We also encourage the agencies to evaluate the effects on new test fuel and new procedures on fuel economy and greenhouse gas emissions. This evaluation should consider both near-term impacts associated with the phase-in period of the new fuel and procedures, and the long-term implications of 2017 through 2025, One National Program.

Looking forward, there are other significant elements regarding future fuels and ultimately engine design which can have a large impact on greenhouse gas compliance. The unprecedented increase in CAFE standards and the associated greenhouse gas requirements are driving a dramatic reduction or downsizing in engine size and number of cylinders.

Pennsylvania Department of Environmental Protection (DEP)

The EPA should consider whether reducing sulfur levels in gasoline reduces or increases back pressure in pre-Tier 3 vehicles' exhaust systems, and then determine whether fuel economy is affected positively or negatively.

If using 10 ppm sulfur gasoline in vehicles that were previously using 30 ppm gasoline eliminates sulfur deposition on a catalyst substrate, a small change in exhaust system backpressure should result. Depending on whether there is an increase or decrease in backpressure, the vehicle's fuel economy would either be enhanced or harmed. EPA should consider this in this rulemaking.

Our Response:

As discussed throughout the final rule, EPA has designed the final Tier 3 program in full recognition of the parallel implementation of the GHG standards in the same 2017-2025 time frame. By aligning the implementation schedules for both sets of standards, we are facilitating the ability of manufacturers to meet one of their stated goals, the ability to develop product plans that simultaneously account for the technological challenges of both programs well into the future. We considered the feasibility of the Tier 3 standards in the context of the established GHG requirements.

As part of the 2017-2025 GHG standards rulemaking, EPA committed to a midterm evaluation of the GHG standards for model years 2022-2025, in coordination with the California Air Resources Board and the National Highway Traffic Safety Administration. EPA will be making a determination as to whether the 2022-2025 GHG standards remain appropriate under section 202(a) of the Clean Air Act. In making this determination, EPA will consider a number of factors relevant to setting GHG standards, such as technology effectiveness, costs, leadtime, feasibility, and other relevant factors (see 40 CFR 86.1818-12(h)). It is important to note that the midterm evaluation is focused on the GHG standards for MY 2022-2025; there is not a midterm evaluation of the Tier 3 standards.

Regarding the consideration of the potential impact on GHG emissions and fuel economy of sulfur deposition on catalysts, we are aware of no information to indicate a relationship between fuel economy/GHG emissions and sulfur deposition related to back pressure increases.

4.1.1.5. Form of the Standards

What Commenters Said:

Children's Environmental Health Network (CEHN)
The phase-in goals for NMOG+NOx should be calculated on a per-vehicle basis (as is proposed for the Tier 3 PM FTP standards) as opposed to the proposed fleet-wide basis (which would allow manufacturers to offset higher-emitting vehicles with extra-clean models). All vehicles should be held to a per-vehicle emissions standard in order to best protect children's health.

Our Response:

We proposed the NMOG+NOx standards in terms of corporate fleet averages. We believe that this fleet-average approach affords manufacturers some flexibility to choose which technologies to implement and on what timeline, limited by the phase-in schedule and the increasingly stringent declining standards in this rule. We believe that this is an efficient way to achieve even greater AQ and health benefits than a per-vehicle approach. We believe the fleet average standards will provide greater AQ benefits because, when combined with the ability to generate credits, the fleet average incentivizes manufacturers to achieve additional reductions in the early years of the program when the standards are the least stringent.

In contrast, the per-vehicle standards we are finalizing for PM are not intended to force increasing technological improvements over time, but rather to bring all new vehicles to the levels being achieved by many vehicles today. In that context, fleet averaging is not appropriate, since our intent is for all vehicles individually to meet the standard.

We note that the Tier 3 rule will result in very significant health benefits, including specific benefits to children, as described in Section VIII.B of the preamble. We are finalizing the form of the standards as proposed.

4.1.2. Levels of the Standards

4.1.2.1. General Comments on Level of the Standards

4.1.2.2. 120,000 Useful Life Standards

What Commenters Said:

Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global):

The CAA is equally clear in prohibiting EPA from setting durability requirements beyond 120,000 miles for vehicles less than 6,000 pounds GVWR. CAA § 207(c)(5)(B) states that the full useful life for vehicles below 6,000 pounds GVWR is 120,000 miles. In the proposed rule, EPA recognizes that the statute does not allow it to set durability requirements beyond 120,000 miles for vehicles less than 6,000 pounds GVWR. To avoid the statutory requirement, EPA again proposes two compliance options for these vehicles. One of these options is viable for manufacturers, and the other one complies with the CAA durability limit:
a. 150,000 mile durability: Manufacturers can choose to certify all of their vehicles below 6,000 pounds GVWR to the 150,000 mile fleet average standard that is harmonized with LEV III fleet average.
b. 120,000 mile durability: A manufacturer can choose to certify a test group to the CAA authorized 120,000 mile durability. However, in doing so, the manufacturer must meet a fleet average for its entire fleet below 6,000 pounds GVWR that is 15 percent lower than the 150,000 mile fleet average.

Again, EPA has created an alternative compliance option that is so punitive that it effectively forces manufacturers to comply with the option that violates the CAA. As discussed above regarding the NMOG+NOx phase-in, EPA cannot avoid compliance with the CAA by offering an alternative option that meets the statutory requirements, but is so burdensome that, in practice, it will restrict manufacturer's choices and require compliance with the option that violates the statute. As explained above, several courts have held that when an agency provides a regulatory scheme where only one option is truly viable, the remaining option becomes a mandate.

In this case, option (b) above is unduly onerous, because a manufacturer's decision to certify even one test group to 120,000 mile durability would trigger the requirement that the manufacturer's entire light-duty fleet is held to a more stringent durability standard. The structure of this alternative makes it clear that EPA's intent is to drive all manufacturers to certify to 150,000 mile durability.

The California LEV III requirements are based on 150,000-mile durability standards, and manufacturers are seeking harmonization between the Tier 3 and LEV III requirements. Even though the California durability requirement is not consistent with the durability limits set forth in the CAA, this is still no reason for EPA to either 1) violate the requirements of the CAA, or 2) impose another Hobson's choice on manufacturers.

We agree that a vehicle certifying to 120,000-mile durability should meet a more stringent standard than a vehicle certifying to 150,000-mile durability. Therefore, it is appropriate for EPA's rules to provide that EPA will accept certification of vehicles to 150,000-mile durability at the CARB standards. The rules should also provide that manufacturers may certify vehicles to 120,000-mile durability at a standard that is 85% of the proposed 150,000-mile bin standard. For such vehicles, the fleet average would be calculated using the corresponding 150,000-mile bin standard. This approach complies with the CAA without confronting manufacturers with an onerous choice.

Recommendation: We recommend that vehicles certifying to 120,000 mile durability be required to meet a "bin" standard that is 85% of the 150,000 mile bin. For calculation of the fleet average, the bin emissions would be the corresponding 150,000 mile bin value. For example, a vehicle that certified to 120,000 mile Bin 30 would need to meet a 26 mg/mile standard, both at certification and in use. In calculating the fleet average, the vehicle would be considered a 30 mg/mile vehicle.

Chrysler Group LLC:

The CAA precludes EPA from requiring manufacturers to certify their vehicles that are less than 3,750 pounds loaded vehicle weight (LVW) and 6,000 pounds GVWR beyond a useful life of 120,000 miles (35). EPA acknowledges this in the preamble to the proposed rule. Notwithstanding this clear statutory requirement, EPA proposes a regulatory structure that will effectively force manufacturers to certify all of their vehicles to a useful life of 150,000 miles. Specifically, EPA again thwarts the CAA by proposing two compliance options — one that does not comply with the CAA's 120,000 useful life limitation but offers a reasonable compliance standard, and another that provides the required statutory useful life protection but for which compliance is so stringent that no reasonable company would ever choose it.

Under the more favorable 150,000-mile useful life compliance option, manufacturers may choose to certify all of their vehicles below 3,750 pounds LVW and 6,000 pounds GVWR to the 150,000 mile fleet average tailpipe emissions standard (in contravention of the CAA) that is set at a reasonable stringency and is harmonized with the LEV III fleet average standard. Under the unfavorable 120,000 mile useful life option, a manufacturer may choose to certify a test group to the CAA-authorized 120,000 mile useful life standard. However, if a manufacturer opts to certify even a single test group to the 120,000 mile useful life standard (the sole useful life authorized by the CAA), it must meet an unreasonably much more stringent fleet average standard for all of its vehicles that are less than 3,750 pounds LVW and 6,000 pounds GVWR that is 15 percent lower than the 150,000 mile fleet average standard.

As with the NMOG+NOx phase-in requirements for heavy-duty vehicles, EPA has created an alternative compliance option that is so punitive that it effectively forces manufacturers to comply with the option that violates the CAA. As detailed in footnote 35, the CAA prohibits EPA from establishing a 150,000 mile useful life emissions standard for light-duty vehicles and light-duty trucks of less than 3,750 pounds LVW. And, as discussed above, EPA cannot simply circumvent the clear statutory limitation on useful life to 120,000 miles for vehicles less than 3,750 pounds LVW and 6,000 pounds GVWR by offering an alternative option that meets the statutory requirements but is so burdensome that, in practice, it will restrict manufacturers' choices and require compliance with the option that does not comply with the plain terms of the statute. Again, EPA's dual-path approach impermissibly eviscerates the statutory limitations in the CAA. Providing a significantly more burdensome alternative compliance path that meets the statutory requirements does not, and cannot, remedy the fact that the primary compliance path violates the statute.

As a general matter, Chrysler supports EPA's attempts to harmonize standards in the Tier 3 rules with the California LEV III standards, which, as relevant here, require all vehicles to comply with a 150,000 mile useful life standard. However, Congress has restricted EPA in what it can do under the CAA, and, absent an act of Congress, again, EPA cannot thwart the statutory protections contained therein. Thus, although EPA can incentivize manufacturers to certify to a 150,000 mile useful life standard to be consistent with the LEV III program, EPA cannot penalize manufacturers for refusing to do so (37). Moreover, the regulatory scheme EPA proposed cannot be characterized as an "incentive" to manufacturers to accept a 150,000 mile useful life standard. Rather, for the reasons discussed below, the alternative compliance option EPA proposed is a penalty on manufacturers that wish to adhere to the statutory limitation to a 120,000 mile useful life standard for vehicles less than 3,750 pounds LVW and 6,000 pounds GVWR. This penalty has two aspects:

First, EPA proposes to adopt a 120,000 mile useful life NMOG+NOx emission standard that is 85 percent of the respective NMOG+NOx 150,000 mile standard. There is no sound scientific basis for reducing the standard by 15 percent simply because the useful life is reduced from 150,000 to 120,000 miles. To the contrary, the available data suggest that vehicle degradation flattens out considerably after 100,000 miles and, consequently, the difference in degradation-related emissions between a vehicle that has accumulated 120,000 miles and a vehicle that has accumulated 150,000 miles is less than 15 percent. Catalyst degradation data obtained in connection with an evaluation of Chrysler aftertreatment systems indicate that the difference in degradation is instead approximately 10 percent. In any case, EPA may not arbitrarily establish a more stringent standard for the 120,000 mile useful life, without undertaking a quantitative analysis of emissions degradation from 120,000 to 150,000 miles that correlates to the magnitude of the more stringent standard for vehicles certified at 120,000 miles useful life. Accordingly, imposing a 150,000 mile useful life standard and a 15 percent more stringent 120,000 mile useful life standard are by no means equivalent from an emissions control standpoint and do not provide manufacturers a realistic choice. Instead, it appears that EPA is creating a 120,000 mile useful life standard that is artificially and unreasonably stringent—by requiring emissions reductions that are far disproportionate to the benefit that would result from accepting a 150,000 mile useful life—in order to force manufacturers to select the illegal 150,000 mile useful life option.

Second, EPA proposes to require that where manufacturers select the 120,000 mile useful life option for even a single vehicle model—and even if that specific vehicle model is unique in some respect or is produced in limited quantities—they must certify all of their light-duty vehicles and light-duty trucks to the 15 percent more stringent 120,000 mile useful life NMOG+NOx emissions standards (See footnote). For example, if Chrysler determines that it needs to retain a 120,000 mile useful life for its Dodge Viper specialty car, which constitutes approximately 0.1% of its total U.S. sales volume, it must meet 15 percent more stringent standards for its entire fleet. As with the NMOG+NOx phase-in standards for heavy-duty vehicles discussed above, this regulatory scheme, which sweeps in a manufacturer's entire fleet if the manufacturer opts to pursue the 120,000 mile useful life option for a single vehicle model, is a penalty imposed on manufacturers that refuse to forego their statutory protections. And, as discussed above with respect to heavy-duty lead time, there is no rational basis for penalizing a manufacturer's entire vehicle fleet simply because the manufacturer opts for the 120,000 mile useful life for a single model or test group, which it may need to do out of necessity. There is no rational relationship between the insignificant increase in emissions resulting from the one model subject to the shorter useful life and the unreasonable and onerous emissions limitation that would be imposed across the entire fleet. Such a poison pill or hammer is so unreasonable that it can only be understood as a penalty for retaining the shorter useful life for even one model. Again, that approach is unreasonable, unfair, and unlawful.

Chrysler nevertheless supports harmonization with the California LEV III requirements, especially considering that the ARB has indicated that it may refuse to accept vehicles certified to a 120,000 mile useful life standard as certified to the California requirements. However, EPA can achieve this goal without unduly penalizing manufacturers that choose to certify one or more test groups to a 120,000 mile useful life standard. As such, we believe EPA should, for purposes of these Tier 3 rules, certify the 120,000 mile Tier 3 bin standards at 90 percent of the respective California LEV III 150,000 mile useful life NMOG+NOx standards; but, in calculating the fleet averages, any such vehicle would be considered at the California LEV III 150,000 mile standard.

Recommendation: Chrysler agrees that it is reasonable to adopt 120,000 mile Tier 3 useful life standards that are lower than the corresponding California 150,000 mile LEV III useful life standards. Chrysler recommends that EPA retain the 120,000 mile useful life NMOG+NOx bin standards, especially where EPA has no statutory authority to impose 150,000 mile standards.

Chrysler also recommends that such 120,000 mile standards be set at 90 percent of the respective California LEV III 150,000 mile useful life NMOG+NOx standards, with fleet average calculations computed using the California LEV III 150,000 mile NMOG+NOx standards.

Chrysler Footnote: EPA states in the preamble to the proposed rule that it is proposing to adopt 120,000 mile useful life NMOG+NOx emissions standards that are 85 percent of the respective 150,000 mile useful life NMOG+NOx standards, see 78 Fed. Reg. at 29,868 ("Numerically, we are proposing 120,000 mile useful life NMOG+NOx standards that are 85 percent of the respective NMOG+NOx 150,000 mile standards."). The proposed rule language itself, however, provides only 85 percent fleet average standards, and fails to provide 85 percent bin standards. Given the description in the preamble to the proposed rule, we assume that this omission was simply an oversight and not intentional. However, if EPA decides to adopt the useful life requirements as proposed, it is critical that EPA provide in the final rule modified bin standards reflecting the 15 percent reduction for the 120,000 mile useful life NMOG+NOx standards (i.e., a 26 mg/mi bin reflecting a 15 percent reduction from the 30 mg/mi bin). Otherwise, EPA's proposed rule actually would require manufacturers that choose the 120,000 mile useful life option to reduce emissions by more than 15 percent as compared to the 150,000 mile useful life option, which does not appear to be EPA's intent.

New York State Department of Environmental Conservation

Most vehicles, excluding casualty losses, remain in service well beyond current useful life requirements (10 years, 120,000 miles). Consequently, New York encourages EPA to adopt more stringent full useful life requirements to prevent significant erosion of emission benefits as Tier 3 vehicles age. Specifically, EPA should adopt California's LEV III useful life of 15 years, 150,000 miles.

Pennsylvania Department of Environmental Protection (DEP)

The EPA is correct to extend the regulatory useful life of vehicles to 15 years or 150,000 miles (whichever occurs first). Motor vehicles built today can easily travel over 150,000 miles before reaching the end of their useful life. Therefore, raising the useful life value to 150,000 miles is appropriate as an option for vehicles restricted by the Clean Air Act to a 120,000 mile useful life and as a requirement for vehicles not so restricted. The 'useful life' of a vehicle is the period of time, in terms of years and miles, during which a manufacturer is responsible for the vehicle's emissions performance. If the manufacturer certifies to the lower 120,000 mile useful life, it would seem that the manufacturer should multiply the proposed 150,000 mile standard to obtain the numerical fleet average by 0.80 not 0.85 as given in Table IV-2 due to the fact that 120,000 miles divided by 150,000 miles equals 0.80. By allowing manufacturers to use the 0.85 factor, extra credit would be given to manufacturers for certifying to a lower useful life. CARB does not allow manufacturers to receive credit for certifying vehicles to a 120,000 mile useful life. It would be more appropriate for EPA to harmonize the Tier 3 requirement with the CARB would be more appropriate for EPA to harmonize the Tier 3 requirement with the CARB standards when it concerns useful life to provide the appropriate incentive to automobile manufacturers to produce vehicles with a longer useful life.

Our Response:

The auto manufacturing industry has uniformly expressed the desire to produce and sell a single national vehicle fleet, including a general ability and willingness of the industry to certify their vehicles to a 150,000 mile, 15 year full useful life, as required by the LEV III program. However, the CAA, written at a time when vehicles did not last as long as they do today, precludes EPA from requiring a useful life value longer than 120,000 miles (and 10 or 11 years, depending on vehicle category and weight) for lighter light-duty vehicles (LDVs and LDTs up to 3,750 lbs loaded vehicle weight (LVW) and up to 6,000 lbs GVWR (i.e., LDT1s)). For heavier light-duty vehicles (i.e., LDT2s, 3s, 4s, as well as MDPVs, representing a large fraction of the light-duty fleet), this statutory restriction does not apply, and we are finalizing a 150,000 mile, 15 year useful life value, as proposed.

For the lighter vehicles, we are continuing to apply the 120,000 mile (and 10 or 11 year, as applicable) useful life requirement from the Tier 2 program, also as proposed. (LEV III does not allow 120,000 mile useful life certification beyond the phase-in period and therefore vehicles certified as 50-state offerings under a harmonized approach will also need to comply with the 150,000 mile useful life for LEVIII regardless of the Tier 3 120,000 mile useful life option.) For these lighter vehicles, manufacturers are allowed to certify to either useful life value. In order for the Tier 3 NMOG+NO_X standards to represent the same level of stringency regardless of which useful life value manufacturers choose, we proposed and are finalizing proportionally lower numerical values (85 percent of the NMOG+NO_X 150,000 mile standards based on a data analysis provided in Chapter 1 of the RIA) for the declining fleet average FTP NMOG+NO_X standards when a manufacturer chooses the 120,000 mile useful life for eligible vehicles. The RIA analysis, also provided in the draft RIA for the proposed rule, provides robust support for the 85-percent value for the adjustment to the NMOG+NO_X standard. Commenters did not make any specific comments about our analysis, including providing supporting information to support a different percentage adjustment value.

We proposed that a manufacturer that certifies any vehicle model under the 120,000 mile provision be required to certify all their LDVs and LDT1s to the 120,000 mile useful life and associated numerically lower FTP NMOG+NO_X fleet average standard. Comments from the auto industry expressed a concern that this approach would be inflexible to manufacturers' needs and unnecessarily burdensome. We disagree that the requirements proposed for the 120,000 mile provision were punitive or create a mandate, but we have considered the concerns expressed by commenters and believe that the emission benefits of Tier 3 program will be maintained if certification of these lighter vehicles to the 120,000 mile useful life standards is allowed on a test group basis. Therefore we are finalizing this revised approach.

We have also considered the comments that recommended that EPA set specific "bin" standards at proportionally reduced levels (factor of 0.85) for manufacturers that choose the 120,000 mile useful life for their lighter vehicles and then include those vehicles in a single 150,000 mile useful life fleet average as proof of compliance. We do not believe it is appropriate to allow a vehicle certified to (and only held to) a 120,000 mile useful life to have their projected emission results included with vehicles that meet the higher 150,000 mile useful life requirement. Manufacturers that choose the 120,000 mile useful life option likely would be doing so specifically to avoid any durability liability beyond the 120,000 mile point, and therefore their performance at the level of the standards is not guaranteed or legally required beyond the 120,000 mile useful life. As the analysis that we performed and that we discuss in Chapter 1 of the RIA was done on a fleet average basis, we believe that it is appropriate for manufacturers to certify each test group to the same Tier 3 'bin' levels and then to average all the 120,000 mile test groups against the "85 percent" adjusted FTP NMOG+NO_X standard for that model year and separately average all of the 150,000 mile test groups to the unadjusted standard. Manufacturers are required to maintain separate 120,000 mile and 150,000 mile fleet averages if they choose to certify some vehicles to the lower useful life standards. With this continued focus on respective fleet average standards for 120,000 mile and 150,000 mile useful life test groups, we do not see an additional value to creating different sets of bins given the existing variety of certification bins available above and below the two separate fleet average standards throughout the phase-in and into the final program.

4.1.2.3. Specific Comments on FTP NMOG+NOx Standards

What Commenters Said:

Manufacturers of Emission Controls Association (MECA)

Two recent research programs have discussed pathways to reaching Tier 3, Bin 30 exhaust standards with a light-duty diesel vehicle. The first of these is the Cummins Advanced Technology Light-Duty Diesel Aftertreatment System (ATLAS) program, sponsored by the U.S. Department of Energy (DOE). Details of this project were presented at the 2012 DOE DEER Conference held in Dearborn, MI (see: ww1.eere.energy.gov/vehiclesandfuels/resources/proceedings/2012_deer_presentations.html, presentation by Mr. Cary Henry, Cummins, Inc.) and included in SAE paper no. 2013-01-0282 that was presented at the April 2013 SAE International Congress in Detroit, MI. Advanced diesel emission control technologies, including a passive lean NOx adsorber and an SCR-coated DPF that utilizes direct ammonia reductant injection, have been combined in this program with advanced combustion controls on a 2.8 liter, 4 cylinder diesel engine to demonstrate a pathway to Tier 3, Bin 30 exhaust emissions compliance on a full-size, light-duty pick-up truck. A second approach to Tier 3, Bin 30 exhaust levels on a light-duty diesel vehicle was discussed by Southwest Research Institute in SAE paper no. 2013-01-1301 (presented at the April 2013 SAE International Congress in Detroit, MI). This project combines advanced diesel combustion technologies, including high temperature glow plugs, with a close-coupled lean NOx adsorber catalyst + catalyzed DPF emission system to significantly reduce cold-start emissions and provide a pathway to Tier 3, Bin 30 exhaust emission compliance on a 2 liter diesel-equipped sport-utility vehicle.

Our Response:

EPA acknowledges these comments supporting the feasibility of the 30 mg/mi NMOG+NOx standard.

4.1.2.4. Specific Comments on SFTP NMOG+NOx Standards

What Commenters Said:

Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

SFTP Fleet Average and Family Emission Limits: Unlike Tier 3, Tier 2 (and LEV II) vehicles certify to a different SFTP standard scheme. Tier 2 vehicles certify to an SFTP standard based on the FTP bin to which the vehicle is certified, while in Tier 3 the FTP and SFTP standards are independent. The Tier 3 and LEV III programs both include the previous generation vehicles in the fleet average. Under the LEV III program, for a LEV II vehicle the certification data is used in the calculation of the fleet average, projected out to 120,000 miles using a deterioration factor or actual test results if testing was conducted using aged components. For compliance purposes (confirmatory and in-use), the vehicle is held to the standard to which it was certified. However, it appears that under the Tier 3 program, EPA will not allow projected certification data to be used in the fleet average calculation for Tier 2 or interim Tier 3 vehicles. Instead, a manufacturer-specified SFTP FEL, which a manufacturer would be held to under confirmatory and in-use testing, would be the value used in the fleet average calculation and would become the new certification standard for that vehicle.

Under EPA's approach of treating values used in the fleet average calculation as emission standards, subject to confirmatory and in-use testing, manufacturers will be forced to add a compliance margin when choosing an FEL under the Tier 3 program for these Tier 2/interim Tier 3 vehicles. For example, a MY 2018 Tier 2 (a.k.a., "interim Tier 3") vehicle with SFTP certification data showing emissions of 95 mg/mile projected to 120,000 miles would use a 95 mg/mi value in the ARB's fleet average calculation. However, under EPA's Tier 3 program the manufacturer might choose an FEL of 145 mg/mile (a 35% compliance margin, which is not atypical) to allow sufficient compliance margin given the various sources of variability (vehicle-to-vehicle, test-to-test, etc.) that a manufacturer must consider relative to confirmatory and in-use compliance testing.

The net effect of this difference is to unnecessarily increase the stringency of the Federal SFTP program over the California program. To address this difference, harmonization with LEV III would only be applicable to "interim Tier 3" vehicles (Bin 125, Bin 160, and the Bin 20 or Bin 30 PZEV vehicles discussed above) and thus would only apply to a small sub-set of vehicles, and only then through the MY 2019.

Recommendation: We recommend EPA adopt the following new paragraph (or changes to this effect) in the interim provisions of section §86.1811-17(b)(7)(iii)(C):

"(C) For vehicles certified to bins higher than Bin 70, and Bin 30 or Bin 20 vehicles which received partial zero emission vehicle (PZEV) credit in California that certified to interim Tier 3 using carryover emissions data, compliance (confirmatory and in-use) will be based on the Tier 2 certification values contained in §86.1811-04."

SFTP 4,000-Mile Standard Prior to MY 2020: EPA has proposed to retain the 4K SFTP standards from the Tier 2 program to prevent "backsliding" for vehicles certified in the earlier portions of the Tier 3 program when the composite SFTP fleet average standards might allow room for less robust SFTP calibrations. Under the proposal, these standards would apply to all "Interim Tier 3 vehicles." The agency concluded the interim SFTP standards would not need to apply to "Final Tier 3 Vehicles," since their emission system designs should be sufficiently robust to mitigate the agency's concern about SFTP backsliding. "Final Tier 3 Vehicles" would include those certified to the new useful life (i.e., 150K), Tier 3 certification fuel, and new PM standards. All others would be considered "Interim Tier 3 Vehicles."

Since EPA's definition of Interim Tier 3 Vehicles would then include all vehicles certified using the option to test with the California E10 certification fuel, all such vehicles would be subject to the interim 4K SFTP standards – even if these vehicles were certified to some of the cleanest bins and to 150K SFTP standards on E10. For example, a vehicle might be certified to Bin 70 or below, perhaps even as low as Bin 20, plus the 150K useful life (for FTP and SFTP) and the new PM standard, but it would still be considered "interim" because it was tested on the California LEV III E10 certification fuel. Such vehicles should be expected to have calibrations as robust as any Final Tier 3 Vehicles, including the new SFTP standards at full useful life, and should not be subject to the interim 4K SFTP standards.

While we do not think there is a need for the interim 4K SFTP standards at all; if the agency is going to insist on retaining them it would make more sense to link these standards to the transitional Tier 3 bins, i.e., those above Bin 70, rather than linking them to the more complex definition of Interim Tier 3 Vehicles. Additionally, having this simplistic link to the bin structure rather than to multiple variables of the more complex Interim Tier 3 Vehicle definition would simplify both reporting requirements for the manufacturers and data acquisition and tracking burdens for the agency, and would do so without any loss of stringency or backsliding.

Recommendation: We recommend that EPA change the applicability of the 4K SFTP standard such that it would apply to only those bins above Bin 70 rather than to all vehicles that have been defined as Interim Tier 3 Vehicles through MY 2019 only.

Interim In-Use Standards: Similarly, interim in-use standards are appropriate for SFTP for both the MDV and LDV classes. For the first time ever, the SFTP standards will apply at a 150,000 mile useful life. And the required levels will be far lower than current standard levels. These two factors, coupled with the rapid introduction of new technologies driven by the GHG and fuel economy requirements, justify the need for interim in-use SFTP standards to help manufacturers manage their in-use compliance risk. [EPA-HQ-OAR-2011-0135-4461-A1, p. 24]

Recommendation: We recommend EPA continue the historic practice of allowing interim in-use standards by harmonizing with the LEV III interim in-use standards for the HDV FTP and SFTP requirements and the LDV SFTP requirements.

American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM)

In discussing the SFTP NMOG+NOx feasibility, EPA notes "The proposed new emission requirements include stringent NMOG+NOx 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 NOx 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+NOx Tier 3 SFTP standard manufacturers will need to develop and implement technologies to manage catalyst temperatures during high-load operation without using fuel enrichment."

California Air Resources Board (CARB)

CARB supports U.S. EPA's proposal to not include relaxed interim emission standards for non-methane organic gas (NMOG) + oxides of nitrogen (NOx) and (PM) in the light-duty SFTP program. CARB agrees that the technologies required for the proposed SFTP emission standards are well-established and interim emission standards, typically reserved for new technologies, are not needed. Accordingly, CARB intends to propose alignment with this proposal once the Tier 3 program is finalized.

International Council on Clean Transportation (ICCT)

The SFTP standards are too lenient and, as proposed, will not be effective. Current vehicles certified to Tier 2 bin 2 or LEVII-SULEV have average NMHC+NOx emissions of less than 10 mg/mi, more than 80% below the proposed limit of 50 mg/mi in 2025. Similarly, the proposed SFTP particulate standards are 3.3 times higher for vehicles 6000 GVWR than the proposed FTP standard. Setting the SFTP standards properly is especially important for diesel engines, as diesel emission control hardware requirements are largely set by the high load conditions on the SFTP. SFTP NMHC+NOx standards should be set at no more than 20 mg/mi and SFTP particulate standards at no more than 6 mg/mi.

SFTP Standards: For the most part, the overall stringency of the proposed rules is adequate and the provisions, including leadtime and credit provisions, are appropriate. However, ICCT is extremely concerned that the SFTP requirements are far less stringent than the FTP requirements. While the proposed Tier 3 SFTP standards are a major improvement over the SFTP standards for Tier 2, the Tier 2 SFTP standards were unchanged in stringency from the Tier 1 SFTP standards and, thus, completely ineffective. Thus, despite the large reduction in the SFTP standard levels, the proposed SFTP standards are still far too lenient and will not achieve the objectives of the SFTP standards to reduce in-use emissions.

To demonstrate our concerns, we have analyzed the stringency of the proposed SFTP standards in two different ways. The first method compares the proposed SFTP standards against current SFTP emission levels. The second method compares the proposed SFTP standards against the proposed FTP standards.

Current SFTP emission levels: Figure 1-5 [of number EPA-HQ-OAR-2011-0135-4304] in the draft RIA (page 1-18), reproduced below, demonstrates that the average SFTP NMHC+NOx emissions for current vehicles certified to Tier 2 bin 2 or LEVII-SULEV emission standards (the orange bars) is less than 10 mg/mi, and the highest emissions seen is about 42.5 mg/mi. The proposed SFTP NMHC+NOx standard drops from 103 mg/mi in 2017 to 50 mg/mi in 2025. So, the proposed standard for 2017 is more than 10 times the average emissions of current vehicles and the proposed 2025 standard is more than 5 times the average emissions of current vehicles.

Proposed SFTP versus proposed FTP standards: The original SFTP standards, adopted in 1996 and applied to Tier 1 vehicles, found that the incremental emissions on the SCO3 and USO6 cycles was similar in magnitude to the incremental emissions from the cold start on the FTP. Thus, SFTP standards for Tier 1 vehicles were set at the same numeric level as the FTP standards.

As the SFTP standards are hot, running emissions only, it is appropriate to separate the FTP requirements into cold start emissions and hot, running emissions. The proposed NMHC+NOx FTP standards are 30 mg/mile. The draft RIA states (page 1-6): [EPA-HQ-OAR-2011-0135-4304-A1, pp. 13-14] ’Based on modal analysis of a gasoline powered vehicle being operated on the FTP cycle, approximately 90 percent of the NMOG emissions occur during the first 50 seconds after a cold start. In addition, about 60 percent of the NOX emissions occur in these early seconds.’

The Tier 2 bin 2 standards were 10 mg/mi for NMHC and 20 mg/mi for NOx. Using this ratio and applying it to the cold start emission ratios from the draft RIA, 70% of NMHC+NOx emissions on the FTP are from the cold start (90% x 1/3 + 60% x 2/3). This means that about 30% of NMHC+NOx FTP emissions are from hot, running operation and, thus, account for about 9 mg/mi of the proposed FTP standards.

The proposed NMHC+NOx SFTP standards are 50 mg/mi, or 5.5 times higher than the hot, running emissions portion of the FTP standards. This is so lenient as to be essentially no off-cycle control. And this is with respect to current vehicles, much less for 2025 with several additional generations of emission control development.

After application of the standard 50 percent compliance margin, hot, running NMHC+NOx emissions on the FTP are about 4.5 mg/mi. Current SFTP NMHC+NOx emissions from Tier 2 bin 2 and LEVII-SULEV vehicles are a bit less than twice this amount. This is a reasonable ratio between SFTP and hot, running FTP emissions. This, in turn, indicates that the hot, running FTP comparison supports the analysis of SFTP emissions from current vehicles.

Both the current SFTP data and the proposed hot, running emissions on the FTP support actual SFTP NMHC+NOx emissions of less than 10 mg/mi. After adding the standard x2 in-use compliance margin, the SFTP NMHC+NOx standard should be set at no more than 20 mg/mi.

Setting appropriate SFTP standards is especially important for diesel vehicles. The cold start in the FTP largely determines the emission control system design for gasoline vehicles. The primary need for SFTP gasoline engine standards is to ensure that proper calibrations are used off-cycle and that emissions remain reasonable in-use. However, for diesel engines, the emission control system design is largely determined by high load operation. Thus, while the proposed SFTP requirements would likely not impact gasoline hardware design, ineffective SFTP standards could lead to selection of diesel emission control systems that are less effective in-use.

In fact, this has already been seen in Europe, where Euro IV and Euro V heavy-duty vehicles equipped with selective catalytic reduction (SCR) systems have significantly elevated emissions of nitrogen oxides (NOx) during in-use driving, particularly when operating in urban traffic. In some cases, actual in-use urban emission levels may be as high as or higher than those from much older vehicles with engines certified to more lenient emission standards (9). This illustrates the importance of setting emission standards using representative test procedures and appropriate standards.

ICCT does have concerns in two areas. First, while the proposed supplemental FTP standards are a major improvement over the SFTP standards with Tier 2, they are still not stringent enough. The Tier 1 SFTP standards were set at the same numeric level as the Tier 1 FTP standards. While the proposed SFTP NMOG plus NOx standards are 67 percent higher than the proposed FTP standards.

Mitsubishi Motors R&D America, Inc (MRDA)

We completely agree with the Alliance and Global Automakers comments regarding concerns with the SFTP test. The SFTP test, which is used to calculate the NMOG + NOx fleet average, is a composite of the SCO3 and US06 tests. The SCO3 test is expensive and time-intensive to run, and the US06 is highly driver-dependent relative to any other vehicle emissions test. As the overall emission standards for the FTP become more stringent in the proposed Tier 3 program, automobile manufacturers will make significant changes to comply, e.g. changes to catalysts, engine calibrations, and transmission gear ratios, etc. It is unknown how these changes will affect the SFTP emissions and therefore compliance with the new standards.

The proposed Tier 3 program does not include early credits for SFTP compliance. Early credits are a necessary compliance flexibility for automotive manufacturers, since they cannot control for market uncertainty, i.e. which vehicles customers will purchase. It will be an unnecessary (and extremely challenging) compliance burden for OEMs to comply with a federal regulation that will not allow early credits, and with the LEVIII program that will allow early credits. This discrepancy between the Federal and California programs can create significant differences between the two sets of standards.

Additionally, the proposed Tier 3 program does not allow for interim in-use SFTP standards, whereas they are included as part of the LEV III program. Without additional allowances for in-use standards during the interim years, it will be difficult for manufacturers to learn about the new technologies and how well they work over time. New technologies will be strongly penalized under the Tier 3 program in comparison to the LEV III program. For example, if an OEM starts basic development work in Spring/Summer 2014 in order to certify the vehicle in 2016, calibrations can be made to meet the required standards. However, the performance of the vehicle over time is unknown. Therefore, interim in-use standards would help alleviate this uncertainty.

Another area which demonstrates a lack of harmonization between the proposed Tier 3 program and the LEV III program is SFTP fleet average compliance. EPA is proposing that non-Tier 3 (i.e. Tier 2) test groups use the Tier 3 120K Family Emission Limits (FEL) for fleet average certification and for confirmatory and in-use standards. EPA is effectively penalizing the Tier 2 carryover vehicles by making it harder to meet their fleet average SFTP compliance level. This requirement would retroactively change fleet average compliance standards for non-Tier 3 vehicles. Additionally, this requirement means that non-Tier 3 test groups would be counted differently for fleet average compliance under LEVIII and Tier 3. A lack of harmonization in this area will introduce a significant reporting burden for manufacturers. Duplicate certification and confirmatory compliance strategies will be necessary and provide no air quality benefit. Similar to LEV III, EPA should allow non-Tier 3 vehicles to use Tier 2 emissions certification data for confirmatory and in-use requirements.

NPRM Comments: For the reasons stated above, we request the following:
-Allow early credits for SFTP compliance.
-Provide interim in-use standards for SFTP compliance.
-Harmonize with the LEVIII program for SFTP fleet average compliance by allowing non-Tier 3 vehicles to use Tier 2 emissions certification data for confirmatory and in-use requirements.

Supplemental Federal Test Procedure (SFTP): Allow early credits and provide interim in-use standards for SFTP compliance. EPA should harmonize with the LEVIII program by allowing non-Tier 3 vehicles to use Tier 2 emissions certification data for confirmatory and in-use requirements.

Natural Resources Defense Council (NRDC)

Based on EPA's own analysis of current vehicle performance, the Tier 3 standards for the Supplemental Federal Test Procedure (SFTP) should be more stringent. As presented in the Draft Regulatory Impact Analysis (DRIA), Figure 1-4, model year 2010 and 2011 vehicles certified to Bin 5 had average HC+NOx levels at or below EPA's proposed NMOG+NOx standard of 50 mg/mi for model year 2025. Further, Bin 2 vehicles, shown in DRIA Figure 1-5, had average HC+NOx emissions below 15 mg/mi and maximum levels below 50 mg/mi. Under Tier 3, it is expected that existing and new technologies enabling vehicles to reach Bin 2 and 3 levels will be much more widespread in the fleet. Clearly, a standard even lower than 50 mg/m is technically and economically feasible.

Union of Concerned Scientists (UCS)

Millions of Americans breathe cleaner air as a result of our nation's clean air laws but serious challenges remain. More than 1 in 3 Americans still live in areas where air pollutant levels exceed at least one of the health-based National Ambient Air Quality Standards. Passenger vehicles remain the second largest emitters of nitrogen oxides (NOx) and volatile organic compounds (VOCs) in the U.S. – the primary pollutants that form smog. These vehicles also emit more than half of all carbon monoxide pollution and contribute to particulate matter emissions. It is therefore essential that the Tier 3 standards for both PM and NMOG+ NOx be sufficiently stringent as to provide quantifiable and real reductions in harmful emissions.

We urge EPA to consider levels for the SFTP for both PM and NMOG+ NOx that are sufficiently stringent to ensure that they are suitably protective of human health and the environment.

Supplemental Federal Test Procedure: EPA should revisit the non-methane organic gas plus nitrogen oxides (NMOG+ NOx) and particulate matter (PM) exhaust emission requirements to ensure that the emission requirements of this test procedure are suitably protective of human health and the environment.

We are concerned that the proposed Supplemental Federal Test Procedure (SFTP) is not sufficiently stringent. In 2025, the Federal Test Procedure (FTP) requires a NMOG+ NOx limit of 30 mg/mile, regardless of class size, while the SFTP level is 50 mg/mile. The SFTP is 67% higher than the FTP. Additionally, the Regulatory Impact Analysis (8) shows that the average SFTP NMOG+ NOx emissions for current light duty vehicles certified to Tier 2 Bin 2 are less than 10 mg/mile, and the highest emissions are just over 40 mg/mile. The RIA also shows that Tier 2 Bin 5 vehicles currently average approximately 30mg/mile for light duty vehicles and up to approximately 50 mg/mile for the largest light duty trucks. This means that the highest current Tier 2 Bin 2 and the average Tier 2 Bin 5 emitters are already compliant with the proposed 2025 standard, and that the 2025 standard is five times the emissions of the average current Tier 2 Bin 2 vehicle.

Our Response:

We received a variety of comments regarding the proposed SFTP standards. On one hand, several commenters stated that the proposed standards are too lenient, based on their evaluation of vehicle emission test data we presented in the NPRM. We have considered these comments and have reviewed the data from the NPRM. Our conclusion from that data continues to be that the SFTP NMOG+NOx emission levels that we are finalizing are sufficiently low to ensure that manufacturers will accomplish the purpose we had set out for these standards – to largely eliminate the use of fuel enrichment events (and their emission consequences) and discourage “backsliding” on SFTP emissions performance as new vehicles are developed, including diesels whose NOx emission control hardware requirements have historically been set by the high load conditions found on the SFTP.

As a result, we designed the standards to essentially eliminate fuel enrichment events and their emissions consequences, thereby resulting in important emissions reductions. See Chapter 1 of the RIA for an analysis of this data. Based on our reassessment, we continue to believe that significant additional real-world emission reductions will not result through SFTP NMOG+NOX standards lower than the 50 mg/mi fully phased-in level we are finalizing. We considered the analyses of commenters arguing that a lower standard is shown to be achievable by some vehicles today, in part based on an assumed relationship between FTP and SFTP performance. We do not see a strong enough relationship between these emissions to draw conclusions about the standard levels. As we discuss here and in the preamble, we find it more compelling to observe the close relationship between SFTP operation and fuel enrichment events.

The 50 mg/mi final level of the standard ensures that over the SFTP cycles, vehicles will have little opportunity to deviate from the tight emission controls established for the FTP. Any lack of attention to the SFTP cycles will result in exceedance of the standards due to the highly non-linear emission performance of the emission control systems when fuel enrichment events in gasoline vehicles occur or when diesels do not properly control NOx aftertreatment. (To achieve additional meaningful reductions for SFTP “off-cycle” like operation, EPA would need to pursue a “not to exceed” requirement similar to what is required for heavy-duty engines; such an approach would require significant new research and we did not propose this for Tier 3.) Again, we believe that the 50 mg/mi NMOG+NOx standard will ensure that the SFTP performance of future vehicles with future technologies continues to be comparable to that attained by the current Tier 2 fleet. Finally, the fuel enrichment limitation provisions we are finalizing will further support the goals of SFTP standards.

On the other hand, a few commenters stated that as compared to the LEV III program, compliance with the Tier 3 SFTP NMOG+NOx standards, including manufacturer-selected FELs, is unnecessarily stringent. The LEV III program has the challenge of determining a fleet average for SFTP that includes LEV II vehicles previously certified only to the 4,000 mile (4K) standards and LEVIII certified to more stringent standards that apply to full useful life. LEV III allows the LEV II results to be deteriorated to full useful life for purposes of fleet average calculation. However these LEV II SFTP requirements remain only 4,000-mile standards.

Unlike LEV II, the Tier 2 SFTP standards have always been full useful life (not only 4,000-mile) standards, and we continue to require all Tier 3 vehicles to also meet full useful life standards. When transitioning allowable “carryover” vehicles into “interim” Tier 3, manufacturers will need to determine the self selected SFTP FEL that they believe represents the full useful life performance of that vehicle. This self-selected standard will be what the manufacturer will be held to for in-use testing in addition to determining the fleet average level at certification. It is possible that the Tier 3 program may require a manufacturer to select an FEL that is numerically higher than the carryover LEV II 4,000-mile result with deterioration applied, but it is at the discretion of the manufacturer to select an FEL that represents expected full useful life performance. This situation, if it occurs, is not inconsistent with our overall intent for the SFTP standards, and we are finalizing these provisions as proposed.

Comments regarding the 4K SFTP standards for Interim Tier 3 vehicles suggested that if we insist on retaining this requirement, it should only apply to Bins higher than Bin 70. The purpose of retaining this requirement for all Interim Tier 3 vehicles is that by definition, Interim Tier 3 vehicles are not meeting the full requirements of Tier 3, which include the final E10 test fuel and the stringent PM standards for both FTP and SFTP. The 4K SFTP requirement is a very effective requirement for protecting against excessive PM emissions during conditions like aggressive or high-speed driving behavior. Until the vehicles meet the stringent Tier 3 PM standards for SFTP, PM emissions will generally be controlled to current Tier 2 performance levels by maintaining the 4K SFTP requirements. Vehicles utilizing LEV III test fuel during the phase-in may be considered Final Tier 3 if they meet the new PM standards and the 150,000 mile useful life requirements.

Several commenters supported relaxed interim in-use SFTP NMOG+NOx standards for light-duty vehicles. Also, one commenter recommended adding early credit provisions for the SFTP NMOG+NOx standards. As discussed above, the levels of these standards are not intended to force major new technological improvement, and will not be challenging for most manufacturers for most vehicles. Based on our analysis of in-use emission performance from IUVP testing, as discussed in the RIA, we do not believe that interim in-use standards are necessary even with the increase in useful life requirements and the introduction of new technologies in response to GHG and fuel economy requirements, and we are therefore finalizing SFTP NMOG+NOx standards without associated interim in-use standards. In their comments, CARB supported this approach and stated in their public comments their intention to propose alignment with this approach once the Tier 3 program is finalized. Similarly, we do not believe early credits will be necessary to facilitate compliance with the SFTP standards, and we are not finalizing early credits for this purpose.

API and AFPM incorrectly state that there are no supporting data to substantiate statements about SFTP NMOG+NOx feasibility. EPA analyzed in-use certification test results for model years 2010 and 2011, which represent the most recent model years for which complete IUVP data sets are available. This analysis can be found in RIA chapter 1.3. The analysis indicates that most vehicles are already meeting the final SFTP composite standard of 50 mg/mi. We concluded that the small number of vehicles currently not meeting the final standards will need additional focus on the SFTP cycles and/or possible hardware improvements to better manage temperature concerns. Additionally, we recognize that our analysis may not have included some newer technologies that have just recently entered the market and that these technologies may require diligent implementation to meet the Tier 3 standards.

4.1.2.5. Specific Comments on FTP PM Standards

What Commenters Said:

Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

Another point of concern is that the PM standards are flat standards that all vehicles must meet, as compared to fleet average standards that are proposed for NMOG+NOx compliance. Thus the risk that a particular type of technology would be precluded by the PM standards is increased because such technology cannot be certified to a higher bin and offset by a different technology certified to a lower bin.

It is also worth noting that the PM standards begin at a time when manufacturers enter the eighth year of the most stringent GHG standards in history, when the number of ZEVs and PHEVs jumps considerably in California and the Section 177 states, and while reducing exhaust emissions by 75 percent on both the FTP and SFTP and phasing in zero evaporative emission standards on all vehicles.

American Lung Association

Harmonize PM Standards with CARB now. We strongly urge EPA to harmonize the Federal Test Procedure (FTP) PM emissions standard with CARB to 1 mg/mile by 2025. Diesel vehicles and some gasoline-powered vehicles have the technology to meet a 1 mg/mile PM standard today. According to the International Council on Clean Transportation (ICCT) in their comments to CARB on the Low Emissions Vehicle program III, certifying vehicles to a low standard can be challenging, but can be done. ICCT recommended focusing on the more precise solid particle number measurement such as in the United Nations Particle Measurement Programme as an alternative proxy, but not a replacement, for the gravimetric method. Technology exists today to collect and report particle number emissions. Automakers in Europe currently do so, therefore, given the lead time, this issue should be resolved by 2017.

Appalachian Mountain Club (AMC)
In setting the particulate matter emissions standard and the Supplemental Federal Test Procedure (FTP) we urge EPA to use the lowest feasible mg/mi level supported by the EPA's own testing information. In addition, the Agency should consider the current efforts by the California Air Resources Board for the California Low Emission Vehicle 3 standards, which is phasing in a 1 mg/mi FTP standard starting in 2025.

California Air Resources Board (CARB)
CARB supports the Tier 3 PM standards proposed by U.S. EPA through the 2024 model year. These standards, when fully implemented in 2022, represent a 70 percent reduction from current PM standards and will ensure new vehicles and technologies will continue to perform at levels achieved by the best of today's vehicle technologies. We also agree with U.S. EPA that these standards are readily achievable with no additional technology or hardware.

However, the federal program does not include the LEV III 1 milligram per mile (mg/mi) PM standard that phases-in between model years 2025-2028, stating "In order for U.S. EPA to propose a standard at this level, there must be established methods to, reliably and consistently measure PM below that standard, for compliance purposes.' While we understand U.S. EPA's reluctance at this time due to concerns with current and proposed test methods, we encourage U.S. EPA to consider adoption of such a standard as discussed below. CARB is in the process of completing testing studies, which will show that existing methods can be modified in a straightforward manner to achieve accurate and repeatable measurement of sub-1 mg/mi PM emissions. At the same time, CARB is also pursuing additional research to explore alternative methods for PM measurement in order to take advantage of promising, new commercially available real-time instruments. We also urge U.S. EPA to re-examine the proposed PM standards for the SFTP for the reasons discussed below.

CARB adopted the 1 mg/mi PM standard because PM emissions are a particular concern for their multiple impacts on public health, air quality, and the global climate. In general, mobile sources (mainly cars and trucks) are not major contributors to the statewide total PM mass inventory. For instance, the PM emissions from light-duty vehicles add up to less than 5 percent of the total California PM2.5 inventory. However, they do contribute significantly to urban pollution and human exposure, such as the elevated concentrations of PM near heavily-travelled roadways. Historically, PM emissions from diesel engines were of most concern because of their high PM emission rates relative to gasoline engines. But as the modern diesel engine achieves increasingly lower PM emissions, the interest in and relative contribution of PM emissions from an ever increasing number of gasoline-fueled light-duty vehicles is growing. Thus, the need for maximum mitigation of PM emissions at the source (i.e., tailpipe) using the most technically and economically feasible approach is paramount.

Comment 1 - Harmonization of 1 mg/mi PM standard between Tier 3 and LEV III: As stated above, based on studies CARB and others have conducted recently, we believe the measurement method will not be an issue for implementing a 1 mg/mi PM standard for the 2025 model year or sooner. We agree with U.S. EPA on the statement that meeting the 1 mg/mi PM standard requires establishing methods to reliably and consistently measure PM below the standard. CARB, U.S. EPA, and some industry laboratories have already measured and reported PM emissions from light-duty vehicles well below 1 mg/mi using the existing three filter method prescribed by 40 CFR Part 1065. In its draft Regulatory Impact Analysis, U.S. EPA reported FTP composite PM emission results for 16 light-duty passenger cars and trucks (Table 1-8 of the Regulatory Impact Analysis). Reported PM emissions from 11 of the 13 conventional port fuel injection vehicles were below 1 mg/mi, ranging from 0.10 to 0.93 mg/mi. With the exception of a few repeat results with comparatively high variability, the data in Figure 1-8 of the Regulatory Impact Analysis suggests reasonably good precision and repeatability in the vast majority of the tests. The reason for the high variability in a few results needs investigation, but may be attributed to vehicle stability. Reproducibility between different tests cells and/or laboratories also needs to be addressed so that consistent results for certification and compliance can be generated within acceptable margins.

CARB has already developed and implemented a strict laboratory filter handling and weighing procedure (MLD 145) that minimizes variability from the filter weighing contribution of PM measurement. The background contribution from the Constant Volume Sampler dilution tunnel at CARB facilities has been determined to be no more than 2.5 micrograms per filter. The proposed test method in 40 CFR Part 1066 allows for a maximum background correction of 5 micrograms per filter, which is equivalent to 0.20 mg/mi PM with nominal Constant Volume Sampler flow of 350 standard cubic feet per minute and no secondary dilution. Allowance for the correction subtracts most or all of the system's contribution to a PM measurement. Therefore, manufacturers can design closer to the standard and still have a reasonable probability of passing a one test certification requirement.

CARB also agrees with U.S. EPA's proposed test procedure changes that will allow the use of fewer filters when conducting PM measurements. Conceptually, this will reduce measurement variability as well as the test burden associated with weighing multiple filters. CARB is evaluating the various filter options proposed in 40 CFR Part 1066 and develop defined filter test method procedures. We expect the additional options will show even further improvement in the capability of the gravimetric technique for measurement of PM below 1 mg/mi.

Given the progress to date and ongoing work, CARB anticipates that improved test procedures, in conjunction with the implementation of strict laboratory filter handing and weighing procedures, will allow consistent and reliable gravimetric PM measurement well below 1 mg/mi. CARB believes that the automotive industry can make the necessary changes to their emission certification laboratories in a timeframe that allows for an earlier implementation of the adopted 1 mg/mi standard than the 2025 model year. To that point, CARB recommends that U.S. EPA consider adoption of a 1 mg/mi PM standard to be consistent with the standards CARB adopted in the LEV III regulations, and commit to evaluate in the near future, concurrently with CARB, whether the standard could be implemented even earlier than the scheduled 2025 model year start date.

Comment 4 — Optional Phase-In Formula for FTP and US06 PM Standards: U.S. EPA is proposing to phase-in Tier 3 FTP and US06 PM emission standards beginning with the 2017 model year with 100 percent compliance required in the 2021 model year. U.S. EPA has also proposed an optional alternative phase-in schedule that manufacturers may use to comply with the Tier 3 PM emission standards for these model years. This alternative phase-in schedule is based on a mathematical equation that provides credits for vehicles certified to the Tier 3 PM standards based on the year in which they are certified. Accordingly, vehicles certified to Tier 3 PM standards in earlier years would be worth more than those certified in later years. This alternative phase-in schedule is similar to one CARB adopted for vehicles meeting the LEV III PM standards. However, while the LEV Ill regulations explicitly state that 100 percent compliance is required at the end of the phase-in period, the proposed Tier 3 regulations do not. We believe that in order to maintain the emission benefits of the Tier 3 program, it is necessary to add language to the Tier 3 rule to clarify that a manufacturer that certifies its vehicles to this alternative phase-in schedule must still meet the requirement that 100 percent of those vehicles meet the applicable PM standards in the 2021 model year.

[See CARB's public comment document EPA-HQ-OAR-2011-0135-4919-A1, received by the docket on October 23, 2013, for two graphics: CARB Light-Duty SFTP Program (PFI Vehicles) and CARB Light-Duty SFTP Program (GDI Vehicles)]

Emissions Control Technology Association (ECTA)

Proposed Tier 3 Limits for PM is Too High: We disagree with EPA's Tier 3 PM limit value and believe it is too high.

EPA concludes that: "The intent of the proposed 3 mg/mi standard is to bring all light-duty vehicles to the PM level typical of that being demonstrated by most light-duty vehicles today'.

The EPA has proposed a Tier 3 PM limit value that is too high. The 3 mg/mile proposed FTP PM standard is achievable in most of today's vehicles, and by EPA's own estimate, is not a challenging value. Given the toxicity of PM, wherein there is no "safe" level in ambient air, that some emerging engine concepts, especially GDI engines, increase and change the PM emission, and that many technologies are readily available to achieve much lower levels, EPA needs to at least match the California LEVIII 1 mg/mile limit value, harmonizing the regulation throughout the United States, and more-closely matching the effective level that will be implemented in Europe in 2017. The typical PM emission throughout the major markets in 2025 will not be 3 mg/mi, but substantially less given the particle number limits today in Europe and Beijing, and being considered in Japan. Setting the bar at levels achievable today for a regulation that will be phased in through 2025 on such a critical emission as PM is not sound public policy, especially if other major markets are tightening much more.

Numerous approaches exist to bring the most difficult engine type, GDIs, into tighter PM compliance; namely fuel injection, EGR, and air handling options (Hyundai, IQPC Gasoline Emissions Conference, 2012; Mercedes, Vienna Motorsymposium, 2013; AVL CTI Emissions Conference, Detroit, May 2011), and gasoline particulate filters. All of these options will be on vehicles in Europe in 2017.

At the very least, EPA should set a 1 mg/mile standard, and subject it to a technology review. The public health benefits will be realized by California and Europe (and later, Japan and China) when engine technology is available, and measurement technology will meet the need. Without doing this, it is conceivable the majority of Americans will have particulate emissions on some vehicles in 2025 that will be more than three times higher than those in California, Europe, Japan, and China.

Environmental Defense Fund (EDF)

EDF applauds the Agency for proposing a 3 mg/mi FTP PM standard for light-duty vehicles to "ensure that all new vehicles perform at the level already being achieved by well-designed Tier 2 emission control technologies." EPA estimates that PM2.5 emissions will be reduced by an estimated 7,500 tons annually in 2030 as a result of these proposed tailpipe standards. EDF agrees that it is important to lock in the lower PM emissions rates already being achieved by Tier 2 vehicles. Moreover, the standard will help prevent any backsliding that could occur as manufacturers move toward low carbon technologies to meet increasing greenhouse gas and fuel economy standards.

We also strongly urge the Agency to finalize a more protective PM standard of 1 mg/mi beginning in 2025. The more stringent standard is technically feasible and would provide even greater human health protections from harmful PM emissions. California has adopted a 1 mg/mi standard to begin in 2025.

A 1 mg/mi FTP PM Standard is Technologically Feasible by 2025. In the preamble, EPA states that the "FTP PM standards that we are proposing are the most stringent technically feasible standards within the implementation timeframe of this proposal." However, the Agency does not explain why a 1 mg/mi FTP PM standard, as finalized in LEV III, is not technically feasible. The Agency only states that more research is needed on PM measurement methods. Nonetheless, EDF believes that a 1 mg/mi standard is technically feasible beginning in 2025, as evidenced by available technology and many Tier 2 vehicles already achieving such a low emission rate.

As evidenced by EPA and CARB testing, Tier 2 vehicles on the road today are already achieving PM emissions levels at 1 mg/mi or lower. As described in the RIA, EPA conducted a test program to measure PM emissions from a variety of Tier 2 light-duty vehicles to help establish the feasibility of Tier 3 PM standards. The test program included 17 late model year vehicles that represented a significant volume of annual light-duty sales and included vehicles that ranged from small cars to trucks, as well as four vehicles with GDI engines. The results of the FTP emissions tests found that all but one of the non-GDI vehicles had PM emissions under 1 mg/mi. And of those, all but one had PM emissions under 0.5 mg/mi. The results of EPA's own tests confirm that existing Tier 2 non-GDI vehicles are already meeting PM emissions levels well below the proposed 3 mg/mi standard and all but one are well below a 1 mg/mi PM standard. Moreover, these are Tier 2 vehicles on the road today, and a 1 mg/mi PM standard would not begin for another 12 years, giving manufacturers ample time to ensure all new vehicles can achieve that low emission rate.

While the GDI engines in EPA's tests had higher levels of PM, there is ample evidence that GDI engines and other low carbon engine technologies needed to meet the most stringent GHG and fuel economy standards can also achieve a 1 mg/mi PM standard (135). GDI engines achieve greater efficiency by mimicking a diesel engine, and therefore can have PM emissions close to those from a conventional diesel engine (one without a DPF). Indeed, all of the Tier 2 GDI vehicles tested by EPA had PM emissions over 2 mg/mi, with the highest result at just over 7 mg/mi. However, according to CARB, "[c]ar makers who choose to pursue gasoline-fueled, CO2 friendlier GDI internal combustion engines for their future vehicles will have two principal technical solutions for further reduction of PM mass emissions" – optimized fuel-injection systems and gasoline particulate filters (GPFs). Recent research by the Manufacturers of Emission Controls Association (MECA) and Environment Canada found that GPFs can bring GDI PM emissions down to levels in line with, or below, those of a typical port fuel injection engine.

Moreover, CARB estimates that the "expected trend is for new GDI vehicles to move towards spray-guided GDI engines" and therefore, "compliance with the proposed [LEV III] PM standards is not expected to impose a cost increase to vehicle manufacturers' (138).

EPA and CARB test results, combined with the evidence that gasoline particulate filters are capable of reducing GDI engine PM emissions in line with conventional gasoline engines, indicate that a 1 mg/mi PM standard is technically feasible by 2025. Therefore, we urge the Agency to finalize the more protective standard that would reduce the health burden on all Americans.

EPA has Ample Time to Finalize a Testing Method for a 1 mg/mi PM Standard. The Agency states in the preamble that it is not considering a 1 mg/mi standard because of the need for "continuing PM measurement method development." While we agree with EPA that additional research and development is needed to reliably measure a 1 mg/mi PM standard, there is ample lead-time for such development, and the Agency should not delay the technically feasible, more health-protective 1 mg/mi standard for this reason.

The current method for measuring vehicle and engine PM emissions is determining the mass of the PM emissions. In the past, this approach was quite effective because of the large amounts of PM emitted by most vehicles. However, as diesel and gasoline vehicles standards become more protective, accurately measuring the PM mass becomes more difficult. Over the years, EPA has continued to make improvements to its PM mass test methods. These improvements have been reflected most recently in the heavy-duty GHG final rule in 2011 and this Tier 3 proposal for measuring the proposed 3 mg/mi PM standard. At the same time, a consortium of government and industry representatives are currently conducting further research on how to best measure PM emissions of 1 mg/mi and lower, including further improvements to PM mass test methods as well as new solid particle counting methods, like those used in Europe. California's LEV III rulemaking documents have an extensive description of the advancements made to both procedures as of 2012, and indicate that significant progress has already been made in developing accurate and reliable measurement techniques for a 1 mg/mi standard. In addition, more current data and information about advancements in test procedures were presented at recent conferences, including the SAE Congress and Coordinating Research Council Real World Emissions Workshop. It is clear that EPA, CARB, and other government and industry members are well on their way to developing a reliable test method for more protective standards. And with an additional decade before the 1 mg/mi standards would take effect, the Agency has more than sufficient time to finalize the most effective and appropriate test method and procedure. EDF strongly urges the Agency to finalize the technically feasible PM standard of 1 mg/mi beginning in 2025.

Ferrari

Ferrari considers the proposed…PM standards feasible in 2021 MY. We therefore support this aspect of EPA's proposed rule.

International Council on Clean Transportation (ICCT)

The ICCT recommends that EPA harmonize with both the CARB 1 mg/mile particulate mass standard starting with 2025 and the European particulate number standards. Currently, both requirements are hindered by the lack of measurement precision, but continuing research into particulate measurement should resolve these issues in the future.

The FTP supports the proposed FTP particulate standards. These would largely harmonize EPA's requirements with CARB's.

One key difference between the Tier 3 proposal and the LEV III rule is that under LEV III, automakers must meet a tailpipe emission standard of 1 mg/mi beginning in 2025. Instead, the Tier 3 proposal extends only to model year 2023, citing concerns expressed in the CA LEV III rulemaking with regard to the state of PM measurement capability to enable testing and compliance with a 1 mg/mi standard.. The ICCT strongly recommends that EPA harmonize with the LEV III particulate standards beginning in 2025. This will allow plenty of time to develop more accurate particulate measurement methods.

A notable omission from the proposed particulate standards is a particle number limit standard, similar to already adopted requirements in Europe. Although the proposal cites the 2010 US EPA Integrated Risk Assessment for Particulate Matter, which highlights evidence of a causal association between PN exposure and adverse health impacts, the document notes a desire for further research to find more robust associations between PN exposure and health impacts. The ICCT strongly encourages EPA to investigate harmonization with the European particulate number standards in the future. California is likely to pursue particle number measurement methods to ensure compliance with 1 mg/mi, which carries the possibility of a transition to a particle number limit in future rulemakings.

Manufacturers of Emission Controls Association (MECA)

MECA strongly supported and agreed with ARB's decision to include a 1 mg/mile particle matter standard for light-duty vehicles over the FTP test cycle in their LEV III requirements. In the Tier 3 proposal, EPA proposed only to harmonize with the LEV III 3 mg/mile FTP PM standard and not propose a 1 mg/mile FTP PM standard. The 2012 decision by the European Commission to establish a particle number emission standard for light-duty vehicles powered by gasoline direct injection (GDI) engines as a part of their upcoming Euro 6 light-duty emission standards provides a more stringent particle emission limit for these GDI vehicles in the same time frame as the Tier 3/LEV III 3 mg/mile PM standard (proposed phase-in for the Tier 3, 3 mg/mile PM standard starts in 2017 and is fully phased-in with the 2021 model year; implementation of the Euro 6 GDI particle number limit of 6 X 1011 particles/km [equivalent to the Euro 5 light-duty diesel particle number limit], measured using the European PMP particle measurement protocol, begins in September 2017; see: ec.europa.eu/enterprise/sectors/automotive/documents/directives/motor-vehicles/index_en.htm). This European light-duty GDI particle number limit will cause auto manufacturers to introduce cleaner technologies, such as advanced fuel injection systems and/or gasoline particulate filters, to comply with the European Euro 6 GDI particle number limit. Auto manufacturers are already working to bring forward early introductions of these ultra-low PM, Euro 6-compliant gasoline engines to the European market in the coming 12 to 18 months (European member states are permitted to introduce tax incentives for early introductions of Euro 6 vehicles prior to the first implementation dates of September 2014 for new models and September 2015 for all passenger car models). Nearly all auto manufacturers that sell into the European market are working with MECA members on potential applications of particulate filters on gasoline direct injection vehicles.

Gasoline particulate filters (GPFs) are based on the same, wall-flow ceramic filters that have been successfully applied on millions of light-duty and heavy-duty diesel vehicles in Europe and the U.S. for more than 10 years. The performance and application of these gasoline particulate filters has been highlighted in a number of recent technical publications in both the U.S. and Europe (e.g., SAE paper nos. 2010-01-0365, 2011-01-0814, and 2013-01-0836; SAE paper no. 2013-01-0527 authored by Environment Canada and MECA). Like diesel particulate filters, gasoline particulate filters are capable of reducing particle emissions by more than 85% over a wide range of particle sizes, including high capture efficiencies for ultra-fine particulates. The application of a GPF on a four-cylinder gasoline direct injection vehicle is expected to cost approximately $100-120 (see ICCT's GPF cost estimate available here: www.theicct.org/estimated-cost-gasoline-particulate-filters), making this emission control technology a cost-effective solution for reducing particulate emissions from future gasoline vehicles. When these filters are properly designed, the impact of a GPF installation on the backpressure and fuel-efficiency of the vehicle is expected to be minimal.

EPA needs to make sure that these same ultra-low PM, Euro 6 GDI engine/emission technologies are also utilized in the U.S. To that end, MECA believes that it is important for EPA, at a minimum, to harmonize with ARB's LEV III, 1 mg/mile light-duty vehicle PM FTP standard to maximize the public health benefits associated with reducing public exposure to particulate emissions from future light-duty vehicles. Some consideration should also be given to aligning with the European Euro 5/Euro 6 diesel/GDI particle number limit, especially if EPA and ARB believe that there are measurement issues with a 1 mg/mile PM standard. Based on information presented by ARB at the 2013 CRC On-Road Vehicle Emissions Workshop held in San Diego in April 2013 and presented to MECA in May 2013, ARB believes that there is a pathway to measuring PM emissions at levels below 1 mg/mile. ARB has published a revised PM mass measurement protocol that is part of their pathway to measuring very low PM mass levels from the exhaust of a vehicle (see ARB test method MLD 145 available at: www.arb.ca.gov/testmeth/slb/exhaust.htm). Ford researchers have also developed a correlation between particle number measurements and particle mass that can provide an alternative pathway to measuring very low PM mass levels (see M. Matti Mariq and Ning Xu, Aerosol Science 35 (2004), pp. 1251-1274). ARB adopted their 1 mg/mile PM standard to provide additional public health protection to exposure to particulate emissions from vehicle emissions and EPA needs to follow California's lead in harmonizing with this very tight PM standard. EPA and ARB need to continue to work together and reach agreement on measurement protocols that are acceptable for use with a 1 mg/mile FTP PM standard. [EPA-HQ-OAR-2011-0135-4675-A2, p. 4] Finally, MECA would like to reiterate our strong support for EPA harmonizing with ARB's LEV III 1 mg/mile FTP PM standard. In July 2013 MECA released a new report on ultrafine particulate (UFP) emissions entitled, "Ultrafine Particulate Matter and the Benefits of Reducing Particle Numbers in the United States." The report summarizes the current understanding of the potential adverse health impacts of UFPs; outlines the various control strategies and technologies that can be used to meet current and upcoming U.S. EPA and California ARB emission standards (including LEV III and EPA's proposed Tier 3 standards); and documents the success story of using diesel particulate filters (DPFs) to meet and exceed U.S. and European emission standards. Notably, the report highlights a correlation between particle number (PN) and PM that can be used in conjunction with PM-based health data to estimate the health benefits of reducing particle number emissions, and indicates that a PN measurement may offer a more robust unit for determining compliance at very low PM mass levels. In addition, the report quantifies the health benefits of the additional emission reductions that are realized when DPFs or gasoline particulate filters (GPFs) are used compared to only engine-based strategies. With respect to light-duty vehicles, the report echoes many of the comments made by MECA with respect to the expected dominant use of GDI engines in the U.S. because of their improved fuel economy versus port injected gasoline engines, the higher particle mass and number emissions of GDI engines relative to port injected engines, and the recommendation that EPA follow California's lead in including a 1 mg/mile PM FTP limit in its final Tier 3 standards. Gasoline particulate filters are a cost effective emission control technology option for meeting a 1 mg/mile FTP PM standard, and GPFs are expected to be introduced in Europe in the near future on some GDI models to meet the Euro 6 GDI PN limit of 6 X 1011 particles/km. As discussed in this report, compliance at the 1 mg/mile PM level provides significant additional health benefits beyond the benefits included by EPA in their Tier 3 proposal. The full MECA report on ultrafine particulates is available on MECA's public website, www.meca.org, under Resources >> Reports. It is important for the United States to continue to set the bar on light-duty vehicle emission standards in order to encourage the development and use of best available control technologies for light-duty vehicles. EPA has a long history of setting technology-forcing vehicle standards based on the public health benefits they provide and this leadership needs to continue with respect to light-duty vehicle particle emission standards.

In addition, MECA asks EPA to harmonize with ARB's 1 mg/mile FTP PM standard and to set tighter PM limits for the US06 test cycle.

Natural Resources Defense Council (NRDC)

EPA should establish a process to tighten particulate matter standards and incorporate particulate matter number into future standards.

EPA's proposed particulate matter (PM) Federal Test Procedure (FTP) standard of 3 mg/mi is less health-protective than a 1 mg/mi standard, which the California Air Resources Board (CARB) recently adopted. EPA did not adopt a 1 mg/mi standard because the agency believes that equipment that can reliably and consistently measure PM levels at and below the standard needs further development. However, because CARB has set a 1 mg/mi standard such equipment will exist by at least model year 2025.

EPA should establish a process with CARB to assess the development of needed measurement technologies. If the joint agency assessment shows that sufficient measurement technologies are feasible, EPA should tighten the PM FTP standard to be at least as stringent as California's with regard to standard levels and phase-in schedules.

EPA should also evaluate the use of particle number as an additional basis for future PM standards, especially to set standards that will reduce ultrafine particle pollution. As history has shown with PM10 and then PM2.5 studies, attention to smaller and smaller particles has been critical to protecting human health. Particle number measurements may serve to bolster verification of controls of very low masses of fine particles (1-3 micrometers) but also become the basis for control of ultrafine particles (<1 micrometer).

EPA acknowledges the potential significant health threat from ultrafines, stating that the agency's Integrated Science Assessment for Particulate Matter "concludes that there is suggestive evidence of a causal relationship between short-term exposures and cardiovascular effects, such as changes in heart rhythm and blood vessel function. It also concludes that there is suggestive evidence of association between short-term exposure to ultrafine particles and respiratory effects. Data are inadequate to draw conclusions regarding the health effects associated with long-term exposure to ultrafine particles".

In its review of measurement and control technologies for tighter standards targeting PM2.5, EPA should also be evaluating methods to count and control ultrafine particles in future standards.

Northeast States for Coordinated Air Use Management (NESCAUM)

NESCAUM strongly supports the proposed PM standard of 3 mg/mi for all light-duty vehicles, light-duty trucks, and medium-duty passenger vehicles for all model years through 2024. However, we feel that the standard should be phased down to 1 mg/mi from 2025 to 2028, consistent with the requirements of the California LEV III program. We note that encouraging progress is being made with respect to reliability of advanced PM measurement techniques, and we share CARB's view that lead time for the 1 mg/mi phase-in is sufficient for appropriate measurement techniques to be perfected and validated. We urge EPA to fully harmonize its PM standards with CARB's and to work with CARB to monitor and support continued progress in the development of PM measurement techniques.

Sierra Club, Clean Air Watch, Respiratory Health Association

Fine particulate matter is recognized as extremely hazardous to health, causing lung disease and contributing to premature death. The proposed standards seek to reduce emissions of particulate matter by proposing a FTP PM certification standard of 3 mg/mi for all model years. The proposed SFTP PM certification standard is much higher, either 10 mg/mi or 20 mg/mi, depending on the vehicle.

It is important to note that as part of their Low Emission Vehicle III (LEV 3) standards, the California Air Resources Board is proposing lower certification standards and will be phasing in a 1 mg/mi FTP standard beginning in MY 2025.

We urge EPA to coordinate with CARB to determine how to measure ultra-fine particles and to consider harmonizing PM standards with those set by CARB in LEV 3.

Union of Concerned Scientists (UCS)

Particulate Matter Emissions Standard: EPA should harmonize with the California Air Resources Board's (CARB's) Low Emission Vehicle III (LEV III) standard for particulate matter emissions.

Particulate matter (PM) can travel deep into the lungs and harm human health. Many scientific studies have linked exposure to PM with respiratory ailments, chronic bronchitis, asthma attacks, heart attacks and premature death, particularly within sensitive populations. Much progress has been made in the last decade to limit PM emissions, but more must be done.

The Union of Concerned Scientists supported CARB's decision to issue a 1 mg/mile standard for light duty vehicles in its Low Emission Vehicle III (LEV III) program and urges EPA to set the most stringent PM exhaust emission standard possible as part of this rulemaking. This can most easily be accomplished by working with CARB on its development of measurement protocols in order to harmonize the Tier 3 program with LEV III.

Additionally, EPA should strongly consider the inclusion of a particulate matter number limit in addition to the PM mass limit for exhaust emissions. The European Commission has recently adopted particulate matter number limits in order to address technology adoption that has resulted in low PM mass but high PM numbers due to an increase in the ultrafine (<100 nm) PM emissions. Adopting a PM number limit (in coordination with CARB) will decrease harmful emissions and also result in a standard that is easier to measure. A well-crafted PM number limit will ensure the continued protection of public health by limiting exposure to particulate emissions and driving advancements in vehicle and emission control technologies.

Our Response:

Most commenters were generally supportive of the proposed 3 mg/mi FTP PM standard. CARB commented that they agree with EPA that these standards are readily achievable with no additional technology or hardware. In addition, several commenters, including CARB and several NGOs and auto industry suppliers, supported a more stringent standard of 1 mg/mi, which the California LEV III program phases in beginning in MY 2025. Some commenters agree with EPA that additional research and development is needed to reliably measure a 1 mg/mi PM standard, but believe that there is ample lead time for such development. Another commented that, currently, both a 1 mg/mi US06 standard and a potential particle number (PN) requirement are hindered by the lack of measurement precision, but they believe that continuing research into particulate measurement should resolve these issues in the future. After careful consideration of these comments and information available at this time, we continue to believe that the PM standards that we are finalizing for the federal Tier 3 program are the most stringent technically feasible standards within the implementation timeframe of this rule. (See Chapter 1.5.1 of the RIA describing EPA testing and PM emissions results.)

We will continue to work closely with CARB in this area. Specifically, our agencies will continue our parallel evaluations of how improved gravimetric PM measurement methods can reduce PM mass measurement variability at very low PM levels and how this relates to the evolving technological capabilities of automakers to reach very low PM levels with sufficient compliance margins. Also, as suggested by several commenters, EPA will continue to follow research on the association between particle number (PN) and health effects and into the accurate measurement of PN. Based on our future findings, we will determine whether any future action is appropriate.

PM emissions over the FTP are generally attributed to cold-start operation, when PM formation from combustion of the fuel is facilitated by the operating conditions, including a cold combustion chamber and fuel enrichment. During cold-start operation, PM control is less effective, especially the oxidation by the catalytic converter of semi-volatile organic compounds from the lubricating oil. We believe that for vehicles that are not already at the Tier 3 levels, the new standards can be achieved with improvements to the fuel controls during the cold start, without the need for any new technology or hardware. We also expect that manufacturers will pay close attention to maintaining low PM emissions during the implementation of newer technologies like gasoline direct injection (GDI) and turbocharged engines. Improvements in cold-start exhaust catalyst performance for NMOG+NOx control will also reduce emissions of semi-volatile organic PM. For these reasons, cold start PM levels are relatively independent of vehicle application and therefore we are finalizing a single FTP PM standard for all light-duty vehicles, as proposed.

The Alliance and Global Automakers support fleet-average standards for PM, instead of the proposed per-vehicle standards. We do not believe that fleet average standards are appropriate in the case of FTP (and SFTP/US06 PM) because the purpose of the form and level of the standards (i.e., per-vehicle versus fleet-average) is different than that of the NMOG+NOx standards. For the NMOG+NOx standards, we designed the declining standards to require increasing technological progress and gradually improving emissions. For the PM standards, many or most manufacturers are already meeting the 3 mg/mi standard with well-performing vehicles, and our intent is to bring all other vehicles to the same PM performance. An averaging system in this context would not be appropriate, and possibly counterproductive, since fleet averaging could allow some or all of the higher-emitting current vehicles to remain at those unnecessarily high levels. For these reasons, we are finalizing the per-vehicle form of the FTP PM standards.

CARB commented that we should require that a manufacturer that certifies its vehicles to the proposed alternative phase-in schedule still meet the requirement that 100 percent of those vehicles meet the applicable PM standards in the 2021 model year. The proposed Tier 3 alternative phase-in schedule includes MY 2021 as the final year when a manufacturer could have the flexibility of not meeting the 100 percent target if they outperform the targets in MY2017 through 2020. However, we believe that including MY2021 in the alternative phase-in schedule provides a reasonable amount of time with which to achieve compliance. We do not believe that the duration of the phase-in will negatively impact the PM emission reductions of the overall program, because it will require manufacturers to exceed the obligations that would have otherwise applied under the primary phase-in in an earlier model year. We are requiring that manufacturers meet the 100 percent compliance requirement in MY2022.

4.1.2.6. Specific Comments on US06 PM Standards

What Commenters Said:

Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

The red text shows the discrepancy between the EPA Tier 3 and the ARB LEV III regulations. We appreciate that EPA recognizes this disconnect between the regulations and allows manufacturers to count vehicles in the 6,000-8,500 pounds GVWR weight class toward compliance with the phase-in percentage (i.e., numerator only) in MY 2017 (we would note what appears to be a typo in §86-1811-17(b)(6)(i)). However, this would not benefit manufacturers with a small volume of vehicles in the weight class. To harmonize with LEV III, we recommend adding an option for manufacturers to comply with the MY 2017 phase in by producing 10 percent of their 0-8,500 pounds GVWR fleet to the revised PM Standard.

Recommendation: We recommend the following changes (including a correction to the typo mentioned above) to §86-1811-17(b)(6)(i):

'Tier 3 FTP standard for PM must also meet the Tier 3 US06 standard for PM. In model year 2017, the phase-in requirement does not apply~~ies only for~~ to vehicles ~~at or below~~ above 6,000 pounds GVWR; however, if you certify these vehicles to the Tier 3 PM standards in the model year 2017, you may count those projected U.S. sales toward your calculation for meeting the phase-in percentage for that year (numerator only). Alternatively, you may comply in the model year 2017 meeting the FTP and the US06 PM standards with 10 percent of your projected nationwide sales of all vehicles (including those greater than 6,000 pounds GVWR).'

The NPRM proposes to adopt new US06 PM standards to control PM emissions under the high speeds and loads encountered on the US06 cycle. The standards proposed harmonize with the LEV III US06 PM standards of 10 mg/mile for vehicles <6,000 pounds GVWR, and 20 mg/mile for vehicles >6,000 pounds GVWR. In §IV(A)(4)(b) of the Preamble to the Tier 3 NPRM, EPA asks for comment on the proposed Tier 3 US06 PM standards, including whether EPA should adopt a standard of 10 mg/mile for all vehicles (both less than and greater than 6,000 pounds GVWR).

First, we would note that light-duty vehicles and light-duty trucks are a very small fraction of PM emissions, accounting for less than two percent of total PM10 emissions and less than four percent of PM2.5 emissions. The other 98 and 96 percent of PM emissions, respectively, come from sources such as cooking, farming operations, construction and demolition, etc.

The US06 PM Standard is an entirely new test for which the industry and the agencies are still gathering and analyzing the emissions data. Further complicating the standards are the likely introduction of new technologies to meet the GHG standards. Given this, we are concerned with the technical feasibility of achieving even the proposed SFTP US06 PM standard of 10 mg/mile for passenger cars and trucks under 6,000 pounds GVWR and 20 mg/mile for light-duty trucks over 6,000 pounds GVWR. In particular, technologies needed to meet the GHG requirements may conflict with the US06 PM standards. Future low-powered/downsized technologies and range extenders needed to meet the GHG requirements, for example, may not be able to comply with the proposed PM standards.

Another point of concern is that the PM standards are flat standards that all vehicles must meet, as compared to fleet average standards that are proposed for NMOG+NOx compliance. Thus the risk that a particular type of technology would be precluded by the PM standards is increased because such technology cannot be certified to a higher bin and offset by a different technology certified to a lower bin.

Moreover, requiring full-size pickups and SUVs that make up the over 6,000 pounds GVWR category to meet the same flat standard that smaller and lighter vehicles in the under 6,000 pounds GVWR category must meet is effectively making the full-size pickups and SUVs meet a more stringent standard, given the higher engine throughput associated with these larger, heavier vehicles.

It is also worth noting that the PM standards begin at a time when manufacturers enter the eighth year of the most stringent GHG standards in history, when the number of ZEVs and PHEVs jumps considerably in California and the Section 177 states, and while reducing exhaust emissions by 75 percent on both the FTP and SFTP and phasing in zero evaporative emission standards on all vehicles.

Recommendation: Taking all of this into consideration, industry does not oppose adopting the proposed US06 PM standards that will harmonize the LEV III and Tier 3 standards. However, we oppose adoption of 10 mg/mile PM standard on the US06 for all light-duty trucks over 6,000 pounds GVWR. We are concerned that such standards are not feasible given the technological changes necessary to meet all of the other emission requirements manufacturers must meet in the exact same timeframe. Moreover, such standards are not warranted.

American Lung Association

We believe the Supplemental FTP PM emissions standards are not sufficiently aggressive and are, in reality, a non-standard. EPA has proposed a Supplemental FTP PM emissions standard of 10 mg/mile which would allow far more PM emissions than existing vehicles currently emit. According to a memorandum describing EPA’s own testing, no vehicles either above or below 6,000 pounds gross vehicle weight rating emitted more than 3.5 mg/mile and most were well below that level. We urge EPA to set the tightest feasible Supplemental FTP PM emissions standards, which would be no greater than 4 mg/mile.

California Air Resources Board (CARB)

Comment 3 - Set lower PM standards Over the Supplemental Federal Test Procedure — US06 Cycle: The proposed Tier 3 program includes US06 PM standards of 10 mg/mi for lighter vehicles and 20 mg/mi for heavier vehicles. Based on recent PM emission data generated by both CARB and U.S. EPA test programs, CARB believes that a more stringent US06 PM standard of 4 mg/mi applicable to both vehicle categories is feasible. The following is a summary of these test programs as well as CARB’s rationale for the recommendation.

Prior to California’s LEV Ill rulemaking, eight California LEV II-certified light-duty vehicles, which included five gasoline direct injection vehicles and three port fuel injection vehicles, were tested for PM emissions over the US06 cycle in CARB’s Haagen-Smit laboratory. Measured PM emissions from seven out of eight vehicles were below 3 mg/mi, including all five gasoline direct injection vehicles. A gasoline medium-duty passenger vehicle (gross vehicle weight rating between 8,501-10,000 Ibs) with an odometer reading of approximately 50,000 miles was also tested and achieved a US06 PM emission value of 0.8 mg/mi, comparable to those measured from the lightduty test vehicles. One particular light-duty test vehicle had PM emissions in excess of 3 mg/mi, but CARB suspects that because the vehicle was not designed or certified to a stringent US06 PM standard, the calibration strategy may not have been optimized for PM control over the US06 and further refinement to the calibration would likely address the issue including minimizing any enrichment events that directionally increase emissions.

Recently, U.S. EPA shared PM emission data from its full useful life program with CARB. The primary objective of the full useful life program was to establish the feasibility of Tier 3 PM standards at vehicle full useful life and investigate the contribution of lubricating oil to PM emissions in Tier 2 vehicles. More than two dozen passenger cars and light-duty trucks were tested for PM emissions on the FTP and US06 cycles. Initial results showed high PM emissions in excess of 40 mg/mi from some of the vehicles over the US06 cycle. U.S. EPA later determined that silicone contamination from the use of silicone exhaust transfer tubes in the emission sampling system was a major contributor to the measured PM mass emissions, especially on test cycles that generate high exhaust temperatures such as the US06 cycle. As a result, U.S. EPA re-tested a dozen vehicles and the new data show that all twelve vehicles, including a suspected oil burner, emit at levels less than 4 mg/mi PM on the US06' cycle.

In response to U.S. EPA's recent US06 testing and the discovery of the silicone contamination issue, CARB has initiated a test program to further investigate PM emissions on the US06 cycle and determine the feasibility of a more stringent standard: The test program aims to gather US06 PM emission data on both current and future engine technologies, such as port fuel injection, gasoline direct injection, turbocharging, and engine downsizing, and the test vehicles are being selected accordingly. While the test program is on-going and vehicles are still being tested, thus far, US06 PM data have been collected for eight port fuel injection vehicles, including one light-duty truck and two gasoline direct injection vehicles. PM emissions over the US06 cycle from seven out of the ten vehicles were measured below 1 mg/mi while nine out of ten were measured below 4 mg/mi. The one vehicle that had PM emissions above 4 mg/mi also showed FTP emissions that exceeded the LEV II FTP PM standard, so it is likely that the vehicle was not operating within design specifications at the time of testing.

While the findings of the above test programs clearly show that current LEV II vehicles which are not subject to PM standards under the LEV II SFTP program, are capable of complying with a 4 mg/mi US06 PM standard, there have been some concerns regarding future technologies, such as advanced gasoline direct injection and turbocharged, downsized engines. While these future technologies are expected increase cylinder pressures and temperatures and possibly the need for additional engine temperature control, CARB still believes the 4 mg/mi US06 PM standard is feasible. This is because affected Tier 3 vehicles will be equipped with improved PM control technologies needed to comply with the 3 mg/mi PM standard on the FTP (in lieu of the 10 mg/mi PM standard that LEV II vehicles are certified to) and because additional calibration opportunities will exist as even today's LEV II vehicles, which are calibrated without PM control considerations over the US06 cycle, generally have emission levels below 4 mg/mi with compliance margin.

In summary, while CARB will continue to collect US06 PM emission data on future technologies, CARB believes the data currently available sufficiently supports a more stringent standard and recommends that U.S. EPA adopt a US06 PM standard of 4 mg/mi in the Tier 3 program. Additionally, should U.S. EPA adopt a more stringent standard in the final proposal, CARB recommends that the corresponding in-use standards also be lowered in accordance with any changes to the certification standards.

Comment 4 — Optional Phase-In Formula for FTP and US06 PM Standards: U.S. EPA is proposing to phase-in Tier 3 FTP and US06 PM emission standards beginning with the 2017 model year with 100 percent compliance required in the 2021 model year. U.S. EPA has also proposed an optional alternative phase-in schedule that manufacturers may use to comply with the Tier 3 PM emission standards for these model years. This alternative phase-in schedule is based on a mathematical equation that provides credits for vehicles certified to the Tier 3 PM standards based on the year in which they are certified. Accordingly, vehicles certified to Tier 3 PM standards in earlier years would be worth more than those certified in later years. This alternative phase-in schedule is similar to one CARB adopted for vehicles meeting the LEV III PM standards. However, while the LEV Ill regulations explicitly state that 100 percent compliance is required at the end of the phase-in period, the proposed Tier 3 regulations do not. We believe that in order to maintain the emission benefits of the Tier 3 program, it is necessary to add language to the Tier 3 rule to clarify that a manufacturer that certifies its vehicles to this alternative phase-in schedule must still meet the requirement that 100 percent of those vehicles meet the applicable PM standards in the 2021 model year.

[See CARB's public comment document EPA-HQ-OAR-2011-0135-4919-A1, received by the docket on October 23, 2013, for two graphics: CARB Light-Duty SFTP Program (PFI Vehicles) and CARB Light-Duty SFTP Program (GDI Vehicles)]

Environmental Defense Fund (EDF)

EPA Should Adopt Most Protective US06 PM Standard – Not Based on Vehicle Weight: EPA seeks comment on the use of vehicle weight to establish separate US06 PM standards for cars and trucks.143 EDF asks the Agency to adopt one protective US06 PM standard for all vehicles subject to the Tier 3 program, regardless of weight. [EPA-HQ-OAR-2011-0135-4355-A1, p. 27]

EPA is proposing a US06 PM standard of 10 mg/mi for vehicles at or below 6,000 lbs GVWR and a standard of 20 mg/mi for vehicles over 6,000 lbs GVWR. EDF believes both of these standards are too lenient and the Agency should adopt a single, more protective standard for all vehicles subject to Tier 3. As EPA states in the preamble, "today's heavier vehicles are already achieving PM emission levels well below our proposed 20 mg/mi standard and are approximately equivalent to the performance of lighter vehicles." Indeed, EPA's data presented in the RIA show that all of the vehicles tested, both above and below 6,000 lbs, achieved a US06 PM emissions result of less than 4 mg/mi. And as illustrated in EPA's Figure below, similar emissions rates were recorded for both light and heavy vehicles, indicating that heavier vehicles are capable of meeting the same US06 PM requirements as the lighter vehicles. EPA's test results also indicate that not only can all vehicles, regardless of weight, meet the same standard, but that standard can and should be set well below the 10 mg/mi standard proposed by EPA for vehicles under 6,000 lbs GVWR. We recommend that EPA finalize a US06 PM standard for all vehicles subject to the Tier 3 program of no greater than 4 mg/mi.

Ferrari

Ferrari considers the proposed PM standards feasible in 2021 MY. We therefore support this aspect of EPA's proposed rule.

Ford Motor Company (Ford)

Consistent with the CA LEV III program, EPA has proposed two separate US06 particulate matter (PM) standards for light-duty vehicles: 10 mg/mi for vehicles less than 6,000 pounds GVWR, and 20 mg/mi for vehicles over 6,000 pounds GVWR. EPA has asked for comment on these standards and also whether a single, 10 mg/mi standard applied to all light-duty vehicle (LDV) classes would be more appropriate. Ford agrees with the Alliance comments on this issue and strongly opposes the application of a 10 mg/mi standard to vehicles over 6,000 pounds.

Unlike PM generation on the Federal Test Procedure (FTP) which is typically dominated by the "cold-start" portion of the cycle–PM on the US06 is more closely related to the work the vehicle is required to perform over the cycle, which naturally increases with vehicle mass. Requiring heaver vehicles to meet the same PM limits as lighter vehicles would, in effect, increase the stringency of the PM standards for these vehicles at a time when automakers must introduce new technologies to meet challenging GHG standards. This increased stringency would be disproportionally applied to full-line manufacturers. The higher 20 mg/mi standard will help ensure that similar fuel economy / greenhouse gas advances can be applied to both lighter and heavier vehicles. US06 PM emissions are also affected by several factors related to the high exhaust temperatures characteristic of this drive cycle, including: 1) the need for catalyst protection, 2) potential desulfurization of the catalyst, and 3) storage/release artifacts from the exhaust and sampling systems. As vehicle size increases, so does the thermal energy in the exhaust. Above 6,000 pounds GVWR, this leads to quicker and more extensive heating of the catalyst and exhaust system during the US06 cycle that exacerbates these issues relative to lighter vehicles.

Recommendation: Ford recommends that EPA adopt the light-duty US06 PM standards as proposed in the Tier 3 NRPM, which specifies a 20 mg/mi standard for LDVs above 6,000 lbs GVWR.

International Council on Clean Transportation (ICCT)

As cold starts have a relatively small impact on particulate emissions, the same times two factor found for SFTP NMHC+NOx emissions should also be applied to particulate emissions. This means that the SFTP PM standard should be set at no more than 6 mg/mi.

Further, there is no reason why light-duty vehicles over 6,000 GVWR should be held to less stringent particulate standards. This violates the premise established with the Tier 2 emission standards that all light-duty vehicles should be held to the same emission standards. It is especially important that GVWR not be used to discriminate between different standards, as GVWR is easily gamed.

The problem is far worse for particulate matter. As the proposed SFTP particulate standard is 3.3 times larger for light vehicles and 6.7 times larger for heavy duties -- heavier vehicles than the FTP particulate standard.

Supplemental comments from ICCT:

The International Council on Clean Transportation (hereafter, "ICCT") is submitting supplemental comments specifically on SFTP PM (particulate matter) standards. Our primary comments were submitted to the docket with our letter of July 1, 2013 and the information in that submission will not be repeated here.

In our initial submission, the ICCT discussed the reasons why the proposed SFTP standards are too lenient and will not be effective. Setting the SFTP standards properly is especially important for diesel engines, as diesel emission control hardware requirements are largely set by the high load conditions on the SFTP. The ICCT recommended that the SFTP particulate standards be set at no more than 6 mg/mi.

We are submitting additional comments on SFTP PM standards in response to the recent release of test data on US06 PM2.5 emissions by CARB.[1] CARB recently tested 11 light-duty vehicles and trucks over the US06 and measured PM emissions. Results are presented in Figure 1 and the vehicle descriptions are in Table 1.

Seven of the eleven vehicles tested had PM emissions much less than 2 mg/mile. The Camry and the Explorer had PM emissions between 2 and 4 mg/mile. Only the Optima and the Juke exceeded 4 mg/mile.

Both the Juke and the Optima had GDI (gasoline direct fuel injection) engines. The literature has suggested that GDI engines with poor combustion design and wall-guided fuel injection could have higher PM emissions. However, the literature has also suggested that GDI engines with good design and spray-guided fuel injection could have low PM emissions. This is supported by the test results on the Ford Fusion, which also has GDI and has PM emissions of just over 1 mg/mile.

In addition, the Juke failed particulate standards on the FTP. This means that this vehicle may not have been operating properly or has a poorly designed GDI system. In any case, the fact that this vehicle was out of compliance means that the data should not be used when setting the SFTP PM standards.

While only two light duty trucks were tested, their emissions were also reasonably low, suggesting that light duty truck standards should be set at the same level as light duty vehicle standards. Further, there is no reason why light-duty vehicles over 6,000 GVWR should be held to less stringent particulate standards. This violates the premise established with the Tier 2 emission standards that all light-duty vehicles should be held to the same emission standards. It is especially important that GVWR not be used to discriminate between different standards, as GVWR is easily gamed.

Finally, it is extremely important to note that these PM emissions were measured in vehicles with existing emission controls. The proposed reductions in FTP PM emissions will require better combustion chamber and fuel injection designs, resulting in lower SFTP PM emissions as well.

In summary, the recent CARB test data completely supports ICCT's recommendation in our initial comments, that the SFTP PM standards should be set at no more than 6 mi/mile. In fact, the test data suggests that even 6 mg/mile would be too lenient and too easy to meet.

Manufacturers of Emission Controls Association (MECA)
With respect to the proposed PM limits for the supplemental FTP test cycles, EPA acknowledged that their Tier 3 proposal is flawed by a dataset that included contamination with respect to the PM analyses that were done on Tier 2-compliant vehicles. ARB shared with MECA in late May 2013 some of the revised, corrected Tier 2/LEV II US06 test cycle results. These data support a much tighter PM standard for the US06 test cycle than proposed by EPA for Tier 3. MECA understands that ARB intends to propose that EPA set a Tier 3 US06 PM limit of approximately 4 mg/mile for all light-duty vehicles (as opposed to the proposed Tier 3 US06 PM limits that depend on vehicle weight) based on the testing they are expected to complete before July 1, 2013. MECA is supportive of ARB's Tier 3 comments on this subject and asks that EPA (and ARB) set the tightest, feasible US06 PM standard in their final Tier 3 regulation.

National Association of Clean Air Agencies (NACAA)

US06 PM Standards — For the Supplemental Federal Test Procedure EPA has proposed that the standards for PM be met based on the US06 test, which represents aggressive highway driving, since the greatest concern regarding PM formation and sensitivity of engine controls is due to high-speed, high-load driving conditions. In particular, the agency has proposed a US06 PM standard of 10 milligrams per mile (mg/mi) for vehicles at or below 6,000 pounds gross vehicle weight rating (GVWR) and a standard of 20 mg/mi for heavier light-duty vehicles, to be phased in over a five-year period beginning in 2017. However, given EPA data showing that manufacturers appear to be controlling PM emissions from heavier light-duty vehicles over severe duty cycles, EPA requests comments on whether it should adopt a common US06 standard of 10 mg/mi for all light-duty vehicles. NACAA has reviewed EPA US06 PM emissions test data provided in a March 1, 2013, agency memorandum available in the Tier 3 rulemaking docket (4). According to the test data shown in Figure 8 (on final US06 PM emission results) of that memorandum, it is clear that US06 PM emission results for vehicles under and over 6,000 pounds GVRW are far below 10 mg/mi. In fact, no vehicle tested is over 4 mg/mi and most are substantially lower. Given the significance for air quality and public health of reducing PM emissions, NACAA recommends that EPA adopt US06 PM standards below 10 mg/mi for all affected light-duty vehicles — under and over 6,000 pounds GVWR — as supported by the agency's test data.

Union of Concerned Scientists (UCS)

Millions of Americans breathe cleaner air as a result of our nation's clean air laws but serious challenges remain. More than 1 in 3 Americans still live in areas where air pollutant levels exceed at least one of the health-based National Ambient Air Quality Standards. Passenger vehicles remain the second largest emitters of nitrogen oxides (NOx) and volatile organic compounds (VOCs) in the U.S. – the primary pollutants that form smog. These vehicles also emit more than half of all carbon monoxide pollution and contribute to particulate matter emissions. It is therefore essential that the Tier 3 standards for both PM and NMOG+ NOx be sufficiently stringent as to provide quantifiable and real reductions in harmful emissions.

We urge EPA to consider levels for the SFTP… PM… that are sufficiently stringent to ensure that they are suitably protective of human health and the environment.

Supplemental Federal Test Procedure: EPA should revisit the… particulate matter (PM) exhaust emission requirements to ensure that the emission requirements of this test procedure are suitably protective of human health and the environment.

The problem is similar for PM. The SFTP PM standard is more than three times higher than the PM FTP standard in 2023 for light duty vehicles and more than six times higher for vehicles with a gross vehicle weight rating of more than 6,000 pounds. As CARB explains in its comments (10), there were flaws in the data collected during EPA's useful life testing due to silicon contamination resulting in higher PM emissions. Retesting of some of these vehicles, as well as additional testing undertaken CARB supports the setting of more a stringent PM standard for the US06 test cycle than currently under consideration.

Our Response:

Comments from stakeholders representing states, including CARB, and several NGOs urged EPA to finalize more stringent US06 PM standards than those proposed, in all cases advocating for standards below 10 mg/mi for the entire light-duty fleet and in some cases advocating for standards below 6 mg/mi. Conversely, auto industry commenters generally supported the proposed standards (10 mg/mi and 20 mg/mi for lighter and heavier light duty vehicles, respectively. We have concluded that the body of recent data clearly shows that the long-term 6 mg/mi US06 PM standard that we are finalizing, is the appropriate level to prevent any significant "backsliding" in US06 PM emissions as new vehicles and technologies enter the fleet. At the same time, the 6 mg/mi standard provides a reasonable compliance margin -- about 50% above the average levels of current vehicles, which are averaging about 3 to 4 mg/mi. A long-term standard numerically lower than 6 mg/mi would run counter to our intent to bring the emissions performance of all vehicles to that already being demonstrated by many vehicles in the current light-duty fleet. We believe the long-term US06 PM standard we are finalizing is appropriate based on all of the information available at this time and will not hinder introduction of new technologies manufacturers may choose for compliance with the other Tier 3 standards or other rules.

The short-term, less-stringent US06 standard of 10 mg/mi (applicable in MYs 2017 and 2018) responds to automaker concerns about uncertainties stemming from simultaneous regulatory requirements and rapidly evolving exhaust and engine technologies in the coming years. We recognize that vehicle control technologies for both criteria and GHG emissions are evolving and will continue to do so, including an expected expansion of gasoline direct injection (GDI) technologies (see Section IV.A.5.c of the preamble and the RIA). Also, the transition to lower sulfur in-use gasoline required by this rule may create temporary additional challenges in consistently achieving lower US06 PM emissions (see Section IV.A.6 of the preamble and in the RIA). We believe that most manufacturers will implement similar if not identical emission control strategies to comply (or, more often, to continue to comply) with both the 10 mg/mi and the 6 mg/mi standards. In so doing, we expect them to use the temporary additional compliance margin provided by the 10 mg/mi standard to reduce uncertainties about potential variability in performance (in use and, in particular, later in vehicle life) during the early years of developing and commercializing their control technologies.

The 10 mg/mi standard will expire after MY 2018, and the long-term standard of 6 mg/mi will take effect. As the implementation of the program continues, we believe a limited degree of relief for testing of in-use vehicles is appropriate. Manufacturers commented that because of the industry's general lack of experience with stringent PM standards, especially as the newly-designed vehicles age, less stringent standards for in-use testing would reduce near-term concerns about performance variability early in the program. We agree, and we are finalizing a separate standard of 10 mg/mi for in-use vehicle testing for the intermediate years of the program, MYs 2019 through MY 2023. This standard is numerically lower than the proposed in-use standards – again because of the availability of improved US06 test data as described above – but the purpose of providing an in-use standard remains the same. The in-use standard, in conjunction with the short-term 10 mg/mi standard, represents a longer duration of relief than we had proposed, again based on comments from the industry about their compliance concerns with new US06 standards. For MY 2024 and later, there will be no separate in-use standard and all vehicles will need to meet the long-term standard at certification and in use.

EPA proposed that different US06 PM standards apply to lighter and heavier vehicles. The US06 PM test data discussed above also makes clear that the US06 PM performance of current vehicles is not closely related to vehicle weight, although the earlier data had indicated that this might be the case. Several commenters urged EPA to finalize a single standard for vehicles above and below 6,000 lbs GVWR based on the newer data. At the same time, auto manufacturers generally supported the proposed vehicle weight distinction, asserting a higher degree of uncertainty about the emission performance of their larger vehicles, especially in the early years of the program and in light of simultaneous technology challenges. The data clearly show that larger vehicles today are generally achieving US06 PM levels very similar to smaller vehicles, and well below the proposed standards. We are not finalizing separate US06 standards for heavier and lighter vehicles because separate standards are unwarranted based on a review of the data. However, we believe that the short-term 10 mg/mi standard, as well as the temporary in-use vehicle testing standard, will significantly reduce manufacturer compliance uncertainties in the early years of the program for all vehicles, as discussed above.

As with the FTP PM standards, manufacturers will comply with the US06 PM standards with the same increasing minimum percentage of their vehicles. Also, in response to manufacturer concerns about the transition to Tier 3, and as with the FTP PM phase-in, we are providing the option for a manufacturer to choose to certify 10 percent of its total light-duty vehicle sales in MY 2017 to the new US06 PM standards, including light-duty vehicles over 6,000 lbs GVWR.

As discussed in Section IV.A.2.c of the preamble, for LDVs and LDTs more than 6,000 lbs GVWR and MDPVs, EPA is also providing an alternative phase-in of the US06 PM standards

The primary PM percent phase-in schedule for MY 2017 requires 20 percent of vehicles 6,000 lbs. or less GVWR to comply with the new PM standards. In review of the comments regarding the PM phase-in requirements for MY2017, we agree with the commenters that the option we proposed may not by itself always apply equitably to manufacturers of different fleet mixes. In response to the suggestions, in addition to the primary PM phase-in we are finalizing the option that a manufacturer may comply in MY 2017 by meeting the FTP and the US06 PM standards with 10 percent of its projected nationwide sales of all vehicles (including those greater than 6,000 pounds GVWR). This approach is harmonized with the LEV III PM requirements in MY 2017.

As in their comments on FTP PM standards discussed above, CARB commented that we should require that a manufacturer that certifies its vehicles to the proposed alternative phase-in schedule still meet the requirement that 100 percent of those vehicles meet the applicable PM standards in the 2021 model year. See the response in Chapter 4.1.2.5 of this document.

Regarding the Alliance/Global comment about per-vehicle vs. fleet average standards for PM, see our response in Chapter 4.1.2.5 of this Summary and Analysis of Comments document.

4.1. LD Exhaust Standards

4.1.3. Start Date and Phase-In Schedules and Lead Time

4.1.3.1. Need to Maintain 2017-18 Start Dates

What Commenters Said:

Boulder County Board of Commissioners and Boulder County Board of Health

Therefore, it is imperative that the federal government take action by December 31, 2013, to adopt Tier 3 so it can be implemented with the 2017 model year of vehicles. If not, an entire year of benefits will be lost, resulting in serious and adverse impact on human health and welfare.

Children's Environmental Health Network (CEHN)

EPA should eliminate the one-year delay of fleet average NMOG+NOx FTP standards phase-in for vehicles with GVWR above 6,000 lbs.

Motor & Equipment Manufacturers Association (MEMA)

The EPA's proposal is mindful of other regulatory frameworks and compliance regimes. Efforts to harmonize Tier 3 vehicle emission requirements nationwide and to choreograph the timing of Tier 3 implementation with the final rules for greenhouse gas (GHG) emissions and corporate average fuel economy (CAFE) standards for light-duty vehicles are critical for interconnected and highly complex vehicle manufacturing supply chains. Also, EPA's integrated systems approach to vehicles and fuels, combined with the alignment to other parallel regulations, is practical and cost-effective. Companies and government entities alike will benefit from the resulting outcomes, such as streamlined costs for R&D and production and reduced burden for multiple, overlapping testing and compliance protocols. Since the timing of this rule is critical, it is important that EPA not delay its completion. If delayed, the benefits of synchronizing the timing of the GHG emissions, CAFE standards, and other programs will be lost and may negatively impact the states in achieving their respective air quality goals.

MEMA urges EPA to fully consider the public comments, particularly from the vehicle manufacturers. In addition, EPA must continue to collaborate with states, like California, and other stakeholders to avoid divergent policy pathways and competing regulatory regimes. MEMA recommends that the Agency promulgate a final rule by end of 2013 in order to match with other regulatory requirements standards affecting MY 2017 vehicles.

Manufacturers of Emission Controls Association (MECA)

[MECA] … urges EPA to finalize these proposals by the end of this year.

Our Response:

As proposed and as discussed in Section IV.A.2.a of the Preamble, the declining fleet-average NMOG+NO_X FTP standards will begin in MY 2017 for light-duty vehicles and light-duty trucks with a GVWR up to and including 6,000 lbs and in MY 2018 for light-duty vehicles and light-duty trucks with a GVWR greater than 6,000 lbs and MDPVs. The standards apply to the heavier vehicles a year later to facilitate the transition to a 50-state program for all manufacturers. During this transition period, there will be two fleet-average NMOG+NO_X standards for each model year, one for LDVs and LDT1s and one for all other LDTs (LDT2s, LDT3s, and LDT4s) and for MDPVs that decline essentially linearly from MY 2017 through MY 2025. At that point, the two fleet-average standards converge and stabilize for all later model years at the same level, 30 mg/mi, which is identical to the LEV III final fleet average.

While the rule is be finalized in 2014 deadline we have maintained the requirement that implementation of the Tier 3 standards start in MY 2017. This planned program start retains the benefits synchronizing the phase-in of the Tier 3 rule with other related programs.

4.1.3.2. Statutory Concerns About Lead Time for Heavier LD Vehicles and Issues With Alternative Phase-In Schedules

What Commenters Said:

Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

In several places throughout the regulations, EPA skirts the plain language of the CAA by offering two alternatives – one that does not comply with the CAA lead time provisions but offers a reasonable requirement, and another that provides the required lead time but is so stringent that no reasonable company would ever choose it. The CAA does not authorize this approach, nor is EPA following Congress' clear intent and direction. Moreover, complying with the plain language of the CAA would achieve the same level of emissions reduction. While we applaud and support EPA's desire to harmonize with California as expeditiously as possible, it is not necessary to violate the CAA in the process.

The CAA clearly requires EPA to provide four years of lead time for changes to emission standards for heavy-duty vehicles, which are defined in CAA § 202(b)(3)(C) as those vehicles manufactured primarily for use on public roads that have a gross vehicle weight rating (GVWR) of more than 6,000 pounds.(2) Specifically, CAA § 202(a)(3)(C) states, "Any standard promulgated or revised under this paragraph and applicable to classes or categories of heavy-duty vehicles or engines shall apply for a period of no less than 3 model years beginning no earlier than the model year commencing 4 years after such revised standard is promulgated." (3)

EPA proposes both a primary path and an alternative path for complying with the FTP and SFTP NMOG+NOx standards:

Primary Path – Fleet Average: Under this option, both FTP and SFTP NMOG+NOx standards are phased in using a fleet average requirement. The manufacturer can certify vehicles to any of a number of specified emission bins, but for each model year, the sales-weighted average emissions must meet a fleet average standard that decreases from MY 2017 to MY 2025 for vehicles less than 6,000 pounds GVWR, and from MY 2018 to MY 2025 for vehicles over 6,000 pounds GVWR.

Alternative Phase-In: Under this option, Tier 3 FTP and SFTP standards under the primary option apply for vehicles under 6,000 pounds GVWR in MYs 2017 and 2018, but do not apply for over 6,000 pound GVWR vehicles until MY 2019. Starting in MY 2019, 40 percent of all vehicles (both less than and greater than 6,000 pounds GVWR) must meet the final FTP and SFTP standards; in MY 2020, 70 percent of vehicles must meet the final standards; and in MY 2021– a full four model years ahead of the primary phase-in option – 100 percent of a manufacturer's fleet must meet the final Tier 3 standards.

Assuming EPA issues a Tier 3 final rule in late 2013, as planned, MY 2014 already would have begun. Therefore, the CAA requires that the regulations applicable to heavy-duty vehicles take effect no earlier than the MY 2019 (four years after the MY 2014 would be MY 2018, and the next MY would be 2019). Thus, EPA's proposed primary path for compliance with the FTP and SFTP NMOG+NOx Phase-In, which would require manufacturers of heavy-duty vehicles to begin complying with the more stringent Tier 3 standards in MY 2018, violates the lead time and stability requirement in CAA § 202(a)(3)(C).

Although the alternative compliance path phase-in for NMOG+NOx does meet the lead time requirement, it would require manufacturers to fully comply with the more stringent standards four years earlier, imposing significantly more stringent requirements on the manufacturers' fleet. This presents manufacturers with a Hobson's choice: either 1) give up the right to four years of lead time under the CAA, or 2) assert the right to four years of lead time under the CAA, and get punished with more stringent standards as a result. The alternative compliance path is so burdensome that no reasonable manufacturer would choose this option; all manufacturers would essentially be forced into excusing EPA's violation of the CAA and complying with the primary path.

The lead time limits that the CAA imposes on EPA were never intended to be circumvented by regulatory ultimatums of this nature. The CAA envisions that EPA will promulgate standards taking into consideration all of the relevant factors and limits set forth in §202(a). Congress did not intend to set up a process under which EPA could offer illusory options with the intent of extracting lead time concessions from manufacturers.

When a regulatory scheme is so heavily weighted or creates significant economic incentives such that only one of the options is reasonable, that option becomes a mandate and is no longer truly an option. The Supreme Court has acknowledged the possibility that "acute, albeit indirect, economic effects" of a state law could effectively restrict choices to the point that the law, while not directly preempted, could result in a de facto mandate that was preempted.4 Similarly, the U.S. District Court for the Southern District of New York held that the court had to examine the effect of the New York City law to first determine whether incentives for the purchase of hybrid taxis created a de facto mandate to purchase hybrids in order to decide whether the rules were preempted by the federal fuel economy requirements in the Energy Policy and Conservation Act (EPCA).5 Also in the vehicle context, the U.S. District Court for the Eastern District of California concluded that while other options existed for compliance with California's 2002 ZEV amendments, they were not viable alternatives to producing advanced gasoline hybrids, the cost of which made likely irreparable injury supporting the auto manufacturer's request for a preliminary injunction against the ZEV requirement.6 These cases make it clear that the courts look with disfavor upon regulatory "alternatives" that are designed to drive the regulated community in a particular direction. Here, the accelerated phase-in under the alternative compliance path would be so stringent that it would effectively eliminate it as an option, resulting in a de facto requirement to comply with the primary path, which is prohibited by the CAA.

In this case, there is a very clear statutory directive at issue. CAA §202(a)(3)(C) unambiguously requires four years of lead time for heavy-duty vehicles. This prohibits EPA from finalizing the primary compliance path as proposed. Providing an alternative compliance path that meets the statutory requirements does not, and cannot, remedy the fact that the primary compliance path violates the statute.

There is a relatively simple solution to this issue that meets EPA's objectives while maintaining compliance with the CAA. EPA can follow the lead time requirement of the CAA and begin the phase-in requirement in MY 2019 for vehicles over 6,000 pounds GVWR at the currently proposed fleet average emissions levels. In other words, the phase-in in MY 2019 would begin at the level that would otherwise be in place under the currently- proposed primary path.7 Such a rule would comply with the CAA, fleet emissions would be at an identical level starting in MY 2019, and there would be no meaningful environmental impact due to beginning the phase-in one year later.

Recommendation: For vehicles more than 6,000 pounds GVWR, the Alliance and Global Automakers recommend that Tier 3 fleet average requirements for both FTP and SFTP begin in MY 2019 at the currently proposed MY 2019 value. This approach is in full compliance with the CAA, completely harmonizes with LEV III in MY 2019, and achieves virtually the same level of emission reduction as the "primary path" proposed by EPA.

2 42 U.S.C § 7521(b)(3)(C).
3 42 U.S.C. §7521(a)(3)(C) (emphasis added).
4 New York State Conference of Blue Cross & Blue Shield Plans v. Travelers Insurance Co., 514 U.S. 645, 668 (1995).
5 Metropolitan Taxicab Board of Trade v. Bloomberg, 633 F.Supp. 2d 83, 96 (S.D.N.Y. June 22, 2009).
6 Central Valley Chrysler Plymouth v. California Air Resources Board, 2002 U.S. Dist. LEXIS 20403 at *15-16 (June 11, 2002).
7 If EPA does not release the final rule by the end of 2013, then an additional year of delay for vehicles greater than 6,000 pounds GVWR is required, starting in MY 2020 rather than the 2019 MY.

Chrysler Group LLC

The NMOG+NOx fleet average requirements for vehicles over 6,000 pounds GVWR should begin in the 2019 MY at the currently proposed 2019 MY fleet average emission level and compliance should end with MY 2025.

Clean Air Act Requirements: Lead-Time for Vehicles More than 6,000 Pounds GVWR and Useful Life Requirements – In several places in the proposed rule, EPA seeks to circumvent plain limits on its authority in the CAA by offering automakers two compliance alternatives – one that does not follow the CAA requirements but offers a reasonable compliance option, and one that applies the required statutory protections but imposes compliance conditions that are so stringent that no reasonable company would ever choose it. The CAA does not authorize this "poison pill" approach, under which companies are essentially forced to waive their statutory protections under the CAA to avoid an unreasonably burdensome compliance alternative. This is particularly so where the burdens imposed with the option to retain the statutory protection bear no rational relation to the statutory protection in question. In short, EPA's dual-path approach, as described below, effectively and impermissibly eviscerates the statutory protections for industry that Congress intended to provide. Chrysler believes that EPA does not have the authority to create overt workarounds to clear statutory requirements and limitations.

It is instructive that EPA previously failed in an attempt to circumvent the requirements of the CAA by proposing to adopt a similar favorable versus non-favorable dual-path approach. In Virginia v. EPA, (24) the D.C. Circuit firmly rejected a regulatory scheme strikingly akin to the proposals here: in the Virginia case, EPA promulgated a rule in 1995 that was intended to reduce ozone pollution in the northeastern United States by requiring states in that region essentially to adopt California's vehicle emission program. However, Section 202(b)(3)(C) of the CAA prohibited EPA from adopting more stringent emission standards for new motor vehicles until

2004, providing that "the numerical emission standards . . . shall not be modified by the Administrator . . . for any model year before the model year 2004" (25). In order to overcome this explicit statutory limitation, EPA offered states in the region a choice: (1) adopt a vehicle emission program that would achieve emission reductions from new motor vehicles in the amount that would be achieved by California's Low Emission Vehicle program; or (2) develop an acceptable "Substitute Program" that would reduce ozone precursors anywhere from 3.5 to 6.5 times more than would the California program (26). However, as even EPA acknowledged, the Substitute Program was so burdensome that it was not a realistic alternative; in the words of the D.C. Circuit, "EPA's alternative [was] no alternative at all, and, "only a very foolish state would see EPA's offer to accept [the alternative compliance option] as a real alternative")."

The D.C. Circuit held that EPA's regulatory scheme, which effectively forced states to adopt California's vehicle emission program in contravention of the CAA, was unlawful. In vacating the rule, the D.C. Circuit flatly rejected EPA's position that because the states had an alternative to adopting the California motor vehicle standards, EPA itself was not imposing more stringent emission standards for new motor vehicles. In so holding, the Court stated: Here Congress's policy and preference is loud and clear. It "is the intent of Congress that" EPA not modify the "numerical emission standards" for "any model year before . . . 2004." 42 U.S.C. § 7521(b)(1)(C). EPA therefore may not require, mandate, order, or impose conditions demanding that any state enact particular motor vehicle emission standards, even if those standards are identical to California's. The time will come when EPA can make its case for tougher emission limitations on motor vehicles. But that time is years from now and, under section 202, the case must be made to Congress.

Likewise, here, EPA has proposed alternative compliance paths in the proposed rule that are "no alternative[s] at all," effectively forcing manufacturers to waive their statutory protections. As the D.C. Circuit held in Virginia v. EPA, such a regulatory scheme is prohibited by the CAA.

Two specific examples of this impermissible regulatory structure are addressed below: (1) the proposed phase-in requirements for heavy-duty vehicles for compliance with the Tier 3 standards for NMOG+NOx; and (2) the useful life durability requirements for vehicles less than 6,000 pounds gross vehicle weight rating (GVWR).

24 - 108 F.3d 1397 (D.C. Cir. 1997), modified on other grounds, 116 F.3d 499 (D.C. Cir. 1997).
25 - 42 U.S.C. § 7521(b)(3)(C).
26 - 108 F.3d at 1403.

NMOG+NOx Phase-In Requirements for Heavy-Duty Vehicles: The CAA requires EPA to provide manufacturers of heavy-duty vehicles, defined as vehicles in excess of 6,000 pounds GVWR, (29) with four years of lead time (and a three-year period of "stability" with no changes to the standards), to comply with new automobile emission standards. Specifically, Section 202(a)(3)(C) of the CAA, 42 U.S.C. § 7521(a)(3)(C), states: "Any standard promulgated or revised under this paragraph and applicable to classes or categories of heavy-duty vehicles or engines shall apply for a period of no less than 3 model years beginning no earlier than the model year commencing 4 years after such revised standard is promulgated." (emphasis added). This statutory requirement is intended to ensure that manufacturers of heavy-duty vehicles are afforded sufficient lead time and stability to recoup their investments in new technology required to comply with more stringent standards (30).

In the proposed rule, EPA attempts to thwart this statutory requirement by proposing two phase-in alternatives for complying with the significantly more stringent Tier 3 NMOG+NOx tailpipe emissions standards. Under the more favorable primary compliance option, manufacturers must meet a fleet average standard that is phased-in between Model Years 2018 and 2025 for vehicles over 6,000 pounds GVWR, but which contravenes the CAA's explicit four-year lead time requirement. Under the less favorable alternative compliance option, manufacturers must phase in 40 percent of their vehicles to the more stringent Tier 3 NMOG+NOx standards beginning in Model Year 2019, which comports with the statutory four-year lead time requirement, but adds the significant burden that all of the manufacturer's vehicles must meet the final standards by Model Year 2021 — a full four model years ahead of the primary phase-in option (31).

Assuming EPA issues a Tier 3 final rule in late 2013, as planned, Model Year 2014 already would have begun. Therefore, the CAA requires that the Tier 3 standards applicable to heavy-duty vehicles take effect no earlier than Model Year 2019 (i.e. four model years after the revised standards are promulgated per Section 202(a)(3)(C), that is, commencing with the 2015 Model Year). EPA's proposed primary compliance option, however, would require manufacturers of heavy-duty vehicles to begin complying with the stringent Tier 3 standards in 2018 (i.e., only three model years after the revised standards are promulgated), and therefore would contravene the lead time requirement in Section 202(a)(3)(C) of the CAA. Conversely, although EPA's alternative compliance option does meet the statutory four-year lead time requirement, it unreasonably imposes unduly and significantly more burdensome compliance requirements than the primary compliance option, and does not present manufacturers with a realistic choice. Moreover, these undue burdens are not rationally related to the four-year lead time requirement and thus are clearly designed as a punitive stick to force manufacturers to "choose" the non-CAA compliant primary option with only three years of lead time.

As described in greater detail in the comments provided by the Alliance of Automobile Manufacturers and Association of Global Automakers, (32) the alternative compliance option, which complies with the four-year lead time requirement but requires manufacturers to certify all of their vehicles to the Tier 3 standards a full four model years sooner than the primary phase-in option, is so burdensome that no reasonable manufacturer would ever choose it; all manufacturers would essentially be forced into selecting the primary phase-in option and turning a blind eye to EPA's blatant violation of the CAA's lead time requirements for heavy-duty vehicles. When a regulatory scheme is so heavily weighted or creates significant economic incentives such that only one of the options is reasonable, that option becomes a mandate and is no longer truly an option. Providing a significantly more burdensome alternative compliance path that meets the statutory requirements does not, and cannot, remedy the fact that the primary compliance path violates the statute.

This dual-path approach that EPA proposes would violate the CAA for an additional reason, as well. Under Section 202(a)(3)(A)(i) of the CAA, EPA is required to promulgate standards "which reflect the greatest degree of emission reduction achievable through the application of technology which the Administrator determines will be available for the model year to which such standards apply, giving appropriate consideration to cost, energy, and safety factors associated with the application of such technology" (33). Thus, the CAA implicitly requires EPA to select the single standard that reflects the greatest degree of emission reduction achievable. Here, it simply cannot be the case that both the primary compliance option (which begins in Model Year 2018 and requires full compliance with the more stringent standards by 2025) and the alternative compliance option (which begins in Model Year 2019 and requires full compliance with the more stringent standards by 2021) reflect the greatest degree of emission reduction achievable taking into account cost, energy, and safety. Rather, if the three-year phase-in under the alternative compliance option is in fact achievable considering the specified factors, then the primary compliance path, which affords manufacturers seven years to meet the more stringent standards, cannot be reconciled with the CAA requirement that EPA promulgate standards reflecting the greatest degree of emission reduction achievable. The more likely explanation, however, is that the primary compliance option reflects the greatest degree of emission reduction that EPA believes is truly appropriate, whereas the alternative compliance option is intentionally so burdensome—and therefore far beyond reflecting the greatest degree of emissions reduction achievable—that manufacturers will be forced to waive their statutory protections and choose the primary path. This attempt to circumvent the statutory protections embodied in the CAA cannot be reconciled with the plain provisions of the Act.

Further, Chrysler objects to the requirement that if a manufacturer chooses the alternative compliance path for any of its vehicles, all of its vehicles, including light-duty vehicles and those heavy-duty vehicles for which the manufacturer is willing to comply with three years lead time, must nevertheless meet the final Tier 3 NMOG+NOx standards by 2021 (instead of 2025 under the primary compliance option). This regulatory scheme, which sweeps in a manufacturer's entire fleet if the manufacturer chooses to pursue the alternative compliance option for even just a single vehicle model, cannot be characterized as an incentive to forego the four-year lead time requirement; rather, it is a penalty imposed on manufacturers that refuse to forego their statutory protections. There is no rational basis for penalizing a manufacturer's entire vehicle fleet simply because the manufacturer chooses to exercise its statutory right to four years of lead time for one heavy-duty vehicle model. Plainly, any emissions benefits of earlier compliance would accrue for those models of vehicles for which the manufacturer might choose earlier compliance. But precluding that choice and imposing more stringent standards even for those models that might comply early, just because a different model or models cannot comply early, has no environmental rationale except to penalize the choice of later compliance for the other models. That design is arbitrary, unreasonable, and unlawful (34).

Recommendation: Chrysler recommends that, for vehicles over 6,000 pounds GVWR, the Tier 3 fleet average requirements for FTP and SFTP NMOG+NOx begin in MY 2019 at the currently proposed Model Year 2019 fleet average emissions levels (under the primary compliance option) and require full compliance only at Model Year 2025. This approach is in full compliance with the CAA, completely harmonizes with LEV III in MY 2019, and will achieve the same level of emission reduction as the proposed rule.

29 - See 42 U.S.C. § 7521(a)(3)(C). A "heavy-duty vehicle" is a "truck, bus, or other vehicle manufactured primarily for use on the public streets, roads, and highways . . . which has a gross vehicle weight . . . in excess of six thousand pounds." 42 U.S.C. § 7521(3)(C).

30 - See, e.g., Natural Res. Def. Council v. Thomas, 805 F.2d 410, 433 (D.C. Cir. 1986) (noting that the four-year lead time requirement "was enacted for the benefit of the manufacturers, to allow time for them to design and develop engines in compliance with newly promulgated standards") (citing H.Rep. No. 294, 95th Cong., 1st Sess. 274–75 (1977) (discussing "abundant lead time"), reprinted in 4 Leg. Hist. 2741–42, J.A. at 19–20).
31 - EPA proposes to adopt a similar dual-path approach for "heavy-duty vehicles" as defined by EPA at 40 CFR §86.1803-01 (i.e., vehicles greater than 8,500 pounds GVWR but less than or equal to 14,000 pounds GVWR). See 78 Fed. Reg. at 29,875-29,877. Under the proposed primary compliance option, manufacturers must meet a declining fleet average standard for NMOG+NOx beginning in Model Year 2018, in contravention of the CAA's explicit four-year lead time requirement. Alternatively, manufacturers can choose to comply beginning in Model Year 2019, which comports with the four-year lead time requirement, but then are subject to a percent-of-vehicles phase-in approach rather than a declining fleet average. Again, EPA's "poison pill" approach cannot be reconciled with the CAA. Accordingly, Chrysler recommends that EPA start the declining fleet average in Model Year 2019, consistent with the CAA's four-year lead time requirement.
32 - Alliance/Global Comments, at 4.
33 - 42 U.S.C. § 7521(a)(3)(A)(i),

Our Response:

The Alliance of Automobile Manufacturers (Alliance), and Association of Global Automakers (Global) and Chrysler LLC commented on the alternative phase-in proposed for vehicles over 6000 lbs GVWR. These comments questioned whether the proposed structure of and restrictions on the use of the alternative phase-ins were so onerous as to unduly restrict a manufacturer from choosing the alternative phase-ins and their lead time and stability provisions as set forth in the Clean Air Act. The commenters criticized the proposed requirement that a manufacturer using the alternative phase-ins apply the alternative schedules to its entire light-duty fleet, both below and above 6,000 lbs GVWR. EPA had proposed this provision to minimize the complexity of complying with the alternative phase-in if a manufacturer's heavier and lighter light-duty vehicles had different compliance structures.

In considering these comments, EPA also considered that during the development of the Tier 3 program and in their comments, the same auto industry commenters consistently urged EPA to design the Tier 3 program to harmonize with the California LEV III standards as closely and as early as possible. As discussed in detail in Section IV.A of the preamble, extensive data that EPA has generated or received continue to support the conclusion that the primary fleet-average standards provide a compliance path that is feasible across the industry and that closely harmonizes with LEV III. EPA believes that we have reasonably resolved these somewhat competing concerns – early harmonization vs. additional lead time – by finalizing the primary declining fleet average standards as proposed while also finalizing revised alternative phase-in compliance schedules (see preamble Section IV.A.2.c). In response to the comments, we have revised the alternative phase-in schedules to reduce their associated burden for manufacturers, while still maintaining environmental benefits that are equivalent to the primary program. We also include provisions in the percent-of-sales phase-in alternatives that allow manufacturers to exclude vehicle models that begin their 2019 model year production early in 2018, in order to provide four years of lead time.

Specifically, we have removed from the alternative phase-in provisions the requirement that a manufacturer apply the alternative schedules to its entire light-duty fleet including vehicles below 6,000 lbs GVWR. For the practical functioning of the program, the final rule requires that any manufacturer choosing to use the alternative phase-in apply all four alternative phase-in schedules to its entire light-duty fleet above 6,000 lbs GVWR. We believe that the alternative phase-ins allow manufacturers to comply with emission standards in a time frame that is clearly feasible and fully compliant with the CAA requirements for lead time and regulatory stability. To the extent that manufacturers choose to use them, the alternative would result in overall emission reductions essentially identical to those of the primary program.

As explained in the preamble, the alternative phase-in schedules would begin to apply to each vehicle for either MY 2019 or MY 2020, depending on exactly when the manufacturer begins production of the vehicle. (See Section 86.1811-17(b)(8)(i) for how we implement this provision.) For models that begin MY 2019 production after the fourth anniversary of the signing of the final rule, the alternative phase-in would provide four full years of lead time and would first apply for MY 2019. The phase-in obligation would be calculated based only on those vehicles beginning production after the fourth anniversary date. For models beginning production before that date, the alternative phase-in would first apply for MY 2020, and the phase-in percentage for MY 2020 would be based on the manufacturer's entire fleet of heavier light-duty vehicles. Based on historical certification patterns, few models begin production before mid-calendar-year, so we expect that the vast majority of MY 2019 vehicles will begin production after the 4-year anniversary and thus the alternative phase-ins, if chosen, will typically apply beginning in MY 2019.

At the time of certification for MY 2018, a manufacturer must declare whether it intends to apply the alternative phase-in schedules to its heavier light-duty vehicles. A manufacturer choosing the alternative phase-ins would be committed to this phase-in approach for the duration of the phase-ins, and could not later choose the fleet-average approach for $NMOG+NO_X$ standards. For all vehicles below 6,000 lbs GVWR, the primary program will apply, beginning in MY 2017. For a manufacture's vehicles subject to the alternative phase-ins, there would be no new tailpipe emissions requirements beyond the Tier 2 program until the beginning of the alternative phase-in schedules; that is, MY 2019 or 2020, as explained above.

As discussed above, a manufacturer choosing the alternative phase-in approach for its heavier light-duty vehicles would be required to use all four phase-ins together. The next paragraphs explain how each of the alternative phase-ins requires an increasing percent of the manufacturer's sales to comply with the alternative standards. Thus, until the end of the phase-ins, some percent of a manufacturer's affected vehicles will meet the new standard and the remainder of that year's sales will not yet comply with Tier 3. For the practical functioning of the program, a manufacturer choosing the alternative phase-ins would be required to comply with exactly the same segment of their fleet in each model year for all four alternative phase-ins. For example, a manufacturer that complies with the 70 percent MY 2020 requirement for the FTP $NMOG+NO_X$ standard with a segment of its vehicle fleet must meet the 70 percent MY 2020 requirement for the FTP PM standard with the same set of vehicles.

For the FTP and SFTP NMOG+NO_X alternative phase-in schedules, once the phase-in is complete for a segment of a manufacturer's fleet, the standards continue for that set of vehicles through MY 2024, after which the full Tier 3 program applies regardless of the phase-in strategy. Thus, the fleet-average standards that decline through MY 2024 do not apply for these vehicles.

Although manufacturers would implement all four alternative phase-in schedules together, as discussed above, each alternative phase-in has unique characteristics. The following paragraphs explain the unique provisions of each.

Alternative Phase-In Schedule for the FTP NMOG+NO_X Standard

Instead of the primary FTP NMOG+ NO_X declining fleet average standards, a manufacturer choosing the alternative phase-ins would comply with a stable fleet average FTP NMOG+NO_X standard of 30 mg/mi that would apply to an increasing percentage of a manufacturer's combined sales of LDVs and LDTs above 6,000 lbs GVWR and MDPVs. This percent phase-in would match the percentages in the primary PM percent phase-in schedule, as discussed above – specifically, 40 percent of MY 2019 heavier light-duty vehicles (excluding those vehicles with production beginning before the 4-year anniversary), 70 percent of all of its heavier light-duty vehicles in MY 2020, and 100 percent compliance in MY 2021 and later model years.

Alternative Phase-In Schedule for the FTP PM Standard

Instead of the primary FTP PM percent phase-in schedule, a manufacturer choosing the alternative phase-ins would postpone the beginning of its FTP PM phase-in for its LDVs and LDTs above 6,000 lbs GVWR and MDPVs until MY 2019 or 2020 (depending on the dates production begins for its vehicle models, as discussed above). The manufacturer would then comply with the 3 mg/mi per-vehicle FTP PM standard (and the 6 mg/mi in-use standard) on an increasing percentage of these vehicles, following the 40-70-100 percentage phase-in of the primary PM program -- specifically, 40 percent of MY 2019 heavier light-duty vehicles (excluding those vehicles with production beginning before the 4-year anniversary), 70 percent of all of its heavier light-duty vehicles in MY 2020, and 100 percent compliance in MY 2021 and later model years.

Alternative Phase-In Schedule for the SFTP NMOG+NO_X Standard

As with the other alternative phase-ins, instead of the primary SFTP NMOG+ NO_X declining fleet average standards, a manufacturer choosing the alternative phase-ins would comply with a stable fleet average SFTP NMOG+NO_X standard of 50 mg/mi that would apply to an increasing percentage of a manufacturer's combined sales of LDVs and LDTs above 6000 lbs GVWR and MDPVs. This percent phase-in again would match the percentages in the primary PM percent phase-in schedule, as discussed above – specifically, 40 percent of MY 2019 heavier light-duty vehicles (excluding those vehicles with production beginning before the 4-year anniversary), 70 percent of all of its heavier light-duty vehicles in MY 2020, and 100 percent compliance in MY 2021 and later model years.

Alternative Phase-In Schedule for the US06 PM Standard

Finally, instead of the primary US06 PM percent phase-in schedule, a manufacturer choosing the alternative phase-ins would postpone the beginning of the US06 phase-in for its LDVs and LDTs above 6,000 lbs GVWR and MDPVs until MY 2019 or 2020 (depending on the dates production begins for its vehicle models, as discussed above). The manufacturer would then comply with the 10 mg/mi US06 PM standard for 40 percent of MY 2019 heavier light-duty vehicles (excluding those vehicles with production beginning before the 4-year anniversary), 70 percent of all of its heavier light-duty vehicles in MY 2020, with 100 percent compliance in MY 2021, and then 100 percent compliance with the 6 mg/mi standard in MY 2022 and later model years.

With regard to Chrysler's comments in paragraph "31" above concerning HD vehicles, reference Chapter 4.2.1 of this Summary and Analysis of Comments document.

4.1.4. Feasibility

What Commenters Said:

Emissions Control Technology Association (ECTA):

We agree with EPA's conclusion that the emissions reduction requirements in the proposed rule are technically achievable, and the pathways illustrated represent cost-effective solutions to meet these reductions.

The technology choices are numerous. Many technologies are on some vehicles already, and can readily be applied to others. Examples include hydrocarbon adsorbers (Ford SAE 2013-01-1297, Nissan SAE2008-01-0449, SAE2009-01-1076), high cell density substrates (only a few 900-csi applications), secondary air (Umicore SAE 2012-01-1245), and advanced thermal management strategies.

International Council on Clean Transportation (ICCT)

The feasibility of the proposed Tier 3 standards has already been demonstrated by the numerous vehicles that already meet the California LEV III standards and Tier 2 bin 2 standards. The two keys to low emissions are precise air/fuel control and rapid catalyst light-off. Since the Tier 2 standards were adopted there have been major improvements in both of these areas, making compliance with the proposed Tier 3 requirements easier.

Manufacturers of Emission Controls Association (MECA)

MECA agrees with EPA staff's assessment that achieving the proposed Tier 3 exhaust…emission standards and associated emission reductions are both technically feasible and cost-effective.

This fact is clearly demonstrated by the more than two million SULEV- and PZEV-compliant light-duty vehicles that have been sold in the U.S. market since these near-zero emission, gasoline vehicles were first introduced more than ten years ago. This technology base of advanced three-way catalysts, exhaust hydrocarbon adsorber materials, high cell density substrates, emission system thermal management strategies, secondary air injection systems, advanced carbon canisters, advanced low fuel permeation materials, and air intake hydrocarbon adsorber materials that have already been commercialized for a variety of PZEV gasoline vehicle applications can be extended and further optimized to allow all light-duty …gasoline vehicles to achieve the exhaust …emission reductions needed to comply with the Tier 3 vehicle emission proposals put forward by EPA. On the exhaust side, Tier 3/LEV III emission technologies (including advanced three-way catalysts, advanced high cell density substrates, and hydrocarbon adsorber catalysts) are highlighted in a new MECA report entitled: "LEV III and Tier 3 Exhaust Emission Control Technologies for Light-Duty Gasoline Vehicles" (available on MECA's website, www.meca.org, under Resources >> Reports). A recent SAE paper (SAE paper no. 2011-01-0301) demonstrates how advanced three-way catalysts utilizing high cell density substrates can be combined to achieve Tier 3, Bin 20 or Bin 30, exhaust emission levels on a four-cylinder, light-duty gasoline vehicle. A 2013 SAE paper (SAE paper no. 2013-01-1297) provides insights into recent improvements in performance and durability of hydrocarbon adsorber catalysts. These latest generation hydrocarbon adsorber catalysts show improved cold-start hydrocarbon emission reductions with reduced precious metal content compared to earlier generations of hydrocarbon adsorber catalysts. Hydrocarbon adsorber catalysts are available to assist in difficult Tier 3 applications, such as larger weight trucks and SUVs.

In addition, advanced diesel emission control technologies, including diesel particulate filters (DPFs), lean NOx adsorber catalysts, and selective catalytic reduction (SCR) catalysts, will be combined with future, advanced diesel engines to allow light-duty diesel vehicles to achieve the proposed Tier 3 emission limits, including EPA's proposed Tier 3, Bin 30 exhaust standards.

MECA agrees with EPA's projections that future hydrocarbon adsorber catalyst applications will be targeted at larger light-duty vehicles. MECA believes that any Tier 3 applications of hydrocarbon adsorber catalysts will rely on "passive" hydrocarbon adsorber approaches that combine a hydrocarbon adsorber function with a three-way catalyst function on the same substrate (typically in a layered coating architecture in an underfloor converter location), rather than "active" hydrocarbon adsorber designs that utilize some type of an exhaust valve to direct the exhaust through a hydrocarbon adsorber material during cold-start. Passive hydrocarbon adsorber catalysts can provide effective cold-start hydrocarbon emission reductions at a significant cost advantage versus active hydrocarbon adsorber system designs. MECA also believes that manufacturers will have the opportunity to optimize emission system designs with advanced powertrains as they move forward with their future light-duty vehicle greenhouse gas compliance strategies. Strategies such as engine downsizing, vehicle weight reductions, and improved engine combustion technologies will help to off-set emission system cost increases for future Tier 3 compliance.

In summary, there are significant opportunities to reduce both criteria pollutant and greenhouse gas emissions from the transportation sector through the design of fuel-efficient powertrains that include advanced exhaust emission controls for meeting even the most stringent criteria pollutant standards that are included in EPA's proposed Tier 3 program. MECA believes that advanced emission control systems have a critically important role in future policies that aim to reduce mobile source criteria pollutant and greenhouse gas emissions.

MECA believes that advanced emission control systems have a critically important role in future policies that aim to reduce mobile source criteria pollutant and greenhouse gas emissions, and we strongly supports EPA's Tier 3 emission proposal.

Pennsylvania Department of Environmental Protection (DEP)

DEP supports EPA's proposed Tier 3 emission standards for vehicles. The proposed standards would be met by vehicle manufacturers beginning in model year 2017 and phasing in through later model years. Vehicles sold in states such as Pennsylvania that have adopted light-duty vehicle emission standards promulgated by California Air Resources Board (CARB) will be meeting the same standards for model year 2015 and later vehicles. States that adopted CARB light-duty vehicle standards comprise nearly 50 percent of the national market for these vehicles. Technological developments in the automotive field that have already occurred or that are in the developmental pipeline as a result of CARB and EPA efforts will allow automobile manufacturers to effectively meet these more stringent standards for NOx, VOC, and PM2.5 by the year 2021.

Sierra Club

The Draft RIA provides sufficient evidence that the proposed Tier 3 standards are technologically feasible for a range of existing vehicles. Already, manufacturers are implementing technologies that reduce NMOG + NOx emissions under more challenging circumstances such as during cold starts, and it is anticipated that manufacturers can make necessary technology improvements to comply with the Tier 3 standard.

EPA also demonstrates feasibility of meeting the proposed rule's PM exhaust emissions reductions; some fleets already are achieving Tier 3 level reductions, and there are a number of available controls and practices, such as reduced oil consumption, which will allow future fleets to meet the proposed standards.

State of Utah

The bulk of pollutants from most of today's vehicles are emitted during cold starts—ignition and the first few miles of driving before conventional catalytic converters warm up enough to be effective—and during fueling. The Tier 3 standards would address these issues by requiring that by 2017 new vehicles have larger catalytic converters to better remove NOx, hydrocarbons, and carbon monoxide; heat pumps that warm the catalytic converter almost immediately upon ignition to avoid an initial rush of emissions after a cold start…. These low-emission vehicle technologies are in use today in California and other countries and have a proven record of results.

Our Response:

All commenters that commented on the technological feasibility of the proposed Tier 3 standards pointed to the current or near-term availability of technological pathways to compliance with all or most of these standards. For the FTP and SFTP NMOG+NOx standards and the FTP PM standard, no commenters expressed significant concern about the feasibility of the proposed levels (although some argued for even more stringent standards, as addressed in Chapter 4.1.2 above). In the proposal, we concluded that all of the Tier 3 emissions standards are technologically feasible in the time frame of the program. The technical conclusions we reached at that time have been further reinforced by information we received in the public comments or has otherwise become available and placed in the docket for this rulemaking. After considering the comments received and with additional supporting information in Chapter 1 of the RIA, we continue to conclude that the Tier 3 standards are feasible and reasonable, considering lead-time provided and expected compliance costs.

See Section IV.A.5 of the preamble and Chapter 1 of the RIA for more detailed discussions of the feasibility of the Tier 3 light-duty vehicle standards.

4.1.4.3. Impact of Gasoline Sulfur on Feasibility of the Vehicle Tailpipe Standards

EPA Tier 2 In-Use Sulfur Test Program

What Commenters Said:

American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM)

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 T50); requiring mild operation before testing; test cycle; vehicle history and data analysis.

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 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 T50. 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.

EPA constructed models of emissions versus mileage for each vehicle, as shown in Figure 7-7 of the In-Use Study report. Some models seem to track the data very well, while others do a poor job. However, EPA did not provide any descriptive statistics for the model, but a number of the vehicles (e.g., 0046 and 0178) seem to have particularly poor fit. EPA recognizes this (page 45) and attributes it to the “variability in the emissions testing.” However, this also calls into question the parameters that EPA has assumed to be important with respect to fuel sulfur impacts on emissions.

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 NOx. 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 NOx in Bag 2 and does not mention the calibration points or error for other low emitting species.

EPA presented the results from the data analysis of the In-Use Study in terms of percentages. While this is a typical outcome of statistical analysis using the log transformation of emission data, it can distort the apparent impacts of lowering gasoline sulfur content. Because mass emission levels in Bag 1 of the FTP are substantially larger than emissions from Bag 2 and Bag 3, even small percentage differences in Bag 1 may be similar in size to very large percentage differences in Bag 2 and Bag 3 when mass emission rates are considered.

Marathon Petroleum Company LP (MPC)

The 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 T50); requiring mild operation before testing; test cycle; vehicle history and data analysis.

Manufacturers of Emission Controls Association (MECA)

EPA has released a thorough and well-designed sulfur effects study on 81 in-use Tier 2 light-duty gasoline vehicles that clearly showed significant reductions in criteria pollutants in comparing emissions performance on gasoline with 28 ppm sulfur versus 5 ppm sulfur. Work published in a 2011 SAE technical paper (SAE paper no. 2011-01-0300) shows similar, significant emission benefits on a 2009 model year PZEV vehicle operated with 3 ppm sulfur gasoline versus 33 ppm sulfur gasoline. In this gasoline sulfur effects study, on a 2009 PZEV passenger car, the results clearly show that the underfloor converter used on the close-coupled + underfloor PZEV catalytic converter system was susceptible to sulfur-related performance degradation due to its cooler operating temperatures during the FTP test cycle using a 33 ppm sulfur-containing gasoline. The loss in NOx performance of this underfloor PZEV converter in successive FTP tests could be recovered to some extent, or avoided to a large degree, by either purging stored sulfur off the underfloor converter with the use of a higher speed and load test cycle (i.e., the US06 test cycle) sandwiched between FTP tests, or using a gasoline with significantly lower sulfur levels (i.e., a 3 ppm sulfur-containing gasoline).

As Mr. Grundler stated, EPA has released a thorough and well-designed sulfur effect study on 81 in-use Tier 3 light duty gasoline vehicles that clearly show significant reductions in criteria pollutants in comparing emission performance on gasoline with 28 ppm sulfur versus five ppm sulfur.

Our Response:

The American Petroleum Institute (API), MPC and the Manufacturers of Emissions Controls Association (MECA) all commented on EPA's analysis of the effects of gasoline sulfur on in-use light-duty vehicle emissions. One of the comments received was with respect to the fuel used in our in-use sulfur analysis and the interaction various fuel properties could have on the overall emissions. There has been little or no published data in the literature pertaining to the interaction of sulfur with other fuel properties such as aromatics or ethanol content. Given this fact, we chose to conduct our study using Tier 2 (non-ethanol) certification fuel as a base. The extent to which ethanol might raise or lower exhaust (and catalyst) temperatures faster after cold start or reduce or increase the sulfur poisoning impacts on cold-start emissions to some extent is not known and API does not provide substantive data on that issue. There is also a propensity for ethanol to lean-out transients and open-loop operation that would also tend to increase NOx and lower NMOG emissions. There does not appear to be a clear theoretical basis to assume a bias in NMOG+NOx emissions results that would result solely from the use of a non-ethanol test fuel when assessing sulfur impacts on exhaust emissions, or that using test fuel with ethanol would have substantially changed the program's overall conclusions.

API also commented on the drive cycle used in our analysis of gasoline sulfur. The objective of the instructions to the vehicle transport driver with respect to hard acceleration and high speed driving was to limit the opportunity for the state of catalyst sulfur loading to change appreciably (up or down) from how it was when the vehicle was acquired from the owner. This does not indicate that we intended or continued to drive the vehicle in a manner that would result in a change in the state of the catalyst. The transport driving in question covered relatively short distances from the owner's location to the test facility, and may have involved rural, city and/or highway driving. Aggressive and high speed driving was avoided because it is known to change the state of the catalyst.

The drive cycles chosen to evaluate sulfur effects represent the types of driving that manufacturers must perform in their certification testing and will need to protect for during in-use emissions performance evaluations of their certified vehicles. No single cycle represents all "typical" driving. We agree that both sulfur accumulation and reversibility are sensitive to driving cycles; however this study was not designed to evaluate cycles but instead to establish the potential for sulfur to degrade emission performance that compromises a vehicle's ability to meet emission standards, particularly the new stringent Tier 3 levels.

With respect to the comment on model predictions and the vehicle parameters included in the model, the intent of the study was to assess the aggregate behavior of a representative sample of the Tier 2 fleet. While we agree that many catalyst and engine operation parameters interact with sulfur to influence emissions and could be studied as part of an engineering analysis, attempting to account for all of them across the test fleet would be very complex and unnecessary for our purpose of assessing the impacts across a broad cross section of vehicles. In terms of the accuracy of the mixed model, overall, the model predictions were in good agreement with the data. Although there were some instances where the model overestimated the effect of sulfur and some instances where the model underestimated the effect of sulfur, we believe that the variability in predictions does not meaningfully affect the overall conclusions, since the model predictions were not biased toward a single direction. Furthermore, the study was designed to examine the effect of sulfur on in-use emissions from the fleet, rather than from individual vehicles.

With respect to the treatment of vehicles as random variables, the mixed model accounts for correlation in the data through the inclusion of random effects and modeling of the covariance structure. The random effects represent parameters that are allowed to vary over vehicles reflecting the natural heterogeneity in the vehicle fleet. In the draft report, the analyses modeled each vehicle family as the random effect for the mixed model examining the effect of clean-out, since multiple vehicles were tested for each make and model. For the mixed models examining the effect of clean-out at 5 ppm and the effect of sulfur level, the analysis modeled the individual vehicle as the random effects. However, since the draft report, additional vehicles were tested and included in the analyses. Therefore, in the final report, the assumptions for the mixed model have been modified to model vehicle family as the random effect for all three datasets. By assuming each individual vehicle family as a random effect, we assumed the presence of substantial between-vehicle family variability, based on the results from the likelihood ratio test assessing the significance of the variation between vehicle families. In addition, consistent with the change in the assumption of random effect, the data plots in the final report are presented in terms of vehicle models. The method of treating vehicles as random effects in order to properly model the covariance structure has been utilized in a similar study examining the effects of fuel properties, including sulfur, on emissions.[3] Furthermore, the external peer-reviewers provided support by stating that "the statistical modeling approach seems appropriate" considering the study design, and the structure and limitations of the emissions dataset, since the approach accommodates missing data, irregularly spaced measurements, and within-vehicle effects.[4] In the final report, we also performed additional sensitivity analyses to examine the extent to which the results of the analysis are affected by the vehicles in the dataset.

With respect to the comment regarding the variability of responses within and between models, as discussed in other responses to comments, in order to account for both the within- and between-vehicle model variability, in addition to modeling a covariance structure, each vehicle family was treated as a random effect in the final analyses for all three datasets which included the test results of multiple samples from each vehicle model.

Regarding API's comment that "EPA made a mid-test change to the procedure for mileage accumulation," the additional on-road mileage accumulation was necessary to fully re-

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[3] Chapter 6 of the Regulatory Impact Analysis for the Control of Hazardous Air Pollutants from Mobile Sources Final Rule, EPA 420-R-07-002, February 2007, last accessed on the Internet on 12/04/2013 at the following URL: http://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P1004LNN.PDF.

[4] Four Peer Reviews in Support of the Tier 3 Rulemaking: Fuel Sulfur Effects Analysis draft report . U.S. Environmental Protection Agency, Washington, D.C. Documents available at http://cfpub.epa.gov/si/si_public_record_report.cfm?dirEntryId=240145.

load the catalyst to a level that represents relatively mild in-use driving. The test results with mileage accumulation constituted a part of the "sulfur level effect" dataset assessing the impact of high and low sulfur fuel on emissions starting with an "unloaded" catalyst. We evaluated the impact of mileage accumulation by including the 'mileage' term as well as the 'sulfur level' and 'mileage' interaction terms in our statistical modeling. The mixed model results showed that the interaction term was not statistically significant, suggesting that the rate of sulfur loading does not vary by accumulated mileages after the clean-out between high and low fuel sulfur levels. The peer-reviewers supported our statistical modeling by stating that "overall, the methodology for determining the in-use sulfur effect for models with and without the sulfur and mileage interaction term appears to be sound."[5]

To evaluate the robustness of the statistical analyses assessing the overall in-use emissions reduction between operation on high and low sulfur fuel, a series of sensitivity analyses were performed to assess the impacts on study results of measurements from influential vehicles for all pollutants, as documented in detail in the report.[6] The sensitivity analyses showed that the magnitude and the statistical significance of the results were not impacted and thus demonstrated that the results are statistically robust.

When modeling the covariance structure, the first-order autoregressive structure was selected. Although we acknowledged in the report that the spatial covariance structure did not converge, we demonstrated that the selected first-order autoregressive structure is superior to the compound symmetry matrix. Furthermore, as stated in the report, we expect the estimates of fixed effects (i.e., the differences in mean emissions between high and low sulfur fuel) to be the same for different covariance structures, differing only in the standard errors of these estimates. The peer-reviewers also supported our methodology by stating that "the autoregressive covariance structure is appropriate."[7]

Regarding emissions concentration measurements taken from Bags 2 and 3, manufacturer specifications for analyzer performance are given in Appendix C of the test program report. However, these are relatively general and do not provide the level of detail that is useful to address the issue of error introduced by very low measurements. To address the increased level of (relative) uncertainty in very low measurements, we performed the sensitivity analyses discussed in Section 7.3 of the report. These exercises suggested that the overall results of the program changed very little when very low-emitting vehicles or zero-emission observations were removed from the dataset.

With respect to the comment on the presentation of the results from in-use sulfur program in terms of percentages, as the commenter points out, it is a widely accepted method for analysis of log-transformed data. In addition, since the statistical analyses were performed on FTP

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[5] The Presidential Memorandum is found at: http://www.whitehouse.gov/the-press-office/presidential-memorandum-regarding-fuel-efficiency-standards.

[6] The Effects of Ultra-Low Sulfur Gasoline on Emissions from Tier 2 Vehicles in the In-Use Fleet, EPA-420-R-14-002.

[7] The Presidential Memorandum is found at: http://www.whitehouse.gov/the-press-office/presidential-memorandum-regarding-fuel-efficiency-standards.

composites, as well as each bag results, we do not believe that the effect of fuel sulfur on emissions is distorted in any way.

American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM)

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. Several of the participating MSAT Study automakers are also members of CRC.

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.

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 Tier 3 Draft Regulatory Impact Analysis (DRIA) provides the following short discussion of the MSAT Study: "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 NOx, 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.

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".

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."

Marathon Petroleum Company LP (MPC)

-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)

Our Response:

The MSAT study was published by EPA as part of the MSAT2 rulemaking package. It was not published separately within peer reviewed literature although it was subject to public comment as part of MSAT2. Regarding the fuel set used in the study, this "one-dimensional" fuel design was reasonable given the scope of the study. The fuel effect most relevant to Tier 3, that of sulfur, was produced by adding a tiny amount of doping agent to the fuel that resulted in a negligible change to the other fuel properties. Thus an A-B comparison between the doped and undoped fuels provides a good assessment of emission impacts of sulfur.

With respect to other comments regarding the MSAT Study, EPA would like to clarify that the MSAT study was merely a scoping program intended to confirm the magnitude of certain fuel effects (benzene) and examine the potential range of certain others (sulfur) using Tier 2 vehicles. The program is mentioned in Sections III.A.2 and IV.A.6 of the preamble as corroborating evidence of sulfur effects of significant magnitude, though the actual percentage of the effects from the MSAT study were not used for inventory or benefits calculations (e.g., in the MOVES model) within the Tier 3 Rule. The need for a larger vehicle fleet and a more representative mileage accumulation approach was discussed in the background of the EPA In-

Use Sulfur Study, which has served as the primary source of EPA's data on in-use impacts of gasoline sulfur under the Tier 3 program.

EPAct/V2/E-89 Study

What Commenters Said:

American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM)

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, T50 and T90. To determine sulfur effects, EPA then used a separate program (in-use fleet test) to adjust for fuel sulfur sensitivity.

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, T50 and T90. 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.

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. [EPA-HQ-OAR-2011-0135-4276-A2.pdf, p. 19]

Marathon Petroleum Company LP (MPC)

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, T50 and T90. To determine sulfur effects, EPA then used a separate program (in-use fleet test) to adjust for fuel sulfur sensitivity

Our Response:

While effects of fuel sulfur levels were not evaluated in the EPAct program, the large In-use sulfur test program specifically addressed fuel sulfur effects on similar Tier 2 vehicle models and included many cleaner and “Tier 3 like” vehicles. This dual approach was adopted because it is not feasible to assess the effects of sulfur and other properties simultaneously, as the complex behavior of sulfur can be expected to confound the effects of other properties during the course of a study. Accordingly, the In-use sulfur test program was designed to examine the effects of sulfur including the storage and release behavior of the catalyst. Accounting for this behavior requires a different study design than that used to assess the non-sulfur properties. For example, in studying sulfur effects, it is critical to account for driving history and to apply specific preconditioning procedures that differ from those applicable to other fuel effects.

With respect to the comment that “fuel effects … differ in some cases from published studies,” it is not surprising that EPAct results differ from those in other studies. Emissions are sensitive to many details of how fuels are blended and how testing is conducted. In addition, calibration strategies implemented differently by different vehicle manufacturers can cause significant differences in fuel effects across vehicles. Invariably, studies are published based on a wide variety of designs and procedures. The EPAct program used a large and representative test fleet (15 high-sales vehicles) along with fuel blending and vehicle testing conducted by experts to produce the highest quality data possible. More details on program design and data analysis are available in the EPAct/V2/E-89 program reports available at http://www.epa.gov/otaq/models/moves/epact.htm.

To address this comment in its original context, we make reference to the technical analysis underlying it, appended to the API comments as Attachment 13.[8]

On this topic, the subsection begins with reference to a summary of results in a recent literature review (CRC E-84).[9] The overall approach in the E-84 report is to treat each fuel property piecemeal, rather than in an integrated fashion. For example, in the chapter covering “Aromatics and Benzene,” test fuels and emissions differences are presented in terms of differences in aromatics levels, and interpreted as though attributable to aromatics differences. Similarly, in the chapter on “Vapor Pressure” effects, emissions differences in cited results are discussed primarily solely in terms of RVP, with minimal reference to other fuel effects. In addition, for all studies cited, results appear to be presented in terms of cycle aggregates, in

[8] Sierra Research, Inc. *Assessment of the Emission Benefits of the U.S. EPA’s Proposed Tier 3 Motor Vehicle Emission and Fuel Standards*. SR2013-06-01. Sacramento, CA. June 23, 2013.
[9] Hochhauser, A.M. *Review of Prior Studies of Fuel Effects on Vehicle Emissions*. CRC E-84. Coordinating Research Council, Alpharetta, Georgia. August, 2008.

which start and running emissions are averaged. This approach complicates simple comparisons to the models derived from EPAct, which evaluated cold-start and hot-running emissions separately, but did not attempt to combine or aggregate them.

To a large degree, the comparisons to previous studies show a basic misunderstanding of what the EPAct model coefficients represent. As emphasized in the EPAct report, a model coefficient for a given property, e.g., "aromatics," does not represent "the effect of aromatics on emissions," but rather the effect of varying aromatics on emissions <u>if the remaining four properties were held constant</u>. In reading Attachment 13, it appears that in most cases, the comparisons listed are made by comparing single EPAct model coefficients to percent differences obtained by averaging results across sets of fuel blends. However, in such "whole-blend" results, differences observed reflect changes in all properties of the fuels, not only the single property under consideration.

These considerations complicate attempts to make simplistic comparisons between EPAct model coefficients and the averaged results of most fuels studies, which involve measurements of small numbers of vehicles on sets of fuels in which selected properties are modified, but without the intensive experimental design incorporated into programs such as EPAct or the Auto/Oil study.

Nonetheless, despite these caveats, the studies summarized in E-84 appear broadly consistent with EPAct in terms of aromatics effects on HC and CO. The chapter covering aromatics effects for gasoline cites approximately 14 studies reporting HC or CO results, varying greatly in scope and design, of which over half reported that reducing aromatics reduced HC and CO (or both), with the remainder reporting mixed results or no effects. For the studies reporting effects, these findings are generally consistent with the EPAct coefficients for aromatics, if we assume that the cycle aggregates reported are dominated by cold-start emissions, for which the EPAct aromatics coefficients are positive (i.e., reducing aromatics reduces emissions and vice versa).

With respect to NOx, results are mixed. We disagree, however, with the conclusion that the results obtained in EPAct are uniformly inconsistent with previous results. At the outset, it is important to note that the three sets of analogous models produced prior to EPAct, namely, the Complex model, the ARB predictive model, and the EPA predictive model, all have positive main-effects aromatics coefficients for NOx.

In addition, in contrast to most studies, the design for the EPAct study is well balanced between the two aromatics levels studied and the levels of the four remaining properties. When the results are averaged by vehicle and by fuel properties, the results suggest a notable increase in NOx for most vehicles, as shown in the figures below. For example, in Figure 1, which shows cold-start (Bag 1) NOx results averaged by vehicle and aromatics level, 13 of 15 vehicles show higher NOx at the higher aromatics level, with the remaining two vehicles showing no obvious change. This effect is also clearly visible when the results are averaged by the two aromatics levels and the levels of any of the four remaining fuel properties. Results are similar but not identical for hot-running (Bag 2) results shown in Figure 2. For running emissions, behavior by vehicle is more complex, with six of the vehicles showing a decline or no change by aromatics level, but with the remaining vehicles showing increases. While this set of results suggests an increase in NOx on average, it also shows variability in vehicle responses, which may be attributable in some degree to measurement or random error, or also to differences in vehicle design, calibration or emission-control strategies.

Figure 1. Cold-start NOx results for the EPAct Phase-3 Program, averaged by Aromatics Level (vol.%) and by Vehicle.

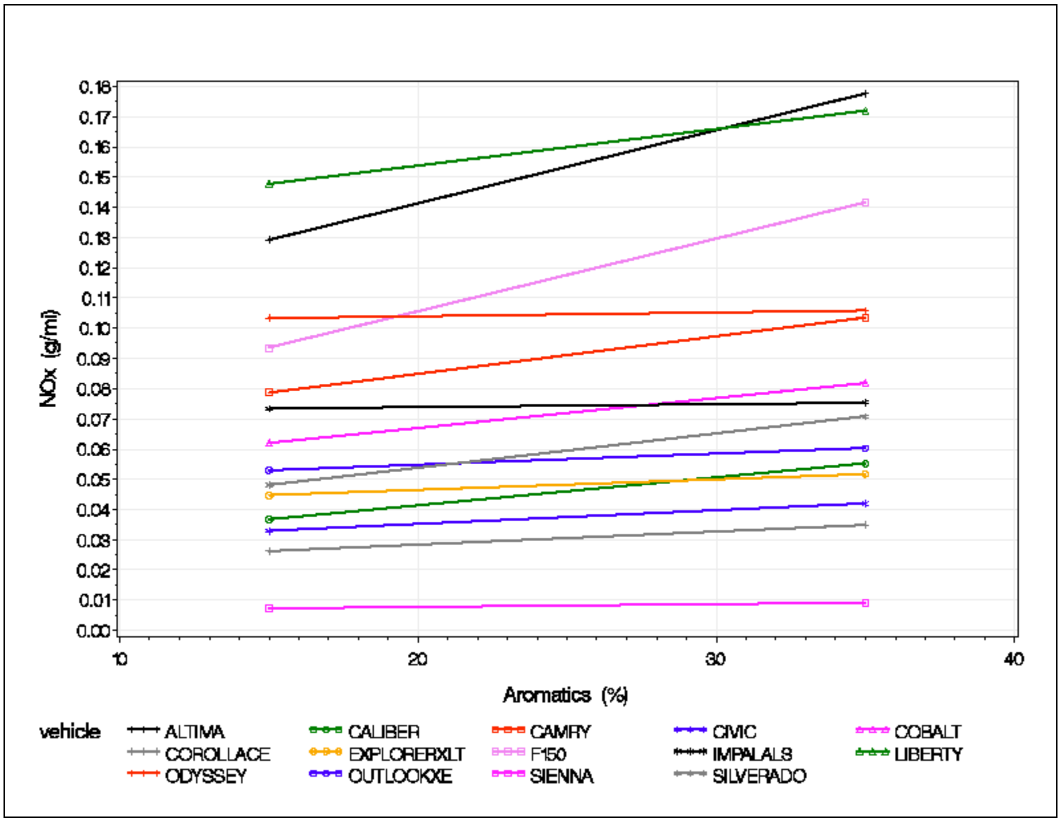
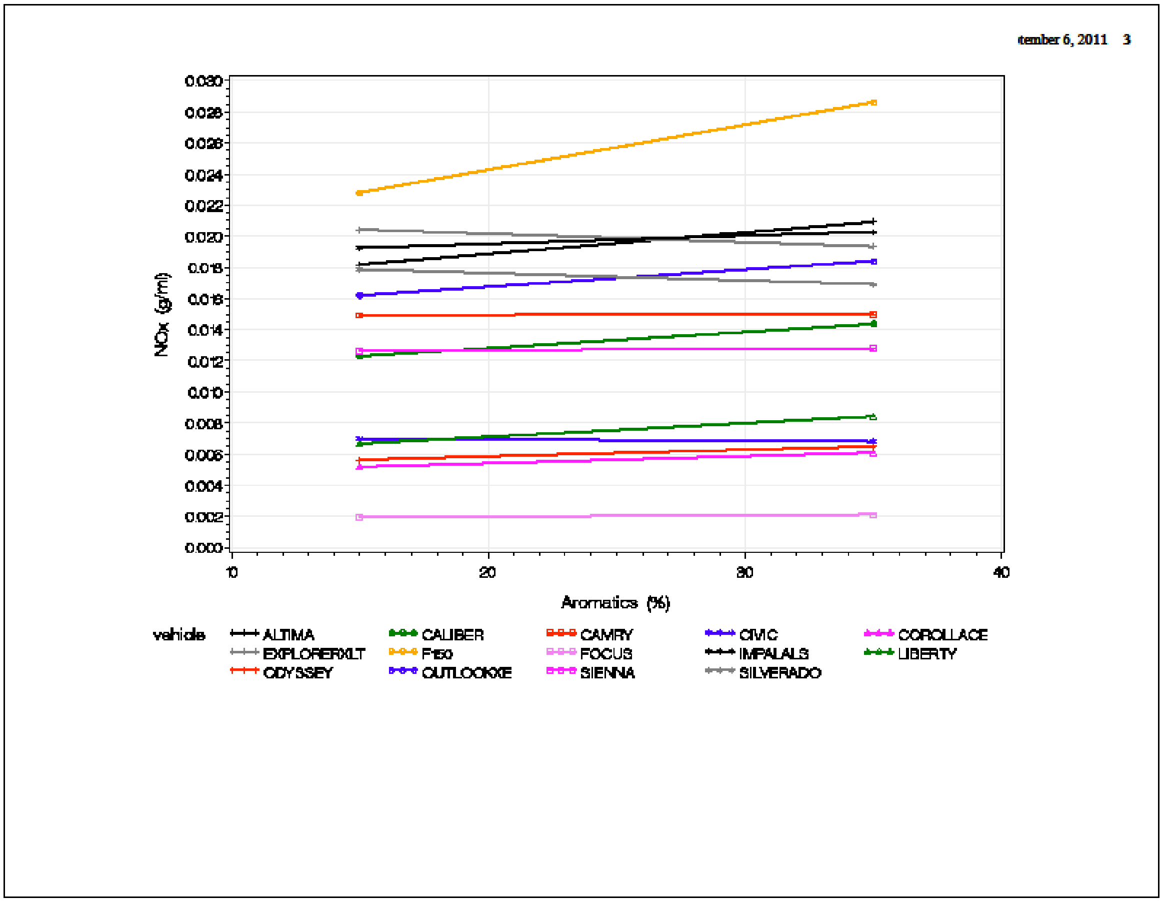


Figure 2. Hot-Running NOx results for the EPAct Phase-3 Program, averaged by Aromatics Level (vol.%) and by Vehicle.



Attachment 13 also notes that according to the studies cited in E-84, reducing RVP generally reduced HC emissions (i.e., NMHC), whereas the EPAct models suggest the opposite effect, i.e., the main-effects RVP coefficients are negative for both start and running emissions. We hold that the coefficients for the HC and CO models are consistent with each other, and with engineering judgment. However, in this context it is important to reemphasize that the coefficient represents a change in emissions associated with a fuel property, if all others are held constant.

The negative RVP coefficient for start emissions suggests that, other fuel properties held constant, a less volatile fuel burns less efficiently under start conditions, resulting in emission of more partially burned and unburned HC, hence elevated HC emissions. The negative coefficient for running emissions may appear less intuitive at first glance, unless we recall that increasing RVP while holding the remaining properties constant would require addition of heavier components to prevent shifts in T50 and T90. The predicted increase in emissions would be associated with a change in RVP, but probably attributable to the changes in other properties.

While keeping this caveat in mind, however, if concurrent changes in RVP and T50 are viewed jointly, the fact that the EPAct coefficients for RVP and T50 are opposite in sign is also internally consistent and easily understood. The interpretation is that heavier, less volatile fuels (T50 increasing, RVP decreasing) tend to burn less cleanly than lighter, more volatile fuels (T50 decreasing, RVP increasing).

Attachment 13 notes the "mixed effects" for CO, i.e., that the linear coefficients for T50 are negative for cold-start emissions but positive for hot-running emissions. For start emissions, the negative coefficient for T50 is consistent with the positive coefficient for HC, meaning that because heavier fuels emit more unburned and partially burned hydrocarbons, they emit less CO. However, during hot running operation, the situation is somewhat different. Under stabilized conditions, heavier fuels burn somewhat less efficiently, but unlike start conditions, this reduced efficiency manifests through increases in both HC and CO.

Commenting on previous fuel-effects models, Attachment 13 notes that the linear effect HC coefficient for RVP is positive for the Complex and Predictive models, and negative for the EPAct models. This may be explained by differences in technology between the Tier-0 and Tier-1 vehicles underlying the Complex and Predictive models, and the Tier 2 vehicles underlying the EPAct models. For example, improvements in air/fuel ratio control during fuel tank evaporative canister purge, as well as the relative contributions of cold-start versus warmed-up operating modes to test cycle composite results, could cause a shift in the primary impact of fuel volatility on exhaust HC emissions.

Finally, with respect to particulate emissions, Attachment 13 notes that "It has been well established that adding oxygenates to diesel fuel generally reduces PM emissions, which makes the finding that oxygenates increase PM in gasoline vehicles interesting…" (page 36). This conclusion reflects a misinterpretation of the EPAct coefficients, as mentioned above. The fact that the linear coefficients for ethanol for the PM models are positive does not imply that the model suggests that "oxygenates increase PM in gasoline vehicles." What the coefficients do mean is that if ethanol is blended into gasoline with the four remaining properties held constant, the increase in ethanol concentration by itself would be associated with an increase in PM. Changes in the other fuel parameters that result from addition of ethanol also have to be taken into consideration when assessing the potential impacts on PM. Furthermore, the model does not necessarily show that the increase in ethanol causes the increase in PM. The impacts on PM may be due to interactions of ethanol with other fuel properties or components.

With respect to the comment that the EPAct Program was not large enough to provide the data needed to resolve non-linear fuel effects, the commenter's Attachment 13 notes that "… aggregated datasets are not necessarily superior to a single well-designed dataset …" and that "… it is very difficult to resolve a large number of non-linear fuel terms in a single program design… . Given the limited number of fuels in the EPAct study, … it is not clear that non-linear effects can be properly resolved. …"

We agree with the first comment and disagree strongly with the second and third. On the contrary, we argue that for analyses of fuel effects, which tend to be tightly correlated, use of a single coherent dataset reflecting a well-designed experiment is superior to meta-analyses involving the combination of multiple datasets embodying differing designs (or no design). One reason for preferring a single experimental dataset is that it allows the incorporation of vehicle as a "blocking variable." A dataset including measurements for all fuels on each vehicle, in effect replicating the experiment on each vehicle, allows variability due to vehicle differences to be isolated from the fuel effects of interest. This feature is a major advantage, as the vast majority of variability in any such dataset is contributed by vehicles, rather than by fuels.

The third comment is simply an unsubstantiated assertion. The EPAct design was produced by a competent and experienced statistician with lengthy experience working in the field of automotive and fuel emissions. The fuel set was accordingly designed using state-of-the-art methods to allow characterization of two quadratic terms and four interaction terms. Granted, as the use of classic factorials in estimation of fuel effects is not practical, the generation of an optimal design required that these six effects be specified in advance, based on prior knowledge of fuel effects. While it is not necessarily impossible to estimate additional effects not included in the design, doing so requires caution. For this reason, we elected to retain models including only subsets of the 11 terms included in the original design. Aside from other considerations, we believe these two reasons are sufficient to rely on a single well-designed experiment to estimate fuel effects. In addition, an independent peer review of the draft analysis report did not raise any significant concerns with the methods used to produce the final models.[10]

With respect to the comment that EPA's statistical analysis of the EPAct Program data does not address application of results to in-use conditions, the statistical analysis for EPAct focused on producing the most robust findings possible from the test program itself. We consider the assertion in Attachment 13 that "important questions about the applicability of the results to the modeling of in-use vehicle emissions … are not discussed … include[ing] the overall representativeness of the database to in-use vehicles and fuels…" to be unfounded. During the design of the project, the vehicle sample was specifically and carefully designed to cover the majority of vehicle sales for Tier-2 vehicles at the time (MY2008). In addition, the fuel set was designed to span the fuel properties of 95% of summer fuels on the market, based on current AAM fuel survey results.

With respect to the comment that "very low emission values observed from some vehicles create problems with the statistical analysis", it would be more correct to say that "censored" or "missing" measurements created issues in analysis, and that vehicles with "very low" measurements were more likely to have values censored by limitations in the measurement techniques. The issue of censored measurements and discussion of dilution and background contamination as causal factors is thoroughly discussed in the project report. In addition, the issue of censoring was addressed in analysis through the application of widely-accepted standard

[10] Four Peer Reviews Supporting Tier3: EPAct Analysis Draft Report. U.S. Environmental Protection Agency, Washington, D.C. Related documents are available at http://cfpub.epa.gov/si/si_public_record_report.cfm?dirEntryId=240069.

techniques, methods that were deemed appropriate by the peer reviewers.[11] Results from this program have advanced our knowledge base of best practices related to measurement.

API also commented that "mathematical relationships relating fuel properties to emissions of some pollutants are too complex and the quadratic form used by EPA is not optimal" and that "the specific mathematical form chosen by EPA is not clearly superior to alternatives…". The text in Attachment 13 (page 44) notes that some EPAct models are more complex than others. If we take "more complex" to mean "more terms" it is clear that the observation is correct but the commenter gives no indication of how we can know when a model is "too complex." As we make clear in the project report, the model-fitting process was conducted so as to develop reduced models that contained no more terms than necessary to achieve the best possible fit to the data, that is, were as simple as possible. An outcome of this process was that models for hydrocarbons contained more terms than those for NOx and PM. We have no technical basis on which to question this result. We can note, however, that on the same page, Attachment 13 cites the recommendation of the DOE/NREL report that "the complete fuels model" be used. As the complete (i.e., full) models contain all possible terms, this citation appears to contradict the comment that the reduced models used are "too complex."

Under this heading, Attachment 13 also takes issue with the inclusion of quadratic terms in the EPAct models, citing this form as "not optimal." On this point, we note that first, linear models with the inclusion of quadratic terms have been used in development of predictive models to date, including the Complex and Predictive models. Second, for EPAct, the experimental design of the fuel set was based on a specified model including quadratic terms for ethanol and T50. The design was reviewed by several fuel and emissions experts from the automotive and petroleum industries, who did not raise similar questions about the proposed model structure during the design phase. Third, it is improbable that given limitations in time and budget, a sufficient number of experimental test points could have been included (and the required fuels blended) to fit a more complex deterministic form, even had such a form been proposed. Fourth, given the empirical, rather than theoretical approach to study design, it is not clear that a more complex deterministic form would have given better results.

Finally, we can add that due to the application of hierarchy in model fitting, quadratic (or interaction) terms are included only when the associated linear terms are also included. So, the relevant unit to consider is not the quadratic term in isolation, but the linear and quadratic terms taken together. The actual shape described by these two terms depends on their signs and the sizes of the coefficients relative to each other. The second-order term is included only when it improves fit and is necessary to describe curvature in the data where it is apparent.

Other Studies on Gasoline Sulfur Effects on Emissions

What Commenters Said:

[11] Sierra Research, Inc. *Assessment of the Emission Benefits of the U.S. EPA's Proposed Tier 3 Motor Vehicle Emission and Fuel Standards*. SR2013-06-01. Sacramento, CA. June 23, 2013.

American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM)

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.

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.

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 NOx emissions between 10 ppm and 30 ppm sulfur fuels from this work is beyond our capability, unless we assume linearity in NOx response to fuel sulfur levels. Confounding any NOx 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.

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, 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 NOx and HC than those seen in the EPA In-Use Study.

MECA relies heavily on an SAE paper authored by Ball, Clark and Moser (Umicore) in attempting to rebut our argument that there are sulfur-insensitive automotive technologies available today that could be used to facilitate compliance with the proposed Tier 3 emissions standards without the need to reduce average gasoline sulfur content to 10 ppm. This SAE paper had reported measurements of the FTP NOx emissions response of a 2009 model year Chevy Malibu PZEV to test gasolines with sulfur contents of 3 ppm and 33 ppm.

In reply to MECA, we reiterate concerns which API and AFPM had raised in a critique of the Umicore SAE paper provided in our June 28, 2013 written comments on the Tier 3 NPRM and also in an earlier November 11, 2011 API response to the AAM proposal to cap gasoline sulfur content at 10 ppm. Specifically:

• The SAE paper fails to note the differences in the underlying properties of the base fuel used and how this may confound the results. Specifically, when comparing a CARB Phase II certification fuel (33 ppm sulfur) with a EEE-Lube certification gasoline fuel ("zero sulfur"), differences in distillation properties, chemical composition and oxygenates can impact emissions results. The standard industry practice is to use sulfur dopants to avoid underlying base fuel changes impacting the emissions.

• Results from testing two fuels on a single vehicle do not provide much guidance on the potential impact of fuel sulfur levels on the fleet of future Tier 3 vehicles. 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.

Marathon Petroleum Company LP (MPC)
-There were very few 'Tier 3 – like' vehicles tested and EPA did not separate out the effects for these vehicles from older technology vehicles

-The 'Umicore' study used only one PZEV vehicle and the sulfur effects (3 versus 33 ppm) were confounded by other base fuel property changes

Manufacturers of Emission Controls Association (MECA)

Numerous published studies have documented fuel sulfur-related deactivation of three-way catalysts that are the primary exhaust emission control technology used on light-duty and medium-duty gasoline vehicles. The negative impacts of gasoline fuel sulfur content on catalytic emission controls are highlighted in a newly revised MECA report: "The Impact of Gasoline Fuel Sulfur on Catalytic Emission Control Systems" (available on MECA's website, www.meca.org, under Resources >> Reports).

EPA has released a thorough and well-designed sulfur effects study on 81 in-use Tier 2 light-duty gasoline vehicles that clearly showed significant reductions in criteria pollutants in comparing emissions performance on gasoline with 28 ppm sulfur versus 5 ppm sulfur. Work published in a 2011 SAE technical paper (SAE paper no. 2011-01-0300) shows similar, significant emission benefits on a 2009 model year PZEV vehicle operated with 3 ppm sulfur gasoline versus 33 ppm sulfur gasoline. In this gasoline sulfur effects study, on a 2009 PZEV passenger car, the results clearly show that the underfloor converter used on the close-coupled + underfloor PZEV catalytic converter system was susceptible to sulfur-related performance degradation due to its cooler operating temperatures during the FTP test cycle using a 33 ppm sulfur-containing gasoline. The loss in NOx performance of this underfloor PZEV converter in successive FTP tests could be recovered to some extent, or avoided to a large degree, by either purging stored sulfur off the underfloor converter with the use of a higher speed and load test cycle (i.e., the US06 test cycle) sandwiched between FTP tests, or using a gasoline with significantly lower sulfur levels (i.e., a 3 ppm sulfur-containing gasoline).

In a MECA study published in a 2007 SAE paper (SAE paper no. 2007-01-1261), an advanced three-way catalyst system installed on a large 2006 V8-powered SUV showed clear evidence of sulfur deactivation in successive FTP testing with aged catalysts using 17 ppm sulfur gasoline. FTP emissions for this full-size SUV started at the proposed Tier 3, Bin 50 levels and increased to slightly above proposed Bin 70 levels by the third FTP test, an emissions increase of more than 80% over three FTP tests. Sulfur deactivation of three-way catalysts negatively impacts the active precious metal catalysts, oxygen storage materials, and other activity promoters found in these sophisticated catalysts. The coverage and negative impacts of sulfur poisons on a three-way catalyst depends, in part, on the temperature history of the catalytic converter(s) found on the vehicle. Fuel sulfur deactivation of three-way catalyst is most apparent at lower exhaust temperatures (e.g., catalyst temperatures of less than about 500 degrees C). Sulfur deactivation of catalysts can be reversed to some degree by exposing catalysts to higher exhaust temperatures. Exhaust temperatures are expected to cool in the future as manufacturers reduce vehicle waste heat to meet future vehicle fuel efficiency/greenhouse gas standards. These cooler catalytic converter operating temperatures cause catalysts to accumulate higher amounts of sulfur poisons with today's gasoline sulfur levels, resulting in higher emission levels of pollutants at the tailpipe, including ozone-forming exhaust pollutants like hydrocarbons and NOx. Ultra-low gasoline sulfur levels of 10 ppm on average are needed to ensure that manufacturers will be able to meet the proposed Tier 3, Bin 30 fleet average emission standards over their 150,000-mile useful life for the full range of light-duty vehicles that consumers wish to buy and manufacturers want to produce.

Work authored by Umicore in a 2011 Society of Automotive Engineers Technical Paper shows similar significant emission benefits on a 2000 model year PZEV vehicle, operated with three ppm sulfur gasoline versus 33 ppm sulfur gasoline. In a MECA study published in a 2007 SAE paper, an advanced three-way catalyst system installed on a large V-8 powered SUV showed clear evidence of sulfur deactivation and successive FTP testing with aged catalysts using 17 ppm sulfur gasoline. FTP emissions for this full-size SUV started at the proposed Tier 3, Bin 50 levels, and increased to slightly above proposed Bin 70 levels by the third FTP test, and emissions increased more than 80 percent over three FTP tests. Sulfur deactivation of three-way catalysts negatively impacts the active precious metal catalysts, oxygen storage materials, and other activity promoters found in these sophisticated catalysts. The coverage and negative impacts of sulfur poisons on three-way catalysts depends in part on the temperature history of the catalytic converters found on the vehicle. Exhaust temperatures are expected to cool in the future as manufacturers reduce vehicle waste heat to meet future vehicle fuel efficiency and greenhouse gas standards.

Our Response:

EPA evaluated every applicable previous study regarding gasoline sulfur impacts on exhaust emissions known to us and we concluded that they were predominantly studies of pre-Tier 2/LEV I vehicles with a very limited sample of LEV II or later vehicles. We determined that the extensive EPA in-use sulfur study, which for the FRM has been supplemented with additional vehicles representing “Tier-3-like” emissions levels, is the largest and most representative data set of newer and cleaner vehicles albeit still dominated by current Tier 2 and LEV II vehicles. In response to API comments that the in-use study did not represent future vehicles not yet in production, EPA and a large manufacturer, Ford Motor Company, performed sulfur testing on Tier 3 prototype vehicles representing the high volume and challenging LDT3/4 light duty trucks designed to meet the cleanest Tier 3 emission levels that have not previously been included in any previous studies. Further, in response to API criticism of the original Umicore study fuel differences, we repeated the Umicore study using the exact same vehicle with a common base fuel at two sulfur levels, eliminating any doubt that the effects observed were from anything other than gasoline sulfur. The increase in NOx emissions with increased gasoline sulfur was approximately double that found in the original Ball/Umicore study. Additional testing was also performed on other “Tier 3 like” vehicles with similar results. The results can be found in the Preamble IV.A.6.d and RIA chapter 1sulfur feasibility discussions. Based on the new testing performed by EPA and data provided by Ford Motor Company on “Tier-3-like” low emission vehicles at full useful life and meeting Bin 50 emissions or lower, the percentage change in NMOG+NOx when going from 30 ppm S to 10 ppm S is much larger than the overall results we reported from the In-Use Sulfur study in the NPRM. We agree entirely with MECA’s comments and the papers and report cited by MECA are also referenced and cited within the RIA and within Preamble IV.A.6.

We disagree that the extensive in-use sulfur study supplemented with cleaner Tier 2 vehicles, the repeat of the Umicore study on a high volume passenger vehicle and the testing of Tier 3 prototype vehicles does not properly support our analysis of the impact of sulfur levels above 10 ppm. In fact, we believe that sulfur levels above 10 ppm on future vehicles designed to meet the new GHG standards may result in a larger negative impact as these more efficient vehicles will have less opportunity to prevent sulfur accumulation in the catalyst. Such an assessment of light-duty vehicles subject to the 2017-2025 GHG standards is also supported by comments from Alliance and Global Automakers, Honda and MECA.

Data from SGS provided by API also shows an emissions benefit for reducing gasoline sulfur although the SGS testing alone is insufficient to determine feasibility of compliance with the Bin 30 fleet-average exhaust emission standards. Testing by SGS was conducted entirely on smaller mid-size and compact light-duty vehicles. More than one-half of light-duty vehicle sales in the U.S. are for light-duty trucks. The procedures used by SGS for rapid thermal aging of the catalysts also did not follow standardized EPA procedures or current industry practices and thus the exhaust emissions tests are not representative of full-useful-life emissions on the tested vehicles.[12] The comments of the Alliance and Global Automakers regarding the difficulty of bringing light-trucks into compliance with Tier 3 exhaust emission standards in the absence of further gasoline sulfur control were in complete agreement with EPA's engineering assessment within the draft RIA and the final Tier 3 RIA. Neither API, AFPM, nor MPC cited or provided any data on gasoline sulfur impacts on the full range of vehicles, including light-duty trucks, subject to the Tier 3 program and the Tier 3 Bin 30 fleet average exhaust emissions standard.

Sulfur Reversibility

What Commenters Said:

American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM) and Marathon Petroleum Company LP (MPC)

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 + NOx 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.

Our Response:

The observations from the In-use Sulfur study were that sulfur contamination is largely reversible on the Tier 2 vehicles included in the study. However, in order to reverse the sulfur contamination, a catalyst clean-out procedure involving very aggressive and high speed drive cycles that push catalysts to thermal limits and sometimes into thermal protection modes were required. Excessive and unnecessary thermal cycling of the catalyst can cause premature deterioration. While a clean-out cycle largely returns the catalyst to a state of reduced emissions levels, subsequent mileage accumulation on the higher sulfur fuel will return the system to a contaminated state with elevated emission levels largely negating the emission reduction benefits

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[12] For further details regarding SGS's rapid thermal aging of exhaust catalysts, see the responses to "Current Tier 2 Vehicles Can Comply with Tier 3 Standards Using Tier 2 Fuels" later in this sub-section.

of the Tier 3 program. Further, some vehicles' emission levels after the cleanout were still elevated on the high sulfur fuel compared with the emission levels following a clean-out with low sulfur fuel. Thus, while reversibility may lessen the total negative effects of higher sulfur fuel, it does not eliminate them. Vehicles will still run with elevated emissions until such time as the vehicle encounters the very aggressive and high speed driving that would facilitate sulfur removal from the catalyst. Depending on the driving habits of particular drivers, that type of cycle may occur only rarely or never. Further, even after clean-out some vehicles experience higher emission levels, and of course once the vehicle begins driving normally the emissions would again begin to rise. Moreover, as emissions are increased for vehicles in use as well as new vehicles, implementation of the 10 ppm requirement on January 1, 2017 will have immediate results in terms of reduced emissions. EPA does not have data on sulfur reversibility for vehicles in full compliance with the Tier 3 standards and post-2017 GHG standards. The Tier 3 standards include additional provisions that impact the ability to use commanded enrichment that previously facilitated sulfur removal during aggressive driving (see discussion of commanded enrichment in Preamble IV.A.6). The GHG standards are generally expected to reduce exhaust temperatures during in-use operation as vehicles become more efficient, resulting in increased sulfur contamination of active catalyst surfaces (see discussion in Preamble IV.A.6 and response to comments regarding Gasoline Sulfur and GHG/Fuel Economy later in this sub-section).

We discuss the implications of reversibility on lead time for sulfur reductions in Chapter 5.1.1.3 of this document.

<u>Gasoline Sulfur and Sulfur-tolerant Cold Start Emissions Control</u>

What Commenters Said:

American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM)

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 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
- 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 Chapter 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 NOx 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 [of EPA-HQ-OAR-2011-0135-4276] 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.

MECA completely misses the point which API and AFPM were attempting to make with respect to the use of emission control technologies with lower sulfur sensitivity to reduce cold-start emissions in order to comply with the proposed Tier 3 standards. MECA asserts that API and AFPM "...assume that the use of three cold start emission control technologies [hydrocarbon adsorbers, reduced thermal mass substrates and exhaust piping, and secondary air injection] …could be used to completely eliminate cold-start emissions with today's gasoline sulfur levels." This assertion takes the API and AFPM comments completely out of context. If one were to read our comments in their entirety, one would note that we never stated that these three technologies had zero sulfur sensitivity, nor did we assume that they would be used to completely eliminate cold start emissions with today's gasoline sulfur levels. Rather, we noted that cold-start technologies "are not likely to be very sulfur sensitive" and that "…if manufacturers could completely eliminate cold-start emissions, the current level of catalyst technology would allow compliance with the Tier 3 standards" primarily because "warmed-up emissions are already at a level that is compatible with the standard." A full rendition of our comments on this point follows (from p. 20 of our detailed comment submittal):

"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.

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Manufacturers of Emission Controls Association (MECA)

With respect to the need for a 10 ppm average sulfur gasoline standard, MECA has had the opportunity to review written Tier 3 comments submitted by the American Petroleum Institute (API) and the American Fuel & Petrochemical Manufacturers (AFPM). In these comments API and AFPM argue that EPA did not adequately justify the need for a 10 ppm average sulfur standard for gasoline in EPA's Tier 3 proposal (API & AFPM Tier 3 comments dated June 28, 2013). In their discussion of the technical need for lower gasoline sulfur levels, API and AFPM refer to three emission control technologies that target cold-start emissions on gasoline light-duty vehicles and that EPA noted in their Tier 3 Draft Regulatory Impact Analysis (DRIA) as technologies they expect to be deployed in order to comply with proposed Tier 3 exhaust standards. These three cold-start emission control technologies are hydrocarbon adsorbers, reduced thermal mass catalyst substrates and exhaust piping, and secondary air injection. API & AFPM make the statement in their comments that based on the description of these technologies provided by EPA in their DRIA, it is reasonable to assume that these technologies have little or no sensitivity to fuel sulfur levels. Using this assumption of no fuel sulfur sensitivity, API and AFPM then go onto to assume that these sulfur insensitive cold-start technologies could be used to completely eliminate cold-start emissions with today's gasoline fuel sulfur levels. They then go on to show that with zero cold-start emissions of NMOG and NOx, typical warmed-up emissions are already at a level on light duty vehicles that would allow proposed Tier 3 emissions of 30 mg/mile NMOG+NOx to be achieved with a 50% compliance margin without the need for a lower gasoline sulfur level (Figure 2 in the detailed comments section of the API & AFPM, June 28, 2013 Tier 3 comments).

This analysis of a Tier 3 compliance pathway that utilizes sulfur insensitive cold-start technologies is severely flawed in its initial assumption that cold-start technologies like hydrocarbon adsorbers, low thermal mass catalyst substrates/exhaust components, and secondary air injection are not sensitive to fuel sulfur levels. Each of these cold-start technologies still relies on a precious metal-based catalyst to oxidize hydrocarbons or reduce NOx, and these precious metal-based catalysts have well known sensitivities to fuel sulfur levels. Hydrocarbon adsorbers utilize zeolite-based materials to adsorb exhaust hydrocarbon constituents under relatively cold exhaust conditions and then release these stored hydrocarbon species at elevated exhaust temperatures. Once an adsorber releases these hydrocarbons back into the exhaust gas, a precious metal-based catalyst is required to oxidize these hydrocarbon species. The adsorber primarily functions as a temporary hydrocarbon “sponge” that provides time for the catalyst to heat-up and “activate” the catalytic oxidation reaction. The catalyst must “light-off” or activate to oxidize hydrocarbons during the cold-start portion of the emissions test cycle. There is an extensive body of literature that clearly shows that precious metal-based catalyst hydrocarbon light-off characteristics are negatively impacted by fuel sulfur levels. As sulfur accumulates on the active catalyst surface, the hydrocarbon light-off temperature increases. Hydrocarbon adsorber effectiveness in reducing cold-start hydrocarbon emissions is tied to the catalyst hydrocarbon light-off properties which, in turn, are impacted by fuel sulfur levels.

In a similar manner, cold-start technologies like low thermal mass substrates and secondary air injection help to accelerate the heat-up of the active catalyst but the catalyst is still the agent that facilitates the chemical reactions of hydrocarbon oxidation and reduction of NOx. Just as in the case of hydrocarbon adsorbers, the catalyst still needs to be activated or lit-off for the oxidation and reduction reactions to occur. Low thermal mass substrates or exhaust piping 3 and secondary air injection only impact the catalyst heat-up process. The catalyst still needs to accomplish the oxidation and reduction reactions and the catalyst activity/light-off temperature is impacted by fuel sulfur levels. An example of this sulfur dependence is found in SAE paper number 2013-01-0300 (authored by Ball and Moser) that reports on the sulfur sensitivity of FTP NOx emissions using a 2009 model year Chevy Malibu PZEV vehicle. This Malibu PZEV vehicle utilizes secondary air injection and high cell density, low thermal mass substrates. Figure 11 of this paper summarizes the NOx FTP emission performance results for each portion of the test cycle: Bag 1 (cold-start), Bag 2 (warmed-up performance), and Bag 3 (hot start performance). For tests run with a 33 ppm sulfur gasoline, NOx emissions for each phase of the test cycle, including the cold-start portion of the test increased with each subsequent FTP test run with the vehicle (a total of three FTP tests run successively). Cold-start NOx emissions increased from 6.6 g/mi to 8.7 g/mi to 9.2 g/mi over three FTP tests using 33 ppm sulfur gasoline – a 39% increase in NOx cold-start emissions for the third FTP test compared to the first FTP test. The use of secondary air and low thermal mass substrates did not make this vehicle insensitive to cold-start sulfur poisoning. In this case sulfur is accumulating on the available active catalyst surfaces and negatively impacting the catalysts’ cold-start NOx performance (and the catalysts’ NOx performance in the other two phases of the test cycle). Triplicate FTP tests run on this same PZEV vehicle using a 3 ppm sulfur gasoline did not show any negative Nox emission trends in the cold-start phase or any other phase of the test cycle. The negative impacts of sulfur on NOx performance observed with the 33 ppm sulfur gasoline where also largely erased by running higher speed US06 test cycles between each FTP test. In this case, the higher speed operation of the vehicle between FTP testing creates higher catalyst temperatures that can purge sulfur that accumulates on the active catalysts during the cooler FTP test cycle.

MECA is unaware of any cold-start emission control technology that is not impacted by fuel sulfur levels since ultimately the cold-start emission performance is tied to the precious metal-containing three-way catalyst performance. API's and AFPM's premise that cold-start emissions can be zeroed out by a sulfur insensitive technology has no basis in fact. As indicated in our earlier comments, MECA agrees with EPA's assessment that a critically important element to ensuring that future gasoline vehicles will be able to comply with EPA's proposed Tier 3 emission limits is EPA's proposed reduction of gasoline fuel sulfur levels to a 10 ppm national average starting in 2017. Numerous published studies have documented fuel sulfur-related deactivation of three-way catalysts that are the primary exhaust emission control technology used on light-duty and medium-duty gasoline vehicles. The negative impacts of gasoline fuel sulfur content on catalytic emission controls are highlighted in a newly revised MECA report: "The Impact of Gasoline Fuel Sulfur on Catalytic Emission Control Systems" (available on MECA's public website, www.meca.org, under Resources >> Reports). This MECA gasoline fuel sulfur report includes the Toyota 2000 SAE paper reference that showed strong sulfur sensitivity on the emissions performance of a prototype SULEV vehicle that employed a close-coupled three-way catalyst and an underfloor converter that utilized a combination three-way catalyst plus hydrocarbon adsorber design. In their published test results both hydrocarbon and NOx FTP emissions increased significantly when the gasoline fuel sulfur level was increased from 8 ppm to 33 ppm (additional large increases in hydrocarbon and NOx FTP emissions were observed when the fuel sulfur level was increased to 150 ppm). The reference for this Toyota paper is SAE paper number 2000-01-2019. API and AFPM note in their comments that EPA neglected to include a reference for this work in their Tier 3 proposal.

Our Response:

EPA agrees with the comments submitted by MECA regarding cold-start emissions. EPA disagrees with the comments submitted by API and AFPM. The technologies listed by API and AFPM are not as suggested immune to the sulfur penalty. Thus, use of higher sulfur fuel in combination with these technologies will reduce their ability to control cold-start emissions. API and AFPM also ignore the engineering limitations within their analysis. For example, substrate cell density is limited by backpressure constraints. The amplitude of air/fuel ratio excursions is limited by control systems, feedback sensors and the design of the fuel injection system. The technologies described in the RIA to address cold start emissions also will not eliminate cold start emissions and largely do not reduce engine out emission levels. They are generally designed to allow the usage of the catalyst sooner following the cold start by increasing the catalyst temperature to more optimal levels earlier in the operation of the engine. As stated in MECA's supplemental comments, all of these technologies ultimately rely on catalytic activity and thus all have performance that is negatively impacted by gasoline sulfur. It is important to note that the effect of sulfur is specifically on the catalyst's ability to perform necessary functions at almost all temperatures including cold starts therefore the effect of sulfur will still be present during cold start even for these specific technologies. It is also well documented within the literature cited in the preamble and RIA that gasoline sulfur directly increases PGM catalyst light-off temperatures (temperature at which the catalysts can effectively oxidize hydrocarbons and CO and reduce NOx). Additionally, the hydrocarbon adsorber ultimately also uses the catalyst when the hydrocarbons are later released into the catalyst therefore sulfur will ultimately also impact the effectiveness of this technology. Furthermore, hydrocarbon adsorbers do not contribute to reduction of cold-start NOx emissions and one of the technologies in the API and AFPM list, secondary air injection, can increase cold-start NOx emissions since lean excursions during air injection can result in an OSC oxidation state that is detrimental to NOx reduction reactions over the exhaust catalysts.

Finally, in order to meet the stringent Tier 3 NMOG+NOx standards, manufacturers will need to employ every available technology in some applications. To eliminate or reduce the effectiveness of a single technology, such as the exhaust catalyst, would result in the inability of certain vehicles to meet the standards.

Current Tier 2 Vehicles Can Comply with Tier 3 Standards Using Tier 2 Fuels

What Commenters Said:

American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM)

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+NOx 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+NOx standards by being below 50 mg/mi.

EPA indicates that a number of 2009 MY Tier 2 vehicles easily meet the 2025 NMOG+NOx target of 30 mg/mi even when running on current cert fuel (15-80 ppm sulfur).

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.

Marathon Petroleum Company LP (MPC)

EPA indicates that a number of 2009 MY Tier 2 vehicles easily meet the 2025 NMOG+NOx target of 30 mg/mi even when running on current cert fuel (15-80 ppm sulfur)

Our Response:

The assessment in Table 1-1 of the Tier 3 DRIA simply reported our finding that a limited set of vehicle models are able to certify to the Tier 3 standards while operating on Tier 2 or LEV II certification fuels conceivably with sulfur levels above 10 ppm . While the allowed range of sulfur in current certification fuel can vary, we believe that typical certification fuel is blended at sulfur levels well below the current 30 ppm average. However, it cannot be concluded that all vehicles can achieve these low levels or meet the fleet average of 30 mg/mi with any sulfur level above 10 ppm. In fact, while certification emission levels seeming to comply with Tier 3 standards may be observed with some manufacturer's current Tier 2 test vehicles, these vehicle models would be subject to in-use testing where they would be required to meet full useful life standards. If they experience fuel sulfur levels above what was considered when they were originally designed, they would likely no longer meet applicable Tier 3 standards. In fact, due to the risk of Tier 3 vehicles encountering higher sulfur level fuels particularly during the transition of in-use fuel to 10 ppm average, we have implemented a provision to allow manufacturers to perform a sulfur cleanout procedure for in-use testing similar to the temporary Tier 2 cleanout provision.

API, AFPM and MPC commented that "EPA indicates that a number of 2009 MY Tier 2 vehicles easily meet the 2025 NMOG+NOx target of 30 mg/mi even when running on current cert fuel (15-80 ppm sulfur)." Detailed comments from API and AFPM mention that 7 of 81 vehicles in EPA Tier Sulfur Test Program met the Tier 3 Bin 30 mg/mi standard on higher sulfur gasoline. Tier 3 Bin 30 emissions of 30 mg/mi NMOG+NOx represent full useful life emissions at 150,000 miles. Upon reviewing data from the test program, EPA identified 6 individual vehicles (not 7) with NMOG+NOx test results below 30 mg/mi. The test results were from only 2 vehicle families – 2007 Honda Odyssey and 2008 Ford Focus. Emissions results of the vehicles tested from these two vehicle families are summarized in the table below:

Make	Model	Model Year	Vehicle ID	Accumulated Mileage	Average NMOG + NOx (mg/mi)	NMOG+ NOx 95% CI (mg/mi)*	Tier 2 Certification Bin	Tier 2 NMOG Standard @ 120,000 miles	Tier 2 NOx Standard @ 120,000 miles	Equivalent FTP NMOG+NOx @ 120,000 miles
Honda	Odyssey	2007	M503ASD-0122S	35,553	32	±3	4	70	40	110
Honda	Odyssey	2007	M503ASD-0187S	37,693	33	±13	4	70	40	110
Honda	Odyssey	2007	M503ASD-0194L	35,742	37	±7	4	70	40	110
Honda	Odyssey	2007	M503ASD-0122S	34,149	32	±5	4	70	40	110
Honda	Odyssey	2007	M503ASD-0255S	36,434	28	±3	4	70	40	110
Ford	Focus	2008	N513ASD-0174S	24,864	18	±8	3	55	30	85
Ford	Focus	2008	N513ASD-0035L/M	35,067	21	±17	3	55	30	85
Ford	Focus	2008	N513ASD-0089S	21,607	18	±11	3	55	30	85
Ford	Focus	2008	N513ASD-0178L/M	27,737	15	±4	3	55	30	85
Ford	Focus	2008	N513ASD-0221S	24,917	20	±6	3	55	30	85
*95 % confidence interval based upon a 2-sided student's t-test.										

Note that none of the tested vehicles within these two vehicle families approach the 120,000 mile or 150,000 mile full useful life of the of the Tier 3 Bin 30 exhaust emissions standards or the 120,000 mile full useful life of the Tier 2 emissions standards to which these vehicles were certified. The accumulated mileages represent approximately 18-32% of a

120,000 mile full useful life or approximately 15-25% of a 150,000 mile full useful life and thus none of the vehicles tested “easily meet the 2025 NMOG+NOx target of 30 mg/mi” unless the full useful life mileage requirements of either the Tier 3 or the previous Tier 2 standards are completely ignored. The comments appear to infer that emissions degradation that occurs over the last two-thirds to three-fourths of a vehicle’s life should be ignored or are negligible. The comments also imply that the approximately 50% Tier 2 compliance margins previously used by auto manufacturers to ensure emissions compliance that take into consideration production variations among vehicles and compliance with IUVP can be ignored within an analysis of whether a particular vehicle is reasonably expected to comply with the Tier 2 Bin 30 exhaust emissions standards.

While exhaust emissions testing at accumulated mileages between 20,000 miles and 38,000 miles are often useful for comparing emissions differences due to fuel changes or changes in emission control hardware, emissions at such relatively low mileage are not representative of the full useful life exhaust emissions to which these vehicles are certified.

Of the five 2007 Honda Odyssey vehicles tested, only one vehicle had average NMOG+NOx emissions lower than 30 mg/mi (28 ± 3 mg/mi). The remaining vehicles had average NMOG+NOx emissions above 30 mg/mi. Even if this individual vehicle could demonstrate NMOG+NOx exhaust emissions at this level at 150,000 miles instead of 36,434 miles, there would still be insufficient compliance margin for a manufacturer to demonstrate compliance with the standard. All of the other four, nearly identical 2007 Honda Odysseys tested had average NMOG+NOx emissions over 30 mg/mi even with limited mileage accumulation (approximately 34,000 to 38,000 miles). This family of vehicles was originally certified to Tier 2 Bin 4 emissions of 70 mg/mi NMOG and 40 mg/mi NOx (combined equivalent NMOG+NOx of 110 mg/mi) at a full useful life of 120,000 miles. The average NMOG+NOx emissions of 28 to 37 mg/mi for these vehicles compared with the level of the standards to which they are certified does not represent over-compliance with the Tier 2 Bin 4 emissions standards to which this vehicle family was certified. The test results represent typical emissions for Tier 2 Bin 4 vehicles of this type when considering the vehicles’ relatively low-mileage and the Tier 2 full useful life exhaust emissions standards to which they were originally certified. Emissions at relatively low mileage are not representative of full useful life exhaust emissions because they do not account for the deterioration of exhaust catalysts and other emission control systems as the vehicle continues to accumulate mileage up to the regulatory full useful life. Even if the emissions results were from tests closer the end of useful life, emissions at approximately 30 mg/mi do not represent exhaust emissions consistent with a vehicle complying with Bin 30 since there would be insufficient compliance margin for the manufacturer to ensure in-use compliance with Tier 3 exhaust emissions standards even assuming a smaller 20-40% compliance margin.

Of the five 2008 Ford Focus vehicles tested, all five vehicles had average emissions that were below 30 mg/mi, although the result was not statistically different from 30 mg/mi at a 95% confidence level for one of the vehicles (N513ASD-0035L/M). Vehicle mileage ranged from just over 21,000 miles to just over 35,000 miles. This family of vehicles was originally certified to Tier 2 Bin 3 emissions of 55 mg/mi NMOG and 30 mg/mi NOx (combined equivalent NMOG+NOx of 85 mg/mi) at a full useful life of 120,000 miles. The test results represent reasonably typical emissions for Tier 2 Bin 3 vehicles of this type when considering the vehicles' relatively low-mileage and the Tier 2 full useful life exhaust emissions standards to which they are certified. As with the Honda Odyssey emissions results, the average NMOG+NOx emissions reported for the 2008 Ford Focus are not representative of exhaust emissions that would need to be achieved in order for a manufacturer to comply with Tier 3 Bin 30 full useful life exhaust emissions standards.

API and AFPM also cited emissions data from six additional Tier 2 vehicles tested by SGS to further assert that current vehicles could comply with the Tier 3 standards even when using Tier 2 fuels.[13] EPA does not believe the data to be representative of the full-useful-life emissions of future Tier 3 vehicles for the following reasons:

1. The vehicles selected for testing by SGS were not representative of the broad range of vehicles that will need to comply with Tier 3. All of the vehicles chosen were mid-size or compact automobiles with 4-cylinder engines and no attempt was made to choose high-volume vehicles or to sales-weight the selection of vehicles. No light trucks were tested even though light-trucks represent more than 50% of vehicle sales.

2. The rapid thermal aging cycle used to simulate mileage accumulation and the parameters selected for the aging cycle appear to have been arbitrarily chosen and did not achieve exhaust catalyst aging conditions that would allow emissions testing representative of full-useful-life emissions for the tested vehicles.

All of the vehicles tested were relatively low-mileage, with accumulated mileage of between 5,000 miles and 11,000. SGS relied upon rapid thermal aging of exhaust system components using the RAT-A cycle for 225 hours with a catalyst inlet temperature of 825 +/- 20 °C for all vehicles to achieve conditions that they indicated would represent full-useful-life emissions. Catalyst aging by SGS was not conducted using the EPA Standard Bench Cycle (SBC) catalyst durability procedure (Title 40 CFR § 86.1823–08 "Durability demonstration procedures for exhaust emissions") or using an alternative, demonstrated equivalent catalyst aging procedure. The single catalyst inlet aging temperature selected for all of the vehicles' exhaust systems does not appear to be representative of an aging temperature that would be representative for these vehicles during operation over the EPA Standard Road Cycle as required by 40 CFR § 86.1823–08. The vehicles tested by SGS ranged from a PFI 1.8L 140 bhp naturally-aspirated vehicle to a midsize, turbocharged, GDI 2.4L 200 bhp vehicle. It would be extremely unlikely that a single, identical catalyst-inlet aging temperature and identical cumulative aging time would be appropriate for rapid thermal aging across all six vehicle models or that such aging would also achieve the same equivalent cumulative mileage for all six vehicles. Data shown in figure 18 of the SGS report clearly showed remarkably different closed-coupled catalyst bed temperatures between the vehicles tested by SGS, further indicating that a single bench-aging temperature was very likely not appropriate for all of the vehicles. It is impossible to determine how the 225-hour cumulative aging time was arrived at or how it was

[13] Vertin, K., Reek, A. "Reversibility of Gasoline Sulfur Effects on Exhaust Emissions From Late Model Vehicles." API Contract No. 2012-106409, June 20, 2013.

determined to be equivalent to 120,000 to 150,000 miles for all of the vehicles tested since the cumulative hours do not appear to have been determined using the Bench Aging Time equation from 40 CFR § 86.1823–08 and the rationale behind the choice of aging parameters was not reported by SGS. SGS stated in their report to API that "Manufacturers have developed proprietary catalyst aging tests based on RAT-A to correlate the test results with real-world experience. For this study, it was not feasible to use proprietary aging cycles for each of the vehicle systems." This statement by SGS did not demonstrate a full understanding of currently acceptable rapid thermal catalyst aging procedures. Manufacturers can only use proprietary catalyst aging cycles for which they have demonstrated equivalence to the standardized EPA SBC procedures (see 40 CFR 86.1823–08). It would have been entirely feasible for SGS to simply use the EPA SBC procedures with vehicle-specific aging times and temperatures to achieve an equivalent of 150,000 miles of driving and thus it is not clear why the RAT-A procedure was chosen for catalyst aging or if the cycle, cycle times and catalyst inlet temperatures were at all appropriate for aging exhaust system hardware to near full useful life equivalent mileage for each of the vehicles tested.

Moreover, as the comments show, the vast number of vehicles in the EPA test program did not meet the Tier 3 standards. As EPA discusses elsewhere, the required reductions are of a magnitude that for the standards to be met across the regulated fleet, EPA expects manufacturers to employ advances in technology in all of the relevant areas of emissions control – reducing engine-out emissions, reducing the time to reach catalyst light-off temperatures, improving exhaust catalyst durability at 120,000 or 150,000 miles and improving efficiency of fully warmed up exhaust catalysts. All of these areas of emissions control need to be improved, and gasoline sulfur reduction to a 10 ppm average is a critical part of achieving Tier 3 levels through these emissions control technology improvements. The use of 10 ppm average sulfur fuel is an essential part of achieving Tier 3 levels while applying an array of advancements in emissions control technology to the regulated fleet. The testing of Tier 2 and Tier 3 type technology vehicles, as well as other information, shows that sulfur has a very large impact on the effectiveness of the control technologies expected to be used in Tier 3 vehicles. Without the reduction in sulfur to a 10 ppm average, the major technology improvements projected under Tier 3 would only result in a limited portion of the emissions reductions needed to achieve Tier 3 levels.

Gasoline Sulfur and PM Emissions

What Commenters Said:

American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM)

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.

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.

We see no justification for EPA's comment that "FTP PM emissions increased with CO2 emissions for the PFI vehicles".

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.

Marathon Petroleum Company LP (MPC)

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.

EPA indicate that sulfate compounds can be a significant contributor to PM emissions from stratified lean-burn gasoline engines and diesel engines but does not support this with any data.

We see no justification for EPA's comment that "FTP PM emissions increased with CO2 emissions for the PFI vehicles".

Our Response:

The purpose of the PM test program on Tier 2 light-duty vehicles was to demonstrate the feasibility of Tier 3 PM emission standards using Tier 2 vehicles at full useful life. The purpose was not to investigate the effect of fuel sulfur level on Tier 2 light-duty PM emissions. Sulfate emissions were measured from the Tier 2 light-duty study. The largest sulfate emissions measured in the study were 0.13 mg/mile on the FTP cycle, and 0.32 mg/mile on the US06 cycle. The average sulfate emissions across vehicles were only .021 mg/mile on the FTP cycle, and 0.077 mg/mile on the US06 cycle.

Measurements from the Kansas City Light-Duty Vehicle Emissions Study tested in-use light-duty gasoline vehicles with much higher fuel sulfur content, and found that the sulfate contribution to the PM emissions was still relatively minor for light-duty gasoline vehicles. The sulfate emissions constituted less than 1% of PM start emissions, and less than 10% of running emissions[14]. As such, even if the fuel sulfur content was increased to 30 ppm in the Tier 2 light-duty PM emission study, the increase in PM emissions is expected to be relatively minor, and would not impact the demonstration of feasibility of achieving the proposed Tier 3 PM standards.

The comment from API regarding FTP PM emissions in relation to CO2 emissions from PFI vehicles originated from text describing a preliminary graph of the results from the test program. The text in question does not accurately describe the data. However, the text was only observational in nature, and was inconsequential relative to the purpose of the associated Figures, which was to show the technological feasibility of the proposed PM standards. In response, we have removed the text in question regarding a CO2/PM relationship from the figures in the final RIA.

Regarding Marathon's comment of there being no supporting data to indicate that sulfate compounds can be a significant contributor to PM emissions from stratified lean-burn gasoline engines and diesel engines, it should be very clear that all lean NOx catalytic reduction systems with sufficient activity to meet Tier 3 with either lean-burn gasoline or diesel vehicles (e.g., compact urea SCR systems, NOx adsorption catalysts and variations/combinations of these systems) all rely heavily on Pt/Pd oxidation catalysts as key system components. As a petroleum refiner, Marathon should be well aware of the oxidation reactions that form sulfate from SO2 over Pt/Pd catalysts under net oxidizing conditions. These reactions and subsequent hydration and formation of sulfate particulate are concisely summarized within the text by Heck et al. and also by numerous other sources.[15]

Evaluation of Emissions at Gasoline Sulfur Levels of 10 ppm and 30 ppm

What Commenters Said:

Marathon Petroleum Company LP (MPC)

EPA utilized very few studies none of which looked at sulfur effects over the range of 10 to 30 ppm.

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[14] Sonntag, D. B., R. W. Baldauf, C. A. Yanca, C. R. Fulper C. R. Particulate Matter Speciation Profiles for Light-Duty Gasoline Vehicles in the United States. J. Air & Waste Manag. Assoc. Published online December 13, 2013. DOI: 10.1080/10962247.2013.870096.

[15] Heck, R.M., Farrauto, R.J., Gulati, S.T. Equation # 8.2 and surrounding text. "Catalytic Air Pollution Control – Commercial Technology, 2nd Edition." John Wiley and Sons, Inc., 2002.

American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM)

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.

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.

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.

Even after all the above data have been discussed, EPA indicated in Chapter 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+NOx." 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.

Pennsylvania Department of Environmental Protection (DEP)

Neither the proposed rule nor the regulatory impact analysis adequately explains how emission reductions were estimated. The proposed rule mentions that studies were performed that examined emission reductions occurring in vehicles when 3 ppm, 5 ppm, and 6 ppm sulfur gasoline are used, but not 10 ppm sulfur gasoline. How did the EPA determine what reductions would occur at 10 ppm sulfur? Regarding catalytic converter operation, the proposed rule states that reactions ' ... can be blocked by sulfur blinding and may be responsible for observation of reduced NO_x activity over [palladium] Pd/ceria catalysts even with exposure to fairly low levels of sulfur (equivalent to 15 ppm in gasoline)' (78 FR 29864). EPA also indicates that Pd catalysts will be important to meeting Tier 3 standards. Emissions in vehicles at 6 ppm sulfur gasoline are low according to the studies mentioned, but at 15 ppm sulfur reactions that reduce NO_x are blocked, which indicates that the catalysts' efficiency may be responding non-linearly to sulfur levels in gasoline. Did EPA consider that catalyst operation may not be nearly as efficient at 10 ppm sulfur in gasoline as it is at 3 ppm, 5 ppm, or 6 ppm? DEP cannot discern from the explanations given in the proposed rule how the control efficiency of the catalyst using 10 ppm sulfur gasoline was derived. This is very important because the monetized health benefits are directly calculated using the estimated emissions reductions.

Our Response:

There have been a number of published studies of the effects of gasoline sulfur levels on NMOG and NOx emissions, particularly those for Tier 2/LEV II and cleaner emission control technologies. Although limited, most of the cited studies included testing of fuel sulfur levels that cross the range of 10 ppm to 30 ppm fuel sulfur and thus provide important insight into the emissions impacts of reducing gasoline sulfur levels from a national average of 30 ppm sulfur under Tier 2 to an average of 10 ppm sulfur under Tier 3 (Takei et al, 2000; Ball et al., 2011; EPA 420-R-07-002, 2007; EPA 420-R-13-002, 2013). At the time of the NPRM, these were the most recently available studies on effects of gasoline sulfur on exhaust emissions. After the NPRM, EPA reviewed additional, supplemental studies and data submissions and cites this information within Preamble IV.A.6 of the Tier 3 final rule. This includes a contract report from SGS Environmental testing submitted by API as part of its Tier 3 comments (Vertin and Reek, 2013), an updated, peer-reviewed EPA report on emissions impacts of gasoline sulfur on high-sales-volume Tier 2 vehicles (EPA 420-R-14-002, 2014), data from EPA's repeat testing of the previously tested (Ball et al., 2011) PZEV Chevrolet Malibu, data from EPA's developmental Tier 3 Bin 30 Chevrolet Silverado testing and supplemental data submitted by Ford Motor Company on a Tier 3 Bin 50 Ford Explorer. This data is summarized within the RIA and Preamble IV.A.6. All of the data was analyzed to characterize emissions changes when reducing average gasoline sulfur from 30 ppm S to 10 ppm S. Most of the additional data generated by EPA or submitted to EPA by industry focused on emissions from low-emitting Tier 2 (bins 3 and lower) or developmental prototype Tier 3 vehicles.

EPA has drawn from all of the analyses identified above to determine that the relationship between changes in gasoline sulfur content and NOx, HC, NMHC and NMOG emissions is typically linear. The linearity of sulfur impacts on NOx, NMHC and NMOG emissions is supported by past studies with multiple fuel sulfur levels all of which compare gasoline with differing sulfur levels that are below approximately 100 ppm (e.g., CRC E-60 and 2001 AAM/AIAM programs as well as comments submitted to this rulemaking by MECA cited within Preamble IV.A.6). As stated within Preamble IV.A.6, the relative linearity of the effect of gasoline sulfur level on NMOG and NOx emissions allows exhaust emissions results generated within EPA and other studies of gasoline sulfur at levels immediately above or below either 10 ppm or 30 ppm to be normalized to either 10 ppm sulfur or to 30 ppm sulfur. This allowed EPA to evaluate vehicle emission control system response to changes in gasoline sulfur content adjacent to or within the range defined by the Tier 3 Standard of 10 ppm S and the current standard (30 ppm S) for the data cited within Preamble IV.A.6 and the RIA.

EPA Citation of Toyota Technical Paper on Fuel Property Requirements for Advanced Technology Engines

What Commenters Said:

American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM)

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 NOx 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 references test data from Toyota to support their position but do not provide any details or the reference material.

Marathon Petroleum Company LP (MPC)

EPA references test data from Toyota to support their position but do not provide any details or the reference material.

Manufacturers of Emission Controls Association (MECA)

The negative impacts of gasoline fuel sulfur content on catalytic emission controls are highlighted in a newly revised MECA report: “The Impact of Gasoline Fuel Sulfur on Catalytic Emission Control Systems” (available on MECA’s public website, www.meca.org, under Resources >> Reports). This MECA gasoline fuel sulfur report includes the Toyota 2000 SAE paper reference that showed strong sulfur sensitivity on the emissions performance of a prototype SULEV vehicle that employed a close-coupled three-way catalyst and an underfloor converter that utilized a combination three-way catalyst plus hydrocarbon adsorber design. In their published test results both hydrocarbon and NOx FTP emissions increased significantly when the gasoline fuel sulfur level was increased from 8 ppm to 33 ppm (additional large increases in hydrocarbon and Nox FTP emissions were observed when the fuel sulfur level was increased to 150 ppm). The reference for this Toyota paper is SAE paper number 2000-01-2019. API and AFPM note in their comments that EPA neglected to include a reference for this work in their Tier 3 proposal.

Our Response:

The specific citations were included within the Preamble to the Proposed Rule, specifically, preamble citation footnote numbers 229 and 230[16]:

> 229 Takei, Y., Kungasa, Y., Okada, M., Tanaka, T. Fujimoto, Y. (2000). Fuel Property Requirement for Advanced Technology Engines. SAE Technical Paper 2000–01–2019.
>
> 230 Takei, Y., Kungasa, Y., Okada, M., Tanaka, T. Fujimoto, Y. (2001). ‘‘Fuel Properties for advanced engines.’’ Automotive Engineering International 109 12, 117–120.

A search containing search terms for the primary author, "Takei", would also have yielded the specific citations in question.

<u>Gasoline Sulfur and Lean-burn Gasoline Spark-ignition Engines</u>

What Commenters Said:

American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM)

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) . .

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. 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).

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

[16] U.S. Federal Register, Vol. 78, No. 98, Tuesday, May 21, 2013, Proposed Rules, footnotes at the bottom of page 29862.

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.

The American Petroleum Institute (API) recently became aware that the Manufacturers of Emission Controls Association (MECA) submitted "supplemental" comments to the EPA Tier 3 Rulemaking Docket that were critical of comments which we had filed jointly with the American Fuel and Petrochemical Manufacturers (AFPM) on June 28, 2013 concerning the Tier 3 Notice of Proposed Rulemaking (NPRM). Specifically, MECA stated that the intent of its submittal was:

"...to provide additional information and comments on four important topics: 1) the importance of 10 ppm average sulfur gasoline to meeting proposed Tier 3 emission limits; 2) the synergy between ultra-low sulfur gasoline and the introduction of cost effective, lean-burn, gasoline direct injection technology with improved fuel consumption; 3) costs associated with Tier 3 compliance on gasoline light-duty vehicles; and 4) harmonization with ARB's 1 mg/mile LEV III PM standard."

In this submittal, MECA attempts to rebut the API/AFPM written comments concerning: (a) EPA's inadequate justification of a technical need for a 10 ppm gasoline S standard, and (b) the future market penetration prospects for lean-burn GDI technology in the US light-duty vehicle fleet.

The supplemental comments from MECA are based upon very limited data that have not been independently validated and that were generated using test fuels with potentially confounded properties. In addition, MECA's outlook for lean-burn GDI technology in the US ignores the real-world experience of this technology in the European and Japanese markets where 10 ppm gasoline sulfur regulations have been in place. Our detailed response regarding each of these topics is further elucidated below.

MECA asserts that lean NOx adsorber catalysts are the preferred strategy for reducing NOx on lean GDI light-duty engines and claims that 10 ppm sulfur gasoline is necessary for the use of this technology in the U.S. However, MECA does not explain why lean-burn GDI technology failed to enter the European and Japanese markets in significant volumes after these two regions adopted 10 ppm gasoline sulfur standards. (i.e., market penetration of lean-burn GDI peaked at ~2% and has since been declining.) MECA also alludes to two European OEMs who want to introduce this technology into the US market. Given the relatively low US gasoline light-duty vehicle market penetration by European OEMs, combined with the relatively high incremental cost of this technology, MECA's comments do not contradict an analysis performed by the Martec Group which estimates that the market opportunity for lean-burn GDI is limited to at most ~3% by 2020.

We further note that the Agency agreed with Martec's evaluation of lean-burn GDI technology in its regulatory impact assessment conducted for the final rulemaking, "2017 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions and Corporate Average Fuel Economy Standards." Specifically, the EPA did not use lean-burn GDI in the vehicle technology packages that were evaluated for that rulemaking as it was found less cost effective than other available technologies. In short, the Agency agreed with API's comments on this issue.

Marathon Petroleum Company LP (MPC)

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.

Manufacturers of Emission Controls Association (MECA)

API and AFPM in their Tier 3 comments are also negative concerning the future application of lean burn, gasoline direct injection engine technology in the U.S. to comply with future EPA greenhouse gas/fuel economy standards. Their comments indicate that the market share for lean-burn engines in the U.S. will reach only about 3% between 2015 and 2020 and decline thereafter (based on research done by The Martec Group). The auto industry has generally expressed significant interest in lean GDI engines in comments made at both Tier 3 public hearings held in Philadelphia and Chicago in April 2013. This auto industry interest is specific to the potential for lean GDI engines to deliver up to 20% improvements in fuel consumption relative to stoichiometric GDI engines (which in turn have lower fuel consumption than port fuel injection gasoline engines). A recent analysis of EPA's estimates of costs to meet their future light-duty 2017-2025 greenhouse gas emission standards by Dr. Timothy Johnson of Corning, Inc. (see SAE Int. J. Engines 6(2):2013, doi:10.4271/2013-01-0538) indicates that CO2 reductions will cost about $100/% CO2 reduced in the 2020-2025 timeframe. According to recent Ricardo estimates, lean GDI engine technology can deliver about 20% lower fuel consumption at a cost of about $30/% CO2 reduced. This relatively attractive cost for reducing CO2 emissions relative to EPA's estimates for costs to reduce CO2 emissions in the 2020-2025 timeframe should drive auto industry interest and adoption of lean GDI engines to meet future U.S. greenhouse gas standards.

As MECA and the auto industry have both pointed out in public comments, a 10 ppm sulfur average gasoline standard is an important enabler for allowing lean GDI engines to meet proposed Tier 3 emission limits and deliver cost effective CO2 reductions. In our previous Tier 3 comments, MECA noted that lean NOx adsorber catalysts are the preferred strategy for reducing NOx on lean GDI light-duty engines and NOx adsorber catalysts have known strong sensitivities to gasoline fuel sulfur levels (see for example Toyota's SAE paper number 2000-01-2019 referred to previously). At least two European auto manufacturers offer lean GDI vehicles that utilize lean NOx adsorber catalysts for NOx control in Europe and the current gasoline sulfur levels present in the U.S. market prevent these manufacturers from offering these lean GDI vehicles in the U.S. market. Emission control manufacturers are working with their automotive customers to make lean NOx adsorber catalysts more effective and less costly (as shown in the recent SAE paper number 2013-01-1299, referenced in MECA's earlier Tier 3 comments), but lower sulfur gasoline is necessary to make lean GDI a viable future option in the U.S. market. Without 10 ppm sulfur gasoline, manufacturers will be forced to use more costly approaches for reducing CO2 emissions from future light-duty vehicles.

In addition to the need for a 10 ppm national average sulfur limit on gasoline for compliance with EPA's proposed Tier 3 emission standards, the availability of ultra-low sulfur gasoline will also open up opportunities for vehicle manufacturers to develop and commercialize lean gasoline engines that can provide improved fuel economy benefits relative to stoichiometric gasoline engines. A number of manufacturers are offering lean gasoline engine options in Europe and are interested in using this lean combustion approach to meet more stringent, future U.S. fuel economy/greenhouse gas emission standards. Lean gasoline engines will require the use of a lean NOx emission control technology to comply with proposed Tier 3 emission standards. Lean NOx adsorber catalysts are being used in Europe (where the gasoline sulfur cap is 10 ppm) on lean gasoline engines to reduce NOx emissions from these lean engines. Lean NOx adsorber catalyst performance is significantly impacted by gasoline fuel sulfur levels – the NOx adsorber function of these catalysts also strongly adsorb sulfur constituents present in the exhaust. Ultra-low sulfur gasoline is an important enabler for maximizing the performance of lean NOx adsorber catalysts, minimizing the duration and frequency of NOx adsorber desulfation events, and maximizing the potential fuel economy benefits of lean engine operation. A recent SAE publication (SAE paper no. 2013-01-1299) describes recent efforts to optimize the performance and desulfation characteristics of lean NOx adsorber catalysts that are targeted for a light-duty lean gasoline engine application. A national 10 ppm gasoline sulfur average requirement will provide manufacturers with the opportunity to use lean gasoline engine technology as an option for meeting future U.S. fuel efficiency/greenhouse gas standards.

Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

OEMs need a low sulfur content of fuel in order to introduce advanced lean burn gasoline direct injection (GDI LB) engines that will enable better fuel system efficiency. LB engine technology requires the use of highly efficient Lean NOx Absorbers or Traps (LNT) because of the technology's inherent higher "engine out" NOx rates. The LNT is more sensitive to gasoline sulfur poisoning than conventional automotive three way catalysts because of its specific catalyst chemistry which binds more strongly with the sulfur. As little as a few parts per million of fuel sulfur will start to bind to the catalyst active sites and require high temperature (~500-600 C), fuel enriched regeneration events to restore the LNT efficiency. If fuel sulfur is not near zero, then more energy is needed to regenerate the catalyst than may be conserved by the lean burn technology itself, jeopardizing its cost effectiveness.

Some groups have asserted that EPA has not identified any automotive technologies that would benefit from lower sulfur gasoline and that will be utilized to comply with CAFE/GHG standards and Tier 3 standards. This assertion is false. The lower sulfur fuel will allow for improved technology crucial for meeting the new criteria pollutant standards. For example, the use of GDI technologies is referenced by EPA in the MY 2017 rule technical support document, which notes: "EPA and NHTSA's current assessment is that the availability of ultra-low sulfur (ULS less than 15 ppm sulfur) gasoline is a key technical requirement for lean burn GDI engines to meet EPA's Tier 2 NOx emission standards". 10 ppm sulfur will result in increased used of optimized GDI and similar technologies in gasoline engines, as it has done for diesel engines.

While we recognize that despite 10 ppm sulfur cap standards, adoption levels of complete GDI/LB technology in Europe and Japan have been low to date, some components of the technologies have been widely used. The full suite of technologies has not been adopted simply because emission limits have been less stringent than Tier 3, and therefore not all of the pollution control equipment is required. Because Tier 3 will require more stringent reductions in criteria emissions, past GDI/LB adoption in Europe and Japan is not predictive of the developing U.S. response.

Mercedes-Benz USA, LLC on behalf of Daimler AG

The 10 ppm retail average and 20 ppm refinery gate/25 ppm retail caps are necessary to optimize fuel efficiency and maintain the function of advanced engine and exhaust aftertreatment technologies. In 2006, Mercedes-Benz first capitalized on Ultra low sulfur gasoline and the concomitant fuel consumption that resulted when it introduced in the EU, the CLS 350CGI which is equipped with stratified lean burn combustion. Depending on the driving mode, engine speed and load, gains in fuel efficiency can range between 5-15% as compared to conventional stoichiometric combustion. Fuel efficiency gains and CO2 reductions of this magnitude, required by the GHG mandate and enabled by lean burn combustion, illustrate the importance of this technology and the need for universal availability of low sulfur gasoline in the US to the Mercedes-Benz GHG Compliance Plan.

While it is possible to dislodge the embedded sulfur through various mechanisms which raise the exhaust gas temperature sufficiently to 'burn off' such deposits, in practice, it is far more difficult to burn off sulfur deposits given the nature of emerging, higher-efficiency combustion technologies which extract more energy from the fuel resulting in lower operating temperatures of exhaust devices. These 'sulfur burn off' events are required to maintain pollutant conversion efficiency of exhaust aftertreatment devices, but they come with a substantial fuel economy penalty. When market fuel sulfur concentrations exceed 20 ppm, fuel efficiency gains can be completely negated in the effort to maintain regulated emission control function.

Lean burn combustion among those technologies necessary to accomplish a nearly 50 percent reduction in greenhouse gas emissions requires low sulfur gasoline for peak efficiency. Fuel efficiency gains in CO2 reductions of this magnitude required by the greenhouse gas mandate are enabled by lean burn combustion, illustrate the importance of this technology and the universal availability of low sulfur gasoline in the U.S. to the Daimler Greenhouse Gas Compliance Plan.

Our Response:

There are two primary rationales for reducing gasoline sulfur to an average of 10 ppm As discussed in the preamble and elsewhere in this document. The first is to provide an immediate reduction in emissions from the existing Tier 2 fleet. The second is to enable compliance with the Tier 3 Bin 30 fleet-average emissions standard, with the assumption that the majority of light-duty vehicles would use stoichiometric-combustion, spark-ignition gasoline engines. Although both the oil and the automotive industry commented on lean-burn technology and low sulfur gasoline, we did not rely on the broader commercialization of lean-burn engine technology as a potential pathway to compliance with the Tier 3 standards, and we do not address in this rule the impact of fuel sulfur on the performance of vehicles with this technology.

<u>Gasoline Sulfur and GHG/Fuel Economy</u>

What Commenters Said:

Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

Sulfur Reductions Facilitate More Fuel Efficient Vehicle Technology. As engine efficiency increases, more work is extracted from the fuel during the combustion process and less energy is rejected as "waste" heat to the cooling system and in the exhaust system. Certain technologies such as lean burn combustion and turbocharged induction, promote cooler exhaust temperatures as compared to naturally aspirated induction and stoichiometric combustion. Such cooler exhaust gas temperatures both facilitate sulfur deposition and inhibit its removal during periodic "burn off" cycles. These events are required to maintain conversion efficiency of exhaust after treatment devices and come at a substantial fuel economy penalty. In the extreme, depending on the sulfur level present in the fuel, fuel efficiency gains can be completely negated in the effort to maintain emission control function.

Some groups have asserted that EPA has not identified any automotive technologies that would benefit from lower sulfur gasoline and that will be utilized to comply with CAFE/GHG standards and Tier 3 standards (54). This assertion is false. The lower sulfur fuel will allow for improved technology crucial for meeting the new criteria pollutant standards. For example, the use of GDI technologies is referenced by EPA in the MY 2017 rule technical support document, which notes: "EPA and NHTSA's current assessment is that the availability of ultra-low sulfur (ULS less than 15 ppm sulfur) gasoline is a key technical requirement for lean burn GDI engines to meet EPA's Tier 2 NOx emission standards". 10 ppm sulfur will result in increased used of optimized GDI and similar technologies in gasoline engines, as it has done for diesel engines.

American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM)

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

Marathon Petroleum Company LP (MPC)

EPA has entirely 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 II.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.

American Honda Motor Co., Inc.

It should also be noted that the Tier 3 standards have an important relationship with other recently finalized vehicle regulations, the model year 2017-2025 fuel economy and vehicle greenhouse gas standards. As a result of the latter set of standards, numerous efforts are now underway to improve the thermal efficiency of advanced internal combustion engines. These efforts are successfully reducing waste heat, delivering more energy to the wheels. Yet because catalysts use wasted engine heat to reach operating temperatures, cooler engines mean lower catalyst operating temperatures. These catalysts are more prone to being poisoned by sulfur in the fuel. Countermeasures to ensure aftertreatment operability in a sulfur-rich environment would require burning unnecessary excess fuel, eroding mpg and putting additional greenhouse gas emissions into the atmosphere – exactly the opposite of the intended fuel economy and greenhouse gas regulations.

Manufacturers of Emission Controls Association (MECA)

Sulfur deactivation of three-way catalysts negatively impacts the active precious metal catalysts, oxygen storage materials, and other activity promoters found in these sophisticated catalysts. The coverage and negative impacts of sulfur poisons on three-way catalysts depends in part on the temperature history of the catalytic converters found on the vehicle. Exhaust temperatures are expected to cool in the future as manufacturers reduce vehicle waste heat to meet future vehicle fuel efficiency and greenhouse gas standards. These cooler converter operating temperatures cause catalysts to accumulate higher amounts of sulfur poisons with today's gasoline sulfur levels, resulting in higher emission levels of pollutants like hydrocarbons and NOx.

Mercedes-Benz USA, LLC on behalf of Daimler AG

As engine efficiency increases, more work is extracted from the fuel during the combustion process and less energy is rejected as 'waste' heat in the cooling system and in the exhaust stream. Certain technologies especially lean burn combustion and turbocharged induction, promote cooler exhaust gas temperatures as compared to naturally aspirated induction and stoichiometric combustion. Such cooler exhaust gas temperatures facilitate sulfur deposition. During the combustion process, sulfur, in various compound forms, is present in the exhaust stream and is readily deposited on the surface of exhaust aftertreatment devices including oxidation and reduction catalysts as well as NOx adsorption components. It is on these surfaces that precious metals are placed by design to provide the conversion sites for the chemical reaction which converts pollutants to harmless gases. This surface contamination with sulfur reduces the conversion efficiency of exhaust aftertreatment components. In fact, even low levels of sulfur impede the function of these devices especially if previously subjected to higher sulfur fuels. However, the cooler exhaust gas temperatures brought about through increased efficiency associated with lean burn and other advanced technologies also inhibit sulfur removal during periodic 'burn off' cycles.

Our Response:

EPA generally agrees with the comments by Alliance, Global Automakers, MECA, and Mercedes-Benz regarding the reduction in exhaust temperatures of stoichiometric-combustion engines as part of GHG emissions compliance and disagrees with the statements by API and MPC, based on the analysis in preamble Section IV.A.6 and RIA Chapter 1. As described in preamble Section IV.A.6, EPA agrees that as engine efficiency is improved via reductions in pumping losses, friction and other means, the general trend will be towards lower exhaust temperatures that can both increase sulfur adsorption onto active catalytic surfaces and make removal of sulfur from those surfaces more difficult.

Comments on GHG, CAFE, and CO_2 emissions are beyond of the scope of the Tier 3 rulemaking.

4.1.5. LD Exhaust Standards: Other Issues

4.1.5.1. Early Credits/Early Tier 3 Compliance

What Commenters Said:

Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

EPA has proposed a mechanism that would allow for the generation of early credits from two model years prior to the beginning of the Tier 3 standards. There are, however, certain aspects of the proposal that are unclear. Additionally, manufacturers' efforts to earn early credits can be frustrated because of the differences in the bin structure between the Tier 2 program and the LEV III/Tier 3 programs.

Rather than dividing the fleet between vehicles over and under 6,000 pounds GVWR, EPA could simply combine the < 8,500 pounds GVWR emission credits federally and compare those to the CA+177 State pooled emission credits (appropriately scaled to a nationwide sales). This would simplify the calculations.

While the language of the preamble and proposed regulation make it clear that the cap is to be computed based upon the ratio of nationwide (50-state) sales to California-only sales, the language related for the computation of the potential early credits is less clear. For the latter, it is not clear whether the language was intended to indicate whether this computation should be based upon nationwide sales or whether it should be based upon only the sales of the "federal" fleet (i.e., excluding the CA+177 State fleet (i.e., 37-state sales)). EPA staff have subsequently verbally clarified that the intent is to base this early credit computation only upon the federal fleet excluding CA+177 States (or 37-state sales). This expectation should be clarified in the final rule, since it is needed to implement the early credits in just a few years and clarification in the final rule would avoid EPA being required to later issue a separate guidance document or technical amendment.

Additionally, the proposal was to compute the "cap" by multiplying California credits by 50-state sales divided by California sales. However, given that the California LEV III regulations allow the option (which most, if not all, manufacturers are expected to use) to base compliance upon the pooled CA+177 State fleets, EPA should revise the cap computation to specify CA+177 State credits multiplied by 50-state sales divided by CA+177 State sales.

For the possible but unlikely case that a manufacturer may not choose to use the CA+177 State pooling option, the EPA proposed cap based upon the ratio of 50-state to California only sales could work. However, for consistency it would be best to also have such manufacturers do the computation on a CA+177 State basis. In this case, the manufacturer could sum all of the credits from the separate fleets to create a CA+177 State total and then apply the ratio based upon total sales in the combined states.

Allow LEV III/Tier 3 Bins in MYs 2015-2017. Due to the differences in the Tier 2 and LEV III/Tier 3 bin structure, some manufacturers could find it difficult to earn early credits unless they created unique vehicle designs and/or calibrations solely for the purposes of earning early credits. The result could be that they would need to sell a fleet mix that would end up having lower fleet average emissions than their respective California/177 State fleets. However, we think it should be reasonable to earn early Federal credits for selling vehicles that are cleaner than required under the Tier 2 program and which would already be designed and sold for compliance with the California program applicable to MYs 2015 and 2016.

For example, a number of manufacturers would expect to comply with the required LEV III fleet averages for MYs 2015 and 2016 by selling a fleet mix containing a significant fraction of ULEVs (i.e., Bin 125) averaged with SULEV-PZEVs (i.e., Bin30). However, there is no Bin 125 or equivalent bin available under the Tier 2 program. This means California ULEVs would either have to certify to Bin 4 or 5 under the Tier 2 program. If certified to Bin 5 (equivalent to 160 mg/mi on an NMOG+NOx basis), they would not earn any early credit. If certified to Bin 4 (equivalent to 110 mg/mi), the vehicles would have to be designed for lower emissions than required by the California program. It would be inefficient to have to design unique vehicles for this purpose, plus it would be challenging (and perhaps even infeasible) to do so given the short available lead time and the need to comply with the separate 0.04 mg/mi NOx standard associated with Bin 4.

We understand, however, that EPA does not intend to reopen the Tier 2 program, but we still believe it is possible for EPA to provide early credits for interim Tier 3 vehicles certified in MYs 2015-2017. The conditions for certification should be the same as available in the California program (i.e., E0 and 120K useful life, although a manufacturer should not be precluded from using E10 or E15 and/or a useful life of 150K if they had a reason to do so) If such conditions are acceptable in MY 2017 there should be no reason for not allowing certification to these conditions prior to MY 2017.

EPA should make all of the LEV III/Tier 3 bins below Bin 160 available for the purposes of earning early Federal credits as interim Tier 3 vehicles. This would allow manufacturers who choose to use bins such as Bins70, 50, 30 or 20 on an NMOG+NOx basis to earn early credits in the Federal program if they sold these same vehicles nationally. Again, the California certification conditions would apply (i.e., E10 and 150K useful life for Bin 70 and below unless it was a carryover SULEV meeting special conditions in California that would allow continued use of E0 and/or 120K useful life).

Allowing certification to these NMOG+NOx LEV III/Tier 3 bins raises a question as to how such vehicles should be incorporated into the Tier 2 fleet averaging program which is based only upon NOx levels. The simplest solution would be to exclude these vehicles from the Tier 2 fleet average NOx computation. Since the above proposal would not include use of the LEV III/Tier 3 bin160, all of the bins involved would have more stringent equivalent NOx emissions than the required Tier 2 fleet average level.

Tier 2 Vehicles Tested on California E10: Finally, §86.113-04(a)(2)(ii) allows manufacturers to "certify 50-state vehicles based upon testing used to meet California's LEV III standards" in MY 2015 and later. However, paragraph §86.113-04(a)(2)(ii)(E) states that "such vehicles are considered to be Tier 2 vehicles for EPA certification; however, manufacturers must exclude them from the fleet-average NOx calculation in subpart S of this part." On the surface, this proposal sounds similar to the option discussed above where vehicles that would actually be certified to LEV III/Tier 3 NMOG+NOx bins and then would be excluded from the Tier 2 fleet average. However, this provision applies to a totally different situation.

This provision applies to the case where a manufacturer would be certifying Federal vehicles to a Tier 2 bin using E10 test data that was used for certification of the same vehicle in the California LEV III program. This would allow the manufacturer the ability to avoid a second test on Federal E0 just to demonstrate compliance with a less stringent Tier 2 bin.

But EPA's proposal to exclude such a vehicle from the Tier 2 NOx average would be counterproductive. This would prevent a manufacturer from being able to earn Tier 2 credits for vehicle being certified to Tier 2 bins 2, 3, and 4 simply because they chose the option to use the California test data to demonstrate compliance. Hence, if the manufacturer needed those credits to offset other vehicles certified to available Tier 2 bins above bin5, they would have to retest this vehicle on Federal E0. This defeats the purpose of allowing the use of California E10 test fuel in the first place.

Also note that the above situation should only apply to vehicles that were certified in California to bins70 and below since in the affected MYs it is only these bins where California requires the use of E10. Vehicles in bin125 and 160 would still be allowed to certify on California phase 2 E0, which EPA has historically accepted for Tier 2 certification purposes. Hence there would be no relaxation of stringency in Tier 2 compliance if vehicles tested on California E10 where allowed to be counted in the Tier 2 fleet average. These would be vehicles designed for compliance with California bin70 or below but which would be certified in higher available Tier 2 bins (i.e., most likely bin 3 or 4).

The provision in §86.113-04(a)(2)(ii)(E) should be deleted as it defeats the whole purpose of having the (2)(ii) in the first place.

Recommendation: EPA should consider simply comparing the sum of the 0-6,000 pound GVWR and 6-8,500 pound GVWR credits to the cap at the end of MY 2017. Also, EPA should revise the language on the computation of the early credit cap to be based upon the CA+177 State credit total and total sales rather than be based only upon only California credits and sales. Given the complexity of this issue, EPA should consider providing an example in the preamble to the final rule.

To facilitate the ability to earn early credits, EPA should allow early certification to all of the LEV III/Tier3 bins below Bin160 under the same conditions that would be available in the California program for MYs 2015 and 2016. Such vehicles could be excluded from the Tier 2 NOx fleet average to avoid issues with the fact that these vehicles would not have a separate NOx standard.

Additionally, the provision in §86.113-04(a)(2)(ii)(E) should be deleted.

American Honda Motor Co., Inc.

Another important aspect related to the harmonization of the Tier 3 and LEV III programs is the treatment of Tier 3 early credits. Honda strongly urges EPA to allow not just federally-certified Tier 2 vehicles, but interim Tier 3 vehicles, to generate early credits (calculated against the Tier 2 standard) in model years 2015 and 2016. Doing so would accelerate nationwide adoption of cleaner emissions control technology prior to the formal introduction of Tier 3, improve automakers' flexibility in meeting the standards in the early years of the Tier 3 program, and ease the transition toward more stringent standards as the program fully phases in.

As EPA is aware, many automakers – including Honda – produce models certified to ULEV125 in California (and Section 177 states), and certified to Tier 2 bin 5 (or Bin 160) federally. Given the short lead time, we believe it is not practicable to certify these models to the Tier 2 Bin 4 (Bin 110) level in model years 2015 and 2016 while still maintaining a sufficient margin to ensure compliance across a mass-produced line. We do, however, believe there would be sufficient compliance margin to meet interim Tier 3 (Bin 125) levels, and that those models could thus see an accelerated nationwide deployment strategy at the cleaner Bin 125 level. For the purpose of generating early Tier 3 credits during the 2015 and 2016 model years, we see no sound reason for treating interim Tier 3 models differently than models certified to formal Tier 2 bins.

It is our understanding from conversations between EPA and OEM trade associations that the agency does not intend to reopen the Tier 2 standards; Honda understands the technical rationale for that position, such as the lack of a separate NOx standard at the Bin 125 level. Barring changes to Tier 2 levels, we believe that an equitable, alternative resolution to this early credit issue is to allow early credits for interim Tier 3 vehicles, which could comply with Tier 3 using E15 or with LEV III using E10 and the accompanying 150,000-mile full useful life, and we urge the agency to do so. (We would further request that the agency, for clarification purposes, articulate whether interim Tier 3 vehicles earning early credits could use E0 and 120,000-mile full useful life, as those values are also consistent with the Tier 3 phase-in provisions.)

The agency notes in the proposed rule that the early credit program is designed to accomplish three goals:
(1) Encourage manufacturers to produce a cleaner federal fleet earlier than otherwise required; (2) provide needed flexibility to the manufacturers to facilitate the "step down" from the current Tier 2 Bin 5 fleet average required in MY 2016 to the LEV III-based declining fleet average in MY 2017; and (3) create a Tier 3 program that is equivalent in stringency to the LEV III program such that manufacturers will be able to produce a 50-state fleet at the earliest opportunity.

Honda believes that allowing interim Tier 3 vehicles to generate early credits will improve the agency's ability to obtain its stated early credit-related objectives, accelerating a 50-state deployment strategy, and bringing cleaner vehicles to market sooner than would otherwise occur.

BMW of North America, LLC

CARB's LEV III program allows the option to use combined NMOG+NOx for LEV II vehicles included in a manufacturer's fleet average. The proposed Tier 3 language addresses the inclusion of the so called interim Tier 3 vehicles; however, allowing a combined NMOG+NOx standard is not entirely clear in the proposed language. BMW kindly requests clarification of the language such that MY 2015 and 2016 Tier 2 vehicles may certify to the combined NMOG+NOx standard.

General Motors LLC (GM)

For the exhaust FTP NMOG+NOx fleet average, we support EPA's innovative approach of allowing early credits and then capping them entering the 2018 model year in proportion to credits a manufacturer has in its California credit bank (or, as requested in the Alliance/Global comments, California + 177 State pooled credit bank). We believe this approach will address EPA's three goals stated in the preamble: 1) encourage a cleaner Federal fleet earlier than required; 2) give manufacturers needed flexibility to go from Tier 2 to LEV III/Tier 3; and 3) make Tier 3 equivalent in stringency to LEV III to facilitate a 50-state fleet.

Under 86.113-04(a)(2) of the NPRM, EPA is suggesting a method for manufacturers to obtain nationwide certifications prior to the introduction of Tier 3. Essentially EPA will accept LEV III certifications as early as model year 2015, as long as the specified requirements are met. GM appreciates EPA's allowance for manufacturers to execute nationwide applications; it's a manpower savings and a reduction in complexity and is consistent with the goal of transitioning to a harmonized national program. The only concern GM has with the proposal is under paragraph (ii)(B), which states: (B) The manufacturer must also use this E10 fuel for fuel economy measurements, with any appropriate corrections related to ethanol content in the fuel. [EPA-HQ-OAR-2011-0135-4288-A1, pp.9-10] (ii)(B).

Our Response:

Several auto industry commenters suggested additional provisions to facilitate earlier harmonization between Tier 3 and LEV III and streamlining of development and certification of vehicle models. Specifically, these commenters requested the ability to have vehicles certified to the Tier 3 standards in MYs 2015 and 2016. They commented that this would allow them to develop, certify and sell a vehicle model for all 50 states, reducing the complexity of potentially different federal and California requirements in MYs 2015 and 2016. Additionally, auto industry commenters noted that the Tier 3 program provides more flexibility in the certification bin structure compared with the existing Tier 2 program, providing them additional opportunities to generate early credits.

We are finalizing a provision to allow manufacturers to certify to Tier 3 standards starting in MY 2015 as "Early Tier 3" vehicles. Manufacturers will have the option to certify their vehicle models to meet the Tier 3 emission requirements, including requirements for test fuel and useful life, in MY 2015 and 2016, and MY 2017 for vehicles over 6000 lbs. GVWR, for all LDVs, LDTs, and MDPVs, which otherwise would be required to begin in MY 2017 under the primary program. As an example, a manufacturer choosing to certify a vehicle as Early Tier 3 can bring the same vehicle models certified to LEV III standards in MY 2015 or 2016 into the Early Tier 3 program by meeting all the same requirements under the primary Tier 3 schedule. There would not be a Tier 3 fleet average requirement for FTP or SFTP NMOG+NOx in MY 2015 or 2016 (and 2017 for vehicles over 6,000 lbs GVWR) if all the same vehicle models certified to LEV III are also certified as the Early Tier 3 vehicles meeting the same LEV III emission standards and also the Tier 3 additional requirements (high altitude, and cold CO and hydrocarbons). These Early Tier 3 vehicles would replace any Tier 2 offering of the vehicle model consistent with the LEV III offering replacing the LEV II models. If a manufacturer chooses to certify only a portion of their LEV III vehicle models as Early Tier 3 vehicles in a given MY, they will be required to meet the LEV III fleet average requirements in that MY for those models certified as Early Tier 3 vehicles.

The same carry-over provisions that begin in MY 2017 will also apply in MY 2015 and 2016. This includes the ability to carryover Tier 2 test results using Tier 2 fuel into the Tier 3 Bins above Bin 70.

The early credit program we are finalizing includes several distinct provisions. The first provision allows manufacturers to generate early Tier 3 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. We proposed and are finalizing a provision limiting the application of the early Tier 3 credits to the following conditions:

- Early Tier 3 credits generated as described above could be used without limitation in MY 2017 on the portion of the fleet entering the Tier 3 program in that MY.

- Early credits generated from all vehicles in the light-duty program in MY2015 through MY 2017 used for compliance in MY 2018 and beyond will be capped at an amount equal to the lesser of the manufacturer's federal credits as calculated above or the manufacturer's LEV III credits scaled up by the ratio of 50-state sales to California and LEV III required states sales. This limitation accounts for the fact that some LEV III credits may have begun to expire and will no longer be eligible as a basis for Tier 3 early credits.

By capping the available federal Tier 3 early credits, we believe that the two programs, LEV III and Tier 3 will be at parity in terms of relative stringency starting in MY 2018. In addition, because the number of Tier 3 early credits that can be used is based on the number of LEV III credits that the manufacturer has generated, there may be additional motivation for manufacturers to over-perform in California during the initial model years, accelerating emission reduction benefits.

The provision in §86.113-04(a)(2)(ii)(E) was deleted as suggested because the provisions we are finalizing provide for both Tier 2 and early Tier 3 in MY 2015, 2016 and 2017 certification paths eliminating the issue of the LEV III combined NMOG+NOx standards not matching the Tier 2 independent NMOG and NOx requirements.

4.1.5.2. Credit Life and ABT

What Commenters Said:

Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

Credit Life (FR29868): We support the 5-year credit life and harmonization of this provision with California. We support the ABT program, which maintains program stringency while also providing flexibility. We also support harmonization of the credit life between EPA and California.

Hyundai Motor Group

We also appreciate flexibilities included in the proposal, such as the ability to average across the fleet for most pollutants. Additionally, we support the averaging banking and trading provisions, which allow companies to obtain or sell emissions credits with other manufacturers, and the carry forward and back of credits, which are helpful flexibilities.

New York State Department of Environmental Conservation

Tier 2 vehicle emissions credits should not carry over to Tier 3. EPA proposes to prevent the use of existing Tier 2 credit balances to meet Tier 3 requirements. EPA also proposes to cap the use of early credits to comply with Tier 3. New York fully supports these provisions, which will expedite harmonization with LEV III and ensure that compliant vehicles are actually produced in the early years of the program.

The averaging, banking, and trading program is an important means of providing vehicle manufacturers with compliance flexibility. To that end we support credit carry forward and carry back provisions identical to those used in the LEV III program.

Pennsylvania Department of Environmental Protection (DEP)

DEP supports flexibility for automobile manufacturers…through averaging, banking, trading programs, or other mechanisms.

Our Response:

We did not receive adverse comments on our proposed design of the ABT program. We are finalizing these provisions as proposed, with one exception. Based on conversations with representatives of the auto industry, we determined that, with certain restrictions, Tier 3 credit life can be temporarily extended in a way that would address uncertainties about the middle years of the program, with no adverse impacts on the overall emission reductions of the program. Specifically, we are finalizing a credit life of 8 years for credits generated in MYs 2017-2022 for the FTP and SFTP NMOG+NOX fleet average standards. For the heavier light-duty vehicles, the 8-year credit life begins for credits generated in MY 2018. (Note that, as proposed, credits generated under the Early Tier 3 Credit provision (preamble Section IV.A.7.a) are limited to 5-year life, and are not affected by the longer credit life provision.)

For credits generated in MYs 2023-2025, the credit life declines by one year of credit life annually, with credit life stabilizing at 5 years for credits generated in MYs 2025 and later. That is, credits generated in MY 2023 have a 7-year life, in MY 2024 a 6-year life, and in MY 2025 and later a 5-year life. However, while credits can be generated, banked, and used internally for the extended time periods, credits cannot be traded to other manufacturers after 5 years.

4.1.5.3. Useful Life for Cold CO and Cold NMHC Standards

What Commenters Said:

Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

Cold CO and NMHC Useful Life: The preamble of the Tier 3 regulation states, “We are not proposing new emission requirements for any vehicle or fuel over the cold temperatures test cycles (i.e., the 20 °F cold CO and NMHC tests)’. We understand this language to mean that in addition to the exhaust emission standards for the cold CO and cold NMHC tests, there would not be any change in the useful life for cold CO and cold NMHC. The current useful life is 5 years or 50,000 miles for cold CO and for cold NMHC is 10 years or 120,000 miles for LDV and LLDT and 11 years or 120,000 miles for HLDT and MDPV. The proposed regulations, however, do not carry over the language that specifies the current useful life for these standards. Based on the preamble language, it is not EPA’s intent to extend the useful life of the cold CO emission test to 10 years or 120,000 miles (or 15 years/150,000 miles) under Tier 3, and therefore, the cold CO useful life language from §86.1805-12(d) should be added to the new section, §86.1805-17, to clarify the useful life for cold CO. Likewise, based on the preamble language, we believe that it is EPA's intent to retain the cold NMHC standards at the current useful life requirements and would not apply the voluntary 15 years/150,000 miles standards for cold NMHC even if the vehicle is certified to 15 years/150,000 miles for the FTP and SFTP standards.

Thus, EPA should also add clarifying language to §86.1805-17 that cold NMHC useful life is not impacted.

Recommendation: EPA should add the following language to §86.1805-17:
"(f) Where cold CO standards are applicable, the useful life requirement for compliance with the cold CO standard only, is 5 years or 50,000 miles, whichever occurs first.
(g) Where cold NMHC standards are applicable, the useful life requirement for compliance with the cold NMHC standard, only, is 10 years or 120,000 miles, whichever occurs first for LDV and LLDT, and 11 years or 120,000 miles, whichever occurs first for HLDT and MDPV."

Our Response:

The useful life requirements for cold CO and cold NMHC standards are unchanged for Tier 3 and will remain the same as under the Tier 2 program. EPA has modified the language in §86.1805-17 to clarify the useful life requirements for cold CO and cold NMHC standards in a way that is equivalent to the commenter's suggested language.

4.1.5.4. Enrichment Limitation

What Commenters Said:

California Air Resources Board (CARB)

Comment 1 - SFTP Enrichment Limitation Requirement

CARB supports U.S. EPA's Tier 3 proposal to reduce the tolerance of additional enrichment from six to four percent of the air to fuel ratio of Lean Best Torque. CARB believes the reduced tolerance is appropriate and feasible due to the improved fuel control utilized by today's vehicles. CARB intends to propose alignment with this proposal once the Tier 3 program is finalized.

Ford Motor Company (Ford)

Enrichment Limitation for Spark-Ignition Engines
EPA has proposed a new Lean Best Torque (LBT) definition, tolerance, and fixed spark mapping procedure designed to limit excessive in-use enrichment. Ford has several major concerns with this proposal: (1) there is no universally accepted "textbook" definition of LBT, (2) there is no

standardized engine mapping procedure to measure LBT, and (3) LBT can vary significantly depending on engine technology and the reference test fuel. For these reasons, we recommend that EPA carry over existing Tier 2 regulatory language (or adopt the LEV III LBT requirements) and establish a joint government / industry committee to determine a universally accepted SAE LBT mapping procedure. This would help to ensure consistent, repeatable results, and enable an unambiguous interpretation of LBT between EPA and manufacturers even as engine and vehicle technologies evolve over time.

Recommendation: Ford recommends that EPA retain the Tier 2 LBT requirements, or alternatively, adopt the LEV III requirements, until a universally accepted LBT definition and mapping process can be established by SAE.

Our Response:

The requirement to not exceed LBT +6% when SFTP standards were first adopted was based on variation in fuel and emission control hardware at that time. More stringent emission standards that have occurred since that time have resulted in reduced part variability that allows us to reduce the 6% tolerance to 4%. The LBT definition included in the FRM is to provide clarity regarding expected enrichment amounts and eliminate the risk that enrichment may interact with the control of ignition timing. Without this clarification, enrichment limitations can be interpreted differently and result in excessive emissions. The FRM allows for alternative definitions of LBT with approval if the finalized definition does not properly achieve the enrichment limitation goals of a unique technology.

4.1.5.5. AECD Requirements

What Commenters Said:

General Motors LLC (GM)

Expansion of AECD Requirements: EPA is proposing adding three additional requirements under paragraph (11) of 86.144-01: "Information requirements: Application for certification and submittal of information upon request."
(i) For any AECD uniquely used at high altitudes, EPA may request engineering emission data to quantify any emission impact and validity of the AECD.
(ii) For any AECD uniquely used on multi-fuel vehicles when operated on fuels other than gasoline, EPA may request engineering emission data to quantify any emission impact and validity of the AECD.
(iii) For Tier 3 vehicles with spark-ignition engines, describe how AECDs are designed to comply with the requirements of §86.1811-17(d). Identify which components need protection through enrichment strategies; describe the temperature limitations for those components; and describe how the enrichment strategy corresponds to those temperature limitations. We may also require manufacturers to submit this information for certification related to Tier 2 vehicles.

While the first two proposed requirements are within the scope of EPA's current AECD regulations ("EPA may request additional data"), the third requirement (11)(iii) is an expansion of the current AECD required submissions. GM is opposed to this additional work for several reasons. This adds additional burden on manufacturers to produce this detail for every submission to EPA. This also falls under the same logic as the first two proposed additions – EPA already has the authority to ask for this information from manufacturers as needed. Our biggest concern is the precedent this sets going forward for on-road spark-ignited applications. Today, the heavy duty diesel engine applications require a highly burdensome and detailed AECD submission. The work necessary to complete our heavy duty diesel engine AECD's is easily a factor of 10 times the man-hours to complete compared to a similar on-road spark-ignited application. Even with all the detail submitted for the heavy duty diesel engine applications, it's often that EPA will ask for further clarification/detail. Our concern is the given proposal in the Tier 3 NPRM under 86.144-01 (11)(iii) is the beginning of a continual expansion of AECD submissions for light-duty that is unnecessary considering EPA already has the authority to ask for the given information. To place the whole industry in a position of spending the manpower to provide that information up front for every application is unnecessary and burdensome.

Our Response:

EPA currently has the authority to request additional data or information regarding any AECD to determine the validity of its use and to determine the impact on emissions. This information is something manufacturers should already have available as part of the certification process they perform in order to justify any AECD. The requirement that we are finalizing to report information that should be readily available to the manufacturer will add minimal additional work and allow the agency to better determine if industry-wide guidelines are being followed.

4.1.5.6. Carryover of Small Volume Test Group Data

What Commenters Said:

BMW of North America, LLC

To reduce the financial burden for small volume models and test groups, we propose allowing small volume test groups in the fleet to carryover certifying to Tier 2 standard and test fuel through MY 2021.

Our Response:

To reduce the burden of testing in the first years of the Tier 3 program, EPA has provided a mechanism that largely allows carryover of Tier 2 test data into the Tier 3 program through MY 2019 for exhaust and MY2021 for evaporative emissions. Consistent with LEV III, the new E10 test fuel will be required for all vehicle exhaust emission certification for MY 2020 and later. Further delay of the Tier 3 program beyond the allowed provisions would restrict the opportunity for a harmonized program with LEV III, an important goal of the Tier 3 program.

4.1.5.7. DOR and Extended Warranty Credits

What Commenters Said:

Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

DOR Credit (FR29873): We support continuation of the DOR technology credit.

Extended Warranty Credit (FR29873): We support the optional credit opportunity of 5 mg/mi for extending the vehicle's warranty to 150,000 miles but do not believe that EPA needs to adopt California's 4 percent recall provision in conjunction with this optional credit.

Our Response:

There were no adverse comments about either the DOR or Extended Warranty opportunities. We are finalizing these provisions as proposed, including no changes to the EPA recall provisions.

4.1.5.8. Compliance Demonstration

What Commenters Said:

Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

The Alliance and Global Automakers share the goal of one national program that would allow a vehicle to be tested once, certified once and sold everywhere. Automaker and agency resources are limited, and it is critical that compliance efforts not be duplicated. To this end, we appreciate that the proposed Tier 3 regulations base fleet average emission requirements on nationwide vehicle sales rather than on non-Section 177 State sales. Given the current level of fleet average emissions, this is a reasonable flexibility that significantly reduces the resources needed to track and manage separate fleets. Similarly, LEV III allows manufacturers to comply with fleet average emission requirements based on sales in California and the Section 177 states. We intend to request that ARB modify the LEV III regulations to allow compliance on a nationwide basis consistent with Tier 3.

Compliance Demonstration Based on National Sales (FR29873): We support harmonization between EPA and California, including the goal of a single fleet, tested once, certified once and sold in all 50-states. Additional comments are provided in the written comment.

National Automobile Dealers Association (NADA)

Harmonized Emissions Mandates, Lead Time, Durability and Other Technical Standards: Last year, the California Air Resources Board (CARB) finalized its Low Emission Vehicle (LEV) III regulations. In order to minimize compliance costs and maximize compliance flexibilities, EPA's final Tier 3 regulations should encourage if not mandate that CARB harmonize with the federal scheme. Among other things, this means that fleet average emissions compliance should be based on a manufacturer's nationwide sales.

Our Response:

We received no adverse comments on our proposal to base fleet-average sales on a manufacturer's nationwide sales, and we are finalizing this provision.

4.1.5.9. Aftermarket Catalysts

What Commenters Said:

Ozone Transport Commission (OTC)

California's vehicle program includes updated aftermarket part rules that require catalytic converters to meet a 50,000 mile warranty and rely on a mass based standard, among other traits as outlined in OTC's "Recommended Revisions to the Federal Aftermarket Catalytic Converter (FACC) Program." EPA's Tier 3 regulatory proposal does not include such an update to the FACC program. Without updating its policy, EPA would be allowing use of replacement converters that will not guarantee emission reductions as long as the original converters. To ensure emission reductions occur when catalysts fall outside of the warranty period, the final Tier 3 regulation should include a more stringent aftermarket catalytic converter policy as recommended previously by OTC.

Our Response:

We did not propose and are not finalizing aftermarket catalyst requirements as suggested by the commenter. If EPA decides to pursue such a program, it will be through a separate public rulemaking process.

4.1.5.10. Treatment of FFVs

What Commenters Said:

Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

Flex-Fuel Vehicle (FFV) SFTP Certification Requirements – Testing on Gasoline and E85: The Tier 3 NPRM contains a new requirement that FFVs be tested using the SFTP on both gasoline and E85 (i.e., 85% ethanol). FFVs operating on gasoline almost always have higher SFTP emissions than when operating on E85. Consequently, to reduce what is a very burdensome test, current EPA Tier 2 and ARB LEV III regulations only require manufacturers to test FFVs using gasoline. Today's new vehicles are already extraordinarily clean. Although we recognize the need for and support further emission reductions, automakers simply do not have the resources to pour into unnecessary tests such as those suggested in this portion of the NPRM.

If EPA is concerned that FFV SFTP emissions would be higher if tested using E85 rather than gasoline, it could require that manufacturers test on the fuel that will result in worst-case emissions (based on the manufacturer's good engineering judgment). This would satisfy EPA's desire to ensure the vehicle would meet standards even when using the worst-case fuel.

Finally, if EPA is unwilling to eliminate unnecessary tests and accept either of the above recommendations, it should at least allow manufacturers to substitute FTP emissions for SC03 emissions. The SC03 test is particularly burdensome, and FTP emissions will be higher than SC03 emissions; allowing the substitution of FTP emissions instead of conducting SC03 testing would result in a worst-case condition. In fact, for these reasons, both EPA and ARB allow vehicles >8,500 pounds GVWR to substitute FTP emissions for SC03.

Recommendation: EPA should eliminate the new requirement for manufacturers to conduct SFTP certification testing on E85. Instead, it should harmonize the Tier 3 and LEV III regulations specifying that SFTP testing of FFVs should be conducted using gasoline only.

Alternatively, EPA could require manufacturers to certify over the SFTP on gasoline and then the manufacturer would attest that the vehicle will comply with the SFTP standards if operated on E85.

Regardless, for E85 testing, EPA should allow manufacturers to substitute FTP emissions for SC03 emissions. For in-use compliance testing, the manufacturer should have the option of running the actual SC03 rather than using FTP data for any test group.

California Air Resources Board (CARB)

SFTP Test Requirements for Fuel-Flexible Vehicles: CARB supports U.S. EPA's Tier 3 proposal to require fuel-flexible vehicles to certify to SFTP standards using both gasoline fuel and the highest ethanol content fuel that a. given vehicle is designed to operate on. CARB believes this proposed requirement would ensure that emissions are controlled with all possible fuel blends and will propose inclusion of this provision in the LEV III program once the Tier 3 program is finalized.

Renewable Fuels Association (RFA)

In an effort to make Federal standards more consistent with California's LEV III program, EPA is proposing new light-duty vehicle exhaust standards for NMOG, NOx and PM, as well as new evaporative emissions standards. Vehicle manufacturers have expressed serious concerns about the inability to certify emissions of FFVs under California's LEVIII standards when those vehicles are operating on flex fuel. At issue is the fact that control of NMOG emissions during cold start conditions is more difficult on flex fuel due to the fuel's volatility characteristics. Thus, when operating on flex fuel, NMOG emissions from FFVs tend to exceed NMOG standards before the catalyst is warmed up. The inability to certify FFVs under the California LEVIII program has resulted in greatly restricted sales of FFVs in the state.

As EPA itself has acknowledged, the increased availability of FFVs is paramount to the successful implementation of the RFS. Thus, we encourage EPA to carefully consider how certification of emissions from FFVs should be handled.

Our Response:

Because of the physical and chemical differences in how emissions are generated and controlled between vehicles operating on different blends of gasoline and ethanol, manufacturers of vehicles designed for high-percentage blends of ethanol (usually called Flexible Fuel Vehicles, or FFVs) may face unique compliance challenges under the Tier 3 program. Historically, under the Tier 2 program, FFVs have only been required to meet all Tier 2 emission standards, FTP and SFTP, while operating on gasoline (E0); when operating on the alternative fuel (generally this means a blend that is nominally 85 percent ethanol, or E85), they have only been required to meet the FTP emission standards.

However, E85 use may rise considerably in the future as ethanol use increases in response to the Renewable Fuels Standards (RFS). Thus, as the Tier 3 program is implemented, it is increasingly important that FFVs maintain their emission performance when operating on E85 across different operating conditions.

We believe that at standard test conditions, requiring manufacturers to meet the Tier 3 standards on any blend of gasoline and ethanol will not be significantly more challenging technologically than compliance on lower ethanol blends, including the E10 Tier 3 test fuel we are adopting. We are thus finalizing, as proposed, the requirement that in addition to complying with the Tier 3 requirements when operating on Tier 3 test fuel, FFVs also comply with both the FTP and the SFTP emission standards when operating on E85. This includes the requirement to meet emission standards for both Tier 3 test fuel and E85 for the FTP, highway test, and SFTP emission standards at standard test temperatures (i.e., 68 °F to 86 °F). Since FFVs can operate on any blend of gasoline and ethanol (up to a nominal 85 percent ethanol), the emission requirements apply to operation at all levels of the alternative fuel that can be achieved with commercially available fuels. However, for exhaust emission compliance demonstration purposes, we will test on Tier 3 test fuel and on fuel with the highest available ethanol content. Also, because gasoline and E85 have very different emission profiles, we are not allowing attestation of compliance on E85.

To reduce the potential increase in test burden, EPA is (as recommended by the Alliance and Global) finalizing the provision to allow manufacturers to substitute FTP emissions for SC03emissions when submitting test data for certification to the SFTP composite standard for FFVs operating on E85. Manufacturers are still required to meet the SFTP standards if the SC03 test cycle is used for the composite calculation.

4.1.5.11. Applicability of FTP NMOG+NOx Standards to Highway Fuel Economy Testing

What Commenters Said:

Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

We support the proposed highway NMOG+NOx standards harmonized with California LEV III standards.

Our Response:

We did not receive adverse comment on this proposed provision and we are finalizing it as proposed.

4.1.5.12. Preconditioning for Catalyst Desulfurization

What Commenters Said:

California Air Resources Board (CARB)

In response to reduced fuel sulfur levels in California and federal commercial gasoline, use of a sulfur purge preconditioning to reduce catalyst sulfur deposits prior to IUVP emission testing was disallowed by both CARB and U.S. EPA beginning in 2007. These purge procedures, which consist of high speed driving cycles not normally experienced as typical driving patterns, are designed to reduce sulfur and carbon deposits in the catalytic converter. Decreasing carbon build deposition in the exhaust system may have a positive impact on emissions but because carbon deposits are a result of real world driving conditions and fuel use, use of a sulfur purge procedure may produce a false representation of true in-use emissions. Nonetheless, the NPRM proposes to allow for conducting a sulfur purge cycle over the US06 test cycle for those manufacturers requiring a sulfur preconditioning test.

Comment 2 - In-Use Verification Program Sulfur Purge Procedure for Sulfur Preconditioning. As noted above, sulfur content of federal commercial fuel has been significantly reduced and, based on past IUVP test data, manufacturers have not been allowed to perform sulfur purge cycles since 2007 and have not experienced any test vehicles failing to meet the exhaust emission standards that were attributed to high sulfur deposits. CARB believes running additional sulfur cleanout procedures is unnecessary and should not be included as part of the IUVP or any in-use confirmatory test program.

Ford Motor Company (Ford)

In-Use Preconditioning: While Ford agrees with the need for controls and specifications for IUVP preconditioning on light-duty vehicles and MDPVs, EPA's proposed modifications to this process places additional restrictions on a manufacturer's ability to mitigate sulfur contamination on in-use vehicles due to exposure to high-sulfur market fuel. These new restrictions come at a time when new, more stringent SFTP and PM requirements must be met and high sulfur fuel (>>10 ppm) will still be widely available. Also, this proposal does not provide the option to conduct a sulfur purge cycle for any emission constituent other than NMOG + NOx on the FTP or HFET cycle. Ford believes that sulfur contamination also poses significant risks for CO and PM, on the FTP cycle, and NMOG +NOx, CO, and PM on the SFTP.

Additionally, the Tier 3 IUVP preconditioning proposal requires an in-tank fuel sulfur assessment before allowing additional preconditioning cycles. Since most contract and OEM labs do not have in-house fuel sulfur measurement capabilities, fuel samples must be sent to off-site laboratories for testing, which could result in impractically long delays for IUVP retests on customer vehicles.

Finally, because sulfur contamination on gasoline catalysts is a cumulative effect, a spot check of the fuel in the customer's tank just prior to an IUVP test captures at best the last 0-400 miles of operation, and is insufficient to ensure that a vehicle has not been impacted by exposure to high-sulfur fuel.

Recommendation: In light of these issues, Ford proposes that EPA carry over existing Tier 2 IUVP protocol, eliminate the fuel sulfur check requirement, and include new, forward-looking IUVP retest provisions for NMOG+NOx, CO, PM, and N2O with new E1x test fuel on all IUVP test cycles . Additionally, for IUVP FTP and SFTP PM measurements, we request that EPA allow OEM's to use good engineering judgment to optionally average multiple tests to determine PM compliance thru 2025MY.

General Motors LLC (GM)

Preconditioning for In-Use Testing: 86.1845-04 (a)(3) outlines provisions on how to address potential residual effects of sulfur contamination on in-use vehicle testing. While we're grateful EPA recognizes the impact of sulfur poisoning on in-use vehicles, these provisions either do not adequately address the sulfur poisoning or are impractical to implement.

EPA goes into great detail about the impact of sulfur poisoning on in-use vehicles in section (IV)(A)(6)(a) of the NPRM, and in sections (IV)(A)(6)(b) through (c), EPA discusses the effects, impacts and controls regarding emission standards on vehicles impacted by sulfur. The information provided by EPA is very compelling and obvious – sulfur does impact in-use vehicles negatively and can prevent manufacturers from meeting standards. EPA also demonstrates that, while not completely effective, preconditioning vehicles to properly burn off some (not all) of the sulfur poisoning effects can significantly improve catalyst performance. Without a preconditioning step, EPA states that “Any degradation in catalyst performance due to gasoline sulfur would reduce or eliminate the margin necessary to ensure in-use compliance with the proposed Tier 3 emissions standards.”

With this in mind, GM does not understand the resistance of EPA to allow preconditioning of in-use vehicles prior to formal in-use testing. Granted EPA is proposing that manufacturers could take a fuel sample of the as-received candidate vehicle and use that as potential evidence that retesting is applicable, but this raises several questions. What if the sample is lost? What if the sample is mislabeled? Do we really want to add the burden of in-use testing by handling a very volatile and hazardous liquid? By no means is this fuel sample conclusive of the vehicle’s sulfur poisoning level. The customer could have easily poisoned the catalyst on previous fuel, and now have a tank of low sulfur fuel.

Moreover, there are numerous practical issues associated with EPA’s proposed approach. For example, taking a fuel sample of every vehicle that is brought in for in-use testing would add time and cost to an in-use test program.

The final concern is that sulfur levels in the U.S. will be phased down over multiple years, while this requirement takes effect with the final rule. This means field fuel will continue to have high sulfur levels in the market. Even when low sulfur levels have been fully phased-in, how can we be sure that a given refinery hasn’t had a “spill” and released fuel with high levels of sulfur? When vehicles are to meet the stringent Tier 3 standards, any degradation such as sulfur poisoning can have significant effects.

We believe EPA wants “real world” testing results, but manufacturers should not be held to comply based on factors they cannot control (i.e., high sulfur fuels). As for real world testing results – that’s a different scope than manufacturer in-use testing for compliance. In-use compliance testing should be conducted in a technically sound, repeatable and accurate manner similar to the original certification process, and manufacturers should not be held accountable for factors beyond their control.

GM proposes allowing manufacturers to conduct either on-road or lab preconditioning of in-use vehicles. Not only will this help mitigate the effects of sulfur poisoning, it will also allow manufacturers to check for any other unforeseen issues with an as-received customer vehicle (e.g., mechanical soundness, operating properly, etc.).

Volkswagen Group of America, Inc.

Tier 3 proposes to limit the OEM ability to use fuel enrichment in calibration. This restriction effectively increases the stringency of Tier 3 because it is now harder to clean the sulfur off the catalyst. If EPA is unwilling to mandate a 10 ppm cap in market fuel sulfur, OEMs must continue to be allowed to condition the sulfur off the catalyst prior to any In-Use exhaust testing. The market fuel will be high enough in sulfur to poison the catalyst. Two US06 cycles on the proper cert fuel will be required to overcome the market fuel and its effects. Vehicles should not be punished because they are operating in an environment of suboptimal fuels. EPA’s own data shows the need for this preconditioning. Mirroring the sulfur purge cycles that EPA used before conducting its sulfur studies, purge cycles are needed for In-Use compliance on high sulfur market fuel. With credits and the high proposed allowable pump sulfur levels, two USO6 cycles are necessary to remove the catalyst poisoning sulfur. This should be the procedure implemented without any monitoring of the fuel in the tank of the vehicle or other burdensome requirements.

Mercedes-Benz USA, LLC on behalf of Daimler AG

Mercedes-Benz requests that the EPA also include in its final Tier 3 rulemaking, a pre-test catalyst conditioning procedure to be performed prior to in-use vehicle testing, which design is mutually agreed upon by Mercedes-Benz and the EPA, in order to minimize the magnitude and frequency of 'sulfur burn off' cycles required in normal operation. This will provide real-world benefit to the consumer in optimized fuel economy and reduced GHG emissions.

Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

The Tier 3 rulemaking is the correct place to set the near-term standards for sulfur and also create a roadmap of how the agency will further reduce sulfur in the coming years. EPA should specify that catalyst burnoff cycles are allowed for Tier 3 In-Use Testing.

Our Response:

Based on our findings from the In-use Sulfur Test program, we firmly believe that in order for Tier 3 vehicles to perform at their designed emission levels, they will need to operate in-use on fuels at sulfur levels that average 10 ppm or less. However, during the transition from 30 ppm average sulfur levels and the possibility of higher sulfur levels that could be encountered due to the Tier 3 fuel 95 ppm sulfur cap extending past the transition, vehicles emission performance could be adversely impacted which would be demonstrated during IUVP emission testing. To address this issue, we are including a provision that allows manufacturers to retest a vehicle if it has failed the initial "as received" tests during IUVP emission testing. The provision allows for a limited and reasonable sulfur clean-out based on Tier 2 experiences, and an additional requirement to provide potential proof of high sulfur exposure, typically from a fuel sample of "as received" vehicle fuel.

We do not believe allowing sulfur related preconditioning, either EPA prescribed or manufacturer determined procedures prior to "as received" testing is appropriate as it may distort the "real world" emission performance evaluation related to sulfur or other vehicle factors. This initial "as received" emission performance information is critical to evaluating the emission performance of the vehicle on design intent fuel and additionally to determine if in-use sulfur levels are supporting expected emission reductions. We acknowledge that the requirement to provide evidence that the vehicle has operated on elevated fuel sulfur levels potentially adds an additional step in the IUVP process, however we believe it is important to attribute any emission increases or failures to the proper root cause so that we may determine if future actions are required, including tighter control of in-use fuels.

4.1.5.13. Cold-Start Emissions; Start-Stop as Potential Tier 3 Technology

What Commenters Said:

Private Citizen

Going forward, there were a couple of things I had concerns with. A lot of the car companies don't seem to be interested in dealing with the pollution before a catalytic converter warms up, the so-called open loop phase. And I'm wondering if that could be included in some of your thinking. Perhaps something could be included where an auto maker might get credit for a start and stop system whereby if someone is at a drive-thru, instead of polluting, the car would just stop automatically, and thereby wouldn't pollute, and perhaps could get credit if they didn't completely meet some of these other tough standards.

Our Response:

The Tier 3 standards, particularly the NMOG+NOx standards, require manufacturers to pay careful attention to cold-start emissions and design their control systems to address emissions prior to catalyst light-off. Regarding start-stop technology, the impact of these systems on CO_2 emissions can be significant, but NMOG+NOx and PM emissions that are the focus of the Tier 3 program are less impacted by reducing idle operation and will be accounted for in the Federal Test Procedure.

4.1.5.14. Cold Durability Testing

What Commenters Said:

Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

Cold Testing Requirements for Emissions Durability Vehicle: For emission data vehicle (EDV) selection, Tier 2 currently requires that manufacturers select the vehicle expected to emit the highest CO emissions at 20°F on candidate in-use vehicles from the test vehicles selected. The proposed Tier 3 regulations add another test based on the worst-case cold NMHC in §86.1828-01(g). EPA recognizes that the expected worst-case cold CO vehicle could be the same as the expected worst-case cold NMHC vehicle, and only testing on one vehicle would be required. However, we see little benefit, but significant cost, to potentially testing two separate vehicles based on different criteria pollutants. The 75°F FTP and SFTP tests are based on a more general "worst-case tailpipe emissions' (11). We believe this is appropriate for 20°F testing as well. The recommendation below parallels the SFTP and FTP language in §86.1828-01(a).

Recommendation: We recommend deleting proposed new paragraph §86.1828-01(g), and instead modifying §86.1828-01(c) as follows:

(c) ~~Cold CO~~ 20 degrees F testing. For ~~cold temperature CO~~ 20 degrees F exhaust emission compliance for each durability group, the vehicle expected to ~~emit the highest CO emissions at 20 degrees F~~ be worst-case for exhaust emission compliance on candidate in-use vehicles shall be selected from the test vehicles selected in accordance with paragraph (a) of this section.

Our Response:

We do not believe this modification is appropriate for evaluating worst case candidates and are finalizing these provisions as proposed. We do not believe that this change will necessarily require the added burden of separate testing for each of the emission requirements however it is clear to us that the relationship between CO and NMHC is not as clear as other worst case emission determinations and involves a variety of factors. These factors may include design difference that asymmetrically impact one emission and not the other (e.g. battery size and cranking system impacts NMHC but not CO). Additionally, the relative compliance margin and approach to these two requirements are very different with Cold CO standard as a fixed cap with typically large compliance margins and cold NMHC as an FEL possibly requiring manufacturers to test different vehicles.

4.1.5.15. Diesel Bench Aging

What Commenters Said:

Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

Due to the lack of diesel bench aging, certification of diesel vehicles under Tier 2 is resource and time intensive as a result of maintaining and testing early prototype vehicles for 120,000 miles. A regulatory provision for diesel bench aging approval is requested to support the incremental durability work associated with 150,000 mile standards under Tier 3. The Alliance and Global Automakers recognize that before individual manufacturers can obtain approval for diesel bench aging, the EPA will need the industry to develop and submit a publically available bench aging procedure that the agency approves. A comprehensive industry group has been formed to develop this procedure and work with the EPA to create a mutually agreeable bench aging procedure for diesel components. Since the industry has now accepted the responsibility for developing the required procedure, the Alliance and Global Automakers respectfully request that the EPA insert language into the Tier 3 regulation that specifically allows diesel bench aging pending approval of the industry developed bench aging procedure. Allowing diesel bench aging in the Tier 3 regulation, avoids the need for an additional rulemaking, streamlining the process for diesel bench aging approval, and saving time and resources in the future.

Mercedes-Benz USA, LLC on behalf of Daimler AG

A bench aging durability procedure should be allowed for diesel-fueled vehicles as it is allowed for other light-duty vehicles, light-duty trucks, and medium-duty passenger vehicles. Under the current Tier 2 provisions, certification of diesel vehicles is both time- and resource-intensive due to the lack of diesel bench aging. In order to achieve the necessary mileage without bench aging, early prototype vehicles must be maintained and tested for 120,000 miles, resulting in additional costs and testing time. These costs would only be higher for a useful life of 150,000 miles under the Tier 3 provisions. As noted in the comments submitted by the Alliance of Automobile Manufacturers, which we support, a comprehensive industry group has already been formed to develop information regarding the feasibility of the standard certification test procedure.

In the Tier 3 Proposed Rule, EPA references the existing exhaust emission bench aging durability programs allowed under 40 C.F.R § 86.1823-08 and the evaporative bench aging durability programs allowed under the provisions of 40 C.F.R § 86.1824-08. 78 Fed. Reg. at 29,908. Allowing diesel bench aging would simply be an expansion of existing programs, tailored as appropriate to diesel-fueled vehicles and similarly requiring the use of good engineering judgment in the design of the bench aging program.

Since the introduction of EU5 standards in the European Union ('EU') in 2009, the EU reviewed and fully adopted the EPA bench aging procedures for gasoline light-duty vehicles. This process allowed maintaining of separate EU standards but coordination of the EU and U.S. procedures. The EU, with a larger diesel share, also adopted a diesel bench aging procedure which has been used by manufacturers and confirmed by the EU since 2009. Moreover, from the development of the new world harmonized light-duty test procedure ('WLTP'), where EPA is also a member, real world driving data of U.S. citizens are certainly demonstrated as being comparable to EU driving patterns. Accordingly, the EU diesel bench procedure has proven it is able to demonstrate real world aging of aftertreatment systems under U.S. real world driving conditions, as is the case for the gasoline procedure. EPA's inclusion of similar provisions would be consistent with past EU practice and would help implement this Administration's global harmonization initiative as evidenced by the Transatlantic Trade and Investment Partnership. Development testing of U.S. diesel engines to U.S. standards using EU bench aging protocol shows that diesel bench aging is an effective way of ensuring compliance efficiently.
For all of these reasons, diesel bench aging should be allowed under the Tier 3 regulatory provisions. If EPA has any concerns regarding issuance of a bench aging approval in the final Tier 3 rule, subject to manufacturer guidance in accordance with existing bench aging regulatory requirements, EPA should immediately initiate a supplemental notice or direct final rulemaking to allow diesel bench aging, the completion of which should be timed to coincide with the finalization of the Tier 3 provisions.

Volkswagen Group of America, Inc.

Diesel bench aging is necessary for streamlining resource-intensive activities. OEMs need a procedure that is well developed with a collective of manufacturers. Tier 3 needs to allow options like these for the future. VWGoA specifically requests that Diesel bench aging be included in the Final Tier 3 rule. We understand that EPA needs an Industry supported and publically vetted procedure. A group of more than 8 OEMs have agreed to work together to create a logical, useful bench aging procedure. With the increase to 150k miles full useful life, demonstrating emissions durability using on-road procedures is too expensive and cumbersome. Currently Diesel vehicle families are not equivalent to gasoline families and require a full, separate demonstration. In the future, compliance to GHG and Fuel Economy rules may mean a larger portion of our fleet may include Diesel options, and creating a streamlined approach to bench aging components will be necessary.

Our Response:

Although EPA appreciates the industry interest in a diesel bench aging protocol, in the absence of an industry-consensus approach, we do not believe it would be appropriate to take action as a part of the Tier 3 rule. EPA will monitor industry progress in this area and consider action at an appropriate future time.

4.1.5.16. Diesel Emissions Fluid Refill Intervals

What Commenters Said:

Volkswagen Group of America, Inc.

Diesel Emissions Fluid (DEF) is the primary method of controlling diesel emissions and marks the first time the driver is integral to the function of the vehicle emission controls. In VW Group vehicles the driver receives multiple escalating warnings including preventing vehicle start for not keeping the fluid reservoir at proper levels. A recent Heavy Duty study in California (1) shows that vehicles (drivers) are filling up the tanks, and when they don't, the inducements are working. Mandating a large mileage interval between fills results in a large fluid capacity and adds unnecessary weight to the vehicle. Current regulations tie the oil change interval to the DEF refill interval; decoupling DEF fill from oil change interval allows more compliance options and easier packaging of smaller systems. The stringency of Tier 3 will require more DEF consumption. This means that the storage tanks will either have to increase in capacity or we must needlessly shorten oil change interval, and thus require the customer to change their oil more often. Allowing a shorter refill interval will help optimize vehicle design for the multitude of functional objectives. VW views this as a critical issue, as it risks not being able to give the driver the best ownership experience. We do understand that this is not directly included in the Tier 3 NPRM, but feels that it can be included in the Final Rule. [EPA-HQ-OAR-2011-0135-4299-A1, main comment pp. 1-2]

Our Response:

As noted by the commenter, this comment is not within the scope of the Tier 3 rule. However, EPA plans to finalize a separate rule to address this issue. On June 8, 2012, EPA proposed a rule to codify SCR maintenance (77 FR 34149). The EPA is close to finalizing that rule and addressing all comments received, including comments about the connection between Tier 3 compliance and DEF tank sizes, as well as comments about de-linking DEF refill intervals from oil change intervals.

4.1.5.17. Manufacturer In-Use Verification Testing (IUVP) Requirements regarding PM

What Commenters Said:

Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

In-Use Verification Program (IUVP) PM Testing at Low Mileage: We do not believe low mileage IUVP PM testing is an efficient or effective use of resources. If there are going to be compliance problems, it is either going to be with fundamental vehicle calibrations where compliance can be demonstrated as sufficient during certification testing or it is going to be due to a high mileage deterioration issue, which would not show up during low mileage IUVP testing anyway. However, EPA has said it wants to see low mileage IUVP data for PM to be assured inadequate designs (calibrations) did not make it past certification especially given the newness and stringency of the proposed PM standards.

We appreciate that EPA has attempted to reduce the burden of IUVP PM testing by proposing that automakers only be required to test roughly half of all IUVP test vehicles for PM, and we support this approach. However, given the substantial burdens of PM testing, we have two significant concerns with the proposed low-mileage PM IUVP testing requirements. One is the excessive burden of having to perpetuate low mileage PM testing after manufacturers have demonstrated that certain fundamental vehicle designs will perform well below the standards based upon certification and initial low mileage in-use testing. The other -- and more immediate -- concern is the near term cost and lead time issues with converting IUVP testing facilities so quickly after doing a major conversion of development testing facilities and virtually all certification testing facilities.

While we do not agree that low mileage PM testing will be cost-effective, if EPA is going to insist on low mileage in-use testing for an initial screening purpose, it does not seem that regular low mileage IUVP testing needs to be perpetuated. The current IUVP regulations allow the agency the discretion to reduce IUVP testing as a manufacturer has demonstrated good in-use performance. However, for non-PM IUVP testing, manufacturers have demonstrated excellent in-use compliance now for over 10 years of IUVP testing, and the agency has never exercised authority to reduce testing burdens despite industry requests. Hence, without more specific test burden reduction criteria being built into the regulations, we would have to assume the same thing would occur with PM testing, whereby the agency would never move to reduce burdens, even after a number of years of demonstrated good in-use performance even at low mileage.

The Agency should be able to conclude that a general design approach (i.e., a given generic fuel injection/engine design approach) assures compliance at low mileage based upon certification testing followed by fairly limited low mileage IUVP confirmation. One specific design approach where low mileage IUVP testing will certainly result in limited benefits is gasoline PFI vehicles. In fact, almost all reported data indicates that the gasoline PFI vehicles have remained well below the 3 mg/mi standards, and historically EPA has waived all testing for these vehicles. Adding testing oversight that will occur in certification alone should be sufficient for these vehicles. The very few concerns that have been noted with PFI vehicles have been associated with higher mileage deterioration, such as potentially with oil consumption, which would not be seen during low mileage IUVP tests. Hence, low mileage testing should be completely waived for PFI vehicles.

Additionally, other fundamental design approaches should be able to forgo additional low mileage PM testing after they have gone through a single round of low mileage IUVP testing without there being any indication of a problem (i.e., if initial IUVP testing validates what was observed in certification testing). At the very least, a test group that is certified based upon carryover data and which has been validated once in low mileage IUVP testing should not be subject to additional low mileage testing as long as carryover continues. Language should be included in the regulations that would allow the manufacturer to request a waiver of the IUVP low mileage PM testing for test groups that it can demonstrate use essentially the same fuel injection, engine design, and PM control characteristics as another test group which has undergone successful low mileage IUVP testing once. Actually, we recommend that similar language be included in IUVP that would similarly allow reduction of low mileage IUVP testing for all other pollutants as well. But it is most important for PM testing given the added burdens and added risks of voided tests associated with the much more challenging PM test procedures.

Furthermore, the IUVP low mileage requirement follows so quickly after the beginning of the Tier 3 program that manufacturers will have to begin conversion of IUVP testing facilities before they have even completed the substantial phase in of new testing facilities needed for development and certification. Given the standards phase in with only 10 to 20% of a manufacturer’s fleet needed to comply in MY 2017, we acknowledge that there will not be many tests groups that will be subject to low mileage IUVP testing at the end of that first one or two compliance years. However, even with only a few tests being needed, the test facility modifications to accommodate PM testing will have to be in constructed. Many manufacturers perform IUVP testing at physically different locations than where development or certification testing is performed. Hence, the “few” initial low mileage test groups cannot be easily tested using the new facilities that would have just been put into place for certification testing. To minimize the burdens associated with converting so many facilities at nearly the same time, we ask that EPA grant extra lead time for establishing IUVP testing capabilities by waiving the low mileage PM testing requirement for the first two model years as the PM standards phase in.

High mileage IUVP testing would be retained as proposed, so minimization of low mileage testing would not let manufacturers escape ultimate recall liability. Hence, manufacturers cannot afford to be careless or try to game their way through certification and minimal low mileage testing. Additionally, if low mileage testing were waived for the first two years of the program, the test groups that would be waived would not totally escape testing prior to high mileage testing, since many such test groups would likely be carry-over groups for the next couple years (i.e., many of these would end up being tested under subsequent model year low mileage testing requirements).

Recommendation: We recommend that EPA include language in the low mileage IUVP regulations that would minimize the need to perpetuate low mileage PM testing for vehicles that have demonstrated good performance via certification and initial low mileage testing.
Specifically we recommend:

- Completely waiving of the requirement for low mileage testing of gasoline PFI vehicles.

• Waiving testing of carryover test groups that demonstrated compliance in their first model year of low mileage testing. We specifically recommend this test reduction for low mileage PM IUVP tests but suggest that it would be equally important and appropriate for low-mileage IUVP testing of other criteria emission pollutants.
• Including a provision where a manufacturer may request the waiver of low mileage testing for test groups having similar PM reduction design characteristics as other test groups that have undergone successful low mileage testing.

Additionally, EPA should delay the applicability of low mileage IUVP PM testing requirement until after the first two model years of the PM standards phase-in.

Our Response:

As noted by the commenter, EPA proposed and is finalizing a provision to significantly reduce the burden of IUVP testing PM measurement by requiring roughly half of all IUVP test vehicles measure PM emissions. We believe that it is important to closely monitor the PM emissions from the future Tier 3 vehicles given the importance of PM emissions reductions to the Tier 3 program and the associated health benefits. The requirements that we are finalizing for low mileage testing are reasonable and necessary to provide an early opportunity to ensure that PM levels observed at certification are consistent with in-use performance. As described in the comment, the current IUVP regulations allow the agency the discretion to reduce IUVP testing as a manufacturer has demonstrated good in-use performance.

While we observed a general trend of certain mature technologies (i.e. gasoline PFI) performing better than others in our feasibility study, we believe that the changes in vehicle designs in response to items such as GHG/FE standards and customer preferences will not guarantee that future vehicle designs will maintain the same PM emission performance regardless of technology maturity. We feel that enough changes can occur year to year such as in the emission controls and calibrations to justify the reasonable and limited low mileage PM testing finalized for Tier 3. Additionally, manufacturers have not provided sufficient evidence in certification or in-use that the levels of the new PM standards, particularly for SFTP US06, are consistently being demonstrated by any technology, including the mature technologies discussed in their comments. In other words, statements regarding the relative maturity of technology and its associated PM performance are based solely on the limited data made public by EPA and CARB and commenters did not provide a single piece of low mileage test data on any technology that would conclude additional reductions in PM measurement are justified, particularly for the SFTP US06 test cycle

We reject the notion that manufacturers require more time to prepare emission measurement testing facilities for the already reduced amount of PM testing that will be required. In fact, the phase-in of the Tier 3 PM standards is structured in recognition of the issue of testing facilities availability and associated burden in the early years as discussed in the preamble and less concern about feasibility since manufacturers have the ability to select the vehicles and technologies in which they have the most confidence in the early years.

4.2 Tailpipe Emissions Standards for Heavy Duty Vehicles

4.2.1. HDV Program Lead Time

What Commenters Said:

Truck and Engine Manufacturers Association (EMA):

Leadtime, Stability and Technical Feasibility:
As established by the Clean Air Act, any mobile source emission standards adopted by EPA for on-highway engines and vehicles above 6,000 lbs. GVWR must be technologically feasible and may be implemented, among other things, only if the requisite leadtime and period of stability are provided to manufacturers.

CAA Section 202(a) requires, among other things, that emission standards for heavy-duty engines must be technologically feasible:

[S]tandards must reflect the greatest degree of emission reduction achievable through the application of technology … determine[d to] be available for the model year to which such standards apply, giving appropriate consideration to cost, energy, and safety factors associated with the application of such technology.

CAA Section 202(a)(3); 42 U.S.C. §7521. See Motor & Equip. Mfrs. Ass'n v. EPA, 627 F.2d 1095, 1111 (D.C. Cir. 1979) (consistency with the CAA requires standards to be "technologically feasible"). EPA has failed to justify the technological feasibility of many of the proposed requirements, specifically those relating to the lack of interim in-use and high-altitude standards for medium- and heavy-duty vehicles and engines.

Engine manufacturers also need sufficient time to develop technology that is feasible and practical. Section 202(a) of the CAA specifically requires EPA to provide sufficient leadtime and an adequate period of stability for any standards affecting new on-highway engines and vehicles above 6,000 lbs. GVWR:

Any standard promulgated or revised under this paragraph and applicable to classes or categories of heavy-duty vehicles or engines shall apply for a period of no less than 3 model years beginning no earlier than the model year commencing 4 years after such revised standard is promulgated.

In other words, any new emission standards may go into effect only four or more full model years after the year in which they were promulgated. And, all new or previously-adopted standards must stay in effect for at least three full model years before EPA may establish another applicable standard.

For vehicles and engines over 6,000 lbs. GVWR, which are subject to those leadtime and stability requirements, EPA has proposed both "primary" and "alternative" paths to compliance:

one path that phases in fleet average standards (which become more stringent in successive model years) over a period of several years and an alternative path that requires a percentage of a manufacturer's product to be phased in to far more stringent emission standards along a much more aggressive timetable. The standards and phase-ins for the categories of vehicles and engines above and below 8,500 lbs. GVWR are different, but each category has similar "primary" and "alternative" paths.

In both categories (above and below 8,500 lbs. GVWR), the "primary" path fails to provide four full model years' leadtime and three years of stability. Meanwhile, while the "alternative" path meets minimum leadtime and stability requirements, the "alternative" path standards are not technologically feasible. EPA has provided manufacturers with a "choice" that is effectively no choice at all: manufacturers must choose one of two alternatives, neither of which meets the statutory requirements of the CAA.

The comments of the Alliance outline in greater detail the issues and impacts associated with EPA's failure to provide four full model years' leadtime for those categories of vehicles under 8,500 lbs. GVWR. For vehicles and engines in the 8,501-14,000 lbs. GVWR range ("Heavy-Duty Vehicles"), EPA has proposed declining fleet average standards that begin in 2018 through 2022, with an "alternative" phase-in percent of sales requirement that begins in 2019 for "any manufacturer who prefers a stable standard and four full years of lead time, as specified in the [CAA]." (78 Fed. Reg. at 29876; emphasis added.) EPA's failure to provide sufficient leadtime and stability in those proposed declining fleet average standards is not a matter of "preference" but a matter of law – as established in the CAA. And, while standards that begin in 2019 technically would provide the legally-required four model years' leadtime (assuming the Proposed Tier 3 Standards are finalized before the end of 2013), EPA has failed to demonstrate that the proposed standards of the "alternative path" are technically feasible for Heavy-Duty Vehicles.

For example, in support of its decision to exclude interim in-use standards for vehicles over 8,500 lbs. GVWR, EPA only used data generated from two medium-duty vehicles which were not aged to 150,000 miles full useful life and were not representative of the vehicles that will be needed to meet new, stringent GHG standards for heavy-duty vehicles. EPA also referred to light-duty vehicles with powertrains similar to their heavy-duty counterparts as support for the lack of interim in-use standards. Yet, in apparently relying on such light-duty data, EPA did not account for the additional technical challenges associated with meeting the proposed standards at adjusted loaded vehicle weight (ALVW). As EPA has noted in the preamble to the Proposed Rule, emissions from Heavy-Duty Vehicles are tested with loaded vehicles to ensure the emissions are controlled when such vehicles are performing their core function: hauling heavy loads. (78 Fed. Reg. at 29874.) Heavily-loaded vehicles have different emission characteristics from vehicles under light load. Thus, light-duty vehicles not tested at ALVW cannot and should not be relied on for demonstrating the technological feasibility of standards applied to heavier vehicles at ALVW.

EPA must meet its obligations to propose and finalize regulations that it can demonstrate are both technologically feasible and provide the necessary leadtime and period of stability required by the CAA. EPA has not done so with either the primary or alternative standards for vehicles greater than 6,000 lbs. GVWR.

Chrysler Group LLC:

NMOG+NOx Phase-In Requirements for Heavy-Duty Vehicles:
The CAA requires EPA to provide manufacturers of heavy-duty vehicles, defined as vehicles in excess of 6,000 pounds GVWR, (29) with four years of lead time (and a three-year period of "stability" with no changes to the standards), to comply with new automobile emission standards. Specifically, Section 202(a)(3)(C) of the CAA, 42 U.S.C. § 7521(a)(3)(C), states: "Any standard promulgated or revised under this paragraph and applicable to classes or categories of heavy-duty vehicles or engines shall apply for a period of no less than 3 model years beginning no earlier than the model year commencing 4 years after such revised standard is promulgated." (emphasis added). This statutory requirement is intended to ensure that manufacturers of heavy-duty vehicles are afforded sufficient lead time and stability to recoup their investments in new technology required to comply with more stringent standards.

In the proposed rule, EPA attempts to thwart this statutory requirement by proposing two phase-in alternatives for complying with the significantly more stringent Tier 3 NMOG+NOx tailpipe emissions standards. Under the more favorable primary compliance option, manufacturers must meet a fleet average standard that is phased-in between Model Years 2018 and 2025 for vehicles over 6,000 pounds GVWR, but which contravenes the CAA's explicit four-year lead time requirement. Under the less favorable alternative compliance option, manufacturers must phase in 40 percent of their vehicles to the more stringent Tier 3 NMOG+NOx standards beginning in Model Year 2019, which comports with the statutory four-year lead time requirement, but adds the significant burden that all of the manufacturer's vehicles must meet the final standards by Model Year 2021 — a full four model years ahead of the primary phase-in option.

> *Footnote:* EPA proposes to adopt a similar dual-path approach for "heavy-duty vehicles" as defined by EPA at 40 CFR §86.1803-01 (i.e., vehicles greater than 8,500 pounds GVWR but less than or equal to 14,000 pounds GVWR). See 78 Fed. Reg. at 29,875-29,877. Under the proposed primary compliance option, manufacturers must meet a declining fleet average standard for NMOG+NOx beginning in Model Year 2018, in contravention of the CAA's explicit four-year lead time requirement. Alternatively, manufacturers can choose to comply beginning in Model Year 2019, which comports with the four-year lead time requirement, but then are subject to a percent-of-vehicles phase-in approach rather than a declining fleet average. Again, EPA's "poison pill" approach cannot be reconciled with the CAA. Accordingly, Chrysler recommends that EPA start the declining fleet average in Model Year 2019, consistent with the CAA's four-year lead time requirement.

Assuming EPA issues a Tier 3 final rule in late 2013, as planned, Model Year 2014 already would have begun. Therefore, the CAA requires that the Tier 3 standards applicable to heavy-duty vehicles take effect no earlier than Model Year 2019 (i.e. four model years after the revised standards are promulgated per Section 202(a)(3)(C), that is, commencing with the 2015 Model Year). EPA's proposed primary compliance option, however, would require manufacturers of heavy-duty vehicles to begin complying with the stringent Tier 3 standards in 2018 (i.e., only three model years after the revised standards are promulgated), and therefore would contravene the lead time requirement in Section 202(a)(3)(C) of the CAA. Conversely, although EPA's alternative compliance option does meet the statutory four-year lead time requirement, it unreasonably imposes unduly and significantly more burdensome compliance requirements than the primary compliance option, and does not present manufacturers with a realistic choice. Moreover, these undue burdens are not rationally related to the four-year lead time requirement and thus are clearly designed as a punitive stick to force manufacturers to "choose" the non-CAA compliant primary option with only three years of lead time.

As described in greater detail in the comments provided by the Alliance of Automobile Manufacturers and Association of Global Automakers, the alternative compliance option, which complies with the four-year lead time requirement but requires manufacturers to certify all of their vehicles to the Tier 3 standards a full four model years sooner than the primary phase-in option, is so burdensome that no reasonable manufacturer would ever choose it; all manufacturers would essentially be forced into selecting the primary phase-in option and turning a blind eye to EPA's blatant violation of the CAA's lead time requirements for heavy-duty vehicles. When a regulatory scheme is so heavily weighted or creates significant economic incentives such that only one of the options is reasonable, that option becomes a mandate and is no longer truly an option. Providing a significantly more burdensome alternative compliance path that meets the statutory requirements does not, and cannot, remedy the fact that the primary compliance path violates the statute.

This dual-path approach that EPA proposes would violate the CAA for an additional reason, as well. Under Section 202(a)(3)(A)(i) of the CAA, EPA is required to promulgate standards "which reflect the greatest degree of emission reduction achievable through the application of technology which the Administrator determines will be available for the model year to which such standards apply, giving appropriate consideration to cost, energy, and safety factors associated with the application of such technology". Thus, the CAA implicitly requires EPA to select the single standard that reflects the greatest degree of emission reduction achievable. Here, it simply cannot be the case that both the primary compliance option (which begins in Model Year 2018 and requires full compliance with the more stringent standards by 2025) and the alternative compliance option (which begins in Model Year 2019 and requires full compliance with the more stringent standards by 2021) reflect the greatest degree of emission reduction achievable taking into account cost, energy, and safety. Rather, if the three-year phase-in under the alternative compliance option is in fact achievable considering the specified factors, then the primary compliance path, which affords manufacturers seven years to meet the more stringent standards, cannot be reconciled with the CAA requirement that EPA promulgate standards reflecting the greatest degree of emission reduction achievable. The more likely explanation, however, is that the primary compliance option reflects the greatest degree of emission reduction that EPA believes is truly appropriate, whereas the alternative compliance option is intentionally so burdensome—and therefore far beyond reflecting the greatest degree of emissions reduction achievable—that manufacturers will be forced to waive their statutory protections and choose the primary path. This attempt to circumvent the statutory protections embodied in the CAA cannot be reconciled with the plain provisions of the Act.

Further, Chrysler objects to the requirement that if a manufacturer chooses the alternative compliance path for any of its vehicles, all of its vehicles, including light-duty vehicles and those heavy-duty vehicles for which the manufacturer is willing to comply with three years lead time, must nevertheless meet the final Tier 3 NMOG+NOx standards by 2021 (instead of 2025 under the primary compliance option). This regulatory scheme, which sweeps in a manufacturer's entire fleet if the manufacturer chooses to pursue the alternative compliance option for even just a single vehicle model, cannot be characterized as an incentive to forego the four-year lead time requirement; rather, it is a penalty imposed on manufacturers that refuse to forego their statutory protections. There is no rational basis for penalizing a manufacturer's entire vehicle fleet simply because the manufacturer chooses to exercise its statutory right to four years of lead time for one heavy-duty vehicle model. Plainly, any emissions benefits of earlier compliance would accrue for those models of vehicles for which the manufacturer might choose earlier compliance. But precluding that choice and imposing more stringent standards even for those models that might comply early, just because a different model or models cannot comply early, has no environmental rationale except to penalize the choice of later compliance for the other models. That design is arbitrary, unreasonable, and unlawful.

Recommendation: Chrysler recommends that, for vehicles over 6,000 pounds GVWR, the Tier 3 fleet average requirements for FTP and SFTP NMOG+NOx begin in MY 2019 at the currently proposed Model Year 2019 fleet average emissions levels (under the primary compliance option) and require full compliance only at Model Year 2025. This approach is in full compliance with the CAA, completely harmonizes with LEV III in MY 2019, and will achieve the same level of emission reduction as the proposed rule.

Our Response:

Chrysler commented on Clean Air Act requirements for lead time and stability for vehicles over 6000 lbs GVWR. Excerpts from these comments pertaining to vehicles over 8500 lbs GVWR are addressed here. Those dealing with vehicles 6000-8500 lbs GVWR are addressed in Chapter 4.1.1.

Comments we received on the proposed HDV standards did not specifically address our analysis of their technical feasibility. The Manufacturers of Emission Controls Association (MECA) outlined diesel and gasoline-engine technologies that they expect will be used to achieve the Tier 3 standards cost-effectively, generally consistent with our RIA. These comments are discussed in Chapter 4.1.4. Vehicle and engine industry commenters argued that the case we made for feasibility relied too heavily on extending light-duty truck test data, supplemented by testing of only two HDVs, neither of which were fully aged or representative of future vehicles designed to meet our new GHG standards. However, these comments did not question the feasibility, durability, implementability, or effectiveness of the technologies we identified, or their ability to achieve the proposed standards. Instead, the focus of these comments was on statutory provisions for lead time and stability, and on how relaxed standards for in-use testing and testing at high altitudes would help to implement the standards within the allotted lead time. These issues, including changes we are making in response to the comments, are addressed in Sections IV.B.2.c, IV.B.6.a, and IV.B.6.f, of the preamble to this final rule. Related additional discussion can be found in Chapters 4.2.4 and 4.2.6.1 below.

Contrary to the assertions of these commenters, HDV manufacturers clearly have a choice between the primary LEV III-harmonized phase-in and the alternative percent-of-sales phase-in. As discussed in the preambles to the proposed and final rules, we are providing for the LEV III-harmonized phase-in to allow manufacturers to more easily market the same HDV models in all 50 states. We are also providing for the alternative percent-of-sales phase-in so that manufacturers may choose to benefit from four years of lead time and three years of stability as specified in CAA section 202(a)(3)(C). That a commenter might view one alternative as "more favorable" and the other "less favorable" does not mean that a manufacturer does not have a choice of phase-in alternatives under the Tier 3 program.

As acknowledged by the commenters, the alternative phase-in clearly meets statutory lead time and stability requirements, but commenters argue that the alternative phase-in of the Tier 3 HDV standards is not technologically feasible. Commenters who disagreed with our assessment of the feasibility of the alternative phase-in for HDV manufacturers did not explain the reasons for their disagreement, beyond referring to similar comments they had on the analogous light-duty (above 6000 lbs GVWR) alternative phase-in. However, the proposed light-duty alternative differs from the one we proposed for HDVs, and the elements in it that were found objectionable by the manufacturers are not present in the HDV alternative. The HDV alternative does not impose "unduly and significantly more burdensome compliance requirements than the primary compliance option", and we see no reason to conclude that it does not present manufacturers with a realistic choice.

Commenters objected that the proposed percent-of-sales alternative has not been shown by EPA to be feasible, or in fact is infeasible because it mandates the early phase-in of low-emitting vehicles certified to the final standards. In fact, the percent-of-sales phase-in is no more stringent than the LEV III-harmonized phase-in, so a manufacturer meeting the percent-of-sales alternative would not have any more difficulty meeting the stringency levels than a manufacturer using the other approach. EPA chose the phase-in percentages in the percent-of-sales alternative to result in a fleet average NMOG+NOx level that is equal to the LEV III-harmonized standards. For example, a manufacturer choosing the percent-of-sales approach must demonstrate (including through use of credits) that 60% of its MY2019 Class 3 fleet meets the final Tier 3 NMOG+NOx standard of 247 mg/mi; the remaining 40% may be certified to pre-Tier 3 NMHC and NOx standards adding up to 630 mg/mi. On average this Class 3 fleet attains (40%)x(630) + (60%)x(247) = 400 mg/mi, which is the fleet average standard in this year under the LEV III-harmonized alternative.

In response to the comments about EPA's assessment of feasibility for the percent-of-sales alternative standards, the feasibility analysis provided in the Final RIA, which expressly addresses the LEV III-harmonized phase-in, serves to demonstrate the feasibility of both alternatives. Contrary to commenters' contentions, neither alternative mandates the early phase-in of low-emitting vehicles certified to the final standards, due to the existence of identical averaging, banking, and trading (ABT) provisions in both alternatives. In fact, with ABT, every manufacturer can produce the same mix of vehicles in any model year to comply with either HDV phase-in alternative, with the exception that MY 2018 is a voluntary phase-in year under the alternative phase-in and a required year under the LEV III-harmonized phase-in. By no means are manufacturers forced to make only vehicles certified to the final standards.

Some comments seem to assert that the percent-of-sales construct for the alternative was chosen by EPA to make this alternative so stringent (by forcing some vehicles to meet final standards four years early) that no reasonable company would use it. This is incorrect, both in regard to its actual effect (discussed above), and in regard to our intent. Rather, the percent-of-sales construct for the alternative was proposed and is being adopted to provide manufacturers with a phase-in alternative that explicitly meets the applicable Clean Air Act stability requirement, consistent with the commenter's legal statements.

We are making one change to the percent-of-sales alternative, necessitated by the fact that this final rule is being signed in 2014, not 2013 as envisioned in the proposal. HDV models for which the 2019 model year begins before the fourth anniversary of the signature date of this final rule may be excluded from the Tier 3 fleet average compliance calculations and all other Tier 3 requirements. These excluded vehicles would instead need to comply with the applicable pre-Tier 3 standards and requirements for the entire production of these models throughout the 2019 MY. This limited allowance ensures that the alternative meets EPA's obligation for four years of lead time under the Clean Air Act. It is similar to a phase-in alternative we provided in the light-duty vehicle Tier 2 rule (see 65 FR 6747, February 10, 2000).

4.2.2. HDV FTP Exhaust Standards

What Commenters Said:

Truck and Engine Manufacturers Association (EMA):

Chassis-Dynamometer-Certified Heavy-Duty Vehicle NOx Standards:
The current NOx standards for heavy-duty, chassis-certified vehicles are 0.2 g/mile and 0.4 g/mile for Class 2b and Class 3 vehicles, respectively. Under the Proposed Tier 3 Standards, EPA is proposing two interim bins, one for Class 2b and one for Class 3, both of which are intended to be "carry-over bins" for existing Tier 2 vehicles. This would allow manufacturers to continue certifying vehicles that are designed to meet the current standards without any modifications. However, as proposed, the NOx standards for these "interim bins" are expressed as three significant digits (0.200 g/mile and 0.400 g/mile for Class 2b and Class 3, respectively). Such a change represents a significant increase in the stringency of the standards due to the applicable rounding rules. Having three significant digits (instead of one) means that existing vehicles would be subject to significantly more stringent NOx standards, which is not consistent with the intent of creating "interim bins."

EMA believes that this proposed change in significant digits was unintentional on EPA's part. Either way, EPA should not change the number of significant digits for the NOx standard in the "interim bins" for chassis dynamometer certified heavy-duty vehicles. Rather, the Agency should – indeed, must – retain the NOx standard at 0.2 g/mile and 0.4 g/mile for Class 2b and

Class 3 interim bins, respectively. Otherwise, EPA's proposed standards are inconsistent with its expressed intent – which EMA supports – to allow "carryover" bins.

Chassis-Dynamometer-Certified Heavy-Duty Vehicle PM Standards:
The current PM standard for heavy-duty, chassis-certified vehicles is 0.02 g/mile for both Class 2b and Class 3 vehicles. Under the Proposed Tier 3 Standards, EPA is proposing two interim bins, one for Class 2b and one for Class 3, both of which are intended to be "carry-over bins" for existing Tier 2 vehicles. This would allow manufacturers to continue certifying vehicles that are designed to meet the current standards without any modifications. However, as proposed (Table 5 of 86.1816-18), the PM standards for these "interim bins" do not match the values in 86.1816-08. Instead of 0.02 g/mile, the PM standards for the two bins in each class are listed as 0.012 g/mile. Such a change represents a significant increase in the stringency of the standard due to both the lower value and to the inclusion of three significant digits. The lower numeric value and the three significant digits (instead of two) means that existing vehicles would be subject to significantly more stringent PM standards, which is not consistent with the intent of creating "interim bins."

EMA believes that this proposed change was unintentional on EPA's part. Either way, EPA should not change the numeric level or the number of significant digits for the PM standard in the "interim bins" for chassis dynamometer certified heavy-duty vehicles. Rather, the Agency should – indeed, must – retain the PM standards at 0.02 g/mile for both Class 2b and Class 3 interim bins. Otherwise, EPA's proposed standards are inconsistent with its expressed intent – which EMA supports – to allow "carryover" bins.

[EMA recommends that EPA undertake the following:]
- Correct the number of significant digits in the NOx standards for chassis-certified heavy-duty vehicles to maintain the standards at 0.2 g/mi and 0.4 g/mi for Class 2b and Class 3 vehicles, respectively
- Correct the numeric value and the number of significant digits in the PM standard for chassis-certified heavy-duty vehicles to maintain the standard at 0.02 g/mi for Class 2b and Class 3 vehicles

Our Response:

We agree with EMA's comments regarding the numerical levels of the NOx and PM standards for the interim bins. We have corrected the PM standard accordingly in the regulations. In response to another comment (made by EMA and others—see Chapter 4.2.2.1), we have combined the NMOG and NOx standards for these interim bins, with an additional requirement capping the NOx level in certification testing. This capped level is specified in the regulation with a single significant digit, as suggested by EMA. This, along with the flexibility for NOx emissions provided under a combined NMOG+NOx standard, effectively addresses the EMA comments regarding NOx.

What Commenters Said:

California Air Resources Board (CARB):

Medium Duty Vehicle Fleet Average Requirement: Unlike the LEV III program that requires manufactures to certify a defined percentage of their medium-duty vehicle's to increasingly stringent emission standards, the proposed Tier 3 program imposes a fleet average emission requirement for this class of vehicles. Staff has determined that, while different in structure, the LEV III and proposed Tier 3 emission requirements for medium-duty vehicles are identical. Accordingly, to provide manufacturers with additional flexibility, CARB will propose an identical fleet average option for compliance in the LEV III program.

Our Response:

We support CARB's intent to propose an identical declining fleet average standard option.

What Commenters Said:

Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global Automakers):

The following list areas from the NPRM preamble for which EPA has requested comment on exhaust emission related items. This includes comments and recommendations on items that are not addressed in our main comment letter.

HDVs (FR29874): [EPA] request[s] comment on the usefulness of creating additional bins between Bin 0 and the next lowest bin in each vehicle class, as a means of encouraging clean technologies and adding flexibility. We see no need for additional bins beyond the bins needed to harmonize with the California program.

HDVs (FR29876): [EPA] request[s] comment on extending the voluntary compliance opportunity to the 2015 model year. Extending voluntary compliance to 2015 as proposed by EPA provides no meaningful assistance to manufacturers as they transition to Tier 3. Instead, EPA should pattern its HDV early credit provisions after those proposed for light-duty.

HDVs (FR29878): EPA requests comment on this proposed optional [PM] phase-in mechanism. We support the optional phase-in mechanism.

Our Response:

We acknowledge the comments from the Alliance and Global Automakers regarding additional bins, 2015 voluntary compliance, and the proposed optional PM phase-in mechanism, and are not making changes to the associated final Tier 3 program provisions from what we proposed. We are finalizing the proposed optional PM phase-in mechanism for which the commenters expressed support. See Chapter 4.2.5 of this Summary and Analysis of Comments document for further discussion of comments on early credits.

4.2.2.1. Combined NMOG + NOx Standards for High Bins

What Commenters Said:

Truck and Engine Manufacturers Association (EMA):

Bin Standards: EPA has proposed separate NMOG and NOx standards for the two highest bins in both the 8,501-10,000 lbs. GVWR range and the 10,001-14,000 lbs. GVWR range of vehicles and engines. EPA states that its proposal is "equivalent" to California's LEV II program. EPA also proposes that those "interim Tier 3" bins be available only through model year 2021. (78 Fed. Reg. at 29875.)

EPA's proposal is not "equivalent" to the LEV II program nor does it harmonize with California for the two highest bins in both the 8,501-10,000 lbs. GVWR range and the 10,001- 14,000 lbs. GVWR range of vehicles and engines. Under California's requirements for the transition from LEV II to LEV III standards, manufacturers may choose whether to certify such vehicles and engines to separate NMOG and NOx or combined NMOG+NOx standards at the same levels as EPA has proposed for the two highest bins in Classes 2b and 3 (395 (LEV) and 340 (ULEV) for Class 2b; 630 (LEV) and 570 (ULEV) for Class 3). Moreover, the California LEV III regulations allow manufacturers to certify to those combined NMOG+NOx standards for as long as manufacturers are able to do so while still meeting the fleet-wide phase-in requirements. Manufacturers certifying to those combined standards also will meet combined OBDII thresholds as part of certification.

Meanwhile, EPA also is proposing to adopt ARB's OBDII regulations. Even though ARB's OBDII threshold for NMOG+NOx will be combined, manufacturers certifying products in those bins will not be able to certify to a combined standard or OBDII threshold, eliminating the possibility of certification to a 50-state vehicle.

EPA should provide manufacturers with the same option to certify to combined NMOG+NOx standards for all bins in the 8,501-14,000 lbs. GVWR range and should allow such option beyond the 2021 model year. Manufacturers who have done the development and testing necessary to certify such vehicles to the ARB combined standards will have done so also with the expectation that EPA would align its standards to assure harmonization nationwide. EPA's Proposed Rule would force certification to separate NMOG and NOx standards for those bins and undermine manufacturers' ability to certify a 50-state vehicle. Such a result would be contrary to EPA's stated goal in the Proposed Rule.

Consistent with its intent to align the EPA program with the ARB standards generally, and to support harmonization where technically feasible and reasonable, EPA should allow manufacturers the option to certify to combined NMOG+NOx standards for the "interim" bins for as long as manufacturers are able to do so.

Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global Automakers):

HDVs (FR29875): [EPA proposes] that vehicles in the interim bins meet separate NMOG and NOX standards, as indicated in Table IV-13, rather than combined NMOG+NOX standards... [EPA requests] comment on this issue and the proposed approach to addressing it.

We support combined NMOG+NOx for the interim HDV bins, consistent with the California program and all other Tier 3 bins.

Our Response:

Industry commenters objected to both the proposed sunsetting of the interim bins and the proposed separate NOx and NMOG standards for these bins, arguing that they overly restrict manufacturer flexibility and work against harmonization with LEV III. However, commenters did not address EPA's concern expressed in the NPRM regarding increased NOx emissions at the interim bin levels.

After considering the comments, we believe a modified approach to the interim bins can at least partly address the industry concerns regarding harmonization while still precluding backsliding on NOx levels. We are finalizing the interim bins with combined NMOG+NOx standards as requested by the commenters, but are adopting a restriction on deterioration-adjusted NOx levels in certification testing, to the levels allowed under the current standards in 40 CFR 86.1816-08. These are 0.2 and 0.4 g/mi for Class 2b and Class 3, respectively. This restriction will not apply to vehicles in use, and does not impose a parallel NMOG restriction. Given our continuing concerns about NOx increases that would be allowed by the combined standards at the interim bin levels, we believe that this approach and the associated certification burden are reasonable, noting that manufacturers already must obtain NOx test results in certifying to an NMOG+NOx standard, and the differing NOx and NMOG deterioration mechanisms will likely dictate that they be considered separately in obtaining deteriorated NMOG+NOx levels for certification.

We believe that making the interim bins available indefinitely would run counter to their limited purpose as an aid to making the transition to Tier 3 emissions levels. Making these bins permanent would, we believe, necessitate that they take on other key elements of the Tier 3 program such as longer useful life, SFTP compliance, and the use of Tier 3 certification fuel. These requirements in turn would negate the usefulness of these bins in helping to carry over some pre-Tier 3 vehicle designs during the transition years in which the declining fleet average standard levels are high enough to accommodate their continued sale. By MY 2022, the fleet-wide standard will be stringent enough to effectively eliminate the ability of manufacturers to use interim bins while meeting the declining fleet average standard levels. We are therefore adopting the sunsetting of the interim bins as proposed, making them available only through MY 2021.

4.2.3. HDV SFTP Exhaust Standards

What Commenters Said:

California Air Resources Board (CARB):

Linking of Medium-Duty Vehicle FTP and SFTP Emission Standards: CARB supports the proposal to require medium-duty vehicles certifying to a Tier 3 ultralow- emission vehicle or super-ultra-low-emission vehicle FTP-equivalent emission category to certify to the equivalent SFTP emission category as well. CARB believes this requirement is appropriate because the SFTP emission standards were designed to be met using the same hardware required to meet the FTP emission standards. Accordingly, CARB intends to propose alignment with this proposal once the Tier 3 program is finalized.

International Council on Clean Transportation (ICCT):

ICCT fully supports extending the supplemental FTP requirements to complete vehicles between 8,500 and 14,000, which were previously exempt.

Our Response:

We support CARB's intent to propose alignment with our requirement linking SFTP and FTP compliance.

4.2.4. HDV In-Use Standards

What Commenters Said:

Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global Automakers):

Interim In-Use Standards: For the > 8,500 pounds GVWR vehicles and for the SFTP standards for LDVs, the proposed Tier 3 regulations do not contain the interim in-use standards that were adopted in LEV III. Interim in-use standards do not change the certification value, and therefore should not have any environmental impacts. However, manufacturers must certify much bigger vehicles to much lower standards across the board at the same time they're introducing new GHG reduction technologies. For example, HDVs 8,500 – 10,000 pounds GVWR currently meet standards in the range of 340 mg/mile NMOG+NOx, but vehicles will need to meet standards that are half that as Tier 3 and LEV III phase in. The same is true for vehicles 10,000 – 14,000 pounds GVWR where the standards are currently about 560 mg/mile but will have to meet standards almost half that under Tier 3. While these standards appear numerically higher than the LDV standards, they are comparable in terms of stringency and emission control hardware required given that they apply to larger vehicles that are tested under much heavier loads including at adjusted loaded weight (ALW) instead of loaded vehicle weight (LVW).

The manufacturers do not have extensive in-use experience at these levels for these larger vehicles and could face substantial jeopardy as the standards are adopted across a large segment of their fleet. Interim in-use standards, which have historically been granted, simply reduce this jeopardy and allow manufacturers to gain in-use data and experience with new, more stringent requirements.

Similarly, interim in-use standards are appropriate for SFTP for both the MDV and LDV classes. For the first time ever, the SFTP standards will apply at a 150,000 mile useful life. And the required levels will be far lower than current standard levels. These two factors, coupled with the rapid introduction of new technologies driven by the GHG and fuel economy requirements, justify the need for interim in-use SFTP standards to help manufacturers manage their in-use compliance risk.

Recommendation: We recommend EPA continue the historic practice of allowing interim in-use standards by harmonizing with the LEV III interim in-use standards for the HDV FTP and SFTP requirements and the LDV SFTP requirements.

Heavy Duty Vehicle FTP, SFTP, Altitude and PM Interim In-use Standards:
We propose that EPA align with the CA LEV III program by adopting the same interim in-use provisions for the FTP, SFTP and PM that are provided in LEV III. These interim standards are necessary to mitigate the risks (both known and unknown) as manufacturers phase in to the new lower standards, a task which is complicated by: (1) rollout of new GHG-enabling engine technologies; (2) first-time application of SFTP standards to HDVs; (3) new test cycle (LA-92); (4) new PM test procedures (Part 1066); and (5) differences between federal and CA market fuel quality (i.e., sulfur).

In support of its decision to exclude the LEV III interim in-use provisions from the Tier 3 program, EPA used data generated from only two vehicles. These vehicles were not aged to 150,000 mile full useful life, and were not representative of the vehicles that will be needed to meet new stringent HDV GHG standards. EPA also referenced vehicle data taken from the existing light-duty fleet to support the view that interim standards were not needed. The selected vehicles had powertrains similar to their heavy-duty counterparts; however, these LDVs were not run at adjusted loaded vehicle weight (ALVW) and cannot be properly used to make this determination.

Recommendation: We recommend: (1) Harmonizing with LEV III by adopting the interim in-use standards for vehicles >6,000 pounds GVWR for both FTP and SFTP.

California Air Resources Board (CARB):

SFTP Medium-Duty Vehicle Interim In-Use Emission Standards: CARB supports U.S. EPA's proposal to not include interim in-use emission standards for NMOG+NOx and PM in the medium-duty vehicle SFTP program. CARB agrees that the technologies required for SFTP compliance are well-established and sufficient lead time is provided such that in-use interim emission standards, which are typically reserved for new technologies are not needed.

Accordingly, CARB intends to propose alignment with this proposal once the Tier 3 program is finalized.

Ford Motor Company (Ford):

HDV Interim In-Use Standards: In the Tier 3 NPRM, EPA did not adopt the LEV III interim in-use provisions for vehicles in the 8,500-14,000 pound weight classes. Ford believes that EPA's reluctance to harmonize with this aspect of the LEV III program is due, at least in part, to a lack of data supporting the need for such provisions. Interim standards are typically intended to provide a temporary mechanism for manufacturers to handle the known challenges and unforeseen difficulties associated with the implementation of new, more stringent requirements. Since manufacturers cannot be expected to supply data to substantiate all such future concerns (the relevant vehicles and/or technologies often do not yet exist or have not yet been realized in "hardware"), we believe that there is sufficient uncertainty in the proposed HDV program alone to justify the adoption of the interim standards finalized in the LEV III program. These uncertainties include an entirely new testing mode for heavy-duty vehicles (i.e. SFTP), new application of LA-92 test cycle, and the roll-out of new test procedures in Part 1066. These concerns are further intensified by the need to implement the new, innovative technologies and vehicle configurations that will be required to meet the challenging GHG standards in this same timeframe. It should also be noted that the case for interim standards is particularly strong in regards to PM, not only because of the unique PM challenges for heavier vehicles detailed in the preceding section, but also because EPA has proposed a new PM test procedure in Part 1066.

Recommendation: Ford proposes that EPA adopt the FTP and SFTP interim in-use standards (including PM) that were finalized in California's LEV III MDV program.

General Motors LLC (GM):

Another important area for harmonization relates to in-use compliance. In-use compliance is the biggest technical hurdle for manufacturers, and also the greatest risk to manufacturers due to all of the factors that can impact in-use emission testing results. To help manage this in-use compliance risk during the transitional years, the LEV III regulations provide interim in-use standards. The Tier 3 regulations adopt some but not all of the LEV III interim in-use standards, and as detailed in the Alliance/Global comments, GM requests that EPA adopt all the types of interim in-use standards adopted in LEV III to ensure harmonization.

Truck and Engine Manufacturers Association (EMA):

Interim In-Use Standards: For vehicles above 8,500 lbs. GVWR, the Proposed Tier 3 Standards do not include the interim in-use standards that were adopted in the ARB LEV III program. EPA should continue the historic practice of allowing interim in-use standards by harmonizing with the LEV III interim in-use standards for the Heavy-Duty Vehicle FTP and SFTP requirements.

The interim standards are necessary to address challenges (both known and unknown) that manufacturers will face as they phase products in to the new, more-stringent Tier 3 standards. As manufacturers design, research, test, and produce Tier 3-compliant vehicles and engines that are commercially viable for introduction into the market, manufacturers also must address the following challenges: (1) rollout of new GHG-enabling engine technologies; (2) the first-time application of SFTP standards to Heavy-Duty Vehicles (and at 150,000-mile useful life); (3) a new test cycle (LA-92); (4) new PM test procedures; and (5) differences between federal and California market fuel quality (i.e., sulfur). Without interim in-use standards, manufacturers face greater risk that they will not be able to produce fully-compliant vehicles and engines or meet customer demands for robust and reliable product.

The Proposed Rule would require manufacturers to certify much larger vehicles to much lower standards across the board at the same time they are introducing new GHG reduction technologies. For example, Heavy-Duty Vehicles 8,501-10,000 lbs. GVWR currently meet standards in the range of 340 mg/mile NMOG+NOx, but such vehicles will need to meet standards that are half that as Tier 3 and LEV III phase in. The same is true for vehicles 10,001–14,000 lbs. GVWR, where the standards currently are about 560 mg/mile but will be reduced to half that under Tier 3.

EPA has failed to demonstrate that its proposal to exclude interim in-use standards for Heavy-Duty Vehicles above 8,500 lbs. GVWR is technologically feasible. In support of its proposal to exclude the LEV III interim in-use provisions from the Tier 3 program for vehicles over 8,500 lbs. GVWR, EPA used data generated from only two medium-duty vehicles which were not aged to 150,000 miles full useful life and were not representative of the vehicles that will be needed to meet new, stringent GHG standards for heavy-duty vehicles. In addition, EPA referred to light-duty vehicles with powertrains similar to their heavy-duty counterparts as support for the lack of interim in-use standards. Yet, as discussed above, in apparently relying on such light-duty data, EPA did not account for the additional technical challenges associated with meeting the proposed standards for vehicles and engines over 8,500 lbs. GVWR at ALVW.

Heavy-Duty Vehicles are designed to do work. Manufacturers must design engines used in such “work-capable” vehicles with characteristics that allow the vehicle to do the work of hauling or towing when such work is required. The design aspects of work vehicles impose laws of physics and thermodynamics which result in work-capable vehicles having different emission characteristics than light-duty vehicles. As a result, heavy-duty vehicles must be compliant under much heavier loads than their light-duty counterparts. Light-duty vehicles cannot and should not be relied on for demonstrating the technological feasibility of standards applied to heavier vehicles at ALVW. As a result, EPA has failed to show that excluding interim in-use standards is technologically feasible for manufacturers.

Manufacturers do not have extensive in-use compliance experience at the proposed standard levels for larger, heavier-duty vehicles and could face significant challenges. Any time there is a substantial change in regulatory requirements, as standards are adopted across a large segment of their fleets, manufacturers not only must meet compliance obstacles but also address customer concerns as new products and new technologies are introduced into the market. Interim in-use standards, which have historically been allowed, reduce the potential compliance risks and impediments to customer acceptance and permit manufacturers to use in-use data and experience with the new, more stringent requirements to make any adjustments necessary to assure compliance with the fully-implemented final standards.

In order to make its program practical and implementable, EPA should align with the California LEV III program by adopting the same interim in-use provisions for the FTP, SFTP and PM standards as are provided in LEV III.

- Include interim in-use FTP, SFTP, and SFTP PM standards for vehicles above 8,500 lbs. GVWR

Our Response:

After considering the comments we have concluded that relaxed interim in-use standards are appropriate for HDVs, both for FTP and SFTP testing. The comments we received from CARB, offered in the spirit of fostering harmonization, do not provide new technical information in support of going forward with our proposal not to set interim in-use standards. We are adopting HDV in-use standards levels that are identical to those adopted for LEV III. We consider these levels reasonable, in line with relaxed in-use standards adopted in past programs, and helpful toward harmonization.

We are not applying interim in-use NMOG+NOx standards to the interim (two highest) bins for the FTP standards, because these bins are intended for carry-over of existing designs, and there should be little uncertainty over their in-use emissions performance. Interim bin vehicles certified to the Tier 3 PM standards shall, however, be subject to the relaxed in-use PM standards in the same way as for HDVs in other bins. Bin 0 standards are driven by specific zero-emissions technologies for which in-use margins would not be appropriate, and so we are not setting in-use standards for Bin 0. We are also adopting the general approach taken in LEV III of making these interim standards available during the phase-in period (model years 2016-2022) for the first two model years that a test group is newly certified to a Tier 3 NMOG+NOx or PM standard.

4.2.5. HDV Emissions Averaging, Banking, and Trading Program

What Commenters Said:

Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global Automakers):

Early Opt-in vs. Early Credits:
Historically, agencies have provided a mechanism to earn early credits in order to facilitate the transition into more stringent fleet average requirements and to safeguard against unforeseen circumstances that could cause a deficit situation. Although the proposed HDV program allows manufactures to opt-in to the program early, this is not equivalent to providing early credits. The early opt-in option is also more stringent than the LEV III program, which will allow for carryover of LEV II credits into the LEV III phase-in. Given the short lead time, extending this opt-in period to the MY 2015 would not provide significant additional flexibility to manufacturers.

Recommendation: We propose that EPA align the HDV credit provisions with the light-duty program by allowing early credits to be generated in MYs 2016 and 2017 vs. a Bin 395/630 average. National HDV credits could then be proportionally capped at the CA level in MY 2018.

VEC vs. Fleet average:
EPA is proposing a fleet-average based compliance for HDVs. This is different than ARB's approach in LEV III, which uses Vehicle Equivalent Credits (VEC) to determine compliance. Adoption of these incongruent approaches for compliance demonstration and reporting would prevent the harmonization of LEV III and Tier 3 for HDVs, even though the stringency of the EPA and California standards are equivalent. Since the stringency is equivalent, manufacturers have no preference for the method. ARB staff have indicated that ARB would consider allowing optional compliance with the EPA fleet average. Although this would have the effect of harmonizing the requirements, ARB is not currently in rulemaking and cannot consider providing this option until after EPA finalizes Tier 3.

Recommendation: Since EPA is in rulemaking, we recommend that EPA provide an option for manufacturers to comply using California's VEC system. After EPA finalizes Tier 3 and ARB adopts the optional compliance with the fleet average approach in Tier 3 (assuming ARB does so), manufacturers would not object to EPA eliminating the California VEC option.

Our Response:

Industry commenters argued that EPA should align the HDV credit provisions with the light-duty program by allowing early Tier 3 credits to be generated in MYs 2016 and 2017, calculated relative to the highest Class 2b and Class 3 bin NMOG+NOx levels (395 and 630 mg/mi, respectively), and capped at a level proportional to the California level in MY 2018. However, these highest bin levels correspond to those of the existing HDV standards for NMHC and NOx, and are significantly higher than the MY 2016 and 2017 LEV III levels. Thus vehicles designed to just meet the LEV III standards in these years could generate a large preliminary number of credits under the industry's Tier 3 early credits proposal, credits they would not earn in LEV III, thereby potentially thwarting the harmonization of the two programs, undermining the stringency and benefits of Tier 3, and bringing into question whether the standards should be revised to meet the requirements of Clean Air Act section 202(a)(3)(A).

We considered whether truncating that credit bank for each manufacturer in 2018 such that it is proportional to their LEV III balance, combined with additional restrictions on trading and banking, would address these concerns and restore a harmonized credit status in that year. However, such an approach would constitute an unnecessarily complex and uncertain pathway to the same result as that achieved under EPA's early opt-in provisions. We are also not we providing for the conversion of pre-Tier 3 HDV credits for use in Tier 3, as we believe that by providing an early Tier 3 opt-in program for HDVs, capable of generating credits for two model years before the mandatory standards take effect (even longer under the alternative percent-of-sales phase-in approach), we are giving ample opportunity for the manufacturers to accumulate early credits. HDV manufacturers are currently certifying their vehicles to existing standards without generating or using NOx or NMHC credits, and the levels we set for Tier 3 standards are not based on any assumption of credit transfers into Tier 3. Allowing such transfers would also introduce new complexities in dealing with the conversion of NOx and NMHC credits into NMOG+NOx credits.

Manufacturers commented that the proposed fleet average compliance approach is incongruous with California's LEV III method based on vehicle equivalent credits (VECs). Although stating that they do not have a preference for the method (since the stringency is equivalent), they recommended that EPA foster harmonization by providing a compliance option based on VECs. We believe that such an option would add unnecessary complexity to the Tier 3 program, and is made even more unnecessary by the intent expressed in CARB's written comments to propose a fleet average option for LEV III that is identical to EPA's approach.

4.2.6. Other HDV Provisions

What Commenters Said:

Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global Automakers):

Chassis vs. Dyno Cert:
We request that EPA align with LEV III and allow the option to choose chassis or dyno certification for complete diesel engines 10,000-14,000 lbs. GVWR (Class 3). Without this option, manufacturer's may be required to dual certify vehicle models that include variants both under and over 14,000 pounds.

International Council on Clean Transportation (ICCT):

The ICCT supports maintaining fuel-neutral criteria emissions standards for heavy-duty vehicles. We also fully support extending chassis-based emission requirements to all complete vehicles up to 14,000 gross vehicle weight.

It is ICCT's position that technology-neutral performance standards are critical in any transportation policy, especially one that involves multiple and alternative fuels that can all be utilized as part of meeting emissions and energy objectives. Thus, we are supportive of maintaining fuel neutral criteria emissions standards for heavy-duty vehicles.

The ICCT fully supports extending chassis-based emission requirements to all complete vehicles up to 14,000 gross vehicle weight. The trend since the first standards were adopted in the 1970s has been to increase the GVW of pickup and other light trucks above the threshold for light-duty emission standards. This has especially been a problem for diesel engines in pickup trucks, which are only sold above 8,500 GVW in order to avoid the light-duty emission standards. Extending the threshold to 14,000 GVW will ensure emission standards are applied appropriately to all complete vehicles.

Truck and Engine Manufacturers Association (EMA):

Chassis- and Engine-Dynamometer Certification of Complete Vehicles:
EPA has proposed to "codify" the practice of most, if not all, manufacturers that currently chassis-certify their Heavy-Duty Vehicles by requiring all diesel-fueled complete vehicles to be chassis-certified under the Proposed Rule. Furthermore, although incomplete Heavy-Duty Vehicles are not required to be chassis-certified, EPA has requested comment on requiring chassis certification of Class 2 incomplete vehicles as is required under the California Air Resources Board's ("ARB") LEV III program for vehicles up to 10,000 lbs. GVWR.

EMA and its members oppose mandatory chassis-certification for any class of engines or vehicles over 8,500 lbs. GVWR. Even if manufacturers have more frequently chosen to certify such vehicles on the chassis test, EPA should not remove the flexibility manufacturers currently have with respect to certification of diesel-fueled complete vehicles. Rather, EPA should finalize a rule that allows engine manufacturers the continued option to choose either chassis-dynamometer or engine-dynamometer certification for both complete and incomplete engines/vehicles over 8,500 lbs. GVWR. Maintaining the option allows manufacturers continued flexibility in certification decisions, thereby minimizing unnecessary costs and certification burdens.

EMA recognizes that its recommendation for optional chassis-certification for complete vehicles is one area where we are not recommending harmonization with ARB, which mandates chassis-dynamometer certification for complete vehicles with GVWRs between 8,501 and 10,000 lbs. GVWR. Such lack of harmonization in this area is appropriate, however, as it provides manufacturers greater compliance flexibility without adverse emissions impact.

If EPA nevertheless proceeds with mandatory chassis-certification, EPA, at a minimum, should align with ARB's LEV III Rule and allow manufacturers the option of engine or chassis dynamometer certification for complete vehicles with GVWRs between 10,001 and 14,000 lbs. or the engines used in them.

- Allow engine manufacturers the continued option to choose either chassis dynamometer or engine-dynamometer certification for both complete and incomplete vehicles between 8,501 lbs. and 14,000 lbs. GVWR.
- Adopt the recommended high-altitude standards for heavy-duty vehicles.
- Engage in further review of optional chassis- or engine-dynamometer certification for gasoline- or diesel-fueled vehicles over 14,000 lbs. GVWR.

Our Response:

Industry commenters opposed mandatory chassis certification for complete diesel vehicles, especially for vehicles in Class 3. ICCT supported it. It is difficult to assess the degree to which a desire to avoid light-duty regulations has driven a shift in the diesel market toward heavy-duty pickups as asserted by ICCT. Nevertheless, although sensitive to the issues raised by the manufacturers, we remain concerned that the fleet average standard program we are finalizing would not work well if a major fleet component, such as complete Class 3 diesel trucks, can be left in or taken out of the fleet calculation based on what each manufacturer considers to be most advantageous. We believe the resulting competitive issues and uncertainties would be problematic, given the wide variance in gasoline/diesel HDV sales among the manufacturers, our provision for averaging across each manufacturer's entire Class 2b/3 fleet, and the overwhelming preponderance of diesels in the Class 3 market. It would also create uncertainties in the Tier 3 environmental benefits, given the pronounced difference between these Tier 3 standards and the heavy-duty diesel engine standards we set 13 years ago, which we expect to remain in effect for the foreseeable future.

As a result, we are finalizing the proposed requirement for chassis certification of complete (but not incomplete) diesel Class 2b/Class 3 HDVs, except that we are providing that manufacturers of complete diesel Class 3 HDVs may, instead of certifying these vehicles, install diesel engines that are engine-certified in any model year that the engine family has less than half of its sales being installed in such complete Class 3 vehicles. This provision is intended to help address manufacturers' concern about dual certification, while at the same time ensuring a coherent fleetwide standards regimen in this vehicle class. It also better harmonizes with California's LEV III program which does not mandate chassis certification for diesel Class 3 vehicles. By only allowing for engine-certified vehicles when they use engines primarily produced for other purposes, we believe this approach adequately guards against potential abuse. In the case of complete diesel Class 3 HDVs produced by a company other than the engine certifier, the responsibility for ensuring the sales limit is not exceeded remains with the vehicle manufacturer, who will need to coordinate with the engine supplier.

4.2.6.1. High Altitude Standards

What Commenters Said:

Truck and Engine Manufacturers Association (EMA):

High-Altitude Standards:
EPA requires high-altitude testing for Heavy-Duty Vehicles (8,501-14,000 lbs. GVWR). While EPA provides high-altitude testing relief in the Tier 3 Rule (relative to low-altitude standards) for light-duty vehicles, EPA does not provide similar relief for Heavy-Duty Vehicles. (78 Fed. Reg. 29870, Table IV-9.) Separate high-altitude standards such as those provided in the light-duty Tier 3 program also are needed for HDVs, which must test at ALVW even at high altitude.

EMA recommends that EPA adopt separate high-altitude standards for Heavy-Duty Vehicles in the same proportion as it provides for LDVs. The table below (marked "Table IV- 13B" to indicate its proposed placement in the Preamble) [The table can be found on p. 8 of Docket number EPA-HQ-OAR-2011-0135-4314-A1] shows the high-altitude FTP Standards recommended by EMA. Consistent with the proposed relief for light-duty vehicles, no adjustment is made for the interim bins.

EMA has recommended high-altitude standards for Class 2b Bin 250 and for Class 3 Bin 400 that are higher than the high-altitude standard for Class 2b Bin 340 and for Class 3 bin 570, respectively. The explanation for this apparent anomaly is that the useful life for the non-interim bins is higher (150,000 miles) than it is for the interim bins (120,000 miles), thus requiring higher standards for the immediately lower bins.

Ford Motor Company (Ford):

HDV High-Altitude Provisions:
In the proposed rule, EPA acknowledged that fundamental physical challenges exist at high altitude that typically results in higher emissions during cold starts. EPA accordingly proposed altitude relief, but only for light-duty vehicles. Heavy duty vehicles have similar, if not greater, challenges at high altitude. These vehicles are designed to operate under load and trailer tow conditions, and as a result the emissions systems are located further downstream from the exhaust manifold relative to a light duty vehicle, further delaying catalyst light-off. To provide manufacturers with sufficient compliance margin, we propose that EPA provide altitude relief for the most stringent HDV bins.

Ford proposes that EPA also provide the following high-altitude standards for HDVs:
[Specific proposed high-altitude standards for HDVs follow.]

Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global Automakers):

Separate altitude standards such as those provided in the light-duty Tier 3 program are also needed for HDVs, which must test at ALVW even at high altitude.

We recommend: Adopting separate high-altitude standards for vehicles >6,000 pounds GVWR in the same proportion as LDV.

Our Response:

Manufacturers argued in their comments that the reasons EPA cited in proposing relief at high altitudes for light-duty vehicles apply for HDVs as well, and requested that relaxed NMOG+NOx standards be adopted in the more stringent bins for testing of HDVs at high altitudes. Ford argued that the challenges could be even greater for HDVs because they are designed to operate at high altitudes with heavy payloads and towed trailers, and this may necessitate the locating of emissions systems farther from exhaust manifolds, thereby increasing catalyst lightoff delays.

Although we agree to a certain extent about the performance of gasoline-fueled HDVs at high altitudes and their similarity to LDVs, the comments did not alter our view that the compliance margins provided in the HDV FTP bin standards compared to what the control technologies can achieve, and the freedom manufacturers have to shift to the more stringent bins gradually as the program phases in, are adequate to account for these effects at altitude. The manufacturers provided no data to counter this view.

We note that our adoption of relaxed interim in-use standards for vehicles in these bins will be directionally helpful to address any remaining concerns by manufacturers regarding emissions at altitude (preamble Section IV.B.6.a). This is because testing at high altitudes is often not required for certification (typically manufacturers use an engineering analysis instead), and thus the relaxed in-use standards will help to facilitate Tier 3 implementation for any HDV designs in which in-use problems at high altitudes surface in the initial model years.

4.2.6.2. Vehicles Over 14,000 Lbs.

What Commenters Said:

Truck and Engine Manufacturers Association (EMA):

Optional Certification for Vehicles Over 14,000 Pounds GVWR:
Currently, heavy-duty gasoline vehicles (HDGVs) above 14,000 lbs. GVWR (or the engines used in them) have the option of certifying on either an engine dynamometer or chassis dynamometer to demonstrate compliance with GHG requirements. As EPA notes in the Preamble, manufacturers choosing the chassis dynamometer option to certify a family of HDGVs for GHGs must use the engine dynamometer test to certify to g/hp-hr standards for all other emissions. (78 Fed. Reg. at 29883.) EPA requests comment on extending this HDGV option for the demonstration of compliance with criteria pollutant requirements.

In addition, heavy-duty diesel vehicles (HDDVs) above 14,000 lbs GVWR (or the engines used in them) currently must certify on an engine dynamometer to demonstrate compliance for both criteria pollutant and GHG requirements. EPA requests comment on whether to provide the option to certify on either an engine dynamometer or chassis dynamometer to demonstrate compliance with criteria pollutant and GHG requirements to HDDVs (or the engines used in them).

While EMA generally supports compliance options that provide flexibility to manufacturers in meeting regulatory requirements, there are still significant unknowns regarding EPA’s intent in possibly offering the options. EMA recommends that EPA engage heavy-duty engine and vehicle manufacturers in a thorough review of the issues and their potential impacts. That has not yet been done. In addition, we will continue to review EPA’s request for comment and will strive to provide EPA supplemental comments.

Cummins Inc.:

Optional Chassis Certification for Vehicles above 14,000 Pounds GVWR:
The existing heavy-duty greenhouse gas (GHG) regulations allow manufacturers to certify heavy-duty gasoline vehicles (both complete and cab-complete) on either the engine dynamometer or chassis dynamometer to demonstrate compliance with GHG requirements. However such vehicles must be certified on an engine dynamometer for all other emissions standards (g/hp-hr). EPA requests comment on allowing a manufacturer to certify a heavy-duty gasoline vehicle (HDGV) for all emissions standards using chassis dynamometer procedures.

In addition, engines for heavy-duty diesel vehicles (HDDVs) above 14,000 lbs GVWR currently must certify on an engine dynamometer to demonstrate compliance for both criteria pollutant and GHG requirements. EPA requests comment on whether to provide the option to certify on either the engine dynamometer or chassis dynamometer to demonstrate compliance with criteria pollutant and GHG requirements for engines for HDDVs.

Cummins does not support an option of chassis certification for GHG or criteria emission standards for vehicles above 14,000 lbs GVWR. Cummins urges EPA not to finalize these options.

In the NPRM, EPA has not provided any regulatory language or discussed this option in detail in the Preamble. It is not clear how such an option would work and what the limits are relative to vehicle size. For example, EPA has not specified whether such an option would be limited to Class 4 vehicles only or if it would extend to even bigger vehicles. In absence of such details, it is impossible for Cummins or any entity for that matter to consider the implications of these provisions.

For vehicles above 14,000 lbs GVWR, EPA already has a robust regulatory framework for both GHG and criteria emissions based on engine dynamometer test procedures. The engine dynamometer test cycles (e.g. FTP) are appropriate for such vehicles, and EPA would need to study the applicability of chassis dynamometer test cycles if the Agency wants to move forward with consideration of these options.

Under the current GHG rule, HDGVs above 14,000 lbs can certify to chassis standards based on a ‘complete sister vehicle’ concept. Vehicles above 14,000 lbs (e.g. Class 4-6 vehicles) are typically engineered and marketed to meet vocational requirements. Many of the vehicles in this class are not sold as complete, ready to be placed into service, vehicles. The common sales path to the end-user is through a specialty body or utility function builder. While the vehicle OEM can communicate parameters such as aerodynamic design standards to which the finish builders must comply, the finish body may exceed the frontal projection and/or may affect air flow quite differently than on a complete pickup truck or even on the bare “cab-complete” vehicle. Hence it may not be appropriate to use coastdown and test weight information of a complete sister vehicle (in Class 2b/3) for chassis certification of vehicles above 14,000 lbs GVWR.

EPA also requested comments on whether manufacturers of such vehicles that are certified to a Final Tier 3 bin should be allowed to exclude them from the fleet average NMOG+NOX calculation. Cummins does not support this provision. Excluding these vehicles from fleet average calculations could potentially lead to unintended consequences. For example, a manufacturer could increase GVWR of their heavier Class 3 vehicles to just above the threshold (e.g., 14,001 lbs GVWR) and then exclude them from fleet average calculations.

Recommendation: Cummins urges EPA not to finalize these proposed options for chassis certification for vehicles above 14,000 lbs GVWR or exclusion of these vehicles from fleet averaging. If EPA wants to consider these options, Cummins would work with the Agency and other heavy-duty engine and vehicle manufacturers to engage in a complete review of the issues and potential impacts of such a rule.

Our Response:

Cummins and EMA responded to our request for comment on optionally extending chassis-based certification to vehicles over 14,000 lbs. Both commenters felt that a more thorough review of the issues and potential impacts involved needs to occur before EPA takes action on this matter. We agree and are not making this change in this rule.

4.3. Evaporative and Refueling Emission Standard Comments

See 78 FR 29884-29899, May 21, 2013 for full detail on the proposal

4.3.1. Tier 3 Evaporative Emission Standards

What Commenters Said:

Organization: Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

Evaporative Emissions 2017 Phase in Requirement:
The Tier 3, LEV III, and PZEV zero evaporative emissions standards are identical. The phase-in is also identical in all but MY 2017. For MY 2017, California does not require a specific percentage of a manufacturer's fleet meet the LEV III evaporative emissions standards. Instead, MY 2017 vehicles in California that generate PZEV credits are required to certify to the zero evaporative emission standard. The proposed Tier 3 regulations allow two options for compliance in MY 2017. The first option requires a manufacturer to meet the Tier 3 evaporative emissions standard on 40 percent of its fleet less than 6,000 pounds GVWR. The second option requires the manufacturer to make the PZEV evap systems available nationwide (i.e., for all California PZEVs, the evaporative emissions control system would need to be sold nationwide). The Tier 3, LEV III, and PZEV evaporative emissions standards require manufacturers to make significant hardware changes to the vehicle. These hardware changes trickle down throughout the manufacturers' development, testing, certification, and supply chain and require substantial lead time to avoid very costly disruptions. While the Tier 3 proposal would have provided sufficient lead time had Tier 3 been finalized in late 2011 (i.e., the 2012 MY), meeting those same requirements when manufacturers have lost two years of lead time would be very costly and disruptive. In addition to the early leak emission standard option described above, the option to make PZEVs available nationwide isn't necessarily as clear as it could be. We understand that this option would require that if a manufacturer made a single vehicle model with three option packages (4-cylinder, 6-cylinder, and hybrid) but only the hybrid was a PZEV, then the manufacturer would need to make the evaporative system on the hybrid available nationwide. The manufacturer would not have to meet Tier 3 evap (or PZEV evap) on the 4-cylinder and 6-cylinder vehicles nor restrict sales of those vehicles. However, the regulatory requirements in §86-1813-17 could be read to require the manufacturer to produce Tier 3 evap in all three vehicles, which we understand is not EPA's intent. Furthermore, we believe EPA's ultimate intent with this provision is that manufacturers choosing this option produce about the same proportion of zero evaporative emission vehicles in the non-Section 177 states as they produce in

the Section 177 states without being subject to sales mix differences between the two regions which are beyond the manufacturer's control. We recommend language below to clarify this option.

We recommend revising §86-1813-17(g)(3) as follows:
(3) You may disregard the percentage phase-in specified in paragraph (a)(5) of this section for 2017 if you choose 50-state certification for all your vehicles meeting the LEV III PZEV evaporative standards in 2017. Under this option, you may not produce a higher-emitting version of those vehicle models for sale outside of California or the section 177 states. For example, if a manufacturer produces Model X in four configurations (4-cylinder (50-State non-PZEV), 6-cylinder (50-State non-PZEV), hybrid (CA PZEV), and hybrid (Federal, non-PZEV), then you could comply with the 2017 model year requirement by putting the CA-PZEV evap system on the hybrid (Federal, non-PZEV) vehicle; you would not have to make changes to the 4-cylinder or 6-cylinder vehicles. Such vehicles may be certified using carryover data under the California program; however, they may generate or use emission credits only if they are certified to meet the emission standards of paragraph (a)(2) of this section. Vehicles that comply under this paragraph (g)(3) may not generate allowances under paragraph (g)(1) of this section, regardless of the calculated percentage of compliant vehicles in model year 2017. Furthermore, you will be deemed in compliance if the fraction of 2017 MY vehicles with LEV III PZEV evaporative systems sold in the non-Section 177 states is within three percent of the fraction of 2017 MY vehicles you sold in California.'

Our Response:

This option was proposed to permit the manufacturers to simply extend their current SULEV or PZEV Zero Evap offerings nationwide as a basis for providing the non section 177 states the same emission reduction benefits as would occur in California and the section 177 states. One of several benefits of using the PZEV zero evap only option was that there would be no end of model year accounting required at the Federal level for the 2017 model year. EPA recognizes that the fleet mix in each state is not identical and that in phase-in programs such as in Tier 3 (or LEV III) there could be very minor year-to-year differences in the number of Tier 3 compliant vehicles in any given state. Thus, we see no need for setting the three percent requirement suggested by the commenter.

Central to this option is the principle that any PZEV zero evap model (e.g., fuel system/powertrain configuration) offered for sale in California and/or any of the section 177 states must be offered for sale nationwide. This does not preclude a manufacturer from offering different fuel system/power train configurations of the same base model for sale nationwide but only if they are offered for sale in California and the section 177 states. Stated differently, to qualify for this option in the 2017 model year, a manufacturer must offer all fuel system/power train /configurations/evaporative control system configurations of a base model it sells in California and the section 177 states in the non-section 177 states also.

High-Altitude testing-FTTP and 3-Day (FR29892)

What Commenters Said:

Organization: Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

EPA indicates the following regarding high altitude 3-day evap.: "We are proposing to keep that requirement but to allow for an adjustment of 5°F in the temperatures related to the running loss test within the 3-day test cycle. Thus, the applicable fuel and ambient temperatures at §86.134-96 (f) and (g) would 90±5 °F instead of 95±5 °F for high altitude testing."

We recommend EPA clarify that all temperature values within the Fuel Tank Temperature Profile (established for sea level testing) will be adjusted down by 5°F for high altitude testing. Additionally, the hot soak and diurnal temperatures should be adjusted down by 5 °F for high altitude testing.

To help reduce the testing burden on industry, we recommend eliminating the high-altitude 3-day requirement. The 3-Day test includes higher temperature inputs that are not typically encountered at high altitude.

In fact, to further reduce testing burden on industry, we would support removing the 3-Day requirement at sea-level as well.

Our Response:

We agree with the commenter regarding the technical rationale for a 5F° downward adjustment in the fuel tank temperature profile for testing at altitude. This has merit because of the nature of the evaporative process for 7.8 RVP fuel at the higher tank temperature and lower atmospheric pressure a as compared to sea level. The 5°F downward adjustment in the sea level fuel tank temperature profiles for high altitude testing is still representative for high altitude and control will still occur using the control systems/technical approaches designed for low altitude operations. This argument does not apply to the temperature cycle used for the diurnal test because temperatures of 96°F or more are encountered in high altitude areas in the ozone season[17] and manufacturers provided no information supporting changes to these test elements at altitude or sea level. Therefore, we are not eliminating the three day test or adjusting test temperatures at low or high altitude.

Organization: American Honda Motor Co., Inc.

High Altitude Evaporative Emission Standards:
Under the Tier 3 rule, EPA allows vehicles certified to LEV III to be carried over into Tier 3. However, LEV III does not specify high altitude standards. Tier 3 sets less stringent standards/requirements for high altitude conditions, due to many, well-understood reasons (e.g. lower atmospheric pressure on vapor generation rates, canister loading and purge dynamics, etc). In §86.113-04(a)(2)(ii)(C), EPA states that LEV III vehicles must also meet "standards at high-

[17] See for example, http://coolweather.net/statetemperature/colorado_temperature.htm.

altitude conditions." Honda believes this requirement is too stringent, and inconsistent with EPA's intention to relax high altitude obligations. Vehicles that certify to LEV III standards should be allowed to meet the relaxed high altitude EVAP standards of Tier 3.

Our Response:

We concur with the commenters view regarding hot soak plus diurnal evaporative emission standards for high altitude. The intent of this provision is for any LEV III or PZEV zero evap carryover vehicles to meet the Tier 3 high altitude standards if it is to be sold outside of California. For PZEV zero evap carryover the manufacturers can use Tier 2 or Tier 3 fuel to meet the Tier 3 high altitude standards through the 2019 model year. For vehicles meeting the LEVIII option 1 or option 2 standards in the 2015 model year and using carryover for future model years they can use Tier 2 or Tier 3 fuel to meet the Tier 3 high altitude standards. For new Tier 3, LEV III option 1 or option 2 certifications in the 2016 and later model years they must use Tier 3 test fuel for the Tier 3 high altitude standards.

What Commenters Said:

Organization: Aston Martin Lagonda Ltd

For evap capability AML recognizes the reasons for EPA wanting to keep all three tests and even adding a leak test; however the 3 day test still allows point source running loss testing to be accepted rather than full enclosed chamber measurement. In this respect I would propose that SVMs certify only using the ORVR test and the 2 day test. The ORVR test effectively drives canister capacity requirements. The 2 day test is the best method for validating purge capability (backed up with the bleed test) and for driving a diurnal capable system design. The 3 day test does not add anything to the validation of an evap system design and in fact with point source running loss measurement the 3 day test with its extended diurnal does not prove system capability any further than the 2 day test but does incur significant testing burden and cost for SVMs. Additionally Aston Martin acknowledges and approves of the removal of the need for the leak test at time of certification.

Our Response:

The leak test and standard apply at time of certification and in-use, but can be met by attestation at time of certification. EPA does not concur with the commenter with regard to the three day evaporative emissions test. The commenter's technical assertions are often but not consistently true. For example, for an ORVR system with a mechanical seal, canister volume and working capacity may be driven by the three day test. The same is the case for sealed fuel tanks used on some hybrid vehicles and for any non-integrated evaporative and refueling system canister approaches. Also, it should be noted that another commenter encouraged EPA to consider diurnal emissions control for more than three days, not less.

What Commenters Said:

Organization: California Air Resources Board (CARB)

Evaporative canister bleed test standard in-use requirement:
CARB supports U.S. EPA's proposal to implement an in-use requirement for the bleed test standard. This in-use requirement would ensure that canister performance is maintained as vehicles age. Accordingly, CARB intends to propose alignment with this proposal once the Tier 3 program is finalized.

Our Response:

We acknowledge CARB's support and intention to propose revisions to align with EPA's canister bleed test standard and in-use requirements.

4.3.2. Program Structure and Implementation Flexibilities

What Commenters Said:

Organization: Volkswagen Group of America, Inc.

VWGoA would also like to request that the Family Emission Limits (FEL) for evap Tier 3 be set at a value much lower than the currently proposed 25 mg. This large increment does not provide the needed flexibility to ensure success on a fleet wide level. VW requests an FEL of 5 mg.

Our Response:

EPA understands that a lower or unfixed increment for the FEL for the hot soak plus diurnal standard would potentially lead to greater credits or smaller debits. However, we believe the increment we proposed is appropriate. Setting a smaller increment creates the potential for false credits which could occur by shaving the compliance margin or by taking credit for the decay in non-fuel hydrocarbon emissions which occurs over time on real world vehicles.

A 25 mg increment means there will be a compliance margin of zero to 24 mg relative to the FEL depending on the measured emission level. This is up to 8 percent of the level of the standard of 300 mg for LDVs/LDT1s, which we believe is not an overly high percentage. In 2013 VWGoA certified with compliance margins of 20-80 percent relative to the MSAT standards, and the differences between the measured levels and the certified levels were very small ranging from zero to 20 percent. The 25 mg increment generally results in a compliance margin larger than that for a 5 mg increment, but this is reasonable since, for example, in 2013 all of VWGoA's evaporative families certified with a compliance margin of 20 percent or more of the standard.[18] Finally, it should be noted that participation in ABT is voluntary.

[1818] Passavant, G. (February, 2014). "Volkswagen Group of America Evaporative Emissions Certification Data for the 2013 Model Year". Memorandum to the docket.

What Commenters Said:

Organization: Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

Cert (FR29887):
Beginning in the 2017 MY, all new evaporative/refueling emission family certifications would have to meet the proposed EPA Tier 3 certification requirements for both test procedure and certification test fuel for evaporative and refueling emission standards. This statement should apply for all new evaporative/refueling certification testing for families certified to the Tier 3 requirements, not all new evaporative/refueling testing. This requirement should not apply to evaporative/refueling families certified to the Tier 2 requirements.

Our Response:

EPA concurs with the comment. As specified in the preamble, Tier 3 evaporative and refueling test procedures and certification test fuel apply to vehicles brought into the Tier 3 evaporative emission program. As discussed in the preamble, these requirements vary depending on the program option and the applicable standards. They do not apply to vehicles still meeting Tier 2 evaporative emission requirements.

What Commenters Said:

Organization: Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

EPA asked for comment on a third option that would require that a manufacturer meet the Tier 3 evaporative emissions standard on 20 percent of its fleet less than 6,000 pounds GVWR and also meet the leak check standard on those vehicles. We support this option and appreciate that EPA understands our concerns. We agree that manufacturers could meet the leak check standard on 20 percent of their MY 2017 fleet; however, since these are independent requirements, there is no reason that manufacturers need to overlap the vehicles meeting Tier 3 evaporative emission standards with vehicles meeting the leak check standard.

Recommendation:
1. We recommend adding the following as new paragraph §86-1813-17(g)(2).
"(2) For 2017 model year only, you may reduce the percentage phase-in specified in paragraph (a)(5) of this section to 20 percent of projected vehicle sales of vehicles at or below 6,000 pounds GVWR, if you also certify 20 percent of your vehicles at or below 6,000 pounds GVWR to the Tier 3 leak emission standard in paragraph (a)(4) of this section. Also, if you certify vehicles above 6,000 pounds GVWR to the Tier 3 evaporative emissions standard in model year 2017, you may count projected U.S. sales of those vehicles toward your calculation for meeting the 20 percent Tier 3 evaporative emissions phase-in requirement in 2017 (numerator only)."

What Commenters Said:

Organization: General Motors LLC (GM)

For phasing in the evaporative emission standards, we support a 20% requirement in 2017 coupled with an alternative phase-in approach starting in 2017 to facilitate the ramp-up to national volumes while maintaining equivalent stringency with the California LEV III program. This is detailed further below.

Evaporative Emission Phase-in

EPA asked for comment on the Tier 3 evaporative emission phase-in schedule options. One of the phase-in options listed would require OEMs to meet the Tier 3 evaporative emissions standards in the 2017 model year for 20% of their fleet for passenger cars and LDTs < 6,000 lbs. GVWR. These vehicles would also have to comply with the leak check standard. Phase-in schedules greater than the 20% option are problematic due to insufficient lead-time and zero evaporative system component supplier constraints. Therefore, GM supports a 20% requirement in the 2017 model year.

The evaporative emission phase-in rate is especially aggressive, and the combination of a 20% requirement in 2017 along with the allowance of an alternative phase-in approach beginning in 2017 will provide needed flexibility for expanding zero evaporative system technology throughout the U.S.

Our Response:

The 20/20 option for the 2017 model year is included in the final rule. The number of vehicles needed to meet the 20 percent value is based on multiplying 0.2 times the passenger car and light truck sales ≤ 6,000 lbs GVWR for the non-section 177 states and excluding California. Compliance with this value can be from any vehicle category covered by the Tier 3 program. Under the 20/20 program the manufacturer must meet or exceed each of the two values: 20 percent Tier 3 evaporative hot soak plus diurnal and 20 percent leak standard. These standards may be net on the same or different vehicles. Manufacturers utilizing this option will have to demonstrate that they meet the 20 percent requirement based on actual sales after the end of the 2017 model year. There is no flexibility to under comply with one percentage but offset by over complying with the other. These vehicles must also meet the 0.020" evaporative system leak monitoring requirement which also takes effect in the 2017 model year.

4.3.3. Alternative Phase-in Percentage Approach

What Commenters Said:

Organization: General Motors LLC (GM)

In addition, GM supports the allowance of an alternative phase-in approach, starting in 2017 model year, which allows flexibility from model year to model year in the phase-in percentage as long as the manufacturer achieves a minimum number of phase-in points equivalent to the baseline phase-in percentage.

The evaporative emission phase-in rate is especially aggressive, and the combination of a 20% requirement in 2017 along with the allowance of an alternative phase-in approach beginning in 2017 will provide needed flexibility for expanding zero evaporative system technology throughout the U.S.

Organization: Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

Alternative Phase-in Percentage Approach: EPA proposes that manufacturers may use an alternative phase-in approach that is equivalent to the normal percentage phase-in requirement measured over the course of the phase-in period but allows more flexibility between model years. Specifically, in lieu of meeting the 60/60/80/80/100% phase-in requirement over MYs 2018-2022, EPA proposes allowing a manufacturer to meet a phase-in that adds up to a value of 1040 or greater using the formula 5 x 2018MY% + 4 x 2019MY% + 3 x 2020MY% + 2 x 2021MY% + 1 x 2022MY%. In addition to providing manufacturers added flexibility between model years, this approach also provides an incentive to over-achieve relative to the normal percentage phase-in requirement in the early years of the phase-in. We support the availability of this alternative phase-in approach.

EPA also asks for comment on whether this alternative phase-in approach should include the 2017 model year, based on a 2017 percentage requirement of either 40% or 20%. We support including MY 2017 in the alternative phase-in approach based on a MY 2017 requirement of 20%. As EPA notes in the preamble, the above equation would be modified as follows to accommodate this change: 6 x 2017MY% + 5 x 2018MY% + 4 x 2019MY% + 3 x 2020MY% + 2 x 2021MY% + 1 x 2022MY% must be greater than or equal to 1160. We believe this alternative phase-in approach would give auto manufacturers the flexibility they need to ramp-up Tier 3 evaporative emission systems to a nationwide level across 100% of their models by MY 2022.

Recommendation: We support inclusion of an alternate phase-in, as well as an alternate phase-in that includes MY 2017.

Our Response:

EPA is incorporating an alternative phase-in scheme which includes the 2017 model year. As stated by the commenter, we proposed the alternative phase-in percentage approach and are finalizing it including the option to include the 2017 model year for the 20 percent option. However, for the 20 percent option in 2017 under the alternative phase-in scheme, the vehicles must meet the hot soak plus diurnal, leak standard, and the OBD 0.020" evaporative system leak monitoring requirements. Over compliance with the 20 percent hot soak plus diurnal requirement could earn "points" toward the required total in the alternative phase-in scheme.

EPA is also including the 40 percent of passenger cars and light trucks ≤ 6000 lbs GVWR option in the alternative phase-in percentage approach if a manufacturer elects that option for the 2017 model year. In either the 20 or 40 percent options, compliant vehicles can be from any class covered by the Tier 3 evaporative emission standards, but the number of vehicles is based on the percentage (i.e., 20% or 40%) of passenger cars and light trucks ≤ 6000 lbs GVWR excluding sales in California and the section 177 states.

What Commenters Said:

Organization: Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

End of year validation for non-ABT (FR29887):
EPA indicates the following requirement regarding the Tier 3 Evap. Phase-in: "At the end of the model year they would be expected to show that the percentages were met and if not they would either use additional allowances or bring more vehicle families into the calculation."

EPA indicates that the end of year validation with actual production volumes is necessary because they allow for fleet averaging.

We recommend EPA clarify that end of year validation with actual production volumes is not required if the manufacturer does not participate in the evaporative emissions ABT program (i.e., the manufacturer does not utilize FELs or credits/allowances).

Our Response:

We do not concur with the commenter. The end of year validation with actual production volumes is required to demonstrate that the required sales percentages were met. This is true whether or not the manufacturer participated in ABT during the phase-in.

What Commenters Said:

Organization: Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

Final Tier 3 Cert (FR29871): "...100 percent of vehicles would need to meet the all Tier 3 requirements and would be considered 'Final Tier 3' vehicles."

We assume this is in reference to "Final Tier 3" exhaust and not final Tier 3 evap, which will not be at 100% until 2022.

Our Response:

The commenter's interpretation of the NPRM preamble text is correct. "Final Tier 3" has no meaning in the regulatory context for evaporative emissions, but the preamble text here was referring to the exhaust emission standard program requirements. Evaporative emissions requirements are fully phased-in in the 2022 model year.

What Commenters Said:

Organization: Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

Credit Trading (FR29889):
Credit trading should be allowed between OEMs. Credit trading between OEMs will not reduce the overall stringency of the Tier 3 program.

Our Response:

We agree with the commenter and have included credit trading between manufacturers in the final program.

What Commenters Said:

Organization: Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

LEV 3 Option 2 (FR29885, FR29886, et.al): Vehicles certified to evaporative emission LEV 3 option 1 provisions are accepted as compliant to the Tier 3 requirements and are included in the percentage calculations. Vehicles certified to the LEV 3 option 2 provisions should be included as well.

Our Response:

We agree with the commenter that vehicles certified to the LEV 3 option 2 provisions are considered compliant and have clarified the description in the preamble (see Section IV.C.1.d) to the final rule of the Tier 3 evaporative emissions requirements for vehicles in various categories.

4.3.4. Technological Feasibility

What Commenters Said:

Organization: Michigan Department of Environmental Quality (MDEQ)

The MDEQ, Air Quality Division supports the more stringent evaporative, leak and refueling emissions standards, as well as the new test procedures described in the proposed rule. Control of these significant sources of volatile organic compounds, particulate matter, and toxic air contaminants have been demonstrated to be cost effective and attainable. California appears to have already implemented a program with many similar requirements, showing that the limits can be met.

Organization: Manufacturers of Emission Controls Association (MECA)

MECA agrees with EPA staff's assessment that achieving the proposed Tier 3 exhaust and evaporative emission standards and associated emission reductions are both technically feasible and cost-effective.

Advanced evaporative emission technologies (including advanced carbon canisters and air intake hydrocarbon adsorbers) that are available to meet Tier 3/LEV III evaporative emission standards for light-duty or medium-duty gasoline or flex-fuel vehicles are discussed in the MECA report: "Evaporative Emission Control Technologies for Light-Duty Gasoline Vehicles" (available on MECA's website, www.meca.org, under Resources >> Reports). MECA worked closely with ARB in developing the LEV III canister bleed emission testing protocol (also included in EPA's Tier 3 proposal) that provides a cost-effective means of defining the bleed emission performance characteristics of carbon canisters used on light-duty or medium-duty gasoline vehicles. Including this canister bleed emission test procedure in the Tier 3/LEV III requirements ensures that vehicle manufacturers have to meet a minimum canister performance level in complying with the "zero" evaporative standards that California first put in place for PZEV-certified vehicles. As on the exhaust side, the millions of PZEV-certified vehicles operating on U.S. highways today form a solid evaporative technology base that can be extended to all future Tier 3/LEV III light-duty and medium-duty vehicles.

Our Response:

EPA agrees with the commenters. The canister bleed standard helps to ensure that vehicle evaporative emissions are near zero. As discussed in Chapter 1 of the RIA there are many technology approaches which could be used to reduce evaporative emissions and there are over 50 models certified to PZEV zero evap requirements for the 2013 model year.

What Commenters Said:

Organization: Ferrari

Ferrari considers the proposed evaporative emission and PM standards feasible in 2021 MY. We therefore support this aspect of EPA's proposed rule.

Organization: Northeast States for Coordinated Air Use Management (NESCAUM)

I'd like to quickly mention two other provisions that would contribute to improved air quality and reduce public exposure to toxic contaminants in gasoline: reducing evaporative emissions to near zero levels from all affected vehicles as is currently the case with hundreds of thousands of California certified vehicles on the road in the northeast.

Organization: Sierra Club

Further, EPA demonstrates that there are a number of technologies in use today that can be integrated into motor vehicles to fully comply with the proposed Tier 3 evaporative emissions standards.

Our Response:

We acknowledge the support of the commenters for this aspect of the proposal.

4.3.5. Evaporative Emission Requirements for Heavy-duty Vehicles (HDV) Requirements

What Commenters Said:

Organization: Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

Chassis-Certified HDV Evaporative Emission Test Procedures: For chassis certified HDV evaporative emission test procedures, industry recommends that EPA reference the light-duty evaporative emissions test procedures and remove the HDV test procedures from the heavy-duty subpart. This would simplify and streamline the regulations and prevent possible inconsistencies between the light- and heavy-duty subparts.

Our Response:

EPA concurs with this suggestion and we are revising the regulatory text to reference the light-duty evaporative emissions test procedures and removing the HDV test procedures from the heavy-duty subpart. It will also help to facilitate the introduction of ORVR for HDGVs over 10,000 lbs GVWR.

What Commenters Said:

Organization: Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

HDGV Cert (FR29895): OEMs should be allowed to certify HDGV >14K GVWR to Tier 3 (voluntarily) and get credits (allowances). OEMs should also be allowed to optionally group >14K HDGV with 10 – 14K GVWR vehicles for certification.

Our Response:

In the NPRM EPA asked for comment on allowing voluntary certification to Tier 3 standards for HDGV>14,000 lbs GVWR if we did not adopt specific requirements. Tier 3 includes revised evaporative standards for these vehicles, as discussed in the preamble and further in Chapter 4.4 of this summary and analysis of comments, so the comment on that point is moot. We agree that HDGVs >14,000 lbs GVWR can be included with those between 10,000 and _14,000 lbs GVWR for certification purposes, such as in optional chassis tests, but they must meet all requirements related to vehicles less than 14,000 lbs GVWR vehicles such as the leak standard and OBD requirements.

4.3.6. HDGV Certification Flexibility

What Commenters Said:

Organization: Truck and Engine Manufacturers Association (EMA)

Use of Engineering Analysis for Vehicles Above 14,000 Pounds GVWR:
EPA is proposing to permit manufacturers to demonstrate compliance to evaporative emission standards using engineering analysis in lieu of direct testing and supplying test results for vehicles above 14,000 lbs. GVWR. (78 Fed. Reg. at 29895; proposed 40 CFR 1037.103(c), 78 Fed. Reg. at 30098.) This is an important change from the current allowance, which starts for vehicles with GVWR above 26,000 lbs. In its proposal, EPA points out that this is the same cut point allowed by ARB and would allow one certification method. EPA requests comments on this proposal.

If EPA determines not to exclude HDGVs over 14,000 lbs. GVWR from the evaporative emission requirements (see above discussion), then EMA supports this proposal. As EPA points out, the proposed change would provide consistency with ARB, and would allow one test method, which is of paramount importance to EMA and its members. In addition, few facilities exist to test evaporative emissions for those large vehicles. As a result, such an allowance would provide needed compliance demonstration flexibility. EMA recommends that EPA add the words "above 14,000 lbs. GVWR" after the first use of the word "vehicle" in the opening sentence of paragraph 1037.103(c) to more clearly communicate that engineering analysis is available for vehicles starting with GVWRs above 14,000 lbs.

- To the extent evaporative standards are in place for vehicles over 14,000 lbs GVWR, allow the use of engineering analysis in place of test data for evaporative emissions compliance

Our Response:

EPA acknowledges the conditional support of the commenter and is incorporating the proposed change to 40 CFR 1037.103(c) in the final rule.

What Commenters Said:

Organization: California Air Resources Board (CARB)

Comment 7 - Evaporative certification method for heavy-duty vehicles over, 14,000 lbs. Gross Vehicle Weight Rating: The NPRM requests comment on a proposal to modify existing certification requirements for heavy-duty vehicles over 14,000 lbs. gross vehicle weight rating so that evaporative certifications would rely solely on design parameters and engineering analysis instead of emissions testing. LEV III test procedures require engineering analysis and data to certify vehicles in this weight category for evaporative emissions, but do not specifically preclude emission testing as U.S. EPA is suggesting. Because some auto manufacturers may prefer to do actual testing, CARB recommends that Tier 3 include actual testing as a means of meeting the evaporative emission requirement. Nonetheless, CARB anticipates providing reciprocity to federal evaporative emission certification for these vehicles once Tier 3 is finalized.

Organization: Truck and Engine Manufacturers Association (EMA)

Further Reliance on Design Parameters and Engineering Analysis:
EPA also requests comments on taking an additional step to rely on design and engineering analysis. (78 Fed. Reg. at 29895.) Under this approach, manufacturers would be allowed to demonstrate that the design of their purge strategy, canister capacity, and overall control system would control emissions to the same degree as similar (or comparable) Class 2b or Class 3 vehicles that meet emission standards when tested over the established measurement procedures. This additional compliance demonstration flexibility – specifically, being able to reference evaporative emission control strategies used on similar or comparable Class 2b or Class 3 vehicles to demonstrate compliance with a performance-based standard – clearly is needed for large vehicles. Accordingly, EMA supports EPA taking such additional steps. It should be noted, however, that EMA's support of this proposal should not be taken in any way as diminution of EMA's support for performance-based emission standards, of which EMA has been a long-time advocate.

- Provide additional compliance flexibility through the use of design analysis for evaporative system compliance to a performance standard

Our Response:

EPA agrees with CARB. Testing using designated test procedures and test fuels should not be precluded as a means to show compliance with the emission standards. . However, For HDGVs over 14, 000 lbs GVWR, certification based on comparison of design parameters and engineering analysis relative to certified configurations is permissible. Of course, the results of any application for certification are subject to EPA approval.

With regard to EMA's comments, EPA solicited comment on the idea of a design- based certification approach for HDGVs over 14,000 lbs GVWR. EPA acknowledges the conditional support of this commenter, but has decided to not to finalize such a provision. We believe the use of engineering analysis and data from other HDGVs as prescribed in 40 CFR 86.1037(c) provides an equivalent flexibility for certification without precluding the use of testing for determining compliance.

What Commenters Said:

Organization: Truck and Engine Manufacturers Association (EMA)

More Descriptive Provisions Related to Using Engineering Analysis: EPA proposes to add more descriptive provisions relating to the use of engineering analysis to demonstrate compliance with evaporative and refueling emissions standards. (78 Fed. Reg. at 29895 and 30098; proposed 40 CFR 1037.103(c)). The more descriptive language, and the addition of an example related to evaporative emissions from certain fuel system components that is set forth in the regulatory language, provide manufacturers helpful guidance as to EPA's expectations. EMA recommends that the proposed language be finalized.

- Adopt the proposed descriptive provisions related to the use of engineering analysis to demonstrate compliance with evaporative and refueling emissions standards.

Our Response:

EPA acknowledges the support of the commenter and is finalizing the proposed language.

What Commenters Said:

Organization: California Air Resources Board (CARB)

Comment 10 - Evaporative option to use design based certification on gaseous-fueled vehicles: Subsequent to adopting evaporative emission standards for gaseous-fueled vehicles, U.S. EPA developed designed-based certification procedures for other sources (i.e., for marine vessels pursuant to 40 Code of Federal Regulation (CFR) 1060.240). These designed-based certification procedures would minimize or eliminate certification emission testing. The NPRM requests comment on changing the certification requirements for gaseous-fueled vehicles to a design-based approach, which U.S. EPA contends would allow for a simpler assessment when certifying these vehicles. CARB does not support this approach and believes that testing vehicles is still the most effective way to ensure system integrity and evaporative emission control. Whole vehicle testing also ensures that the evaporative system as installed in the vehicle, rather than its individual components, is properly evaluated such that the evaporative emission targets are met.

Organization: Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

CNG/LPG Design Based Cert (FR29907): Industry supports a design based certification approach for gaseous fueled vehicles. The evaporative emissions from metallic high pressure gaseous fuel systems are very low.

Our Response:

EPA agrees that whole vehicle testing is preferable and would not preclude manufacturers from doing so. The test procedures and standards in the CFR still apply to these vehicles and could be used by EPA even with this flexibility for design-based certification approaches. With regard to gaseous fueled vehicles we do not think that requiring emission testing using current test procedures is necessary and meeting design standards is sufficient to conclude that the vehicles are meeting emission standards. The fuel storage system designs for these vehicles are greatly different than for gasoline-fueled vehicles and they do not use the same emission control strategies as used on a gasoline-fueled vehicle. The test procedures are not as well suited to evaluate their performance since some aspects of the test procedure are intended to evaluate the characteristics and performance of control system approaches which are not used on gaseous fueled vehicles.

4.3.7. Evaporative Emission Requirements for FFVs

What Commenters Said:

Organization: Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

FFV Test Fuel (FR29884): Footnote 277 indicates that splash blended fuel should be used for FFV evap testing for Tier 3 certification. To simplify the regulations and reduce the number of required test fuels Tier 2 and Tier 3 certified FFVs should be allowed to optionally conduct evap testing with the new Tier 3 test fuel. Data carryover on splash blended Tier 2 test fuel should be allowed for FFVs certified to Tier 2 regulations.

Organization: General Motors LLC (GM)

Additionally, the use of splash blended 10 psi test fuel for flex-fuel vehicle (FFV) evaporative emission testing, as proposed by EPA, represents an evaporative emission stringency increase for FFVs complying with the Tier 3 requirements. This would serve as a roadblock for manufacturers to designing and offering FFVs and would also undermine the harmonization with California's LEV III program.

GM recommends that EPA adopt a 9 psi Tier 3 test fuel, and that this same fuel be used for both conventional and FFV evaporative emission testing. This would facilitate the timely adoption of the Tier 3 regulations and preserve the harmonization with CARB and the LEV III regulations.

Our Response:

We have considered the comments on the appropriate test fuel for FFV evaporative emission testing, taking into account the vapor pressure of Tier 3 E10 test fuel. EPA has decided to use the same evaporative emissions test fuel for conventional vehicles and FFVs. This would provide harmonization with LEV III and Tier 3 evaporative emission requirements for these vehicles. More detail on our approach to certification fuel for evaporative and refueling emissions testing for FFVs can be found in Section IV.C.5 of the preamble. For our response to comments on test fuel for non-FFV evaporative emissions testing, see Chapters 4.5.1 and 4.5.2 of this Summary and Analysis of comments.

4.3.8. Test Procedures

Vehicle Preconditioning before the Hot Soak plus Diurnal SHED Test

What Commenters Said:

Organization: Volkswagen Group of America, Inc.

Among the exclusive brands in the Volkswagen group are a group of vehicles that are treated exceptionally by developers and owners. These exotic vehicles are still subject to the some emission standards regardless of the production volume expected. Therefore these vehicles are rare and require special handling to account for vehicle background emissions that may not decay us in other models. VW requests exceptions for specialty vehicles in the evap vehicle preparation sections of Tier 3. Tires may have to be conditioned even after 12 months, as well as the vehicles themselves. A chassis may be several years old with current fuel system components removed and installed. This process may contaminate areas of the vehicle that are only 'cleaned' by baking off residual hydrocarbon. This should be allowed for all of Tier 3, and requires modification to section 1066.814(e).

Our Response:

EPA agrees that there are some unique vehicle models that may require special handling in vehicle preparation prior to evaporative emission SHED testing for certification. This may be the case for specialty vehicles such as when a chassis used in one year's certification is "reconditioned" for re-use in a subsequent year's certification. In these circumstances, a manufacturer may seek EPA pre-approval for revised vehicle preconditioning measures.

What Commenters Said:

Organization: Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

Baking tires and to remove contamination (FR29898)

EPA indicates that no preconditioning shall be permitted for any vehicle aged twelve months from the date of manufacture.

We recommend EPA revise this limitation to address the following contingencies:

1) If a manufacturer determines that a vehicle with >12 months has been contaminated (e.g., fuel spill, refrigerant leak, washer fluid leak, etc) then baking shall be allowed to clean up the contamination;

Our Response:

We do not agree with the commenter's request. Spot cleaning of confirmed spills or leaks may be requested and approved on a case-by-case basis before evaporative emission testing of the vehicle. However, baking of the entire vehicle would create the potential for the removal of non-fuel hydrocarbons from the test vehicle which should otherwise be accounted for in the vehicle emission certification level.

2) If a manufacturer needs to install tires with less than 12 months from date of manufacture (as indicated by the tire manufacture date on tire sidewall) on a >12 month vehicle, baking of the tires alone shall be permitted prior to installation on the vehicle.

Our Response:

EPA generally concurs with this comment, but this allowance must be requested and approved on a case-by-case basis before evaporative emission testing of the vehicle.

What Commenters Said:

Organization: California Air Resources Board (CARB)

Comment 6 - Evaporative emission testing spare tire removal allowance: The proposed Tier 3 regulatory language (§1066.814) contains an allowance to remove the spare tire during evaporative emission testing. This provision conflicts with the text in the NPRM that only allows exchanging the vehicle's spare tire with one that has been aged. CARB supports the proposed allowance to exchange the spare tire with an aged one, but does not agree with allowing spare tire removal. Such an allowance would reduce the stringency of the whole vehicle emission standards, which already account for background emissions, including those from the spare tire.

Our Response:

EPA concurs with this comment. The final rule provides that the spare tire may be exchanged for a used tire or baked but not removed. This is because non-fuel hydrocarbon emissions related to the spare tire were considered when the Tier 3 hot soak plus diurnal evaporative emission standards were developed.

SHED FID Ethanol Adjustment Factor

What Commenters Said:

Organization: Volkswagen Group of America, Inc.

1. The direct measurement of criteria pollutants has been widely regarded as the technical pathway of choice in complying with regulations. Therefore, regulating the use of a FID factor instead of allowing direct measurement is alarmingly contrary to this philosophy. Allowing the use of photo acoustic or impinger methods, used to measure precisely the amount of alcohols in the SHED, provides a robust, direct measurement of fuel-based evaporative emissions. Providing a FID factor, which may be arbitrary, also will effectively increase the stringency of the standards. Manufacturers will have to account for this factor in their design criteria to minimize the confirmatory and In-Use testing risk of the Agency's desire to use a FID factor. CARB provides an optional factor, 1.08, which is clearly not harmonized with EPA. Analysis of real vehicle data shows this factor to be smaller than this number. VW requests that a test program be developed and executed prior to any factor being introduced in the regulation. This program would examine this factor using several OEM and Agency labs, as well as vehicles of differing technologies. We look forward to further discussions in this area.

Organization: General Motors LLC (GM)

2. Evaporative Emission Testing Ethanol Adjustment Factor

In the Tier 3 NPRM, EPA proposes the use of a 10% mass adjustment factor to account for alcohol based emissions during evaporative emission SHED testing. In the current proposal, EPA specifies the use of a flame ionization detection analyzer coupled with the use of the adjustment factor as the only viable option to account for alcohol emissions. GM believes that the 10% adjustment factor is far greater than the true magnitude of alcohol based emissions. OEMs should be afforded the opportunity to utilize analyzers (i.e., photo acoustic) that measure the alcohol contribution during certification and in-use evaporative emission SHED testing. Furthermore, GM believes that certification confirmatory and in-use evaporative emission SHED testing should be conducted using the same test methodology that was used for the initial certification testing. Regarding an adjustment factor, while GM supports the availability of a factor as an option, it should be based on a more accurate assessment of the impact of alcohol emissions on total evaporative emissions. Therefore, GM recommends that EPA specify the actual measurement of alcohol emissions as the baseline for evaporative emission testing, and allow use of an adjustment factor as an option. However, EPA should review the available industry data to determine a more representative adjustment factor value.

Organization: Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

3. Ethanol Adjustment Factor – Photoacoustic or Impinger

Total hydrocarbon evaporative emissions are measured in a SHED using a flame ionization detector (FID). To measure ethanol evaporative emissions, a photo acoustic analyzer (e.g., INNOVA™) or a midget impinger sampler with gas chromatograph analysis (hereafter, impinger) may be implemented. The FID is less responsive to ethanol emissions than to gasoline emissions, requiring that a "response factor" be determined for ethanol. To correctly measure total evaporative emissions with a fuel that contains ethanol, the photo acoustic or impinger methods are required to measure the ethanol evaporative emissions independently, and then subtract the ethanol contribution from the FID measurement (with the ethanol response factor applied). Finally, the FID measurement, after correction for ethanol response, is added to the photo acoustic or impinger measurement for ethanol to determine the total evaporative emissions.

In the preamble to the Tier 3 NPRM, EPA proposes to use an ethanol adjustment factor of 1.10 for evaporative emission testing conducted using the proposed E15 certification fuel. Manufacturers would use a FID and multiply the measured results by 1.10 to obtain the certification or in-use value. EPA admits that the 1.10 ethanol adjustment factor is based on worst-case E15 data. The LEV III regulations allow manufacturers to measure actual emissions using impingers or photo acoustic analyzers, or an adjustment factor of 1.08 (based on the LEV III E10 test fuel).

We would also note that our data suggest that the ethanol adjustment factor should be significantly lower than the proposed 1.10 for E15 or 1.08 for E10. Moreover, the factor is likely to change based on the test being conducted. Industry data suggest that for the two- and three-day diurnal tests the adjustment factor should be about 1.03; and no adjustment is necessary for the other tests (spit back, BETP, ORVR, and running loss). (See attached Ford FFV Evap and ORVR Ethanol Adjustment Data)

The proposed Tier 3 regulations state that the adjustment factor would apply to all evaporative emission tests – hot soak plus diurnal, refueling, canister bleed, and spit back.

For clarity, the ethanol adjustment factor should not be applied to the spit back emissions test since this is mass-based and does not use a FID. Additionally, the SHED ethanol adjustment should not be applied to the canister bleed emissions test procedure (BETP) for the reasons outlined in the LEV III rulemaking (see Section 12.9, “Hydrocarbon Mass Determination. There is no requirement to separately measure for alcohol emissions in this bleed emission test.”)

While the use of a FID would streamline the test procedures, the Tier 3 evaporative emissions standards are too stringent to design evaporative systems that provide headroom for both the standard and another 10 percent for the ethanol adjustment factor. Consequently, manufacturers need the option to test the actual emissions (using either a photo acoustic or impinger) rather than using a FID with an adjustment factor.

Recommendation: We recommend that EPA harmonize with ARB requirements allowing the measurement of actual emissions using photo acoustic or impingers for all emission measurements. If EPA wanted to streamline its own procedures, it could test using FIDs and an ethanol adjustment factor: vehicles that pass in this way would pass overall, but compliance failures would need to be verified by measuring actual emissions.

In addition, EPA and industry should collaborate to determine and adopt a more representative ethanol adjustment factor.

IUVP & EtOH Adj (FR29899)

4. For IUVP testing use an ethanol adjustment factor. Industry is opposed to the use of the adjustment factor to account for alcohol during IUVP evaporative emission testing. EPA should provide the ability for manufacturers to determine OMHCE results for evap, running loss and ORVR using impingers or Innova in place of the 1.10 factor (as we do today for ethanol FFV programs which test evap, running loss and ORVR with ethanol based fuels). This allowance is necessary because of concerns that the 1.10 factor provided by EPA is too high.

Our Response:

The commenters generally acknowledge that a correction for the FID ethanol response is needed. EPA agrees with the commenters that they should have the option to measure and correct the FID measurement or use a fixed correction factor. However, to prevent arbitrary and inconsistent results by using the lower of the correction values on a test-by test basis, the final rule stipulates that all testing of any vehicle using the certification evaporative emissions data must be based on the approach used for certification testing. This applies to EPA confirmatory testing as well as all IUVP and IUCP testing. Also, if the data is approved for carry across for certification of other evaporative families or carryover for a subsequent model year's certification the same rules regarding which method will be used to adjust the FID data will apply. The commenters also presented the view that EPA's proposed 1.10 factor for E15 was too large based on their data. Although not conducting a test program as requested by VWGoA, EPA reviewed the data provided by the Alliance and Global in their comments and supplemental information provided by GM. Presuming the use of a test fuel with E10, EPA also reviewed the test data provided by CARB to support their adoption of the 1.08 value. Taking the information in the datasets together, we believe CARB's 1.08 value to be conservative but reasonable for the intended purpose. Four of the fifteen values calculated by CARB were 1.07 or larger.[19] The data provided by GM showed seven of twenty points were 1.07 or larger. All of the data provided by Ford was less than 1.07.[20] The correction factor depends on the vehicle and FID response factor and to some degree the FID instrument used (analog or digital) which may explain some of the differences.

Furthermore, EPA considered the manufacturers' comments that the correction should only apply to the hot soak plus diurnal measurement. EPA agrees that the correction should apply to the hot soak and diurnal measurements and is not needed for the canister bleed, refueling, or spit back measurements. There was no data for the SHED rig test provided by the commenters and the running loss data showed some need for correction. Thus, to align with CARB, we are applying the requirement for measurement correction to the running loss and SHED rig test results, in addition to those from the hot soak and diurnal test.

SHED Rig Test

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20 Passavant, G. (2013, October). Manufacturer Data on Ethanol Measurements in the SHED. Memorandum to the docket.

What Commenters Said:

Organization: Volkswagen Group of America, Inc.

Evaporative emissions rules are meant to control fuel-based emissions. The only way to truly measure fuel-based emissions without the non-fuel emissions confounding the result is to have a rig. Having a rig-based certification option will eliminate any tedious evap vehicle setup, such as vehicle background and tire conditioning. Methods can be developed to measure rig-type emissions In-Use, easing the Agency fears of complex and burdensome testing. VWGoA specifically requests EPA to continue to optionally accept the ARB PZEV rig procedure until 2025MY. W/ also specifically requests a mid-term review of the Tier 3 evap regulations and procedures to be completed before the expiration of the rig option currently proposed for 2019.

Our Response: We do not agree with the commenter. The major shortcoming of the rig test is that it cannot be conducted in any confirmatory testing or in IUVP testing without disassembling the fuel/evaporative system to remove it from the vehicle. There would be no way to ascertain the representativeness of the test results relative to what would have occurred when the fuel/evaporative control system was installed in the vehicle. In response to the request for more time to use the SHED rig test option, EPA has extended the time we will accept SHED rig tests results from California LEV III option 1 certifications through the 2021 model year.

<u>Test conditions</u>

What Commenters Said:

Organization: Revecorp Inc.

Second, the proposed rule leaves evaporative emissions testing temperatures the same and the proposed rule even is considering reducing the temperature for the 3-day running loss test. Revecorp believes that instead of reducing the upper temperature range limit, it should be increased to be more real-world. Ozone is a problem during high temperatures, so the propose rule should test vehicles under higher temperature conditions such as at least 100 degrees F.

Revecorp recommends - All testing should be conducted using fuel which is more similar to industry average in-use fuel, evaporative emission tests should be conducted over a wider, higher temperature range.... As noted above, all of these changes and test requirements should be demonstrated at high altitude.

Our Response:

EPA is not removing the 3-day running loss test from the Federal requirements for either low or high-altitude testing conditions. EPA did not propose to increase the high end of the temperature cycle and does not believe it is appropriate to take such actions at this time in the absence of prior proposal.

Multi-day diurnals

What Commenters Said:

Organization: Revecorp Inc.

Third, if the proposed rule is to achieve larger evaporative emissions reductions, vehicles should be designed to capture evaporative emissions for more than two or three days.

Modeling studies such as those conducted by Sam Reddy (presented at the CRC conference in 2011) indicate that significant evaporative emissions come from vehicles sitting for extended periods of time such as on new and used car lots for sale and at long term parking locations such as airports. Emissions from these conditions could be reduced significantly by designing evaporative emissions control systems to be able to contain more evaporative emissions. If testing was required to prove that evaporative canisters do not "break through" in less than four days, significant reductions in evaporative emissions could be gained. In addition, requiring manufacturers to perform the test out to five days and providing EPA hour by hour measurements of evaporative emissions (60 hour observations) would give EPA information about vehicles evaporative emission control system and expected in-use durability/performance. The cost to for vehicle manufacturers to make this change would be relatively small (increasing canister volume). Revecorp believes this is a better solution than the requirement to add a supplemental "scrubber" canister, and would achieve the same result or better – at a lower cost.

Revecorp recommends - … evaporative emissions test should be conducted for five days with hourly data provided to EPA and the standard being no breakthrough until after 48 hours.

Our Response:

Data available to EPA indicates that some Tier 2 vehicles emit fuel vapors after the third day of the diurnal. However, many went for several days beyond the 3-day period before emissions occurred[21] The impact of these emissions on the inventory depends on the fraction of vehicles which are parked for more than three days, the diurnal temperature conditions when they are parked, the state of vapor load on the canister before it was parked, and the fuel vapor pressure. Canisters do not breakthrough to an uncontrolled level because diurnal natural back purge (20-25% efficiency per day) during cooling allows them to reach a steady-state condition. A larger canister volume with more total gasoline working capacity would help to reduce multi-day diurnal emissions assuming it was well purged before the extended park. However, this is not as straightforward as it sounds because the current test procedure mandates that the canister be loaded to breakthrough before the evaporative emissions test sequence begins. Normally, purging a canister with a larger volume of carbon or carbon with higher butane working capacity carbon takes a greater air volume to purge an equivalent amount of vapor from the carbon. In some cases the additional purge air volume may not be readily available on small to mid size

[21] Lindner,J., Sabisch,M., Glinsky,G.,Stewart,J.,St.Denis,M.,Roeschen,J., (2013) Multi-Day Diurnal Testing, ERG Contract Report to US EPA.

vehicles/engines. Conversely, a scrubber is a low working capacity carbon which loads easily and purges quickly. The activated carbon canister is at the heart of the vehicles evaporative/refueling control system and directly impacts compliance for the SHED rig, canister bleed, hot soak plus diurnal, refueling, and running loss standards. Accordingly, we are not lengthening the duration of the hot soak plus diurnal evaporative emissions tests in this rule. The EPA sets test procedures and performance standards to control these emissions. The use of a larger canister, a carbon with a greater working capacity, or a canister scrubber is a manufacturer decision based on consideration of cost, technology, and compliance issues.

What Commenters Said:

Organization: Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

BETP-Fuel/temp profile (FR29896)

EPA indicates that they intend to incorporate the CARB BETP requirements by reference.

If they do so, then they need to add clarification which indicates that Federal fuels/temperatures can be used in place of the California fuels/temperatures identified in the CARB regulations.

Our Response:

EPA agrees with the commenter and is adding this provision to the regulatory text.

4.3.9. Certification Emission Test Fuels

What Commenters Said:

<u>a. HDGV Test Fuel</u>

Organization: Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

HDGV Tier 3 Fuel (FR29895)

Industry supports the optional use of Tier 3 test fuel for HDGV testing.

Our Response:

EPA asked for comment on permitting the manufacturers to use Tier 3 test fuel for evaporative emissions testing if EPA did not adopt the proposed Tier 3 evaporative emision standards for HDGVs. EPA is adopting the Tier 3 evaporative emission standards for HDGVs so the point is moot. HDGVs certifying to Tier 3 evaporative emission standards can use Tier 3 certification fuel as early as the 2015 model year if they want to earn allowances.

What Commenters Said:

Organization: Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

HDGV Tier 3 Cert Fuel (FR28985)

If HDGV evaporative emission or ORVR testing is conducted on Tier 3 fuel, should engine exhaust testing be required on the Tier 3 fuel? Evaporative and exhaust testing requirements should be independent in the Tier 3 regulations. Therefore, exhaust testing should not be required on the same fuel utilized for evaporative or ORVR testing.

Our Response:

Subsequent to the release of the NPRM and receipt of the comments, EPA met with manufacturers of engine-dynamometer certified heavy-duty gasoline engines and discussed their comments. These HDGV engines are not subject to revised exhaust emission standards in the Tier 3 rule. The manufacturers stated that procuring and storing Tier 2 fuel for exhaust emission testing for the relatively few HDGE test groups is not preferable long term, and they agreed that all HDGE test groups should meet the existing exhaust emission standards on Tier 3 fuel by the 2022 model year. Based on the information EPA received from the manufacturers, the final rule provides that a requirement to use Tier 3 test fuel for exhaust emission testing can phase-in until the 2022 model year as deemed appropriate by the manufacturers. Also based on feedback from the manufacturers, the final rule provides that after the 2022 model year manufacturers can carryover certification on Tier 2 fuel for up to five percent of sales for atypical applications such a military vehicles.[22] Further discussion of these issues appears in the preamble to the final rule.

4.3.10. Application of Evaporative Emission Standards to Fuels Other than Volatile Fuels

What Commenters Said:

Organization: Truck and Engine Manufacturers Association (EMA)

Application of Evaporative Requirements to Gaseous-Fueled Heavy-Duty Vehicles Above 14,000 Pounds GVWR

[22] Passavant, G. (September, 2013).”EPA & Ford Meeting on Issues Related to Tier 3 NPRM”. Memorandum to the docket.

a. EPA has proposed that Heavy-Duty Vehicles over 14,000 lbs. GVWR that run on volatile liquid fuel (such as gasoline or ethanol) or gaseous fuel (such as natural gas or liquid petroleum gas ("LPG")) meet the evaporative emission standards of 86.008-10 through the 2017 model year ("MY"), and part 86.1813 requirements in MY2018 and beyond. EPA's proposed requirements violate the CAA's lead time and stability requirements by imposing new standards with less than four full model years' lead time and at the same time other, already-promulgated, future standards are set to go into effect, including new GHG emissions requirements in 2017.

b. EPA requests comment on "adjusting the regulations such that evaporative emissions standards apply only to volatile liquid fuels, which is the approach [EPA has] taken for nonroad applications (see, for example, 40 CFR 1060.801)." (78 Fed. Reg. at 29899) EMA supports such an approach and urges EPA to exclude heavy-duty vehicles that run on gaseous fuel from any evaporative emission requirements.

c. Fuel systems for gaseous fuels such as natural gas (other than LNG) and LPG are not designed or intended to vent to the atmosphere and, therefore, do not need to, nor should they, be subject to evaporative standards. LNG systems are designed to vent to the atmosphere, but also are designed to be able to go substantial periods of time without the need to vent. Moreover, owners and operators of LNG-fueled vehicles have substantial incentives to minimize consumption of fuel – a very valuable commodity. For example, managers of fleets with LNG fueled vehicles monitor LNG fuel systems and vehicle duty cycles to ensure that no fuel is vented, in order to prevent fuel waste.

EMA urges EPA to exclude heavy-duty vehicles that run on gaseous fuel from any evaporative emission requirements. At a minimum, EPA should conduct an appropriate cost-benefit analysis before including natural gas and LPG-fueled vehicles above 14,000 lbs. GVWR in evaporative emission standards.

EMA recognizes that its recommendation to exclude gaseous-fueled heavy-duty vehicles from evaporative emission requirements does not fully harmonize with ARB. If EPA were to conclude that such requirements were appropriate, EPA, at most, should apply evaporative emission requirements only to LPG-fueled vehicles, which is consistent with the current California requirements.

Exclude all gaseous-fueled vehicles over 14,000 lbs. GVWR from evaporative emission requirements.

Organization: Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

Refueling Standards (FR29899)

EPA requests comment on using this rulemaking as the proper context for applying the refueling standards to vehicles powered by every kind of fuel.

We request comment on adjusting the regulations such that evaporative emission standards apply only to volatile liquid fuels, which is the approach we have taken for nonroad applications.

The Alliance and Global Automakers agree with the EPA proposal to adjust the regulations such that evaporative emission standards apply only to volatile liquid fuels, as is the approach taken for non-road applications and has been an allowed approach under Tier 2 regulations. Excluding diesel fuel from the standards because it is nonvolatile and natural gas and liquefied petroleum gas because they are not liquid fuels at atmospheric pressure is the right approach and does not impact evaporative emission stringency and/or controls.

Volatile Liquid Fuels (FR29899)

Industry agrees with EPA that evaporative emission certification should only be required for vehicles that operate on volatile liquid fuels.

Organization: California Air Resources Board (CARB)

Comment 5 - Evaporative emission requirements for alternative fuels.

The NPRM requests comment on whether the evaporative emission requirements should be modified in Tier 3 so that the standards only apply to volatile liquid fuels, which would effectively remove evaporative emission requirements for liquefied petroleum gas and natural gas. CARB recommends that U.S. EPA retain the current applicability of the evaporative requirements by continuing to require that liquefied petroleum gas and liquefied natural gas vehicles certify to evaporative emission standards. CARB currently has an evaporative emission requirement for liquefied petroleum gas vehicles. Although existing California evaporative control regulations do not specifically include liquefied natural gas, we believe controlling evaporative emissions from liquefied natural gas systems is warranted and intend to pursue such action in the future. Having an evaporative emission requirement for these vehicles assures that system venting does not occur during normal diurnal conditions, and that other sources of evaporative emissions are controlled.

Our Response:

EPA proposed that the Tier 3 evaporative emission standards apply to gaseous fueled heavy-duty vehicles. The existing evaporative emission standards apply to all HDVs as per 40 CFR 86.008-10 and 1816-08 and the proposed standards are contained in 40 CFR 86.1813. EMA raised concern with regard to lead time. The final rule provides four model years of lead time for gaseous-fueled vehicles. The applicability of the Tier 3 evaporative emission requirements for any given gaseous-fueled heavy-duty vehicle evaporative family depends on when it begins production in the 2019 model year. If it begins MY 2019 production before the fourth anniversary of the signature date of the Tier 3 final rule, the Tier 3 evaporative emission requirements would defer to the 2020 model year. If it begins MY 2019 production on or after the date which is four years after the anniversary date of the signature of the Tier 3 final rule, then the Tier 3 requirements apply for the 2019 model year. In addition, due to the nature of the phase-in inherent in the evaporative emissions program, we expect that manufacturers with diverse product lines will have the lead time necessary to meet the Tier 3 phase-in percentage requirements while at the same time deferring compliance with the evaporative emission requirements for gaseous-fueled vehicles until the 2020 model year or later when the percentage requirement is 80 percent. In this case they could choose to include these vehicles in the denominator of the percentage calculation in the applicable model year (either 2019 or 2020). Small manufacturers have until the 2022 model year to meet the Tier 3 evaporative emission standards.

Existing evaporative emission standards apply to all gaseous fueled vehicles including natural gas and liquified petroleum gas (LPG) (see 40 CFR 86.008-10 (b)) and 1816-08. EPA sought comment on applying the evaporative emission standards only to vehicles using volatile liquid fuels (a fuel that is liquid at atmospheric pressure and has a Reid Vapor Pressure higher than 2.0 pounds per square inch – gasoline. ethanol, and methanol), but we did not propose it explicitly. EPA has examined the comments and once again studied the fuel properties and fuel system characteristics for the vehicles covered by the existing evaporative emission requirements. Based on this review, we have decided not to change the applicability except to add that ethanol is covered as a volatile fuel. The requirements are technically feasible and appropriate for the technologies involved. The Tier 3 evaporative emission standards apply to all vehicles using volatile fuels (a volatile fuel is a volatile liquid fuel or any fuel that is a gas at atmospheric pressure -- gasoline, methanol, ethanol, natural gas, and LPG are volatile fuels).

EPA has reviewed the evaporative emission requirements relative to the fundamental elements of the fuel system designs for these vehicles. Based on this review, we are not applying all the various evaporative and refueling requirements, only those that are appropriate given the technology. However, we are applying the standards to sealed systems as well as low pressure systems. Specifically, EPA has decided to continue not to include the 2-day evaporative emission standards and test procedures for gaseous-fueled vehicles. This is largely because these vehicles do not use carbon canisters to control evaporative emissions so canister purge does not come into consideration. Even though the commenters suggested that gaseous fueled vehicles should not be subject to standards due to the nature of their design, EPA believes the running loss and three 3-day evaporative emissions tests are needed to ensure control of leaks which could arise in these sealed systems as a result of mirco cracks and poor connections. The behavior and practices of owners, operators, or fleet managers is not relevant to certification. While the test procedures for these standards would apply, EPA believes that meeting consensus standards will provide the appropriate control and is including regulatory provisions to permit manufacturers to certify based on related data, engineering analysis, and compliance with national consensus standards such as ANSI, NGV 1-2006. Assuming the use of these compliance flexibilities and elimination of the 2-day test, compliance costs should be minor.

4.3.11. Refueling Emissions Control and ORVR

What Commenters Said:

Organization: Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

ORVR on Alternate Fueled Vehicles (FR29899)

ORVR requirements should not apply to CNG, LPG, fuel cell or electric vehicles.

Our Response:

For LDVs, section 202(a)(6) requires that refueling standards apply to vehicles of all fuels. EPA has more discretion for light trucks and heavy-duty vehicles. Existing EPA regulations apply the refueling emission standards and related requirements to all complete vehicles up to 10,000 lbs GVWR. In the NPRM we asked for comment on the future application of the refueling standards to only volatile liquid fuels (a fuel that is liquid at atmospheric pressure and has a Reid Vapor Pressure higher than 2.0 pounds per square inch – gasoline. ethanol, and methanol) or applying them to all volatile fuels (a volatile fuel is a volatile liquid fuel or any fuel that is a gas at atmospheric pressure -- gasoline, methanol, ethanol, natural gas, and LPG are volatile fuels).

Based on comments and review of the fuel properties and fuel systems EPA is retaining most of its existing requirements and adding new requirements. First, as discussed further below, we will no longer require diesel-powered LDTs, MDPVs, or HDVs to certify to the refueling emission standard. Second, with regard other fuels (not gasoline) EPA is adding requirements for other volatile fueled vehicles (e.g., gaseous fueled) to meet the refueling emission standard. EPA agrees in principle that manufacturers and users have incentive to minimize fuel losses. However, we believe that the potential exists for vapor losses in such systems from micro leaks during the refueling event and during operation and that without including all volatile fuel vehicles in the requirement the potential exists for problems to be overlooked either during design or installation. Thus, for refueling emissions we have decided to maintain the program structure already applied to evaporative emissions and are applying refueling emission standards to all complete volatile fuel vehicles including LDTs, MDPVs, and HDVs.

For LDTs up to and including 8,500 lbs GVWR not already covered by the refueling emission standard, the standard would apply to the vehicle when it meets the Tier 3 evaporative emission standards. Since control of evaporative and refueling emissions is technically linked, we are requiring that when an MDPV or complete HDV less than or equal to 14,000 lbs GVWR not already covered by the refueling emission standard meets the evaporative emission standards its also meets the refueling emission standard.[23] As is the case for evaporative emissions for these alternative-fueled vehicles, the applicability of the Tier 3 refueling emission requirements for any given family would depend on when it begins production in the 2019 model year. If it begins production before the fourth anniversary of the signature date of the Tier 3 final rule, the Tier 3 evaporative emission requirements would defer to the 2020 model year. If it begins production on or after the date which is four years after the anniversary date of the signature of the Tier 3 final rule, then the Tier 3 requirements apply for the 2019 model year. The refueling and evaporative emission standard implementation schedule provisions are structured the same and vehicles in any evaporative family must meet the Tier 3 evaporative and refueling emission standards in the same model year.

[23] (For vehicles over 8,500 lbs GVWR the Tier 3 refueling emission standards apply only to complete vehicles. See the discussion below regarding ORVR for incomplete HDGVs.

However, due to the nature of the phase-in inherent in the evaporative emissions program, we expect that manufacturers with diverse product lines will have the lead time necessary to meet the Tier 3 phase-in percentage requirements while at the same time deferring compliance with the evaporative emission requirements for gaseous-fueled vehicles until the 2020 model year or later when the percentage requirement is 80 percent. In this case they could choose to include these vehicles in the denominator of the percentage calculation in the applicable model year (either 2019 or 2020).

For complete HDVs over 14,000 lbs GVWR, the refueling emission standard does not apply until the 2022 model year, even if the vehicle meets the evaporative emission standards in an earlier model year. Small manufacturers have until the 2022 model year to meet the Tier 3 evaporative emission standards

For both LPG and CNG the refueling test procedures and standards apply, but EPA will deem a system to be in compliance if they certify compliance with relevant national and international consensus standards (e.g., ANSI and ISO) related to fuel system and fuel system component integrity and the refueling connector.

What Commenters Said:

Organization: Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

ORVR Incomplete Class 3 HDGVs (FR29824, FR29894, FR30051, FR30098)

EPA explains that Class 3 (10,001 – 14,000 lbs GVWR) HDGVs are further sub-categorized into complete and incomplete vehicles.

We recommend that EPA clarify that the new ORVR requirement is only applicable to complete vehicles, and excludes all incomplete vehicles >8.5K GVWR.

HDGV Cert (FR29895)

ORVR requirements must exclude incomplete vehicles >8.5K GVWR.

Our Response:

EPA concurs with this comment and we are finalizing the new ORVR requirement only for complete class 3 heavy-duty vehicles, excluding all incomplete vehicles greater than 8500 lbs GVWR. EPA believes that ORVR controls are technically feasible for incomplete HDGVs, but at this point, the ORVR requirement applies only to complete HDGVs > 8,500 lbs GVWR because manufacturers have indicated to EPA that they would have to establish additional measures to ensure that the steps taken to complete the vehicle by the secondary manufacturer do not compromise the integrity and safety of the fuel/evaporative control system (including

ORVR) and that the ORVR system continues to perform properly with regard to emissions control. Incomplete vehicles certified to the ORVR requirements may earn ORVR or evaporative emission standard allowances.

What Commenters Said:

Organization: Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

ORVR-Reducing gasoline waste on large tanks (FR29895)

For large tanks, the ORVR test generates 50 or more gallons of waste gasoline. Industry would like to work with EPA to develop methods to reduce this. We recommend adding the following (or words to this effect) to §86.1816-05:
"For vehicles with fuel tanks larger than 40 gallons, manufacturers may request alternative ORVR testing to reduce wasted fuel. The request should include data to indicate that testing is representative of in use refueling."

Our Response:

EPA agrees that an alternative procedure should be available to address this concern. Most if not all gasoline fuel tanks over 40 gallons are found on HDGVs over 14,000 lbs GVWR. In response to this comment, we have included a test procedure approach for ORVR for vehicles over 14,000 lbs GVWR which will allow the use of a seal test as currently contained in the refueling emission test procedure regulations rather than the full SHED test. This gives manufacturers the opportunity to demonstrate that their test vehicles have the purge strategy and canister design (e.g., geometry, back pressure, and gasoline working capacity) based on engineering analysis and comparison to designs used on lighter-weight GVWR HDGVs which meet the refueling emission standards and have been certified rather than running the full refueling test procedure.

What Commenters Said:

Organization: Private Citizen

These comments were submitted as testimony at the Philadelphia, PA public hearing on April 24, 2013.

I was also concerned about some of the vapor and evaporation at gas pumps and whether that could be included in this, or whether in a separate rule. So I was thinking along the lines of cumulative that you could do, especially when it comes to congressional negotiations that happen when something gets lowered. Perhaps an all-inclusive thing might get to our goal without focusing on one small area.

Our Response:

In May of 2012, EPA finalized a rule to permit states which adopted Stage II vapor recovery requirements to remove such requirements if certain Clean Air Act requirements related to future compliance with the ozone NAAQSs are met.[24] This was adopted because the Administrator deemed ORVR to be in widespread use and as provided under the Clean Air Act there was no need to continue redundant control (Stage II and ORVR) of refueling emissions after ORVR was in widespread use. The Tier 3 rule expands the ORVR requirement further by adding the requirement that all complete HDGVs over 10,000 lbs meet the refueling emission standards. Nonetheless, the analysis prepared by EPA in support of this decision recognized that full fleet turnover to ORVR would not occur for more than a decade. EPA expects many states to remove Stage II since the remaining available emission reductions are small relative to the costs of maintaining the systems. The hydrocarbon reductions from the Tier 3 will help to ensure that current and future plans for compliance with the ozone NAAQS are not impacted.

What Commenters Said:

Organization: California Air Resources Board (CARB)

Comment 9 - Refueling: Modifying the terms for exemption from the refueling requirement for diesel vehicles.

CARB does not support U.S. EPA's proposal to withdraw the condition that the fuel tank temperature not exceed 130°F in order for a diesel vehicle to qualify for an exemption from the refueling emission requirement absent data showing there would be no emission impact. Accordingly, the NPRM should cite any studies supporting such an action. While less volatile than gasoline, diesel fuel will still generate vapors, especially under higher temperatures. If the original regulatory language is retained, it would likely act to encourage auto manufacturers to consider heat exposure when designing and locating the fuel tank, which would result in reduced refueling emissions.

Organization: Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

ORVR Diesel (FR29899)

If EPA agrees that diesel ORVR is not a concern (for the same reason diesel is not a concern for Evap.), EPA should exempt diesel vehicles from the ORVR requirement (i.e., eliminate the standard and requirement for an attestation).

[24] See EPA final rule, "Air Quality: Widespread Use for Onboard Refueling Vapor Recovery and Stage II Waiver". 77 FR 28772, May 16, 2012.

Organization: Truck and Engine Manufacturers Association (EMA)

1. Application of Refueling Requirements to Diesel-Fueled Vehicles Above 10,000 Pounds GVWR

EPA proposes in Section 86.1813-17(b)(1) to add a refueling requirement to diesel vehicles above 10,000 lbs. GVWR starting with model year 2018. EPA's proposed requirement violates the CAA's three-year period of stability by imposing new standards near the same time other, already-promulgated, future standards are set to go into effect, including new GHG emissions requirements in 2017, and also violates the CAA's four-year lead time requirement.

Moreover, such a requirement for diesel-fueled vehicles is unnecessary and unjustified. Diesel fuel is a non-volatile fuel, as EPA correctly points out in Section 1037.103(a)(2), and, for this reason, is excluded from evaporative emissions pursuant to Section 86.016-1(a)(4)(iii).

Furthermore, Section 202(a)(6) of the Clean Air Act, which EPA references to justify the application of refueling standards to diesel vehicles, specifically applies only to "new light-duty vehicles." (78 Fed. Reg. at 29899.) As defined in the CAA, light-duty vehicles are those less than or equal to 6,000 lbs. GVWR. Thus, diesel-fueled vehicles greater than 6,000 lbs. GVWR are not required to be subject to refueling emission standards.

EMA recommends that all diesel applications be excluded from refueling requirements. If EPA desires to expand refueling requirements to heavy-duty applications over 6,000 lbs. GVWR, the Agency must conduct a full assessment and rulemaking to demonstrate why such requirements should be expanded to diesel vehicles. As the Proposed Rule generally covers vehicles up to 14,000 lbs. GVWR, in no case should any refueling standard be made applicable to diesel-fueled vehicles above 14,000 lbs. GVWR.

- Exclude all diesel applications over 6,000 lbs. GVWR from refueling requirements

Our Response:

One commenter said that the requirement to include diesels above 6,000 lbs GVWR in the program was advisable and others indicated that it was unnecessary. In the NPRM, EPA indicated that even with turbulent mixing of the dispensed and tank fuel, the very low vapor pressure of diesel fuel (<0.05 psi) coupled with the vapor shrinkage conditions which would occur during the refueling test (cooler fuel dispensed into a warmer fuel in the tank which then condenses vapor in the headspace) make it very unlikely that a diesel vehicle could fail the 0.20 g/gal refueling emission standard. This is reinforced by the simple chemical equilibrium calculations. Consider for example, Table 7.1.2 of AP-42 which indicates a vapor pressure of 0.022 psi at 100°F for diesel fuel and by interpolation about 9.6 psi for a 9 RVP fuel. A 9 psi RVP gasoline fuel gives a refueling emission rate of about 5 grams per gallon. So, a simple calculation 5(0.022/9.6) = .011 g/gal. This is only about 6 percent of the standard. In the MOVES model used to support the Tier 3 rule we used a zero value for vapor displacement emissions. Based on these very low values, EPA is removing the requirement for diesel vehicles to demonstrate or attest to compliance with the refueling emission standard, except for light-duty vehicles where it is required under the statute.

4.3.12. Other Comments and Issues

What Commenters Said:

Organization: California Air Resources Board (CARB)

Comment 8 - Evaporative emission testing reduced canister loading allowance for pressurized fuel systems:
The NPRM requests comment on allowing reduced canister loading for a pressurized system. This load procedure would be proposed by the auto manufacturer to reflect actual diurnal canister loading using the manufacturer's specific technology. CARB is concerned that this would reduce the stringency of the test and may result in future vehicles that have inadequate ability to purge the canister. The current requirement to load a canister to breakthrough is a critical part of the evaporative emission test, which ensures that enough purge capability is designed into the vehicle to purge a full canister during an 11-mile FTP drive cycle. While CARB recognizes that certain engine technologies in the future will have reduced purge capabilities, there are already a number of strategies available today that could help compensate, such as heated purge, optimization of purge strategy to maximize use of available engine vacuum, and purge pumps. Accordingly, CARB recommends that the canister loading procedure remain as proposed.

Our Response:

The current load to breakthrough requirement for the canister ensures that purge is adequate to achieve control during in-use operation. Under this requirement, the manufacturers cannot over size the canister to be sure the test is passed without also providing for adequate purge to ensure good in-use performance. At least directionally, this requirement creates a disincentive to increase canister size or total working capacity as these situations often require more purge air volume to strip the same amount of fuel vapor from the activated carbon in the canister. EPA agrees that the possibility of lower purge volumes over the FTP might be compensated for by other technologies but this is not without a cost in dollars or weight. EPA did not propose a specific change and we received no auto industry comment in support of a modification. Thus, we are making no change to this requirement for the Tier 3 rule.

Evaporative Emissions Durability Test Fuel

What Commenters Said:

Organization: Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

a. Durability Test Fuel: The Tier 2 certification test gasoline, Indolene, contains no ethanol, yet the regulations require the gasoline used for evaporative durability mileage accumulation contain the highest commercially available ethanol concentration allowed by federal law. We understand the historical need for this provision, since the market fuel and certification fuel contained significantly different ethanol content. EPA proposes new Tier 3 certification test gasoline requirements which would require either 15 percent (proposed) or 10 percent (industry recommended) ethanol. Since permeation evaporative emissions remain relatively consistent between E10 and E15, manufacturers should have the option to use either Tier 3 test fuel or fuel containing the highest commercially available ethanol concentration for mileage accumulation on evaporative durability programs.

Recommendation: We recommend EPA provide manufacturers the option to use either Tier 3 test fuel or fuel containing the highest commercially available ethanol concentration for mileage accumulation on evaporative durability programs. This optional allowance could reduce the burden on manufacturers to maintain separate Tier 3 test fuel and mileage accumulation fuels without any negative environmental consequences. [EPA-HQ-OAR-2011-0135-4461-A1, p.28]

Evap Dura (FR29897):

Revisions to the durability test fuel are discussed. To reduce the number of required test fuels EPA should allow the optional use of Tier 3 test fuel for evap durability testing. Evap durability demonstration testing should not be required to address the differences between the current durability fuel and the Tier 3 test fuel.

Evap Dura & Market Fuel (FR 29908):

To reduce the number of required test fuels EPA should allow the optional use of Tier 3 test fuel for evap durability testing. Evap durability demonstration testing should not be required to address the differences between the current durability fuel and the Tier 3 test fuel.

Also, the language requiring the evap durability service accumulation test fuel to contain the highest concentration of ethanol commercially available in any state should be modified. The concentration of ethanol in the evap service accumulation test fuel should be specified to match the concentration of ethanol in the Tier 3 test fuel.

Organization: Chrysler Group LLC

EPA should clarify the fuel requirement for evaporative emissions durability testing. The regulations, 40 C.F.R. § 86.1824-08(f), require that the fuel manufacturers select for service accumulation "contain[] ethanol in, at least, the highest concentration permissible in gasoline under federal law and that is commercially available in any state in the United States." In the preamble to and record for the proposed rule, EPA has discussed its interpretation of those existing requirements, and particularly the meaning of "commercially available." It is clear that E15, at 0.017 percent of the current market, should not be considered to be "commercially available" today. EPA should clarify more generally what "commercial availability" means by objective criteria that industry can readily understand. Therefore, as detailed above, evaporative emissions durability fuel should represent that which is the predominate fuel in the market, i.e., E10.

Recommendation: Chrysler recommends that EPA clarify the meaning of "commercially available" in the final rule and define it to mean the predominant fuel in the marketplace, consistent with our recommendation above, and, currently, E10.

Our Response:

EPA did not propose to change the regulations for evaporative emissions durability service accumulation fuel, which require such fuel to contain "ethanol in, at least, the highest concentration permissible in gasoline under federal law and that is commercially available in any state in the United States. Unless otherwise approved by the Administrator, the manufacturer must determine the appropriate ethanol concentration by selecting the highest legal concentration commercially available during the calendar year before the one in which the manufacturer begins its mileage accumulation.''(See 40 CFR 86.1824-08(f)). While there are only minor permeation differences between E10 and E15 for the materials and systems evaluated we believe it is important that evaporative systems are designed to meet the emission standards over their full useful life. E15 is the highest ethanol concentration allowed in gasoline under federal law and this fuel is commercially available. We cannot predict with certainty whether the use of E15 will become more widespread in the future but with a 15 year useful life for many Tier 3 vehicles it is prudent that evaporative system components have the durability to perform well when this fuel is encountered. Most manufacturers use bench aging for their evaporative system components, so there should be less compliance burden. If E15 in-use fuel becomes progressively more available, we would expect that E15 service accumulation fuel would be used for whole vehicle evaporative durability programs.

Deterioration Factors

What Commenters Said:

Organization: Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

Carryover Durability Data: Deterioration Factor (DF) determinations are very resource intensive, so we would like to use the DFs generated for Tier 2 (or LEV II) on Tier 3 vehicles. This should yield a higher DF than if manufacturers developed a new DF using Tier 3 vehicles, since both variation and deterioration tend to go down with emission standards (lower standards = lower DF). However, as proposed, the regulations would not allow a manufacturer to carry over a DF if the useful life test point exceeded the new emission standard (300 mg). Since the Tier 2 and LEV II evaporative standards were higher than the Tier 3 and LEV III evaporative emissions standards, this provision would prohibit the use of much of the manufacturers' durability data.

It's likely some of the vehicle full useful life tests will exceed the new standards. However, the purpose of the DF is to establish the change in emissions as the vehicle ages, and using the Tier 2 data should be a conservative means of achieving this information. California recognized this temporary concern and allowed that carryover data from LEV II evaporative emissions certification would be capped at the LEV II evaporative emission standards. This is a transitional issue (and a conservative one), since manufacturers will begin conducting durability testing on the new Tier 3 evaporative emissions standards as the program phases in.

Recommendation: To prevent very expensive and unnecessary testing and harmonize with the California LEV III, we request that EPA cap carryover durability data evaporative emission at the Tier 2 evaporative emission standard limits.

Additionally, evap durability carryover should be capped at LEV 2 evaporative emission standard levels. This would align the Tier 3 regulations with the LEV 3 regulations.

Organization: Chrysler Group LLC

Additionally, evap durability carryover should be capped at LEV 2 evaporative emission standard levels. This would align the Tier 3 regulations with the LEV 3 regulations.

Our Response:

EPA understands the premise of the request and agrees that in most cases an evaporative emissions DF based on Tier 2 technology would be likely to be numerically larger than an evaporative emissions DF based on Tier 3 technology. The allowance requested by the commenter, is often referred to as line crossing, is not prohibited in the EPA regulation. EPA regulations at §86.1824-01 permit manufacturers to develop their full-useful life deterioration factors for evaporative and refueling emission standards based on the use of good engineering judgment. These DFs are additive in nature, and when added to the “undeteriorated low mileage” test value the sum must be less than the applicable emission standard or FEL. Manufacturers usually certify such that this summed value falls below the emission standard or FEL enough to provide a margin for in-use compliance and to address variability and other uncertainty. Regulations (at §86.1824-08) require that evaporative emissions durability assessments must employ gasoline fuel for the entire mileage accumulation period which contains ethanol in, at least, the highest concentration permissible in gasoline under federal law and that is commercially available in any state in the United States (currently E15). Thus, EPA is permitting the use of this data but requires that: (1) the manufacturers use good engineering judgment in the testing used to develop their deterioration factors and the assessment and application of this data in developing deterioration factors, (2) the manufacturers use the evaporative/refueling emissions test fuel as required in the applicable regulations for Tier 3. The comment states that “It’s likely some of the vehicle full useful life tests will exceed the new standards.” Under current EPA provisions it is possible that the data used to develop the DF could have a measured emission point above the standard, but the addition of the deterioration factor to the low mileage test result must not result in an exceedance of the Tier 3 emission standard or the FEL (under ABT).

<u>Miscellaneous</u>

What Commenters Said:

Organization: Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

UL (FR30072):

Evap and exhaust useful life are associated in §86.1813-17(a)(5); however, they should be treated independently in the Tier 3 regulations as described in the preamble, page 29886

Our Response:

During the Tier 3 evaporative emission program phase-in years (2017-2022 model years), the exhaust and evaporative/refueling systems may have different useful life values if both systems are not yet meeting the Tier 3 evaporative emission standards. However, the effective operation of the engine and evaporative systems are interdependent and both need to operate effectively to get the required in-use performance. A different useful life for exhaust and evaporative system standards is counter to this important design premise.

What Commenters Said:

Organization: California Air Resources Board (CARB)

Comment 4 - Evaporative emission standards specifically for when an auxiliary (non-road) engine is installed in a motor vehicle.

CARB supports U.S. EPA's proposal to extend evaporative emission requirements to auxiliary non-road engines installed on motor vehicles. This would provide additional control of evaporative emissions. Accordingly, CARB intends to propose alignment with this proposal once the Tier 3 program is finalized.

Our Response:

We acknowledge CARB's supportive comments and plans to propose alignment on this requirement. The Tier 3 NPRM proposed that any vehicle with an installed auxiliary engine and fuel system must be tested in the SHED for hot soak and diurnal emissions with the fuel tank and fuel system installed. The tank should have a 40 percent fill of the appropriate fuel. If the propulsion engine and the auxiliary engine used the same fuel then they should be of the same specification. EPA is finalizing this requirement because emissions of these engines are part of the overall vehicle system. EPA expects that in many cases these engines will already have some form of evaporative controls as part of the nonroad program, but there is the potential that they will not be integrated into the vehicle correctly (e.g., placed near a heat source or there is insufficient purge) or the engine-based controls may not be sufficient to allow the vehicle as a whole to pass the Tier 3 emission evaporative standards.

What Commenters Said:

Organization: Revecorp Inc.

The proposed regulation does not require sufficient in-use compliance testing.

Revecorp believes that in-use compliance testing for tailpipe and evaporative emissions must also be performed at high altitude. Proving compliance during certification does not prove that emissions control system designs are durable. For example, Revecorp's firsthand experience working on various studies and reviewing the literature indicates that there are many common failures of evaporative emissions control systems in-use. These include:

Evaporative emissions purge valves sticking closed – This leads to a lack of purge of evaporative emissions, therefore the canister is overwhelmed and emissions escape through the vent.

Canisters are placed in bad locations – This leads the canisters to age prematurely and crack allowing emissions to escape to the environment as opposed to be drawn into the engine and burned.

Canisters with bad intake locations (such as at the top of the wheel well) – This leads to the canister ingesting dirt in-use and then the dirt deactivating the charcoal in the canister. This again leads to evaporative emissions escaping continuously from the canister. This condition was found in a pair of identical vehicles recruited in for CRC study E-91, indicating it was a design flaw which would only be found with in-use testing.

Revecorp's interpretation of the proposed rule is that in-use verification program (IUVP) requirements are not being strengthened for tailpipe emissions testing and there are no IUVP requirements for evaporative emission testing at high altitude. As noted previously, if engineering demonstration is allowed and there is no IUVP requirement for evaporative emission control systems at altitude, manufacturer deficiencies will never be discovered.

Revecorp recommends – Vehicle manufacturers should be required to prove in-use compliance for both tailpipe and evaporative emissions, at both sea level and at high altitude.

Our Response:

EPA does not agree with the commenter's assertion regarding the need for IUVP at high altitude to assure system performance. As reflected in the commenter's experience and our recently completed study on evaporative system diagnostic trouble codes (DTCs) from OBD systems interrogations in I/M programs, evaporative systems do not perform flawlessly. However, purge related codes were found in less than 0.5 percent of all vehicles which had the evaporative system OBD monitor ready when they entered the I/M lane.[25] This is not to suggest

[25] Weatherby, M., Sabisch, M., Kishan, S. (February 2014) Analysis of Evaporative On-Board Diagnostic (OBD) Readiness and DTCs Using I/M Data.

that purge valve failures are acceptable but to note that (1) they are not common and (2) OBD finds them without IUVP Overall this is a relatively low rate but reliability of the operation of the purge valve in use deserves further study and consideration.

In the NPRM, we discussed the issue of failed canisters and laid out the idea that a malfunctioning canister (whether it is from "poisoning" or a blocked purge air valve) should be monitored as part of OBD. Manufacturers disagreed with EPA on the feasibility monitoring for canister failures, but EPA believes this is feasible. More information on the frequency of canister problems in use is needed before we consider adding an OBD requirement to address this potential concern. EPA is undertaking a study in response to this question.

Furthermore, the commenter indicated that IUVP testing at high altitude would be useful in finding problems such as those related to the purge valve failures or non-functioning canisters. EPA notes that IUVP testing at any altitude would find problems if they occurred on the vehicle tested. Current pass rates for exhaust and evaporative emissions in IUVP exceed 90 percent. Specifically with regard to evaporative controls, the sample sizes are small and it is not clear that adding an IUVP requirement for SHED testing at high altitude would be of great benefit.

What Commenters Said:

Organization: Revecorp Inc.

The proposed rule is not protective enough of the health of Americans living at high altitudes and population growth continues in these areas at a rate that exceeds the average for the US.

Although only approximately 5% of vehicles operate at "high altitude" (as the NPRM notes), the proposed TIER 3 rule is a national standard. This national standard must protect all human health - regardless of location or altitude. Revecorp is concerned that the proposed TIER 3 rule compromises on testing requirements by allowing for "engineering demonstration" of how evaporative emissions control systems will function at altitude, as opposed to requiring actual testing. This could lead to vehicles being produced which are not compliant. [EPA-HQ-OAR-2011-0135-4816-A2 p. 2]

Evaporative emissions are especially difficult to control at high altitude and as EPA notes, they account for 30 to 40% of hydrocarbon emissions including toxics such as benzene. Unfortunately, evaporative emission control systems perform worse at high altitude due to reduced atmospheric pressure. In addition, newer technologies, which the vehicle manufacturers are just now gaining experience, are making it more difficult for these systems to function effectively. Gasoline direct injection (GDI) and variable valve timing (VVT) are becoming more popular due to fuel economy regulations. Unfortunately, both reduce pumping losses across the engine and therefore reduce the vacuum available to purge the evaporative emissions canister completely. Another detrimental trend for evaporative emissions control systems is that many manufacturers are downsizing vehicle engines to improve fuel economy and making up for the loss in performance by turbocharging. Turbocharging causes a loss of vacuum, so strategies to completely purge the canister are becoming more complex. The lower vacuum is a bigger problem at altitude. As a result of the lower barometric pressure, typical vacuum levels are reduced by 20% at 5,000 feet and more at even higher altitudes. Additionally, the lower fuel flow required to maintain stoichiometric air fuel ratio at high altitude areas severely limits purge options. Therefore, more sophisticated strategies need to be developed and should be physically tested and proven at altitude. In addition, high levels of dust and particulate matter exist at the semi-arid high altitude areas of the US. The high level of dust and particulate need to be accounted for in the design of the evaporative control system and again need to be physically verified as part of an in-use compliance program.

At high altitude, all of the above problems become even more difficult to overcome due to the reduced atmospheric pressure. Allowing vehicle manufacturers to use "engineering demonstrations" (showing on paper how the systems "should" work at high altitude) to prove that new technologies will function at high altitudes could allow evaporative emissions control systems which do not function properly or are not durable to be put into production. If these systems are not designed properly, there is no in-use compliance testing for these vehicles to identify any deficiencies so vehicles could have high evaporative emissions for their lifetime. The proposed rule also notes that the new canister bleed standard would not apply at high altitude. Due to the reduced atmospheric pressure, this test should be required to ensure the system is working properly.

Revecorp recommends - All testing (tailpipe, evaporative and canister bleed test) should be required to be performed at high altitude to protect the health of all Americans, including those living at high altitudes.

Our Response:

EPA understands the basis for the commenter's concern but does not agree with the conclusion. One can always propose that more testing is preferable, but this must be tempered against a reasonable expectation of the value added and the cost. In the case of evaporative emissions control EPA does not have information or data to indicate that specific high altitude testing requirements is needed.

The key factors which govern compliance are vapor generation (ambient and fuel temperatures and RVP), canister load (vapor generation rates, canister architecture, and activated carbon characteristics), and purge (air mass and volume).The basic chemical and physical principles governing these three processes are well understood and have been modeled extensively. This understanding creates the basis by which engineering analysis of system designs and data at low altitude can be used to predict compliance with the standard at high altitude. More specifically, manufacturers understand and characterize how evaporative systems operate at low altitude and conduct tests to show compliance with the emissions standards. With knowledge of the system characteristics for the vehicle at low altitude, models, engineering analysis, and good engineering judgment can be used to predict how they would perform at high altitude where there may be different conditions. A good example is purge. Manufacturers know how much purge air volume is needed to prepare the canister for evaporative and refueling vapor loads and how much volume is generated on that vehicle as a function of available manifold vacuum pressure. If the calibration changes at altitude and this reduces the purge volume, adjustments may be needed depending on compliance margins and other system design factors. Similarly, the working capacity of the activated carbon in the canister depends on the partial pressure of the evaporative emission constituents such as butane and pentane. The canister working capacity determined using low altitude testing methods may need to be adjusted to assure the same working capacity at high altitude due to the effect of the lower atmospheric pressure on the evaporative emission constituent partial pressures.

This situation is simpler for exhaust emissions since the air/fuel ratio is governed by feedback controls from the oxygen sensor. Adjustments are made automatically by the onboard computer.

Nonetheless, in many cases manufacturers do some developmental testing at high altitude to confirm the relationship between system performance at low and high altitude. They then use those results as a basis for future analysis and extrapolation of high altitude performance based on low altitude system characteristics and calibrations.

4.4. Onboard Diagnostics (OBD) Comments

4.4.1. General OBD System Regulation Changes

What Commenters Said:

Organization: Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

1. Tier 3 contains a number of changes to the EPA OBD regulations. Namely, beginning in 2017, Tier 3 adopts all of the latest California OBD regulations and adds a requirement to monitor “distance since 0.02-inch evaporative monitor decision” and report that value to a scan tool. The adoption of ARB’s latest OBD regulations will include both rate-based monitoring and the 0.02-inch evaporative emissions leak check monitor. We generally support the changes proposed.

2. CARB is currently proposing some changes to its OBD program in response to the LEV III program exhaust emission standards. We request comment on incorporating these changes into this rule or other rules in the future. We support ongoing harmonization with the CARB OBD regulations, especially if CARB makes adjustments to lead time, phase-ins or stringency of provisions. If EPA adopts the California OBD regulations by reference, it will important for EPA to update the reference by regulation in a timely manner. For this rulemaking, EPA should adopt the latest version of the ARB OBD regulations (i.e., as amended 7-Aug-2012).

3. EPA notes, ‘We also would generally expect to continue the current practice allowed by EPA regulations which is for EPA to accept CARB OBD certifications as satisfying EPA requirements provided that they include at least all of the requirements covered by the EPA regulations” [78 FR 29905]. We support that EPA continue the current practice to accept California OBD certification as satisfying EPA requirements, and this provision continues to be important to ensure OBD certification [EPA-HQ-OAR-2011-0135-4461-A5, p4]

4. MY 2017 Implementation of California OBD Requirements

EPA also plans to align its overall OBD regulations with those in California and has proposed the same MY 2017 start date for all other OBD requirements. The same concerns about applying OBD requirements in the initial year of the regulation for the Distance Since Evap Monitoring Decision and CA OBD Leak Detection Monitor at 0.02" apply for the overall requirements. For this reason, as well as for simplicity, we recommend the same phase-in for the overall OBD requirements, aligning with the phase-in for the evaporative emission standards to maintain a single, streamlined phase in for all OBD requirements.

If EPA is unwilling to phase-in the overall California OBD requirements with the Tier 3 leak emissions and evaporative emissions standards, we recommend that EPA provide an option for manufacturers to phase in the requirements at a rate of 30/60/100% beginning in MY 2016– a year earlier than would otherwise be required – while still maintaining the 60/60/80/80/100 starting in MY 2018 for the Distance Since Evap Monitoring Decision and CA OBD Leak Detection Monitor at 0.02". EPA should also allow the OBD alternative phase-in (using the point system) for this option.

Recommendation: We recommend that EPA provide a phase-in for the overall California OBD requirements consistent with the phase-in for the other Tier 3 OBD requirements - Distance Since Evap Monitoring Decision and CA OBD Leak Detection Monitor at 0.02" – which we have recommended aligning with the corresponding leak emissions standards (60/60/80/80/100 starting in MY 2018).

Alternatively, EPA could offer a separate phase-in for the overall OBD requirements, not including the Distance Since Evap Monitoring Decision and CA OBD Leak Detection Monitor at 0.02", of 30/60/100% beginning in MY 2016. EPA should also allow the OBD alternative phase-in (using the point system) for this option.

Our Response:

EPA proposed to adopt, with a few adjustments, the CARB regulatory requirements related to OBD II (see California Code of Regulations (CCR) §1968.2 dated May 18, 2010). We received comment that since our NPRM was issued, CARB was completing an update of its OBD II regulations and that EPA should adopt these provisions in lieu of the May 18, 2010 provisions. We have reviewed these updates and concur with the commenters, so we are adopting the provisions officially approved by CARBs Office of Administrative Law on July 31, 2013, with certain adjustments and exceptions discussed in the preamble. As mentioned in the NPRM and supported by the commenters, EPA expects to continue to work closely with CARB on future OBD updates and to continue the current practice allowed by EPA regulations which is for EPA to accept CARB OBD certifications as satisfying EPA requirements provided that they include at least all of the requirements covered by the EPA regulations.

Several commenters requested a phase-in compliance approach in lieu of a fixed compliance date, but no specific justification was provided by the commenters and EPA could not establish a need for this accommodation since the most recent changes to CARB OBDII regulations (2013) did not meaningfully affect provisions regarding vehicles under 14,000 lbs GVWR which have been in place since 2006. LDVs, LDTs, MDPVs and vehicles under 14,000 lbs GVWR already comply with CARB OBDII requirements and use the CARB certification as the basis for EPA certification. However, EPA agrees that phase-ins may be appropriate in situations where there was an explicit Federal requirement that was less rigorous than the California OBDII requirement (e.g., 0.020" evaporative leak monitor) and when there is a new Federal requirement (e.g., Distance Since Evap Monitoring Decision). After considering the comments received, EPA is permitting a limited and minimal phase-in for the 0.020" leak detection criterion for the OBD evaporative system monitoring requirement. We are permitting this phase-in, because a few vehicle models still only meet the 0.040" monitoring threshold in their Federal configuration and complying with the 0.020" CARB OBD II requirement entails validating performance in high altitude and cold weather regimes not seen in California. Thus, the 0.020" requirement would be new for those few models currently certified only to the EPA evaporative leak monitoring requirement. We are, therefore, implementing the following phase-in provision for the 0.020" leak detection criterion for the OBD evaporative system monitoring requirement. First, if a vehicle model meets the 0.020"requirement in the 2016 model year it is not eligible for the phase-in provision. No backsliding is permitted. Second, for manufacturers with models not meeting the CARB OBDII evaporative system leak monitoring requirement in the 2016 MY(see CCR 1968.2(e)(4)), they will be permitted to delay product-wide compliance with the 0.020" leak provision of the evaporative system monitoring requirements until the 2018 model year by engaging in a voluntary early phase-in. This phase-in would begin in the 2016 model year and conclude in the 2018 model year at a 100 percent implementation rate. For example, a manufacturer could delay attaining 100 percent compliance with the OBD evaporative system leak monitoring requirement until the 2018 model year by complying in the 2016 model year using a percentage which is at least as large as the delay for the 2017 model year (e.g., 40% in 2016 MY, 60% in 2017MY, and 100% in 2018MY).

What Commenters Said:

Organization: California Air Resources Board (CARB)

Comment 1 - Version of OBD II Regulation Adopted:
Overall, CARB supports U.S. EPA's incorporation of the OBD II regulation section 1968.2 into the federal requirements. However, CARB adopted additional changes to the 2010 version of the OBD II regulation that is referenced in the proposal. Specifically, CARB adopted changes which became operative on August 7, 2012. The 2012 amendments to the OBD II regulation are considered minor and include changes to the permanent fault code requirements and in-use monitor performance requirements to address issues related to hybrid vehicles (including plug-in hybrid electric vehicles), delays to the required start date for three minor diesel-related monitors, and an extension to the allowance for particulate matter filter monitors to exclude detection of specific failure modes. CARB recommends that U.S. EPA adopt the more recent version of the OBD II regulation to be more closely aligned with California.

Our Response:

EPA agrees and is adopting the 2013 version of CARBs OBD II regulations (13 CCR 1968.2), with certain adjustments and exceptions, as discussed in the preamble.

What Commenters Said:

Organization: Appalachian Mountain Club (AMC)

Overall we support these provisions including the adoption of the California Onboard Diagnostic System (OBD) requirements.

Organization: Michigan Department of Environmental Quality (MDEQ)

The US EPA is proposing to update the OBD regulations to parallel the California Air Resource Board's current requirements. This shows the requirements can be accomplished while simultaneously making it easier for car manufacturers to have fewer regulatory requirements to track and for which to adjust.

Our Response:

EPA agrees and is adopting the 2013 version of CARBs OBD II regulations (13 CCR 1968.2), with certain adjustments and exceptions, as discussed in the preamble. We expect to continue the current practice allowed by EPA regulations which is for EPA to accept CARB OBD certifications as satisfying EPA requirements provided that they include at least all of the requirements covered by the EPA regulations.

4.4.2. Specific Revisions to EPA OBD Regulatory Requirements

What Commenters Said:

Organization: Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

1. We recommend several additional changes below. These changes will streamline the requirements and recognize that manufacturers begin at different levels of compliance with the regulations.

Storing information in Non-Volatile RAM (NVRAM) and clearing codes:
As proposed, §86.1806-17 would require the vehicle to store the last evaporative leak check result, and the distance (in miles) since that result was determined. Further, the leak check results (both results and miles since determination) must be scan readable (i.e., readable with a generic scan tool). We agree with these changes, and the SAE J1979 committee is developing a PID to store the miles since determination. The regulation would also require that the leak check results and mileage since determination be retained in system memory even if codes are cleared or the vehicle battery is disconnected. This would require manufacturers to store the results and

mileage in NVRAM. Currently, vehicles only store permanent fault codes (i.e., when a monitor fails a component) in NVRAM. Expanding that memory is both costly and time consuming. We understand that the intent of this requirement is to be able to determine 1) if the monitor has made a pass/fail determination within the past 750 miles and 2) whether the determination was either "pass" or "fail." The requirement to store this in NVRAM was designed to prevent a situation where a vehicle could pass the Leak Emissions Standard test by disconnecting the battery or clearing the OBD codes. We support this intent, but believe it can be accomplished much more efficiently. By simply resetting the "distance since determination" PID to maximum value (40,722 miles) when codes are cleared or the battery is disconnected, the PID would only reset to zero when an evaporative monitoring pass/fail decision is made. This would prevent a vehicle from passing the IUVP leak emissions standard test by simply disconnecting the battery or clearing codes, since the vehicle would not meet the requirements for determination within 750 miles. Moreover, since the counter will only reset after the evap monitor has made a decision, and since the absence of a DTC will indicate that the monitor passed and the presence of a DTC will indicate it failed, there is no need to store the pass/fail decision in NVRAM. The SAE J1979 Committee is currently developing the requirements for the "Distance Traveled Since Evap Monitoring Decision" PID and will include the requirement to set the PID to maximum value when the codes are cleared or when the battery is disconnected, and only reset the counter to zero when the evaporative emissions monitor has made a pass/fail decision.

Recommendation: To implement this proposal, we recommend the following change to §86-1806(b)(1):
(1) OBD systems must record in computer memory the result of the most recent successfully completed diagnostic check for a 0.020 inch leak The ~~required~~ data must be able to be used to determine ~~records include~~ the miles driven since the last check occurred, ~~and~~ the pass/fail result, and if there has not been a completed check since the computer memory was last cleared (e.g., from a scan tool command or battery disconnect). The system may be designed to keep data only from the previous 750 miles of driving. The ~~leak check results~~ data must be reported in a standardized format consistent with other data required for the 080 system. ~~scan readable, and must be retained in system memory even if codes are cleared or the vehicle loses battery power.~~'

Organization: California Air Resources Board (CARB)

Further, U.S. EPA is proposing vehicles support and report a new standardized data parameter that will be used to indicate the distance traveled since the OBD evaporative system leak monitor was last completed successfully, if the system passed or failed during the monitoring event, and to store this data in non-volatile memory such that it can survive battery disconnects and on-board computer memory clear events. This proposed requirement is intended to determine whether off-board leak detection testing needs to be performed on individual vehicles during the In-Use Verification Testing (IUVP) program.

Concerning the proposal for a new standardized data parameter, CARB has worked with the SAE J1979 committee to develop an updated standard to achieve this. However, the draft SAE proposal created to meet the intent does not completely align with the U.S. EPA proposed regulatory language. Specifically, it does not provide for the data to be stored in non-volatile memory but instead has the value report a clear indication if the data has been erased and the monitor has not successfully run since then. In this situation, it appears to CARB that this will satisfy the intent and provide a clear indication that the off-board leak test should be performed on such a vehicle selected for IUVP testing. Secondly, the draft parameter indicates the mileage since the last successful test completion but does not directly indicate whether it was a pass or fail decision. Instead, current fault code status must be used and the absence (or presence) of an evaporative system leak fault code will confirm whether the monitor last ran and passed (or failed, respectively). Again, CARB believes this will provide the necessary data for the intended use in IUVP testing. Accordingly, CARB recommends the proposed language be modified in the final proposal to eliminate the requirement that the new data be able to survive battery disconnects and computer memory clear events as well as remove the requirement that the new parameter directly report whether the last monitoring event was a pass or a fail.

Our Response:

We agree with the commenters. Since the manufacturers normally implement the OBD requirements using technical guidance from the consensus-based SAE J1979 standard we think it is important for our requirements to be compatible with that standard provided that it will meet the EPA objective and that it be done for the lowest possible cost. EPA received further input from commenters on this issue which slightly revised the suggested language in the comment. We are adopting provisions consistent with the input from commenters.[26]

What Commenters Said:

Organization: Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

MY 2017 Implementation of "Distance Since Evap Monitoring Decision" As currently written, the regulations require, beginning in MY 2017, 100 percent implementation of the OBD distance since evap monitoring decision. Implementing even a relatively straightforward requirement such as this one, across all vehicles adds burden – in this case, unnecessarily. We do not believe it was EPA's intent to require a 100 percent phase-in of this requirement in MY 2017. Moreover, the leak emissions standard does not begin until MY 2018 and then phases in with the Tier 3 evaporative emissions standards (60/60/80/80/100 percent starting in MY 2018), and the phase in for the two should be aligned.

Recommendation: We recommend the following change to §86-1806(b): '(b) The following additional provisions apply to vehicles that are also certified to the leak emissions standard of §86.1813-17(a)(4).'

Our Response:

[26] Passavant, G. (January, 2014). "Manufacturer Input on Distance Since Last Evaporative Monitoring Decision". Memorandum to the docket.

EPA concurs with this comment. The "Distance Since Evap Monitoring Decision" requirement will be phased in on vehicles as they meet the leak standard. This occurs over the 2017-2022 or 2018-2022 model years depending on the compliance option used for the 2017 model year.

What Commenters Said:

Organization: Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

MY 2017 Implementation of California 0.02" Leak Detection Monitor:
The proposed regulation would also drop the option for federal vehicles to comply with an OBD leak detection monitor requirement of 0.04" and require all federal vehicles to comply with the current California OBD requirements, including the 0.02" evaporative leak detection monitor (in lieu of the federal 0.04" leak detection monitor) and rate based monitoring requirements (which are not included federally). As proposed, the 0.02" leak detection requirements would be required for each manufacturer's full federal fleet in MY 2017. While several manufacturers comply with the California OBD requirements nationwide already, other manufacturers certify a large portion of their federal fleet to the federal OBD standards. Validating their entire federal fleet to the 0.02" leak detection monitor will involve significant resources and cannot be efficiently implemented in the time between the Tier 3 final rule and MY 2017. For example, the federal vehicles will need to be validated at high-altitude, a requirement that does not exist in the California program. Rather than a 100 percent requirement in MY 2017, we recommend EPA provide a phase-in period to allow these manufacturers to more efficiently manage limited resources needed to make this conversion. The Tier 3 program already involves a number of different phase-in provisions. Creating another phase-in that is not aligned with other provisions would add burden on both the manufacturers and the agency in the form of unnecessary new reporting and tracking compliance requirements. For simplicity, we recommend linking the phase-in of the 0.02" monitor requirement with the percentage phase-in steps that have already been proposed for the new evaporative and leak test emission standards. We recognize the agency might be reluctant to allow this long phase-in of the basic monitor requirement because there may be incremental air quality benefits associated directly with the change from the 0.04" to the 0.02" monitor requirement independent of the leak test standard and accompanying OBD changes (i.e., distance monitor, etc.). However, we believe there will be enough incentive for manufacturers to make this conversion as soon as possible that a separate, more rapid and more rigid phase in requirement will be unnecessary. Given that not all manufacturers are in this situation (i.e., significant use of the 0.04" option) and given there will be a strong incentive to move as quickly as possible to achieve a full national fleet of vehicles that can be sold anywhere in the U.S., it seems very unlikely that any manufacturer would take the fullest advantage of the phase-in schedule. Use of the 0.04" monitor would prevent a vehicle from becoming a "50-state" vehicle. Under the current Tier 2 regulations, there are multiple differences between the EPA and California requirements that might cause a manufacturer to opt for separate fleets. But given that EPA has worked to align the Tier 3 program as much as possible with the California LEV III program, in the future there will be fewer reasons for a manufacturer to opt for separate fleets, particularly if the only difference is the OBD leak monitor. Therefore, we don't think EPA needs to add complexity to the program by creating another phase-in that is not aligned with other aspects of the Tier 3 program.

Recommendation: We recommend that EPA provide a phase-in for the CA OBD leak detection monitor requirements (0.02” detection) that aligns with the phase-in for the leak emissions standards (60/60/80/80/100 starting in MY 2018).

Our Response:

There are very few manufacturers who are not already fully compliant with the 0.020” cumulative diameter threshold for leak diameter monitoring on all of its Federal models, even though the current Federal requirement is only for a 0.040” cumulative diameter threshold. The 0.020” threshold has been in effect in California for over ten years. EPA sees no need for a full phase-in as requested, but sees the value in giving those manufacturers who are not yet fully compliant with the 0.020” threshold some flexibility to integrate the prove-out of their monitoring hardware and software with other field work. Therefore, we are providing a very limited phase-in flexibility wherein manufacturers may defer 100 percent compliance for their gasoline-powered vehicles less than or equal to 14,000 lbs GVWR until the 2018 model year by pulling ahead compliance to the 2016 model year for a percentage equal to or greater than that percentage that they wish to defer to the 2018 model year.

What Commenters Said:

Organization: California Air Resources Board (CARB)
Currently U.S. EPA accepts On-Board Diagnostics (OBD) systems certified to CARB’s OBD II regulation as systems also satisfying the federal OBD regulation. The NPRM proposes to codify this practice by adoption and incorporation by reference CARB’s OBD II regulation (title 13, California Code of Regulations, section 1968.2) as approved on June 17, 2010, effective starting in 2017 model year, except for the following provisions:
- sections 1968.2(a), (b), (k) are excluded
- the tampering clause in section 1968.2(d)(1.4) is excluded
- the camshaft/crankshaft alignment monitoring requirement in section 1968.2(e)(15.2.1)(C) would only apply to vehicles with variable valve timing systems

The proposal also includes a requirement for manufacturers to perform additional demonstration testing of the evaporative system monitor capability and to report additional standardized data through the OBD system that would identify how many miles since the evaporative system leak detection monitor last completed.

Comment 2 - Camshaft/crankcase Alignment Monitoring Requirement:
The proposal includes a specific exclusion for the requirement in the CARB OBD II regulation section 1968.2(e)(15.2.1)(C) that OBD systems must be able to detect a misalignment between the crankshaft and camshaft. This is not a technology-forcing requirement and has been in place for many years in California-certified OBD II systems. CARB believes that a reduction in diagnostic capability and emission benefit would result due to the exclusion of camshaft/crankshaft alignment monitors on vehicles without variable valve timing systems, because alignment malfunctions can routinely occur in-use due to timing belts slipping or being

improperly installed during maintenance involving timing belt replacement. Therefore, CARB recommends that the proposed regulation language be changed by removing the specific section that limits camshaft/crankshaft alignment monitoring to only those vehicles equipped with variable valve timing systems.

Our Response:

This limitation is specifically included in the current EPA OBD requirements and EPA did not specifically propose to remove it. EPA did not receive input on this issue from any manufacturer and we did not seek their input on CARB's comment. Thus, while EPA believes CARB's perspectives have merit, we are not in a position to remove this limitation without input from the manufacturers and others. It should be noted that the requirement will continue to apply to vehicles equipped with variable valve timing systems and these are expected to become more prevalent in response to the 2017-2025 model year GHG and fuel economy standards.

What Commenters Said:

Organization: California Air Resources Board (CARB)

Comment 3 - Evaporative Leak System Monitor:
The NPRM proposes a requirement for manufacturers to phase-in a 0.020 inch leak detection monitor as CARB's OBD II regulation has required since the 2002 model year. CARB supports this change to align detection capability nationwide. Further, most manufacturers already extend this capability nationwide by certifying a single system that meets CARB requirements.

Our Response:

We agree with this commenter. The requirement is feasible and being met by almost all manufacturers. The requirement will apply to all 2017 and later model year gasoline-powered highway motor vehicles up to 14,000 lbs GVWR. The regulations provide a limited flexibility which will permit manufacturers to defer full compliance to the 2018 model year if they comply in the 2016 model year with a percentage equal to or greater than the percentage they defer from the 2017 model year to the 2018 model year.

What Commenters Said:

Organization: Ford Motor Company (Ford)

Adoption of CARB OBD Regulations: EPA has proposed to require that all Federal vehicles meet California's On-board Diagnostic regulations by the 2017MY. Ford has two specific concerns with this proposal:

0.020" OBD Leak Monitor Detection Threshold – This proposal would require that all Federal vehicles adopt California's 0.020" leak detection monitor threshold by the 2017MY. The existing

EPA requirement for leak detection is 0.040”, but under the Tier 3 proposal, 100% of a manufacturer’s fleet would be required to meet this more stringent requirement in 2017MY. Although most Ford vehicles have a leak detection monitor capable of meeting this new requirement, they have not been validated to the 0.020” threshold on a nation-wide basis. In order to accomplish robust leak detection to the more stringent standard nationally, additional validation and data collection must be performed that account for more varied environmental and market fuel conditions encountered in all 50 states (e.g., high-altitude, additional fuel formulations, etc.). Since OBD assessments are typically performed holistically as part of new program vehicle development, the processes and engineering resources are not in place to retroactively reassess existing systems to account for these new conditions. For these reasons, Ford proposes that EPA allow a phase-in for the 0.020” requirement of sufficient duration to allow migration to the new standard to be accomplished via new program development, which is typically on a three-year cycle.

Recommendation: Ford proposes that EPA provide a phase-in for the new 0.020” OBD leak detection threshold that would allow Ford to utilize its existing, robust new program OBD validation processes and avoids the need to employ ad-hoc, off-program actions. Ford requests that such a phase-in start no earlier than 2016MY, and extends for at least three years.

Our Response:

There are very few manufacturers who are not already fully compliant with the 0.020” cumulative diameter threshold for leak diameter monitoring on all of its Federal models, even though the current Federal requirement is only for a 0.040” cumulative diameter threshold. The 0.020” threshold has been in effect in California for over ten years. EPA sees no need for a full phase-in as requested, but sees the value in giving those manufacturers who are not yet fully compliant with the 0.020” threshold some flexibility to integrate the prove-out of their monitoring hardware and software with other field work. Therefore, we are providing a very limited phase-in flexibility wherein manufacturers may defer 100 percent compliance for their gasoline-powered vehicles less than or equal to 14,000 lbs GVWR until the 2018 model year by pulling ahead compliance to the 2016 model year for a percentage equal to or greater than that percentage that they wish to defer to the 2018 model year.

4.4.3. Provisions for Emergency Vehicles

What Commenters Said:

Organization: Ford Motor Company (Ford)

Emergency Vehicle Provisions:
The CARB OBD regulation required manufacturers to meet unique monitoring requirements to detect malfunctions causing an air/fuel ratio imbalance between cylinders. By the 2016 model year, all vehicles certified to the CARB OBD II requirements must meet the final Air/Fuel Ratio Imbalance Monitor (AFRIM) requirement final emissions threshold of 1.5 times the applicable standard. We believe there should be an exemption from the AFRIM threshold for emergency

vehicles. We will illustrate this comment with the example of Ford's 2016 and later model year Police Interceptor package. In order to meet the 1.5 times the standard emissions threshold, the Police Interceptor would require an added underbody catalyst. This would result in performance degradation for the Police Interceptor, with a 0-100 MPH time increase that may not meet police agency expectations. As a result, CARB had agreed to provide Ford with an exemption from the AFRIM requirement on the Police Interceptor package using a provision in the California Vehicle Code that allows emergency vehicles to meet Federal emissions requirements:

27156.2 Notwithstanding any other provision of law, any publicly owned authorized emergency vehicle operated by a peace officer, as defined in Section 830 of the Penal Code, any authorized emergency vehicle, as defined in Section 165 and used for fighting fires or responding to emergency fire calls pursuant to paragraph (2) of subdivision (b) or pursuant to subdivision (c) or (d) of that section, and any publicly owned authorized emergency vehicle used by an emergency medical technician-paramedic, as defined in Section 1797.84 of the Health and Safety Code, is exempt from requirements imposed pursuant to California law and the regulations adopted pursuant thereto for motor vehicle pollution control devices.

Ford had planned to certify the 2017 and subsequent model year Police Interceptor without the AFRIM monitor since the Federal OBD requirements do not require this monitor. The vehicle could then be certified and sold in all 50 states. The Police Interceptor is being developed to meet all other Federal and California emissions and OBD requirements. However, EPA's proposal to require CARB OBD II on all Federal vehicles by the 2017 model year would force the Police Interceptor to again have to meet the AFRIM requirement, and thus force those vehicles to be fitted with an underbody catalyst with the associated vehicle performance reduction for the sole purpose of keeping emissions below 1.5 times the standard just in case an unlikely cylinder imbalance malfunction were to occur. We do not think it was EPA's intent to impose OBD requirements on Federal vehicles that CARB would not require on vehicles sold in California.

Recommendation: With respect to the AFRIM issue specifically, Ford recommends that EPA provide an exemption from the CARB OBD II AFRIM requirement in 13 CCR 1968.2, paragraph (e)(6.2.1)(C) through at least the 2019 model year for emergency vehicles. This would allow Ford the sufficient lead time to implement the necessary design changes need to meet the CARB OBD II AFRIM requirement without needing to add hardware or other solutions that reduce vehicle performance levels. More generally, we encourage EPA to adopt language in the final Tier 3 rules to the effect that EPA will recognize and adopt, with respect to Federal vehicles, any OBD exemptions that CARB may allow for California vehicles.

Our Response:

EPA has held follow-up discussions on this matter with Ford and CARB staff and has reviewed the technical data regarding the ability of the law enforcement vehicles to meet the AFRIM monitoring threshold requirements.[27] Adding an underbody catalyst to these two vehicle configurations just to meet the AFRIM requirements adds cost and more importantly reduces performance needed in these types of vehicles. These two test groups (comprised of law

[27] Passavant, G, (January, 2014). Information Related to CARB AFRIM OBD Requirements for Emergency Vehicles. Memorandum to the docket.

enforcement vehicles) are not required to meet the current AFRIM monitoring requirements and CARB does not intend to require it in the future. Since Ford expects to have compliant powertrains for these test groups by the 2020 model year and the only potential adverse environmental effect is failure to notify the user in the event of an AFRIM imbalance situation, EPA will defer this requirement for these vehicles through the 2019 model year. The final rule also incorporates broader provisions that address potential future OBD issues related to emergency vehicles.

4.4.4. Future Considerations

<u>1. OBD Monitoring of the Performance of Canister Carbon</u>

What Commenters Said:

Organization: Revecorp Inc.

Although tailpipe emissions are significant, Revecorp is most concerned with changes in the proposed rule related to the control of evaporative emissions. This is because evaporative emissions account for 30 to 40% of hydrocarbon emissions, including toxics such as benzene. Research conducted for EPA has shown that vehicles can have failures of the evaporative emissions control systems (such as deactivation of the canister substrate) that OBDII systems do not identify. This is in part because sensing of the activity of the canister carbon is not monitored by OBDII systems, so when it fails, it goes unnoticed. This can lead to vehicles with uncontrolled evaporative emissions for the life of the vehicle, which is not identified by the OBDII system (to notify the motorist to get the vehicle repaired) and not caught by in-use compliance testing because it is not required for evaporative emissions control systems (at least not at high altitude).

On-board diagnostic systems should be strengthened to improve identification of in-use excess emissions.

As noted above, without a way to identify failures of the emissions control systems in-use, vehicles will have high emissions for their lifetimes. In one phase of a study conducted for EPA on in-use vehicle evaporative emissions (EPA contract #: EP-C-06080, the "Ken Caryl" phase of the study) 50% to 75% of the vehicles which were identified to have high evaporative emissions did not have the check engine light illuminated (the excess emissions were not identified by the OBDII system). This is in part because a major component of the evaporative emissions control system (the evaporative canister) is not checked by the OBDII system to ensure it is functioning properly. In some cases, canisters were damaged and evaporative gases were escaping into the environment. The canister of a vehicle is the single most important component of the evaporative emissions control system and should be monitored to ensure it is performing properly.

Revecorp recommends – Monitoring of canister performance should be added to the OBDII requirements.

Our Response:

EPA agrees that the canister performance is critical to the overall ability of the evaporative system to control vapor emissions. While it is easy to estimate the emissions increase which occurs if the canister partially or totally fails – and it is quite large- it is more difficult to determine the frequency and cause of such failures. Purge valve failures leading to saturated canisters are infrequent (~0.5%)[28] based on an initial review of OBD data, but the frequency of saturated canisters related to other causes such as blocked air inlet purges and ingestion of liquid is unknown and is informed only by anecdotal information. EPA is now engaged in further study of this question to help determine the frequency of such occurrences and whether an OBD requirement is justified.

What Commenters Said:

Organization: Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

OBD monitoring of the performance of the canister carbon is neither necessary nor practical. The OBD system currently verifies that the canister is in the system (large and small evaporative leak test) and that purge is working correctly. Also, if the system is designed properly so that there is no liquid water or fuel entering the canister, the carbon in modern canisters does not deteriorate during the life of the vehicle. Therefore, diagnosis of the canister carbon is unwarranted. Furthermore, diagnosis of the performance of the carbon would be extremely difficult. The potential diagnostic signals associated with vapor in the fuel today, e.g., (closed loop fueling feedback) have too much variation to make a reliable diagnostic. Even adding new hardware for diagnosis e.g., carbon bed temperature sensor, would not provide for a reliable diagnostic.

Our Response:

EPA disagrees with the assessment of the commenter with regard to the technical capability to monitor canister performance. If it is warranted, there are several sensing schemes which could be used to monitor the in-use performance of the canister itself. However, as mentioned above, more information on the frequency and causes of failures is needed, so we are not putting a requirement in place at this time.

What Commenters Said:

Organization: California Air Resources Board (CARB)

Comment 4 - Evaporative System Activated Carbon Canister Monitor and Purge Monitor:

[28] Weatherby, M., Sabisch, M., Kishan, S. (2014) Analysis of Evaporative On-Board Diagnostic (OBD) Readiness and DTCs Using I/M Data.

Though not officially part of U.S. EPA's proposal, U.S. EPA seeks comments about a provision to require the OBD system to monitor the activated carbon canister, specifically for evidence of proper performance of the canister such as adequate adsorption and desorption of hydrocarbon vapors. U.S. EPA believes such performance could be sensed with existing hardware on the vehicle (e.g., looking for changes in canister carbon bed temperature or presence of vapor in the fuel going to, the intake manifold after a cold start or refueling event). CARB currently has no requirement for monitoring the canister performance but given the increasing importance of keeping evaporative emissions to a minimum, believes the idea merits further exploration and research before making any decisions on implementing any regulation changes. Important aspects that would likely need to be investigated include whether monitoring of the activated carbon canister can indeed be robustly done with the existing hardware on the vehicle.
Our Response: EPA agrees that given the potential emissions impact, this issue merits further research and assessment. EPA believes that if monitoring is warranted, there are several sensing schemes which could be used to monitor the in-use performance of the canister itself. However, as mentioned above, more information on the frequency and causes of failures is needed before we propose a requirement.

2. OBD Monitoring of Vacuum Pump or Other Assist Hardware

What Commenters Said:

Organization: Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

If a vacuum pump or other hardware is utilized to assist canister purge, the current OBD regulations would require that this pump and associated hardware be monitored.

Organization: California Air Resources Board (CARB)

Regarding devices used to assist purge flow, increased usage of such devices in the future is possible, so further investigation into monitoring of these devices is warranted. However, CARB believes the OBD regulation already covers monitoring of these devices to some extent, since they would be considered evaporative system components and consequently required to be monitored under comprehensive components requirements for proper function.

Our Response:

EPA appreciates these comments and will include such monitoring approaches in future certification reviews if a future system uses a vacuum pump or other hardware to assist canister purge.

3. Diagnose Sealed Fuel Systems Down to 0.010" or 0.015"

What Commenters Said:

Organization: Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

Industry is opposed to OBD detection of leaks smaller than 0.020” in sealed fuel systems. Fuel system leaks that are less than 0.020” are extremely difficult to detect and are even more difficult to repair. Attempting to detect leaks smaller than 0.020” would result in a high risk of false MILs and numerous vehicles that could not be repaired. Ultimately, this would undermine the public’s confidence in OBD performance.

Organization: California Air Resources Board (CARB)

EPA also seeks comments about a provision regarding pressurized and sealed fuel tanks. Based on its observation of a trend towards fuel tanks with higher operating pressures or tanks sealed to the atmosphere during normal operation and data showing a leak in these systems will result in substantially higher emissions relative to traditional low pressure systems. U.S. EPA seeks comment on the feasibility and cost of requiring OBD leak detection monitors to detect a smaller diameter orifice on such systems - specifically, something in the magnitude of a 0.010 inch leak in lieu of a 0.020 inch leak anywhere in the evaporative system. This would apply to vehicles with a designed in-use operating pressure in excess of 0.36 psi (10 inches of water).
CARB currently has no such requirements but given the increasing importance of keeping evaporative emissions to a minimum, believes the ideas merit further exploration and research before making any decisions on implementing any regulation changes. Important aspects that would likely need to be investigated include the feasibility of the repair service community to efficiently diagnose and repair detected leaks with a smaller diameter.

Our Response:

EPA understands the concerns regarding detection and repair raised by the commenter. While there is limited data on emission rates as a function of cumulative orifice diameter, more information on the frequency of such leaks is needed before pursuing this requirement.

4. Vent Leaking Sealed Fuel Tank System to Canister

What Commenters Said:

Organization: Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

EPA has requested comment about opening the vent valve on key off if a leak is detected in a sealed fuel system. This concept will not reduce the emissions from a leak because the flow through the canister is more restrictive than the flow out of the leak. Therefore, almost all of the vapor will go out the leak rather than into the canister.

Organization: California Air Resources Board (CARB)

For sealed tanks, U.S. EPA seeks comments on an added requirement that any valve that isolates the fuel tank vapor from the canister be defaulted to an open position at key off (allowing vapors to vent to the canister) if the OBD monitor detects a leak and illuminates the malfunction indicator light. Further, for pressurized systems, U.S. EPA is asking for comment on setting the evaporative system monitor threshold in the 0.010 inch to 0.015 inch range, specifically asking for the feasibility of this threshold, the effects of the vent valve open requirement on on-board refueling vapor recovery, and the reparability of leaks below 0.020 inch.

CARB currently has no such requirements but given the increasing importance of keeping evaporative emissions to a minimum, believes the ideas merit further exploration and research before making any decisions on implementing any regulation changes. Important aspects that would likely need to be investigated include the feasibility of the repair service community to efficiently diagnose and repair detected leaks with a smaller diameter.

Our Response:

EPA did not make a specific proposal with regard to venting of higher pressure or sealed fuel tanks with leaks to the activated carbon canister. While sealed or higher pressure fuel tank system designs are not common today, the reduction of vacuum for purge air in some future engines/powertrains (e.g., hybrids) creates the possibility that manufacturers will turn designs of this nature to help reduce vapor loads to the canister and thus allow for lower purge volumes. Manufacturers should be cognizant of the issue raised by EPA in the NPRM and put emphasis on system durability. In coordination with CARB, EPA will continue to evaluate trends in fuel system operating pressures and potential design features leading to leaks.

4.4.5. Heavy-duty Vehicles

What Commenters Said:

Organization: Truck and Engine Manufacturers Association (EMA)

<u>OBD Requirements as Applied to Hybrid Applications:</u>

Current ARB and EPA OBD regulations include provisions requiring hybrid components and systems to be monitored under “comprehensive component monitoring” requirements. Those provisions pose a significant barrier to the introduction of hybrid system technology. In fact, the current OBD provisions will substantially limit the availability of hybrid vehicles nationwide. The use of hybrids in medium- and heavy-duty commercial applications is an emerging technology, and the market for that technology is very small relative to overall heavy-duty applications and to the light-duty passenger car industry. There are multiple medium- and heavy-duty duty-cycles and applications where hybrids might be practical. Additional time is needed to develop and commercialize hybrid technologies for those applications, and even more time and resources are needed to develop proper diagnostics on hybrid components. As things stand, however, current OBD regulations will result in little or no use of hybrid applications in California, depriving the state (and any state that has opted in to California’s standards) of the fuel efficiency and other benefits that hybrid technology has to offer. The same is true nationwide, as EPA's existing hybrid OBD requirements for heavy heavy-duty vehicles and engines become fully implemented. Engine and vehicle manufacturers are continuing their efforts to assure that hybrid technology – an important GHG emission-reduction opportunity – will be available throughout California and the remainder of the U.S. EPA should support those efforts by adopting (and, as necessary, amending) OBD regulations without hybrid component monitoring requirements. EPA should take additional time to assess whether a potential regulatory framework can be developed, with appropriate lead time, that assures the feasible, cost-effective and reasonable development of hybrid system and engine technologies and associated diagnostic strategies.

Take additional time to assess the appropriate regulatory framework for cost effective and feasible development of hybrid technology and diagnostic strategies

Our Response:

EPA acknowledges EMA's comment opposing hybrid component monitoring requirements. However, no detail regarding the technology issues or problems or systems integration was provided in the comment. Follow-up discussion with EMA indicated that their major concern regarding OBD and hybrids was related to vehicles over 14,000 lbs GVWR.[29] After confirming that the Tier 3 rulemaking does not address OBD requirements for vehicles over 14,000 lbs GVWR and that appropriate lead time would be provided for new heavy-duty vehicles equal to or less than 14,000 lbs GVWR, EMA was satisfied with the way EPA was implementing the OBD requirements for hybrids for vehicles equal to or less than 14,000 lbs GVWR. Thus, we are not deferring adoption of OBD requirements as part of the Tier 3 rule. As discussed below, the OBD provisions of the Tier 3 rule do not apply to vehicles/engines over 14,000 lbs GVWR.

<u>14,000 Pounds GVWR and Under:</u>

EPA is proposing to update its OBD regulations to be consistent with ARB's current OBD requirements ("OBDII"). (78 Fed. Reg. at 29903-29904.) For Heavy-Duty Vehicles (8,501-14,000 GVWR), those requirements would begin in MY2018. Although adopting the OBDII regulations for MY2018 does not provide the four full model years' lead-time required by the CAA, EMA recognizes that EPA already accepts certification with ARB OBDII requirements as satisfying EPA OBD requirements for vehicles 8,501-14,000 lbs. GVWR. As a result, EMA generally supports such alignment with ARB's OBDII regulations, with the significant exception noted above. EPA should support manufacturers' efforts to assure the cost-effective commercial use of hybrid technology by adopting the OBDII regulations without hybrid component monitoring requirements. If EPA were to adopt the OBDII provisions without removing such requirements, the successful commercialization of hybrid vehicles throughout the nation would be substantially impeded, if not thwarted altogether.

Adopt the ARB's OBDII regulations without requirements to monitor hybrid components

[29] Passavant, G. (February, 2014). "OBD for Hybrid HD Vehicles/Engines". Memorandum to the docket.

Our Response:

As discussed above and in the preamble, EPA proposed adoption of CARB 2010 OBD regulations and based on comments is adopting the version of the CARB OBD regulations completed in July 2013. With the exception of hybrids EMA did not oppose the 2018 model year implementation of OBD for HDVs equal to or less than 14,000 lbs GVWR. EMA's comment concerning hybrid component monitoring is addressed above. As discussed in the preamble, to be consistent with the manner in which the Tier 3 exhaust emission standards are being implemented for the heavy-duty vehicles between 8,501 and 14,000 lbs GVWR, the OBD requirements will apply in MY 2019 based on the Job 1 (first production) date for the vehicle/engine model. If the vehicle/engine model Job 1 date is before the fourth anniversary date of the signature of the Tier 3 rule the Tier 3 requirements will be mandatory in the 2020 model year, not the 2019 MY. If the Job 1 date is on or after the fourth anniversary of the signature date of the Tier 3 rule the OBD requirements will apply beginning in MY 2019. The Tier 3 OBD requirements will apply to all 8,501-14,000 lb HDVs beginning in MY 2020.

<u>Over 14,000 Pounds GVWR:</u>

In the preamble to the Proposed Rule, EPA indicates that the proposal to adopt the California OBD regulations also "includes heavy-duty vehicles above 14,000 lbs. GVWR, though these vehicles would not need to meet the new requirements related to leak testing" (78 Fed. Reg. 98, 29919). Based on other language in the Proposed Rule, including footnote 313 of the preamble (which specifically states, "We are not proposing to change the [OBD] requirement for incompletes and vehicles with a GVWR above 14,000 lbs.") (78 Fed. Reg. at 29904), EMA believes the reference on page 29919 of the Federal Register notice is a drafting error. EMA also believes the language is an error because EPA has not (1) conducted any technical analysis of applying ARB's heavy-duty OBD regulations; (2) properly notified heavy-duty manufacturers of any such significant changes to the EPA heavy-duty OBD program; or (3) proposed any other changes in the rule that would require the application of California's OBD regulations to vehicles and engines over 14,000 lbs. GVWR. EPA objects to the finalization of any portion of the Proposed Rule that would adopt ARB OBD regulations applicable to vehicles and engines over 14,000 lbs. GVWR. EPA should clarify in the final rule that no changes to EPA's on-board diagnostics requirements applicable to engines and vehicles over 14,000 lbs. GVWR are being proposed or made in conjunction with the Tier 3 Standards (other than OBDII regulations that may be applicable to optionally chassis-certified HDGVs). Without this vital clarification, the Proposed Rule will be subject to immediate challenge.

State unequivocally in the final rule that no changes are being made to OBD requirements for engines or vehicles greater than 14,000 lbs. GVWR

Our Response:

The OBD provisions in this rulemaking do not apply to vehicles/engines over 14,000 lbs GVWR, except that the Tier 3 OBD regulations are applicable to optionally chassis-certified HDGVs.

4.4.6. Other Issues

What Commenters Said:

Organization: VNG.CO

Reduced OBD Testing Requirements – Today: Current EPA rules allow alternative fuel conversion SVMs to meet much less stringent OBD requirements than OEMs certifying small volume test groups, with as few as four tests of major diagnostic monitors (including fuel trim lean & rich, catalyst deterioration, engine misfire, and oxygen sensor) instead of the many more typically required for OEM certification.[15] As illustrated above, the NPC Future Transportation Fuels report notes that "certification, OBD, aftertreatment and calibration" are a significant source of per-vehicle incremental costs for current OEM NGV production. This is particularly the case for pickup trucks, where it is the single largest cost component at about $4,500 per vehicle, or nearly 40% of the total incremental cost.[16] Harmonizing OEM small vehicle test group OBD testing procedures with the reduced OBD testing requirements for alternative fuel converters is consistent with the 'level playing field' provided in most other respects between these categories of vehicles, and represents a major opportunity to reduce NGV incremental costs for consumers without sacrificing the efficacy of the certification process.[17] Reduced OBD Testing Requirements – Under Tier 3: The Tier 3 NPRM proposes that EPA "upgrade" its OBD regulations "to be consistent with the latest CARB regulations." These CARB OBD requirements are similar to the EPA requirements for full OEM testing and have similarly been cited as "the most costly and time-consuming requirement in the certification process" for NGV aftermarket conversions in the California market.[19] Compared to the streamlined EPA OBD testing requirements for SVM converters, which usually require a handful of demonstrations that can be reviewed in a week, the CARB process currently requires "more monitors to be adjusted, more tests for each of these monitors to be conducted, lots of documentation on the adjustments to monitors, and many more test results to be reported," resulting in application packages of 200-300 pages long that take CARB about 3 months to review.[20] This adds considerable expense as well as time to the certification process, and this barrier to entry has limited the availability of NGV conversions in California.

For this reason, CARB is working with stakeholders to develop less extensive OBD testing requirements for small-volume converters that will be aligned with EPA SVM requirements while still ensuring effective emissions performance. Similar to EPA's rules for SVM converters, the new CARB rules would require as little as four demonstrations of OBD systems. 21 Consistent with EPA's judgment in allowing reduced OBD test requirements for converters, CARB notes that this reduced testing burden will still preserve emissions benefits of their emissions program. EPA should ensure that the Tier 3 rules incorporate these and other changes that CARB makes to streamline its own regulations.

CARB's proposed rule changes will significantly reduce barriers to entry in California; however, like the current EPA OBD rules, they apply only to aftermarket converters. In order to effectively harmonize these rules with existing EPA definitions as well as to provide a level playing field between SVMs and OEM small-volume test groups, the Tier 3 rules should specify that any reduced aftermarket OBD requirements introduced by CARB will be applicable to OEM small-volume test groups as well as SVM converters up to the current 15,000 vehicle thresholds for each.

Our Response:

EPA met with the commenter in October 2013 to get a better understanding of the issues raised in their comments.[30] EPA proposed that the new OBD provisions not apply to the small businesses and SVMs (as defined in the rule) until the 2022 model year. Provisions for OEM small volume test groups were not included. We understand the commenter's view that OBD is potentially more costly for small volume test groups and could be a deterrent to a manufacturer decision to develop these configurations. EPA is willing to consider reduced OBD requirements for small volume test groups of OEMs (perhaps on a transitional or interim basis). However, EPA cannot before the fact commit to applying the changes under consideration in California.

Commenters' footnotes:
[15] Environmental Protection Agency. "Clean Alternative Fuel Vehicle and Engine Conversions Final Rule: Webinar for Conversion Manufacturers." 27 April 2011. http://www.epa.gov/otaq/consumer/**fuels**/alt**fuels**/**conversions**-fr-**webinar**.pdf
[16] National Petroleum Council. "Future Transportation Fuels: Natural Gas Analysis." 28 May 2013. pp. 53-58. http://www.npc.org/FTF-report-080112/Chapter_14-Natural_Gas-052813.pdf
[17] Existing EPA regulations (40 CFR 86.1806–01) already afford flexibility in OBD testing requirements and allow EPA to reduce them if requested to do so by the applicant, particularly in the case of alternative fuel vehicles. EPA should encourage *both* SVM converters and OEMs certifying NGVs in small-volume test groups to request and utilize these reduced OBD requirements.
[18] Environmental Protection Agency. "Control of Air Pollution From Motor Vehicles: Tier 3 Motor Vehicle Emission and Fuel Standards; Proposed Rule." Federal Register, 21 May 2013, p. 29903.
[19] Ward, Peter F, on behalf of Alternative Fuels Advocates LLC. Letter to Annette Hebert, Chief Mobile Source Operations Division, California Air Resources Board. 22 Feb 2013.
[20] Carmichael, Tim, on behalf of California Natural Gas Vehicle Coalition. Letter to Annette Hebert, Chief Mobile Source Operations Division, California Air Resources Board. 8 Mar 2013.
[21] California Air Resources Board. "Public Workshop: Proposed Amendments to the Alternative Fuel Conversion Certification Procedures for New and In-Use Vehicles and Engine." 1 May 2013. http://www.arb.ca.gov/msprog/onroad/altfuelconv/5-1-2013_Alt%20Fuels%20Wkshp%20V8.pdf

4.4.7 Requirements for Alternative Fuel Vehicle Converters

What Commenters Said:

Organization: National Propane Gas Association (NPGA)

EPA is seeking changes to its regulations that address fuel specifications for gasoline and vehicle emission standards for certain types of vehicles. The changes would essentially harmonize EPA's regulations with those of the California Air Resources Board's (CARB) Low Emission

[30] Passavant, G. (October, 2013). EPA and VNG.CO Meeting on Tier 3 NPRM. Memorandum to the docket.

Vehicle III (LEV III) program. Implementation would be phased-in over a period of time beginning from the year 2017 and running thru 2025.

From a broader perspective, NPGA disagrees with the basic premise that EPA should seek to harmonize its regulations with the CARB LEV III program. NPGA does agree with EPA's stated intention of allowing manufacturers to be able to sell their product in all 50 states. However, NPGA argues that the reverse should occur, i.e. CARB should harmonize its regulations with the federal regulations.

CARB's regulations are typically more stringent than EPA's, and it's unclear as to whether all of their changes over the years have met the level of administrative approval required by EPA. What is clear, though, is the higher costs to certify to CARB's regulations, which have served as a major deterrent for alternative fuel converters to make a business case for participation in the California market. EPA has even acknowledged that there is a significant cost burden to comply with CARB's OBD requirements, for example. As a result, can an economic justification be made (by CARB or EPA within this NPRM) for the emissions benefits lost due to this cost avoidance?

NPGA believes there is no demonstrated benefit (costs or otherwise) to using CARB's regulations over EPA's regulations. CARB's regulations pertaining to alternative fuels have not been updated since the 1990s. While NPGA understands they are working on changes to the regulations, those changes remain in development and have yet to be finalized. NPGA simply believes that EPA's alternative fuel regulations are easier to manage from a cost/benefit perspective compared to CARB's.

In 2011, NPGA lauded EPA for promulgating a series of changes that streamlined the regulations for certifying alternative-fueled vehicles. This action was a culmination of years of effort on the part of both the alternative-fuel industry and EPA in recognition that such changes would increase the availability of clean-burning vehicles, and, thus, have the effect of reducing pollution. These changes have had an overall positive impact on the industry and environmentally, as well, since that time.

NPGA would caution EPA to be mindful of changes to its emission regulations that would result in more conventional fueled vehicles put into operation than alternative fueled vehicles (as has occurred in California). Similarly, any changes put in place should not offset the gains in pollution reduction from EPA's 2011 rulemaking that has resulted in more alternative-fueled vehicle certifications.

Our Response:

EPA acknowledges the NGPA comment regarding the value and wisdom of harmonized programs and their view that CARB should harmonize with EPA. We are sensitive to this concern, but the overwhelming sense of the commenters was that an EPA Tier 3 program harmonized with the CARB LEV III program was superior to separate requirements whenever possible. EPA agrees with those commenters who supported a harmonized program to the greatest degree possible. However, there are a few places where the programs are not fully harmonized and the OBD requirements for alternative fuel converters are one of these situations. The thrust of the commenters concerns related to OBD seemed to be that EPA was adopting CARBs requirements including those for OBD for alternative fuel converters. This is not the case. EPA adopted small alternative fuel converter provisions in 2011 and the converters will still be able to meet the OBD requirements using the provisions of 40 CFR 85 Subpart F. We are aware of the work ongoing at CARB, but it is not yet final.[31] As CARB updates its OBD regulations in the future EPA will consider these changes and propose to adopt them, if appropriate.

4.5. Emissions Test Fuel ("Cert Fuel")

4.5.1. Proposed Changes to Gasoline Emissions Test Fuel

4.5.1.1. Ethanol Content of Emissions Test Fuel

What Commenters Said:

Organization: Advanced Biofuels Association (ABFA)

ABFA is an advocate for "Technology Neutrality" throughout the regulatory system and believes that biofuels should be allowed to compete freely in the market. Most of the fuel and fuel additive regulatory system at US EPA Office of Transportation Air Quality (OTAQ) over the years has been written to address the market of the first generation biofuel, ethanol, which has been the only cost effective widely available biofuel. Ethanol has been and will continue to be a valuable commercial product for the nation's fuel supply and energy independence. However, new biofuel molecules are beginning to enter the market for blending with gasoline. New biofuels under development by ABFA member companies and others provide multiple commercial and societal benefits such as high energy density, low RVP and improved emissions parameters. In addition, many of these fuels would not require any new infrastructure investments to reach the market and grow into a significant contributor to the nation's energy independence.

EPA requests comment on proposing to change the certification test fuel to E15 and supports this by stating that the requirements in the Renewable Fuel Standard (RFS-2) will reflect E15 as the fuel in the US marketplace in the next 10-15 years. (78 Federal Register 98, 29909). This statement is driving towards a specific molecule and is picking winners and losers in the marketplace. The RFS-2 requires that the US fuel supply contain 36 billion gallons of renewable fuel by 2022 which can be achieved by drop in molecules with more energy density. When the RFS-2 was created in 2007, fuel consumption in the US was rising, the NHSTA efficiency standards had not been promulgated, and the US government had great hope for the consumer acceptance of E85. Since 2007, fuel consumption in the US has decreased significantly and will continue to decrease based on CAFÉ standards and other factors. E85 consumption reached 38.6 million gallons in 2011 and consumption has remained flat since then. This change to the EPA

[31] See http://www.arb.ca.gov/regact/2013/altfuel2013/altfuel2013.htm downloaded on February 19, 2014 for more information.

certification test fuel will not achieve the RFS-2 requirements. US EPA creating a technology neutral position and allowing the marketplace to pick the winners is the correct approach. This is working today, through the higher RIN values driving the market to work with more energy dense fuel to fill the based D6 RIN pool.

In addition, concern for the implications of this rule with respect to vehicle certification, ABFA's concerns with proposed changes in the certification test fuel extend particularly to the use of this same fuel as the baseline for Part 79 fuel and fuel additive registration.

EPA requests comment on a plan to allow the use of E10 as the certification test fuel with a transition scheme to E15 in the future. (78 Federal Register 98, 29910) would create confusion in the marketplace by changing the base fuel for Part 79 registration. Advanced biofuel companies are working to gain the data set to provide to US EPA to register their fuels for on road use. The change in base fuel will add extra costs, through further toxicity testing and research to comply with Tier I and Tier II requirements, without adding value to the companies or environmental benefits. The base fuel should remain a non additive fuel without oxygen to allow for the least regulatory burden for todays and future fuel/engine company complying with the US EPA regulatory requirements.

Many companies have already invested significant sums in research and development, facility citing, engineering design, or equipment purchase. Of particular concern to ABFA is what signal granting a specific molecule for certification fuel will have on the RFS and would have on the plans to begin breaking ground on a number of advanced biofuels plants. Several ABFA member companies, including Dynamic Fuels, Neste Oil, KiOR, Gevo, Lanzatech, UOP, Solazyme and others have already made significant capital investments to build these production facilities that are up and running at a commercial scale today. Our regulations need to stay technology neutral to provide a marketplace that has not pre-picked the winners and losers.

Organization: Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

Automakers support updating certification test fuels in Tier 3 regulations, as California did in its recent LEV III rulemaking.

Automakers support updating and expanding Federal Certification Test Fuels (hereafter "test fuels"). We advocate that EPA's final rule implement a Tier 3 E10 9 psi RVP test fuel as the gasoline test fuel (18) rather than an E15 test fuel. There are only about 20 U.S. retail outlets for E15 to date, and there are numerous other uncertainties affecting E15 fuel use. Trying to be "forward looking" by assuming significant national market penetration of E15 is too speculative a basis to require that E15 be the federal test fuel for 2017 and beyond.

EPA should make the final Tier 3 gasoline test fuel E10 9 psi RVP.

Organization: Mercedes-Benz USA, LLC on behalf of Daimler AG

The primary factors which directly impact the Mercedes-Benz GHG Compliance Plan are sulfur content in market fuel, and ethanol content and octane level in certification and market fuel.

Organization: American Coalition for Ethanol (ACE)

Ethanol content - We strongly support EPA's proposal that emissions test fuel, which is also commonly referred to as 'certification fuel,' needs to be updated to account for the present-day reality that the most popular in-use fuel in the U.S. (E10) contains ethanol, and under the RFS, higher blends of ethanol, including but not limited to E15, will become the rule and not the exception.

Indolene, the current certification fuel, is not and never has been useful in the practical sense because motorists never used it in vehicles. Updating the federal emission test fuel to better match today's in-use fuel and to reflect the reality that the RFS will call for an ever-increasing level of ethanol in gasoline is the appropriate step to take. We strongly support E15 as the new certification fuel, and suggest that if a phased-in process is chosen, it be done in such a way that it provides incentives for manufacturers that chose to optimize for E15 at an earlier date.

What is critical is that the certification fuel no longer act as an implicit impediment to higher ethanol blends. We expect ethanol blends to increase from E15 to even higher level blends to capture the economic value and clean air benefits associated with these higher-level blends. As a result, it is critical that EPA institute a certification fuel regimen that is easily adaptable to higher level blends.

Organization: American Fuel & Petrochemical Manufacturers (AFPM)

The AFPM supports a new certification fuel. Indolene should be replaced with E10, not E15. Almost all gasoline today is E10. It is speculative to expect that E15 will be the predominant fuel in 2017. The current certification fuel in California is E10, and one of the stated goals of this proposal is harmonization with California standards.

Organization: American Honda Motor Co., Inc.

Testing on E15:
EPA is proposing that E15 become the standard test fuel based upon, for example, anticipated market acceptance, the continued implementation of RFS, and the adoption of this standard by the retailing industry. While it is true that EPA has approved E15 for use in newer vehicles, this highly controversial decision has seen numerous detractors. Furthermore, the RFS could be implemented in any number of ways, including: a) a higher percentage of E85 in the market, combined with E10, or b) a higher percentage of drop-in biofuels in the market, combined with E10, and/or higher E85 sales. Test fuel should represent the market, not forecast the market. Additionally, Test fuel should be harmonized as much as possible with California – one of the overriding goals of the regulation. We believe it is premature and inappropriate to require as the test fuel a market fuel which is, for all intents and purposes, not in the market today. We recognize that E10 is the standard fuel in the market today, and believe it would be reasonable and appropriate to make E10 the standard fuel for Tier 3. We also recommend that EPA adopt an

approach to handle the period in which market fuels are in transition. For example, if and when E15 becomes more than 1/3rd (one-third) of all gasoline sales, then EPA will adjust the Tier 3 rules and adopt the fuel with appropriate phase-in testing requirements. Perhaps EPA is over-correcting for a previous, perceived error. E10 was a common market fuel available at the time of Tier 2, and yet E0 remained the test fuel. It is counter to EPA's prior practice to require E15, an anticipated – but in no way certain – market fuel, to become its new, de facto standard.

Organization: American Lung Association

Update Certification fuel to in-use fuel. In separate decisions announced in October of 2010 and January in 2011, EPA granted a waiver request to major manufacturers of ethanol to increase the allowable limit of ethanol in gasoline to 15 percent starting for vehicle model years 2001 and after. Although EPA has increased the permissible amount of ethanol in gasoline to 15 percent, this fuel is still not widely available in the marketplace. Most gasoline sold today contains up to 10 percent ethanol by volume (E10). We believe that the certification fuel should match the fuel being sold in the market. Based on current gasoline sales, E10 should be the certification fuel. We urge EPA to adopt an approach that gives the agency the flexibility to update and match the certification fuel with the current market fuel without further rulemaking. Under such an approach, perhaps a triggering event such as the suggested 30 percent market share of gasoline sold with fifteen percent ethanol (E15), could prompt EPA to change the certification fuel. Two model years of lead time for such a switch should be sufficient time for the auto manufacturers to accommodate any such change. EPA should continue to have flexibility to make modifications to certification fuel specifications as appropriate.

Organization: American Motorcyclist Association (AMA)

Changing the certification fuel to E15 or E30 is at odds with the 22 million motorcycles and all-terrain vehicles currently in use, not to mention the legacy fleet of cars, boats, lawnmowers, generators and hundreds of millions of small engines in commerce today. None, of these vehicles and engines is designed to operate on fuel with more than 10 percent ethanol.

Automobile and motorcycle manufacturers must certify that on-highway vehicles produced will meet applicable U.S . Environmental Protection Agency and National Highway Traffic Safety Administration emissions, fuel economy and safety requirements prior to selling vehicles. The fuel vehicles must use for this requirement is called the certification fuel. The current certification fuel is E0 - that is, fuel that has no ethanol content.

The current certification fuel should not be changed to reflect 'forward-looking' assumptions about what 'could become a major gasoline blend over the next 10-15 years,' such as E15 or E30. These changes would be contrary to both the letter and spirit of the law.

Currently, the risks of increasing E15 in the marketplace will negatively impact every American. Since the EPA used only one test to determine whether E15 is safe for vehicles before granting a waiver, the AMA urges the agency to allow for an independent scientific study of E15. We also request that motorcycles and ATVs be included in the study.

The AMA has expressed concerns about E15 being mistakenly used and damaging engines in motorcycles and ATVs, and about the continued availability of gasoline that has no ethanol, or gasoline with only a 10 percent blend, that is safe for use in motorcycles and ATVs.

Organization: American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM)

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.

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.

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.

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.

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.

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.

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.

The EPA should set a new certification fuel as E10, not E15. It will be likely the predominant fuel in the marketplace.

Also on the certifying in a higher octane and higher ethanol content fuel, EPA should not go ahead of the requisite research and collaboration necessary to set new fuel specifications. And I'm out of time, so thank you for doing ppms.

Organization: Appalachian Mountain Club (AMC)

EPA proposes to update the federal emission test fuel to better reflect real world fuel. We generally support this concept and believe EPA should replace Indolene with the currently available ethanol blend E10. Higher ethanol blends have yet to be widely used in the marketplace and can impact greenhouse gas and fuel economy standards. EPA should use one consistent test fuel and consider the impacts across all of these regulations.

Organization: BMW of North America, LLC

Harmonization of certification fuel is particularly crucial as with the new standards and increasing product complexity and regulation stringency manufacturers have to bear increased test burden. The proposed Tier 3 standard requires a different certification fuel than the certification fuel adopted by CARB's LEV III program. In the interest of a 50-state certification and to avoid double testing, BMW proposes that EPA adopt an E10 fuel as required by CARB and allow in-use testing with the harmonized fuel.

Organization: BP Products North America Inc.

Establish E10 as Emissions Test Fuel– BP supports a change in EPA's federal emissions test fuel from Indolene to a fuel representative of the predominant, in-use gasoline. Recognizing the huge uncertainties underlying E15's potential market penetration and the predominance of E10 in the market today, BP recommends that EPA adopt E10 as the test fuel for the foreseeable future. If/when E15 were to become the predominant, in-use gasoline, then and only then, should EPA adopt E15 as the test fuel.

Organization: California Air Resources Board (CARB)

CARB staff disagrees with U.S. EPA's decision to propose 15 percent by volume ethanol gasoline (E15) as the Tier 3 certification test fuel.

E15 is currently used in a handful of fueling stations nationwide and its further penetration into the marketplace is uncertain. Given the practical considerations inherent in providing a refueling infrastructure for E15, it may not proliferate very rapidly into the marketplace. On the other hand, E10 has been tested thoroughly as a viable fuel for all vehicles currently on the road and, as a result, will likely be widely used for the foreseeable future. However, should E15 constitute a significant fraction of the federal commercial fuel market at some future date, it would be appropriate at that time for U.S. EPA to reconsider the composition of Tier 3 certification fuel.

Organization: Chevron Products Company

We are opposed to the designation of E15 as a certification fuel given that it is not representative of the fuel in wide use in the market and it is not compatible with most of the vehicles in the existing fleet.

The proposal to shift the certification fuel to E15 ignores the many difficulties in marketing E10+ blends to the existing vehicle fleet. CRC has produced compelling data that demonstrate the incompatibility of E15 with millions of 2001+ vehicles. In addition, E15 remains illegal in California and will remain so for the foreseeable future. It is not clear when, if ever, E15 will be a practical product option. The potential for E10 and its higher RVP to continue to be the predominant gasoline used by Tier 3 vehicles creates a disconnection between certification requirements and real in-use emissions. Therefore, a more prudent path for EPA would be to adopt an El 0 certification fuel at this time, deferring an El5 fuel until market conditions justify the change.

Organization: Chrysler Group LLC

Gasoline Emissions Test Fuel:
- Regulations that specify a fuel for testing purposes should match the fuel predominantly sold in the U.S., which we believe should be at least 70% prevalent in the marketplace.
- The certification test fuel for gasoline-fueled vehicles should be an E10, 9.0 psi RVP test fuel, rather than an E15 certification test fuel.
- The exhaust and evaporative durability test fuel should also be representative of the predominate fuel in the market, which is E10.
- EPA should adopt a mechanism to accurately determine the point in the future at which E15 becomes 70% prevalent in the marketplace, building in appropriate lead time.

Definition of Commercially Available Fuel and Resultant Federal Test Fuel Requirements: Chrysler believes that test fuels should match the predominant fuel in the marketplace. Matching test fuel to marketplace fuel will ensure vehicles deliver the performance and environmental benefits in the real world as they were certified. Chrysler thus believes that test fuel used in certification testing and also in durability mileage accumulation should be representative of the predominant fuel in the market. This includes the ethanol content of the gasoline.

Accordingly, Chrysler supports updated Tier 3 test fuel requirements for gasoline-fueled vehicles to match test fuel to fuel that is predominate in the marketplace, but objects, however, to EPA's proposal to require use of 15 percent ethanol by volume (E15) as the test fuel for certification testing beginning Model Year 2017. Requiring use of E15 would conflict with the objective to match test fuel to in-use fuel, because E15 is not the predominate fuel in the market. In addition, Chrysler is concerned that EPA has not defined the term “commercially available,” as used in the fuel requirements for evaporative emissions durability testing. This concern is broadened where EPA, in a similar context, uses the phrases “commercial gasoline that will be generally available through retail outlets”, and “national average in-use fuels” to describe fuels for exhaust or evaporative durability service accumulation. Further, EPA, in seeking comment on the appropriateness of the alternative test fuel provisions at 40 C.F.R. § 1065.701(c), which also refers to fuels that would be “readily available nationwide” and implies this to mean “commercially available.” Chrysler finds these terms add considerable uncertainty when determining appropriate certification and durability test fuel requirements, and proposes that EPA adopt a single definition to represent the predominate fuel in the market that would apply to all test fuels.

To the degree EPA seeks to interpret E15 as (1) “commercially available”, (2) a “national average in-use fuel”, or (3) “readily available nationwide’, Chrysler believes that E15, which is not currently available to the vast majority of American vehicle owners, is neither “commercially available”, “national average in-use fuel”, nor “readily available nationwide”. In order for EPA to require that any specific fuel blend, such as E15, be used in certification testing or durability testing, that fuel blend must be representative of the predominate fuel in the market.

As EPA acknowledges in the proposed rule, E15 fuel is not representative of the currently prevailing gasoline in the marketplace. Instead, E10 is the predominate gasoline in the market. Moreover, there is no basis to believe that E15 will displace E10 as the predominate market gasoline in the foreseeable future. Although Chrysler recognizes EPA’s attempts to be “forward looking” in selecting an appropriate long-term test fuel, the Agency’s unsupported assumptions of significant market penetration of E15 are too speculative at this point to support specifying the use of E15 as the federal test fuel for Model Year 2017 and beyond.

Chrysler believes that EPA should define one term to describe the fuel that is predominate in the marketplace and therefore appropriate for fuels used in regulatory testing. In general, the meaning of the term “commercially available” in a legal or regulatory context is highly dependent on the context in and purpose for which it is used. For example, an item might be considered “commercially available” in certain contexts—where the objective is simply to ensure that the product can be obtained—if it can be purchased from an online provider, even if there is only one such provider and even if such provider is located in a geographically distant location. In the context of EPA’s fuel requirements for durability testing, however, it makes little sense to define “commercially available” in this fashion. Rather, in the durability testing context, the term “commercially available” is intended to ensure that testing is representative of real world in-use conditions — i.e., to ensure that manufacturers are conducting durability testing with a type of fuel that is representative of fuel that is actually being used in the marketplace. This ensures that durability in testing is likely to assure durability of cars in actual use. Obviously, gasoline cannot be ordered on the Internet or from a distant location. Rather, the ability to obtain the fuel has to involve ready access nearby to the routes of cars throughout the country.

EPA appears to agree with this interpretation of the term “commercially available” in the preamble to the proposed rule:

First, under the alternative test fuels provisions in 40 C.F.R. § 1065.701(c), a manufacturer must show that its proposed alternative test fuel is "commercially available." EPA states in the preamble to the proposed rule that, pursuant to this provision, manufacturers can "petition the Administrator for approval of a higher octane, higher ethanol content test fuel if they could demonstrate that such a fuel . . . would be readily available nationwide. . . ." In other words, in the preamble, EPA interprets the term "commercially available" in the alternative test fuel context — with the same goal of using a fuel representative of real world conditions — to mean "readily available nationwide." Chrysler supports this interpretation.

Second, EPA states in the preamble to the proposed rule regarding the requirement in 40 C.F.R. § 86.1823-08(d) that manufacturers use fuel with the highest ethanol content "commercially available" for purposes of evaporative emissions durability testing (7). With respect to this requirement, EPA states that "as E15 in-use fuel becomes progressively more available, we would expect that E15 service accumulation fuel would be used for whole vehicle evaporative durability programs." Again, EPA indicates that the term "commercially available" excludes fuels, such as E15, that are currently available only at select service stations in limited states.

Even with this interpretation that "commercially available" means "readily available nationwide," Chrysler believes that EPA must also specify the threshold for which a fuel is "readily available nationwide" in order to ensure that the industry has a clear understanding of what is required. In that light, the Onboard Refueling Vapor Recovery (ORVR) rules may provide a useful analogy for determining when market conditions have changed such that E15 fuel may be deemed "commercially available" or "readily available nationwide." Under the Clean Air Act, EPA has authority to waive certain requirements of the Stage II vapor recovery program when EPA finds that ORVR systems are in "widespread use" in the highway vehicle fleet. Because Stage II vapor recovery systems on gasoline pumps and ORVR systems on highway vehicles perform the same function (i.e., capture ambient vapors emitted during refueling), the reasoning goes, there would be little environmental benefit gained by requiring Stage II vapor recovery systems on gasoline pumps if ORVR systems on highway vehicles are already in "widespread use." On May 9, 2012, EPA determined that ORVR was in "widespread use" and therefore waived the requirement that certain current and former ozone nonattainment areas implement Stage II vapor recovery systems on gasoline pumps. In reaching this determination, EPA relied in part on its marketplace finding that "75 percent of gasoline will be dispensed to ORVR-equipped vehicles by April 2012." Therefore, a "widespread use" threshold of 70% to express "commercial availability" or "readily available nationwide" appears to be a reasonable threshold to determine commercial availability of gasoline for the purpose of defining test fuels, and is consistent with our proposal to have such test fuels be the predominate fuel sold in the marketplace.

E15, which is not available except at twenty service stations across the United States, is not representative of the predominant market fuel in the U.S., nor is it commercially available for virtually all cars in the United States today. It is unclear when EPA might consider E15 to become "commercially available" such that it must be used for service accumulation during durability testing. EPA should clarify that the term "commercially available" should mean "readily available nationwide," consistent with EPA's apparent interpretation of the term in the preamble to the proposed rule, and thus representative of the predominant fuel in the marketplace. Today, only approximately twenty of the more than 120,000 retail outlets in the United States, or 0.017%, offer E15 fuel (13). Even E85, which is generally still not considered to be widely available in the marketplace, is available at approximately 2,350 service stations, or one hundred times as many stations as E15 (14). In the context of evaporative testing requirements to test on “highest ethanol content commercially available”, E85 does not meet the test of availability. Not only is E15 not the prevailing market fuel, it should not be considered “commercially available,” since only a tiny fraction of motorists can get it. It is unreasonable to consider a fuel “commercially available” if that fuel is only available at select service stations in a limited number of states. Accordingly, it is inappropriate for EPA to specify E15 as the test fuel for purposes of any of the motor vehicle testing requirements.

Recommendation: Chrysler recommends that EPA define the fuel requirements for certification and evaporative emissions durability testing to mean the predominant fuel in the market, which we believe should be at least 70% of the fuel sold in the U.S. marketplace. We also recommend that EPA adopt a mechanism to determine, based on objective criteria and sufficient lead time, the point in the future at which the predominate fuel in the marketplace reaches that threshold.

EPA proposes to adopt an E15 certification test fuel requirement for gasoline-fueled vehicles (15). However, E15 is not representative of the predominate fuel in the marketplace, which is E10. In fact, E15 is not even “commercially available” to the vast majority of American vehicle owners. As such, it is unreasonable and inappropriate to specify E15 as the certification test fuel.

Chrysler supports EPA’s goal of specifying test fuel that best matches gasoline that the American public’s vehicles actually use (16). Chrysler also supports EPA’s goal of continuing to monitor the relationship between test fuel and in-use fuel so that testing is undertaken with fuel that represents real-world conditions. E10 is the fuel that the American public’s vehicles use, because it is the predominate fuel in the market; as such, EPA should designate E10, not E15, as the proper certification test fuel. Further, matching the ethanol content of certification test fuel to fuel used in the real world is important because the combustion of higher ethanol content gasoline (for example, of E15 versus E10, and both as compared to Indolene) tends to decrease volatile organic compound (“VOC”) and carbon monoxide (“CO”) emissions, but tends to increase oxides of nitrogen (“NOX”) emissions (17). Accordingly, adopting a higher ethanol content gasoline for certification testing is not necessarily “conservative,” because increasing the ethanol content of gasoline affects pollutants differently.

Organization: Consumers Union;Consumers Union (comment campaign)

While Consumers Union supports EPA’s intention to match the certification fuel with the fuel in the market, we recommend an alternative plan in case the market for E15 does not overcome the significant barriers to its development and materialize by 2017. Even if E10 continues to be the dominant fuel in the market, testing vehicles for fuel economy purposes at E15 would be more accurate than the current E0 certification fuel. Adjustment factors can always be used to account for predicted differences (as they are now). However, uniform adjustment factors after the fact are never as precise as using the market fuel to begin with; automakers that maximize efficiency for E15 may distort fuel economy expectations of consumers using E10 at the pump. Therefore, we would recommend that E10 be the default fuel, unless E15 comes to dominate the market, at which point a reasonable lead time could be provided to switch the certification fuel again.

Organization: Countrymark; Small Business Refiners (SBRs)

Adoption of a 15 percent ethanol by volume (E15) certification test fuel for gasoline-fueled vehicles.

EPA recommends matching today's in-use gasoline federal emission testing fuel standard by replacing 'Indolene' (E0) fuel with 15% ethanol blend (E15). Justification for the change is to better match today's in-use gasoline.

According to EIA data, only eight fueling stations across three states were selling E15 by the end of 2012. As a comparison, more than 159,000 fueling stations were in service at the end of 2012. EIA and DOE both believe that E15 penetration into the market is not likely to occur in significant volume.

In addition, the change to E15 is not supported by the oil industry, automotive industry, or consumer groups such as AAA because E15 brings several new problems to the market place. A few significant problems are listed below:
- A higher blending ratio of ethanol is more corrosive, potentially resulting in engine damage or a shorter engine and fuel system operating life.
- Containment failures cause greater environmental damage because ethanol promotes mixing of gasoline and water; which would not readily occur without ethanol being present.
- Ethanol cannot be transported via pipeline like other transportation fuels. Ethanol must be shipped by rail or truck; resulting in additional investments for unloading and storage capacity.
- Transporting ethanol by rail or truck increases greenhouse gas emissions, reducing the claimed benefit of using renewable fuels.
- Blending E15 instead of E10 reduces the amount of butane that can be blended into gasoline. This directly reduces the refinery's profitability and restricts flexibility in our operations because we need to find another disposition for butane instead of blending with gasoline.

Organization: Countrymark

CountryMark is not interested in producing E15 and recommend that the fuel standard be changed to a 10% (E10) blend of ethanol to represent today's in-use gasoline based on fuel demand across the country.

CountryMark started blending ethanol at ten percent long before being obligated under the RFS because it made economic sense. We have not sold CBOB (Conventional Blend stock for Oxygenate Blending) or RBOB (Reformulated Blend stock for Oxygenate Blending) to support E15 since it was approved as a fuel option. CountryMark is not planning to incorporate E15 as a major volume product into our portfolio of offerings to our customers. We do not see sufficient demand to justify changing operations at our refinery to meet E15 specifications.

Organization: Small Business Refiners (SBRs)

The SBRs are opposed to a requirement to produce E1S and recommend that the fuel standard be changed to a 10% (E10) blend of ethanol to represent today's in-use gasoline based on fuel demand across the country.

Organization: E.I. du Pont de Nemours and Company

Of particular interest to DuPont is EPA's proposal to set E-15 as certification fuel. Renewable fuels have a bright future in the U.S. and the Tier 3 proposed rule includes a number of provisions that can support making renewable fuels more widely available and economically competitive. Expanding renewable fuels will ultimately drive reductions in air pollutants that are the target of the Tier 3 rule.

Setting E-15 as certification fuel is also the baseline for evaluating the health effects of the fuel and associated fuel additives, a mandatory part of the Part 79 registration process. DuPont suggests that EPA recognize this in the final rule and address how this fact affects existing and future registrations.

First, DuPont supports EPA's proposal to set E-15 as emissions test fuel for light-duty cars and trucks as well as heavy-duty gasoline vehicles. EPA must create the requisite incentives for auto manufacturers to pursue advanced engine technologies. Setting E-15 as test fuel is a step in the right direction.

EPA is requesting comment on alternative approaches to implementing E-15 as test fuel. Two of the options include requiring E-15 to be available on the market before transitioning to E-15 as test fuel. Instead, DuPont suggests that EPA set a specified future date for transitioning to E-15 test fuel. This approach would ensure E-15 as test fuel providing certainty for fuel producers and auto manufacturers, and provide the requisite incentives to automakers to advance engine technologies.

Organization: ExxonMobil

If the Agency decides to proceed with this rulemaking, we recommend that EPA: specifies E10 as the new vehicle certification fuel.

Organization: General Motors LLC (GM)

The basic foundation of today's Federal Certification Test Fuels (hereafter "test fuels") has been in place and relatively unchanged since 1975. GM supports updating and expanding the test fuel to be aligned with current predominate market fuel. We advocate that EPA's final Tier 3 rule specify an E10 9 psi RVP test fuel gasoline rather than the proposed E15 test fuel that does not represent the market. There are only about 20 U.S. retail outlets selling E15 to date and most of these do not offer E15 during the summer. Because there are many uncertainties about the further expansion of E15, EPA's "forward looking" approach assumes significant national market penetration of E15 that is too speculative for something as important as the Federal test fuel for 2017 and beyond.

As mentioned above, transitioning to an E15 test fuel is too speculative for something as important as the Federal test fuel for 2017 and beyond. If there needs to be a provision to recognize E15 in the future, then GM suggests a two-step approach.

Organization: Private Citizen

However, I do not support the new proposal for E15 gasoline since this fuel has not yet been adequately tested on non-flex fuel gasoline engines, or proven safe for motorcycles or other small engines. Besides, we already have 10% ethanol (E10) which is enough to help reduce tailpipe emissions without creating excessive problems due to ethanol's incompatibility with fuel system materials and designs in older vehicles. Ethanol-blend fuels reduce fuel economy (miles per gallon) due to lower energy content, and they often cause damage to fuel systems... doing this in the name of cleaner air just does not make sense to me. There's got to be a better way to deal with the ethanol issue, and I urge you to please oppose the introduction of E15 without adequate testing.

Organization: Growth Energy

Growth Energy Strongly Supports an E15 Certification Fuel. Growth Energy saw the need for additional market space for the higher biofuel volumes called for under the RFS and subsequently filed the Green Jobs waiver for E15 with the Agency in 2009. In January 2011, the Agency approved the waiver for 2001 and newer light duty vehicles. While the critics have done everything in their power to prevent higher ethanol blends in the marketplace, EPA has appropriately proposed that all 2017 and newer vehicles should be certified on E15 – clearly the fuel of the near future. Nearly the entire American vehicle fleet fuels on E10 today rather than E0. Now that EPA has approved E15 and the U.S. Supreme Court has denied cert on the critics' lawsuits to prevent the implementation of the E15 waiver, it only makes sense that the automakers and the American public move forward with what EPA views as a major transportation gasoline blend in the near term. With the approach of the RFS blend wall, it only makes sense that we will begin to see more E15 in the marketplace. Additionally, more than 70 percent of the vehicles on the road have been approved by EPA for use with E15 (model years 2001 and newer), and two major automobile manufacturers, Ford and General Motors, are already warrantying their newer vehicles for E15 – GM for model years 2012 and 2013 and Ford for model year 2013 (Oil Price Information Service, October 2, 2012 "Ford and GM Okay E15 Blends for Newer Vehicles").

Organization: INEOS Bio

EPA requests comment on various ways to transition the emissions test fuel, including: starting with a transition to E10 with a transition to E15 as that fuel becomes more widely available on the market; transitioning to E15 after a few years to allow time for this greater market availability or by setting a date certain by which the transition should be made to help drive E15 market availability; or, allowing "vehicle manufacturers to request approval for an alternative certification fuel, such as a high-octane 30 percent ethanol by volume (E30) for vehicles they might design or optimize to use such a fuel" so that it may "help manufacturers that wish to raise compression ratios to improve vehicle efficiency, as a step towards complying with the 2017 and later light-duty greenhouse gas and CAFE standards."

INEOS Bio commends EPA's efforts to transition the certification test fuel for emissions from light duty cars and trucks and heavy duty gasoline vehicles ("the emissions test fuel") to better reflect the current and future in-use fuel as it begins to contain greater volumes of biofuels resulting from the continued development and commercialization of biofuels and increased RFS volumes in the market.

INEOS Bio believes that EPA should work to set the emissions test fuel to promote the highest achievable level of ethanol and octane in the U.S. fuel supply. Encouraging the highest achievable level of biofuels would help meet EPA's overall goal in this rulemaking to address the impacts of motor vehicles and fuels on air quality and public health. (11) For instance, cellulosic ethanol from waste in comparison to gasoline contains no sulfur and has over 100% reduced GHGs. In addition, ethanol combusts without producing air toxics, which are the main source of particulate matter. Blending ethanol in gasoline also reduces the need for unhealthy detergent additives which are mandated to reduce the formation of engine deposits from gasoline that increase exhaust emissions and result in the loss of fuel economy and performance. These benefits of ethanol only rise with higher blends, so INEOS Bio encourages EPA to issue a final rule that would encourage and drive the highest achievable blend which we feel in this given market would be E15.

Organization: International Council on Clean Transportation (ICCT)

While the ICCT supports using a more representative fuel for certification testing, E15 is not representative of in-use fuel. E15 can cause damage if it is used in small engines or in legacy vehicles. E15 is also specific to ethanol, which encourages the use of food feedstocks instead of more environmentally friendly feedstocks. Finally, E15 provides significant evaporate cooling, which manufacturers could exploit to generate higher fuel economy on the tests than the vehicles actually experience in use. The ICCT recommends that the test fuel use E10.

The ICCT is concerned about the proposed revision to use E15 for the certification test fuel. While the ICCT supports using a more representative fuel for certification testing, E15 is not representative of in-use fuel. E10 is representative of current in-use fuels and should be used for emission and fuel economy testing.

In addition to violating the principle of using representative fuels, the ICCT has a number of serious concerns with E15: E15 can cause damage if it is used in small engines or in legacy vehicles; it is specific to ethanol (as opposed to drop-in biofuel pathways), which encourages the use of food feedstocks such as maize instead of more environmentally friendly feedstocks; and it provides significant evaporative cooling, which manufacturers could exploit to generate higher fuel economy on the tests than the vehicles would actually experience in use.

The problems and potential damage if E15 is used in small engines and legacy vehicles has been well documented by Honda and other vehicle manufacturers and will not be repeated here. However, our concerns in this area are exacerbated by the lack of systems to provide proper fuel and prevent misfueling in-use. For example, EPA has not proposed a system to separate the use of E15 for newer vehicles and E10 for older vehicles. A system where E15 is used for regular fuel and E10 for premium fuel would encourage misfueling of small engines and legacy vehicles, as customers choose E15 just because it is cheaper. If E10 is used for regular fuel and E15 is used for premium fuel, this would discourage the use of E15 in vehicles that could safety use it and would make it impossible for older vehicles requiring premium to be refueled properly. Thus, for the refueling system to work properly, it appears that service stations must provide separate pumps for both E10 and E15 for both regular and premium. This is not likely to happen unless EPA requires it. Until EPA addresses the refueling situation with regulations, refueling will almost certainly be marked by confusion and misfueling.

The ICCT is also concerned that E15 will encourage biofuels made from food crops, instead of advanced biofuels. It is not currently cost effective to make ethanol out of cellulose, thus simply increasing the ethanol blend wall is effectively a mandate for more food-based biofuels that can easily be turned into ethanol. Several pathways for producing advanced biofuel from feedstocks such as cellulose will likely be able to deliver drop-in fuels. As drop-in fuels have a higher value in the market than ethanol, it is also possible that cellulose can be more profitably turned into drop-in fuels. E15 would work against this by incentivizing ethanol, not drop-in fuels. Insofar as wider use of E15 supports increased use of maize and sugarcane ethanol rather than driving investment into advanced drop-in fuel pathways, the net result will be that E15 would tend to increase food prices (and hence worldwide food insecurity), decrease biodiversity due to land use change, create yet another roadblock for advanced, lower carbon, biofuels and deliver less carbon reductions than would be available from commercializing biofuels from cellulosic wastes and energy crops.

The ICCT's third concern is specific to fuel economy testing. 15% ethanol content provides significant evaporative cooling in the cylinder. This would allow manufacturers to advance ignition timing or make other modifications to improve fuel economy on the test cycles—and which would not be likely to be achieved in-use.

The advantages of even E10 were demonstrated in a test program to maximize engine power on a variety of fuels. Grassroots Motorsports (December 2012) tested a Mazda Miata on the following fuels, using a standalone computer to tune the vehicle for each fuel on a Dynapack dynamometer to make the most power: The charge cooling effect of E10 boosted performance on 93-octane fuel by about 1.5% and virtually matched the performance of 100 and 105-octane race gasoline. GRM couldn't redesign the engine and they were only able to revise spark timing, camshaft timing, and air/fuel ratio at WOT. The higher charge cooling with E15 would allow manufacturers to do even more optimizing—and they could also optimize the design of the engine over all operation.

It is important that the fuel used for certification and fuel economy testing be representative of in-use fuel. However, that fuel is currently E10, which is what should be used for EPA's testing. E15 is not currently representative of in-use fuel and its use for EPA testing has several major problems, which should be avoided.

Organization: Marathon Petroleum Company LP (MPC)

EPA must also change the proposed certification fuel to a 10% ethanol blend with the 1 psi waiver that is more representative of current and future transportation gasoline.

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.

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 and if E15 becomes the dominant ethanol blend in the market.

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. Once the manufacturers all warrant their vehicles for E15, and E15 represents a dominant portion of the overall market (including California) then 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.

Legal justification for new test fuel – 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, MPC 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 to 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.

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.

Organization: Maryland Department of the Environment

When reviewing the use of ethanol in the certification fuel, we would recommend that EPA, in the final rule, specify E10 as the test fuel. This recommendation is based on data at this time that shows that E15 is only a small segment of the U.S. fuels market, it currently is not use in Maryland, and it is questionable at this point if this fuel will see wide spread automotive use. In addition, in the past MDE has voiced its concern over the use of E15 based on its increased volatility which leads to increased ozone emissions particularly in the summer months.

Organization: American Energy Alliance (comment campaign)

One overlooked part of this proposed rule is that it also changes the "vehicle certification fuel" to E15 (gasoline that is 15 percent ethanol). This is a stealthy way for EPA to get much more wide-spread adoption of E15 fuel at gas stations, a mandate that threatens engines and forces Americans to use a less efficient fuel.

Organization: National Association of Clean Air Agencies (NACAA)

Use of Ethanol in Certification Fuel — NACAA supports the concept of ensuring that fuels used for certification purposes should more closely reflect real-world fuels. Given the prevalence of E10 (gasoline containing 10 percent ethanol by volume) in the marketplace, we encourage EPA to replace the currently used indolene with E10 as an emissions certification fuel. We are concerned that EPA has proposed to require that E15 be used as certification fuel. At this time, E15 is only a small segment of the U.S. fuels market and the prospect of it becoming a widely used automotive fuel in the future is questionable. Further, use of E15 in the existing vehicle fleet will have adverse impacts on vehicle emissions (e.g., aldehydes or NOx). Therefore, we recommend that in the final Tier 3 rule EPA specify E10 as a test fuel and continue to monitor the use of E15 in the marketplace. Should use of E15 become significant, the agency can then consider the pros and cons of revising test fuel specifications to include E15.

Organization: National Association of Convenience Stores (NACS) and Society of Independent Gasoline Marketers of America (SIGMA)

The Proposal would make E15 the default test fuel for most non-flex-fuel vehicles ("FFVs"). At the present time, E10 is the predominant fuel in the market. It appears unlikely that E15 will gain significant market share in the immediate future. NACS and SIGMA do not oppose making E15 the test fuel provided that vehicles certified on E15 do not experience significant deterioration in their performance when they run on E10. If such performance problems do occur, the Agency must consider delaying designating E15 as the default test fuel, and, instead, make E10 the test fuel until E15 is more widely available and utilized.

By developing specifications for ethanol-based fuels, and requiring other potential fuels of the future to petition the Agency for approval as a test fuel, the Proposal could entrench ethanol's current role in the fuel supply, and impose artificial impediments to new fuels coming to market.

<u>Certification Fuels:</u>
The Proposal would update the specifications of the certification test fuel with which vehicles demonstrate compliance with emissions standards. For non-FFVs, the Proposal moves away from "Indolene" ("E0") to an E15 test fuel. In addition, the Proposal would for the first time impose detailed specifications for the E85 emissions test fuel used for FFV certification. Finally, the Proposal would allow vehicle manufacturers to request approval for an alternative certification fuel for vehicles they might design or optimize for use on such a fuel.

<u>Non-FFVs:</u>

The Proposal designates E15 as the test fuel for most non-FFVs to demonstrate compliance with emissions standards. NACS and SIGMA members recognize and appreciate that the Agency is trying to be "forward-looking" in designating E15 as the test fuel. While E10 blends are relatively standard across the country, much higher percentages of ethanol—including E15—will need to be consumed to satisfy the RFS's increasing consumption targets. If E15 is going to be the predominant fuel in the future, the market needs adequate notice so it can, among other things, adjust its infrastructure accordingly.

Of course, the Proposal designates E15 as the default test fuel before that fuel has made any substantial inroads into the marketplace. At the present time, E10 is the predominant fuel, and there are few indications that this will change in the immediate future. The Proposal would nonetheless require vehicle manufactures to calibrate their vehicles to meet the proposed Tier 3 standards on fuel containing 15 percent ethanol by volume. NACS and SIGMA do not oppose this provided that vehicles certified on E15 do not experience significant deterioration in their performance when they run on E10. If such performance problems do occur, the Agency must consider delaying designating E15 as the default test fuel, and, instead, make E10 the test fuel until E15 is more widely available and utilized.

The retail market is not ready to accommodate sufficient volumes of higher fuel blends to satisfy the RFS requirements at the present time. From retailers' perspective, a primary concern is infrastructure compatibility. By law, all equipment used to store motor fuel—including underground storage tanks ("USTs") and dispensers (gas pumps) must be certified by a nationally recognized testing laboratory.[4] If a retailer fails to use appropriately certified equipment, that retailer may also be violating tank insurance policies, state tank fund program requirements, bank loan covenants, and other local regulations. In addition, the retailer could be found negligent per se based solely on the fact that his fuel dispensing equipment is not certified. Currently, there is essentially only one organization that certifies such equipment – Underwriters Laboratories ("UL").

Prior to 2010, UL had not listed a single dispenser as compatible with any fuel containing more than 10% ethanol. This means that any dispenser in the market prior to 2010 is not legally permitted to sell E15, E85, or anything else above 10% ethanol. As a practical matter, this means that a significant number of retailers wishing to sell blends >E10 must replace their dispensers, at an average cost of $20,000 *per dispenser.* For some retailers who operate specific models of dispensers, there are UL-approved retrofit kits now available for approximately $4,000, but the number of units that can utilize these kits is uncertain. Further, a substantial majority of UST systems may have to be replaced as well. Once a retailer begins to replace underground equipment, the cost can escalate rapidly and can easily exceed $100,000 per location. (Many of these units are *manufactured* to be compatible with high concentrations of ethanol, but are not *listed* as such by UL.)

For a significant number of fuel retailers across the United States, these costs preclude them from upgrading their infrastructure. Unless Congress or the Agency develops a mechanism by which current equipment is permitted to store and dispense higher fuel blends lawfully, retailers will remain reluctant to market E15. That the RFS mandates will continue to escalate annually does not change this fact. Designating E15 as the default test fuel for most motor vehicles on the road will also not change this fact.

Further, and perhaps more importantly, until consumers indicate their desire to purchase E15, very few retailers will consider offering the new fuel even if their equipment is legally approved to do so. Since the approval of E15, there has been no discernible effort to generate consumer demand and encourage the availability of this product in the market. Quite the contrary, most information readily available to consumers discourages the use of E15.

Therefore, if designating E15 as the default test fuel for non-FFVs could impair vehicles' ability to run on E10, NACS and SIGMA urge the Agency to make E10 the default test fuel to better reflect market realities. This does not preclude the Agency from transitioning to E15 if legal and logistical barriers are removed. This could include a market review in the next several years and, if warranted, further regulatory action to implement the change from E10 to E15.

Organization: National Automobile Dealers Association (NADA)

EPA should not approve E15 as a test fuel given its lack of presence in the marketplace and should not mandate a test fuel above 9 psi RVP.

To enable Tier 3 tailpipe standard compliance, EPA should establish a 10 ppm gasoline sulfur average with a 25 ppm cap. To enable Tier 3 evaporative emissions compliance, a Reid Vapor Pressure (RVP) cap should be set at 9 psi for a maximum E10 gasohol test fuel.

Organization: National Corn Growers Association (NCGA)

We are supportive of the EPA's approach toward establishing E15 as the new certification fuel for 2017 and later non-flexible fueled light duty vehicles and the lower sulfur specifications for in-use gasoline.

EPA has proposed changing the certification test fuel from one containing no ethanol to E15 with a volatility of 9 psi and an AKI of 87.

Separate from the Tier 3 rule, EPA approved the use of E15 in 2001 and later on-road motor vehicles (5). It would not make sense to certify new motor vehicles on E0, or even E10, when EPA has approved the use of E15 in these vehicles. Nearly all vehicles in the United States are currently fueled with E10, and the RFS volume requirements will increase the renewable fuel content in the United States beyond today's levels. Therefore, it is important that the 2017 and later model year vehicle fleet be certified on the expected future ethanol content rather than the historic ethanol content.

We believe E15 certification test fuel should be introduced for the 2017 vehicle model year as EPA has proposed. In view of the long history of ethanol use as E6, E10 and E85, the understanding of materials compatibility and engine and emission impacts of ethanol blends in the literature for 30 years, it seems that a phase-in schedule might not be required to design and calibrate for E15. EPA discussed potential delays in the introduction of E15 test fuel to allow auto manufacturers to make calibration adjustments. While phase-in schedules or “trigger points” may be necessary and appropriate in some situations, we believe it would reduce complexity and improve market certainty to require the introduction of E15 test fuel for the 2017 model year as EPA has proposed.

A specific model year requirement such as 2017 provides a 3-year lead time for vehicle design and calibration changes. This would also provide important certainty for fuel providers, marketers and distributors that a trigger point approach would not provide. Perhaps more importantly, implementation in the 2017 model year would eliminate the need for an interim E10 test fuel and the related complexity and potential vehicle modifications associated with a second test fuel transition.

Organization: National Marine Manufacturers Association (NMMA)

NMMA’s focus is on the EPA’s request for comment regarding changing the automotive and light duty truck certification fuel to E15, and perhaps higher, and its effect on boats and marine engines due to potential misfueling and continued availability of suitable fuel.

The NMMA is not opposed to the use of ethanol as an additive in gasoline. Our members have been designing their engines and fuel systems to be compatible with E10 since the early 1980’s. Our very serious concern is that the 12.1 million recreational boats currently registered the United States, and those boats currently being manufactured, have not been designed to be compatible with gasoline that has ethanol content greater than 10%. Recreational marine fuel systems are not unique in this regard. The overwhelming majority of non-road engines, from chainsaws to weed trimmers to lawn mowers, operate similarly to recreational marine engines with open loop systems including a carburetor that is set at the factory and designed to be—and required by EPA to be—tamper proof.

In addition to the well-documented physical evidence of ethanol’s damaging effects on marine and other non-road engines, NMMA’s concerns are also based on the physical properties of ethanol in gasoline. Gasoline is a mixture of many hydrocarbon compounds that consist mainly of hydrogen and carbon. Ethanol contains hydrogen and carbon, but it also contains oxygen. The exact air-fuel ratio needed for complete combustion is called the “stoichiometric air-to-fuel ratio.” This ratio is about 14.7 to 1 on a weight basis for gasoline that does not contain any ethanol. When more ethanol is added to gasoline, less air is required for complete combustion because oxygen is already contained in the ethanol. For example, for E10 the stoichiometric air-to-fuel ratio is 14 to 14.1 pounds of air per pound of fuel. The stoichiometric air-to-fuel ratio for straight ethanol is 9 to 1, so as the proportion of ethanol in gasoline increases so must the air-to-fuel ratio decrease. To deliver the required power for a given operating condition, engines are designed to consume enough air and fuel to generate the required energy. The marine engine is designed and calibrated to anticipate a specific fuel-to-air ratio and nothing different. Because ethanol blended fuels require more fuel for the same amount of air to achieve stoichiometric conditions, the fuel system must adapt by introducing more fuel. If additional fuel is not introduced to compensate for the ethanol, the resulting mixture has less fuel than needed and the engine experiences a condition known as “enleanment.”

Enleanment can lead to a variety of performance problems. For example, the combustion and exhaust gas temperatures will be higher, engine starting may be harder, and the engine speed control may become inaccurate. The increased combustion and gas temperatures resulting from lean operation can result in severe damage to pistons, head gaskets, catalysts and emission related components, which in turn may result in the failure of the engine and increased exhaust emissions.

A series of engine evaluations conducted by Mercury Marine and Volvo Penta under direction of the Department of Energy (DOE) National Renewable Energy Laboratory (NREL) concluded that ethanol content in gasoline at 15% by volume will severely damage marine engines and cause them to exceed the EPA emission standards (1). There is no remedy for this engine damage and emission standard exceedances and it is not limited to recreational marine engines. These same issues apply to other product categories including outdoor power equipment, heavy duty engines, and snowmobiles. If E15 becomes the primary fuel in the US marketplace, misfueling will occur, EPA and California emission standards will be violated, engines will be damaged, and the American consumer will be stuck paying the bill for a misguided US government policy that needs to be corrected now.

EPA requests comment on proposing to change the certification test fuel to E15 and supports this by stating that the requirements in the Renewable Fuel Standard (RFS-2) will result in E15 becoming the predominant fuel in the US marketplace in the next 10¬15 years (78 Fed. Reg. at 29,909.) The RFS-2 requires that the US fuel supply contain 36 billion gallons of renewable fuel by 2022. When the RFS-2 was created in 2007, fuel consumption in the US was rising, the NHSTA motor vehicle fuel efficiency standards had not been promulgated, and the US government had great hope for the consumer acceptance of E85. Since 2007, fuel consumption in the US has decreased significantly with expectations of its continued fall. E85 consumption reached a high of 38.6 million gallons in 2011 and consumption has remained flat since then. The E85 contribution to achieving the requirements in the RFS-2 is insignificant.

E15 can never achieve the requirements of RFS-2. This proposed change to the EPA certification test fuel will not even come close to achieving the RFS-2 requirements. EPA would need to mandate E20, E25 or even E30 for all engines immediately to meet 36 billion gallons in nine years. Such action would not be logical or responsible. Thus, EPA is attempting to create a piecemeal approach to achieving a federal requirement that cannot be achieved without great cost to vehicle and engine owners. The RFS-2 is a broken government mandate that may have made sense in 2007, but does not work today. NMMA recommends that the certification fuel remain at E10 and that EPA formally request that Congress and the Administration amend the Renewable Fuel Standard to reflect America's realistic motor fuel resources for 2013 and beyond.

EPA also requests comment on a plan to allow the use of E10 as the certification test fuel with a transition scheme to E15 in the future (78 Fed. Reg. at 29,910). This would create far more confusion for consumers than an immediate mandate to E30. At this time, gasoline retailers that choose to sell E15 must clearly label the gasoline pump with the following specific language:

If E15 becomes the certification test fuel for automobiles and light trucks, it will soon be the primary fuel in the marketplace. Being the primary fuel in the marketplace, marine engine manufacturers will have to follow suit and design engines to operate on E15. However, their open loop engines require a fuel to air ratio for optimum combustion that is limited and far less able to tolerate variation in fuel oxygen content. In other words, an engine designed for 2.5% oxygen will not operate efficiently or meet the emission standards with a fuel containing 5% oxygen.

NMMA is also concerned with consumer labeling. The current label (see above) clearly states that if the consumer uses E15 in any engine other than a 2001 and newer passenger vehicles, it is a violation of federal law. If E15 is the only available fuel in the marketplace, breaking this law seems inevitable. Is this violation of federal law a misdemeanor or a felony? When does the label come off; when does it stay on? When does it apply, when doesn't it apply? NMMA is concerned that this proposal shows no consideration for the consumers who own the millions of lawn mowers, garden equipment, farm machinery, snowmobiles, and marine engines that will be damaged and no longer covered under manufacturer warranties. This automobile and light truck proposal will start the process of moving the nation's fuel supply to E15 and destroying marine and other non-road engines in the process.

Organization: Natural Resources Defense Council (NRDC)

The gasoline emissions test fuel should be modified to reflect typical fuel on the market, which is gasoline blended with 10 percent by volume of ethanol (E10).

Gasoline Emissions Test Fuel Should be Modified to Reflect Typical Fuel on the Market (E10). NRDC agrees with EPA's objective to make the emission test fuel closer to the fuel widely available in the market, and we support increasing the ethanol volume to 10 percent but not 15 percent as proposed by EPA. Today the share of E15 in the gasoline market is small and the likely share during the implementation of the Tier 3 rule with model year 2017 and beyond is highly uncertain. It is conceivable that instead of reaching E15 as the majority fuel in the market, renewable drop-in fuels could have a significant market penetration. If drop-in fuels such as biobutanol capture a large share of the market, EPA would have to evaluate the need for subsequent changes in the test fuel to match the marketplace.

EPA should establish a market penetration level above 10 percent for ethanol and/or drop-in fuels that would trigger a regulatory proceeding to establish new test fuel parameters. In establishing the trigger volume, EPA should consider the rate at which ethanol or other renewable fuel volumes are increasing in the market, the amount of time required to complete a rulemaking and the amount of time required for manufacturers to adopt the new fuel in their test procedures. The goal should be to set the trigger such that any changes to the test fuel could be adopted by the manufacturers when the new test fuel would be representative of the majority of the fuel on the market.

Organization: New York State Department of Environmental Conservation

We have long urged EPA to adopt emissions certification gasoline specifications that are representative of actual commercial gasoline. We are pleased with EPA's steps in this direction. However, nearly all commercial gasoline contains nominally 10 volume percent ethanol (El 0). We urge EPA to adopt El 0 as the standard certification gasoline ethanol content, not the E 15 standard proposed.

Certification fuels should be comparable to commercial fuels. We have long urged EPA to change certification gasoline standards to more closely reflect commercial gasoline. Currently, the two have little in common. Current certification gasoline contains no ethanol, and regulations allow unrealistically low amounts of aromatics and olefins.

The use of certification gasoline that reflects the properties of commercial gasoline rather than a 'super-clean' certification gasoline provides additional assurance that the air quality benefits promised by Tier 3 are realized. We support EPA's steps in this direction.

10. Commercial gasoline overwhelmingly contains nominally 10 volume percent ethanol. This is the ethanol content that should be specified for certification gasoline.

The Department opposes EPA's proposal to require 15 volume percent ethanol in certification gasoline (E15). This is no more reflective of commercial gasoline than today's requirement for zero ethanol. Allowing E15 in certification gasoline violates the principle of testing and certifying vehicles on a fuel that reflects the properties of commercial gasoline. E15 is not a significant commercial fuel now, and there is no assurance that E15 will become a significant commercial fuel in the future.

Unless and until E15 becomes the dominant commercial gasoline blend, it should not be the certification gasoline blend.

Organization: Northeast States for Coordinated Air Use Management (NESCAUM)

EPA should ensure that certification fuels accurately represent fuels used in the real world. In our view, the proposed requirement that certification fuel contain 15% ethanol by volume (E15) is inappropriate at this time. Given that this fuel represents a tiny fraction of the present-day fuels market in the U.S., that its future prospects as a mainstream automotive fuel are highly uncertain, and that its use in the existing fleet of vehicles will have non-trivial effects on vehicle emissions, we urge EPA to refrain from specifying E15 as a test fuel at this time. We suggest that EPA continue to monitor the use of ethanol as a blended transportation fuel. If and when E15 comes to represent a significant share of the national market, EPA should reassess its implications and the potential benefits and drawbacks to revising the test fuel specifications.

Organization: Ozone Transport Commission (OTC)

In the past, EPA has relied upon multiple fuels that are not necessarily available at public gasoline dispensing facilities for use in testing vehicles to meet certification standards. OTC is encouraged by EPA's decision to have one national real world test fuel. This will ensure that the cars on the road are indeed meeting the emission standards for which they were tested. However, OTC suggests that EPA rely on current, rather than future, in-use fuel, in particular in regards to ethanol concentrations. Currently, E15 (15% ethanol) is available in only six states having only a small market share nationally due to concerns about its effects on automobiles and infrastructure at gasoline dispensing facilities. Furthermore, California requires E10 (10% ethanol) as a test fuel, which would lead to a discrepancy between vehicles tested to meet California vehicle standards and those tested to meet EPA standards. OTC calls on EPA to require E10 test fuel to maintain nationally harmonized testing standards, and only move to E15 at a point in when E15's market share becomes the predominant fuel blend.

Organization: PBF Energy Inc.

PBF supports the EPA in the concept that the proposed vehicle emission test fuels should match the properties of fuels found typically in the market place. The EPA should revise the proposed rule to require that vehicle manufacturers certify emissions with E10 test fuel until such time as E15 is actually widely used by consumers as- opposed to a projected to be used by consumers. As an alternative, we recommend that the EPA defer to using the DOE/EIA projection of E15 usage and timeline of prevalence as the inception date for allowing E15 to be used in new vehicle emission certification.

Organization: Pennsylvania Department of Environmental Protection (DEP)

The EPA is correct to develop a certification test fuel for vehicles subject to Tier 3 standards that is more representative of the fuel that is used in the nation. DEP has urged EPA to change the certification fuels to represent a real-world fuel on other proposed rulemakings. DEP supports EPA moving to a fuel that is more representative of the fuel available to the nation's motorists. In the future, EPA should make timely changes to the certification fuel as relevant changes occur to fuels available in the marketplace.

The EPA should not use a certification test fuel that contains 15 volume percent ethanol before that fuel is in widespread use in the nation. DEP questions whether there is sufficient ethanol supply to meet the 15 volume percent threshold when Tier 3 goes into effect. The ethanol industry reports that 20 of 211 biofuel plants are currently idled and many more are not producing at capacity. If the current drought in the Midwest continues into the summer of 2013 (which the National Oceanic and Atmospheric Administration predicts), some ethanol plants will likely be shut down permanently. Current annual biofuel production is at least 5 billion gallons per year short of demand predicted in the EPA's proposed rule. The certification fuel should include 10 volume percent ethanol until over 50 percent of the fuel supplied to the nation's motorists meets the 15 volume percent ethanol requirement. In addition, CARB will be using 10 volume percent ethanol in their certification fuel. The federal fuel certification requirements should be harmonized with CARB's requirements. Importantly, as previously stated, ethanol increases NO_x emissions and the increase to 15 volume percent of ethanol in gasoline seems to be counter to the desire to achieve NO_x reductions through the use of Tier 3 gasoline.

Organization: Phillips 66 Company

Certification fuel – We oppose E15 as the certification fuel. Phillips 66 does not support the proposed change in the certification test fuel to E15. The certification fuel should be reflective of the predominant fuel in the marketplace that the vehicle will be operated on. EPA states "if E15 were not to enter the gasoline pool in significant quantities, it may be more appropriate to require that vehicles be calibrated for and tested on E10". We believe that the certification fuel should be E10 and not E15. EPA asked for comment on an approach that would set the test fuel at E10 but potentially transition to E15 in the future, either through a review and rulemaking process or by some "trigger". Should EPA determine in the future that another change in the certification fuel is warranted, we believe that EPA should go through a rulemaking process. We would not support an automatic "trigger" without opportunity to review and comment through a rulemaking process.

Organization: POET, LLC

The Tier 3 Proposed Rule appropriately recognizes that ethanol blending is of central importance to our nation's transportation fuel supply and accomplishing key environmental and energy security goals. To achieve these goals and maintain a robust domestic transportation fuel supply, it is critical that EPA design its regulations to facilitate the production, blending, and use of ethanol as a transportation fuel.

Ethanol already provides about 10% of the fuel for our nation's cars and trucks. Indeed, most fuel available today contains 10% ethanol in every gallon distributed at the pump. EPA has recently approved blends of 15% ethanol (E15) for over 230 million vehicles on the road today (those that are model year 2001 and later). Additionally, over 14 million flexible-fueled vehicles (FFVs) are on the road that can run on gasoline and blends containing up to 85% ethanol.

Ethanol is also inherently less toxic than petroleum fuels. Clean-burning ethanol is essentially comprised of alcohol with a small amount of denaturant to render it unsuitable for drinking. Ethanol use enables key air emission reductions of particulate matter, benzene, sulfur, and other toxic constituents as compared to gasoline. In fact, ethanol itself contains no benzene, generally no sulfur, and overall has significantly lower air emissions than gasoline on a toxicity-weighted basis.

The continued use of E10 and the increased use of E15 are critical to our nation's energy supply and environmental goals.

To summarize, POET strongly supports two key certification fuel provisions in the Proposed Rule. In particular, POET supports both the 'E15' base certification fuel, as well as an optional E30 certification fuel. It is also imperative that RVP limits must not be a barrier to the use of higher ethanol blends.

POET supports EPA's proposed E15-based certification fuel.

EPA proposes a new certification fuel that would be applicable to conventional gasoline vehicles, including those that run on ethanol blends up to E15. This new certification fuel is proposed to include an ethanol content of 15%.

POET strongly supports a new certification fuel based on an ethanol content of 15%. POET agrees with EPA that such a fuel is a 'better match' for fuels in use today (which generally have an ethanol content of at least 10%) than the current certification fuel that contains no ethanol.

Moreover, such a certification fuel is appropriate considering the increased use of E15 over the next few years. EPA is correct in pursuing a 'forward-looking E15 test fuel for light- and heavy-duty gasoline vehicles,' and an E15 certification fuel better reflects the near future. EPA notes that 'In-use fuel is projected to continue to change with the implementation of the RFS2 program' including with 'the expansion of the number of retailers that offer E15.' POET agrees. The RFS2 obligations mandate increasing amounts of renewable fuel, the majority of which is likely to be ethanol. Furthermore, the percentage of gasoline use from vehicles on the road that are capable of using E15 (including model years 2001 and newer) is greater than 70% and is growing as new vehicles replace aging ones.

An E15 certification fuel is preferable to an E10 certification fuel because an E10 certification fuel may become obsolete in the timeframe covered by this rulemaking. Moreover, EPA has sought to have vehicles tested with the highest available ethanol content that reflects actual driving conditions; for conventional 'gasoline' vehicles, this would be an ethanol content of 15%.

Moreover, without enabling E15 use, EPA would be frustrating the will of Congress in enacting the RFS, and EPA must adhere to regulatory requirements that it act to 'ensure' that RFS targets are met. Congress has mandated that EPA 'promulgate regulations to ensure that gasoline' contains the applicable volumes specified in the RFS. An E15 certification fuel is necessary for the RFS targets to be met in the short term, by allowing for the deployment of vehicles that can best make use of (are optimized for) this fuel.

E15 should also become the prevalent fuel in the marketplace for compatible vehicles (model year 2001 and newer) given ethanol's inherent economic advantages as a blendstock and octane enhancer.

Organization: Renewable Fuels Association (RFA)

RFA supports the proposal to establish E15 as the certification test fuel beginning in 2017. RFA supports EPA making much needed modifications to the certification fuel used by auto manufacturers in certifying all new vehicles. Significant changes in the composition of the in-use gasoline available to consumers have taken place since the initial new vehicle certification requirement circa 1974.

RFA strongly supports moving to a certification fuel that contains the highest level of ethanol that is likely to be in broad commercial use in the next 5-10 years. In light of EPA's recent approval of E15 for use in light-duty automobiles built in 2001 or later, and the recent introduction of E15 at retail gasoline stations in several states, we agree that E15 is the proper new certification fuel beginning in 2017. The agency should be mindful, however, that RFS2 requirements and the increasing desire for higher octane fuels to maximize engine efficiency are likely to drive average ethanol content above 15% over the course of the next 10 years.

Looking at certification fuel another way, EPA could align the emissions certification fuel with the diurnal emissions test fuel containing ethanol in at least the highest concentration permissible in gasoline under federal law and that is commercially available. Further, EPA should include an incentive for auto manufacturers who phase in the certification of new vehicles with the new certification fuel ahead of the prescribed schedule for implementation. Early adoption of the new certification fuel will accelerate the capability of the national car pool with higher ethanol blended fuels.

Organization: Shell Oil Products for Shell and Motiva

EPA Should Change the Vehicle Certification Fuel to E10. EPA is proposing to change the vehicle certification fuel to E15. We agree it is appropriate for EPA to change the vehicle certification fuel from the current E0, since over 90% of all gasoline in the United States is now blended with ethanol, but believe that EPA should change it to E10 rather than E15. As required by section 202(h) of the Clean Air Act, EPA's regulations should require that the certification fuel reflect the fuel that is generally available in the market. Section 202(h) required EPA to update its regulations to ensure 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." As this relates to fuel, it clearly calls for EPA to use E10, not E15 as the certification fuel.

It is unlikely that E15 use will expand to the degree that EPA suggests in the proposal. EPA fails to consider that notwithstanding its approval of E15, the automobile manufacturers do not support E15 use in the current fleet and E15 is not compatible with the infrastructure at the majority of retail gasoline stations. Studies by the Coordinating Research Council also indicate that E15 can damage even 2001 and newer vehicles.

Organization: Sierra Club, Clean Air Watch, Respiratory Health Association

As EPA notes in the proposed standards, in-use gasoline has changed significantly in previous decades. With the implementation of the Renewable Fuel Standard, most gasoline sold contains up to 10% ethanol by volume (E10). In the proposed rule, EPA proposes moving from Indolene to an E15 test fuel. Additionally, EPA is proposing to allow manufacturers to request approval for alternative certification fuel, such as E30.

However, ethanol blends higher than E10 are not widely available in the market today. Though EPA recently increased the "blend wall" to E15, that fuel has not been widely adopted yet, and significant concerns have been raised about the effect of higher ethanol blends on older vehicles and small engines. By proposing E15 as a test fuel and blends such as E30 as an alternative test fuel, EPA is moving ahead of what is happening in the marketplace.

Instead of proposing E15 as a certification fuel, EPA should instead adopt a certification fuel that is closer to real-world conditions, such as E10. It is critical that this test fuel requirement be harmonized with test fuel requirements for other vehicle standards, particularly light-duty greenhouse gas and fuel economy standards, as increased ethanol blends affect fuel economy.

Though test fuel conditions may need to be updated in the future, EPA should strive to match real-world fuel conditions.

Organization: Truck and Engine Manufacturers Association (EMA)

EPA has proposed changing on-highway certification test fuel to E15 with a 9 psi RVP. (78 Fed. Reg. at 29825.) In addition, EPA requests comment on the potential to utilize E10 rather than the proposed E15 certification test fuel with a transition scheme to E15 at a future time. (78 Fed. Reg. at 29914.) Finally, EPA suggests that if it were to adopt an E10 certification test fuel, that fuel would have a maximum of 10 psi RVP rather than the 9 psi RVP maximum proposed for E15 certification test fuel. (78 Fed. Reg. at 29895.)

EPA's proposed changes in certification test fuel for heavy-duty vehicles up to 14,000 lbs. GVWR would constitute a substantial change from current certification test fuel requirements. EPA has not provided support in the Proposed Rule for any such change. EPA acknowledged in the Proposed Rule that its previous Tier 2 regulations do not apply to Heavy- Duty Vehicles (8,501-14,000 lbs. GVWR). Yet, EPA now has proposed that such vehicles be subject not only to more stringent emission standards, but also to a change in certification test fuel. In fact, EPA previously determined that E15 certification fuel would not be appropriate or acceptable for use in Heavy-Duty Vehicles (i.e., vehicles over 8,500 lbs. GVWR) (see reference below). To make such a change in certification test fuel for Heavy-Duty Vehicles, EPA must first fully review, analyze and make a new determination that E15 is acceptable for Heavy-Duty Vehicles, which it has failed to do. EMA does not support such a change.

EMA also strongly objects to any attempt to create a transition scheme where products would be certified on E10 test fuel for the near term and transitioned to certification utilizing an E15 test fuel at an unspecified future date. In addition, EPA should not adjust the maximum RVP based on ethanol content, as such a change would have the effect of increasing the stringency of the new standards.

EMA recognizes that current Heavy-Duty Vehicles are compatible with E10 marketplace fuels. As such, if EPA makes any change to certification test fuels for Heavy-Duty Vehicles, EPA, at most, should adopt E10 certification test fuel with a maximum of 9 psi RVP for Tier 3 Heavy-Duty Vehicles and the engines used in them.

Adopt E10 certification test fuel with a 9psi RVP for light-duty and medium-duty vehicles subject to the Proposed Rule, with future rulemakings to make similar changes to the test fuels for other heavy-duty and nonroad spark-ignition engines

Organization: Union of Concerned Scientists (UCS)

EPA should adopt a certification fuel that accurately reflect the fuels used in the marketplace now and in the timeframe of the vehicles' useful lifetime. The certification fuel should be chosen to accurately reflect the fuels used in the marketplace now and in the timeframe of the vehicles' useful lifetime. Today the fuel most commonly in use is E10, so this is an appropriate choice for a certification fuel. But the fuel market is changing, and is expected to continue to change, and

EPA should ensure that the choice of certification fuel is, to the extent possible, technology neutral, and does not present a barrier to the use of the higher levels of biofuel called for in the Renewable Fuels Standard. Technical guidance from automakers, fuel producers and other experts will be required to assess the best course forward, and to determine the pros and cons of E15, E85, midlevel blends such as E30, or drop-in biofuels as a compliance pathway for the RFS. We are not in position at this point to judge the outcome of these considerations in detail. However, we urge that in performing this assessment EPA use realistic volume targets for the RFS, particularly in the timeframe from 2016 to 2022. We have provided comments in an RFS rulemaking explaining that the original RFS2 schedule targeting 36 billion gallons in 2022 is no longer realistic, because of the limited availability of cellulosic biofuels (11). More plausible timeframes for meeting the full 36 billion gallon target of the RFS are closer to 2030 than 2022, and because of this there is time for an orderly transition to higher biofuel blends as the cellulosic biofuel industry scales up. Any introduction of new fuel blends into commerce should be conducted in a manner that will protect consumers from inadvertently damaging their vehicles.

Organization: United Steelworkers Union (USW)

One concern our union does have with the proposed rule is the EPA's test fuel specification. EPA has indicated a desire to move from "Indolene" (E0) to an E15 test fuel. While updating the federal emissions test fuel to better match today's in-use gasoline is an appropriate approach, specific issues regarding the "blend wall" and E15 still need to be addressed. USW would recommend that test fuels meet what is the predominant fuel available at fuel stations in the US.

Our Response:

In the NPRM, EPA proposed that the gasoline emissions test fuel be changed from E0 to E15 as a forward-looking position based on indications following the 2011 E15 waiver decision that the market would move in that direction. Since the time when we developed the proposal, several relevant factors have led EPA to reconsider that position, including minimal proliferation on a national scale of stations offering E15. The most recent surveys of the market show that E10 now comprises nearly 100% of in-use gasoline, with very small amounts of E0 and E15 being sold in limited areas where there is specific interest.[32] Adopting an E15 test fuel would also complicate the regulatory streamlining goal of long-term harmonization of the Tier 3 vehicle emission regulations with California's LEVIII program (which uses E10 for emissions testing).

We received comments supporting use of E10 as emissions test fuel from the automotive and oil industries, as well as states, NGOs, and private citizens citing the fact that this was most representative of current market conditions. Other stakeholders involved in fuel marketing and distribution cited significant infrastructure cost and liability concerns in making E15 widely available at existing stations. Some commenters expressed the concern that inclusion of ethanol in test fuel would indicate an improper EPA policy preference for ethanol over other biofuels. Ethanol industry commenters generally supported E15 certification fuel as proposed, but provided no specific timeline on which this blend level would become representative of in-use fuel.

[32] More detail on fuel survey data is available in Chapter 3 of the Regulatory Impact Analysis.

Based on our review of the data and comments and under our authority in section 206 of the Clean Air Act, specifically including section 206(d), EPA has determined that E10 most appropriately reflects in-use gasoline around the country today and into the foreseeable future, and thus we are finalizing E10 as the ethanol blend level for gasoline emissions test fuel for Tier 3 light-duty and heavy-duty gasoline vehicles. (Test fuel for motorcycles and nonroad engines is not changing at this time.) We are not at this time adopting any specific timeline or criteria for considering a gasoline emissions test fuel based on a higher-level ethanol blend. Instead we will continue to monitor the in-use gasoline supply, including the qualities of E15 in-use, and based on such review may initiate rulemaking action to revise the specifications for emissions test fuel. At this time it would not appear necessary to take further action to consider market triggers to transition automatically to E15 as an emissions test fuel as opposed to through a new rulemaking process. Rather than speculate about what in-use fuel qualities might be in the future, we prefer to see how E15 properties develop as it expands into the market.

Some commenters expressed concern about implications for future test programs, fuel waiver approvals, or Part 79 fuel registrations resulting from a change in test fuel properties. While we recognize these interactions may occur, we believe the change in emission test fuel is warranted to ensure that the certification process more appropriately reflects in-use conditions

Some comments included in this section also pertain to the RVP level of emission test fuel, a topic to which we respond in Chapter 4.5.1.2 of this document.

Some comments included in this section also pertain to evaporative durability or service accumulation fuel, a topic to which we respond in Chapter 4.3 of this document.

Some comments included in this section also pertain to allowances for alternative emission test fuel, a topic to which we respond in Chapter 4.5.1.5 of this document.

4.5.1.2. Emission Test Fuel RVP

What Commenters Said:

Organization: Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

Automakers support updating certification test fuels in Tier 3 regulations, as California did in its recent LEV III rulemaking. EPA has asked for comment on adopting certification gasoline containing 10 percent ethanol with a 10 psi Reid Vapor Pressure (RVP). We have further discussion on the ethanol content in our fuels comments below; however, we cannot and do not support Tier 3 if EPA adopts a certification gasoline with an RVP of 10 psi. The proposed evaporative emission standards are already extremely challenging to meet across all the required vehicle sizes based on the 9 psi fuel proposed by EPA. An RVP of 10 psi would significantly increase the stringency of these standards, and we are not confident that the evaporative standards could be met with such fuel. Moreover, adopting a certification gasoline with an RVP of 10 psi would eliminate several years of work by the EPA, ARB, and automakers to harmonize the Tier 3 and LEV III requirements and make them equal in stringency. While it might be possible to make test procedure changes for an equivalent stringency on the higher RVP, such changes would require years of additional work by EPA, ARB, and automakers and, even then, would be more likely to result in confusion and uncertainty than in equivalence. Automakers support a Tier 3 test fuel with 10 percent ethanol and RVP of 9 psi.

While EPA has used typical or average values for a number of the specific properties for the proposed Tier 3 test fuel, the Agency has made exceptions to its market representative approach for sulfur and RVP. In the case of sulfur, EPA is proposing more stringent market gasoline average sulfur limits, so the test fuel sulfur levels appropriately reflect this change. However, in the case of test fuel RVP, EPA is setting the level to reflect the maximum allowable content rather than representative market levels. Although 10 psi RVP fuels are in use in the market as a result of the statutory 1 pound waiver, a 9 psi RVP limit for both an E10 test fuel and summertime market gasoline is a better outcome for advanced vehicle technologies and for the environment, as detailed below.

As noted above in Part I, the auto industry supports harmonization of Federal Tier 3 and California LEV III vehicle emission programs, to allow use of one test fuel and test regime to certify for both Tier 3 and LEV III purposes. Toward that end, while there are differences between these standards, we continue to support permanent mutual reciprocity to allow OEMS to use one test fuel and its related testing regime per test vehicle, either LEV III or Federal Tier 3, for purposes of both Federal and California certification. Such reciprocity is appropriate for all test fuels, not just gasoline.

U.S. gasoline is now supplied as E10 in virtually all markets. The summer RVP for this fuel varies from 7 to 10 psi, depending on local regulations and marketers. California recently finalized new E10 7 psi RVP certification fuel (LEV III), based on the market fuel prevalent in California. As noted above, the Alliance and Global Automakers recommend that EPA set the Tier 3 test fuel ethanol level at 10% (E10), which represents over 90% of U.S. gasoline.

Likewise, we deem it critical that EPA set the test fuel Reid Vapor Pressure (RVP) at no greater than 9 psi, which is toward the high end of the allowed range, but which appeared as the 75th percentile of the U.S. samples in the 2012 Alliance North American Fuels Survey (excluding California).

We understand that an E10 9 psi RVP cert fuel would be acceptable to California for purposes of mutual reciprocity certification. Transitioning to an E15 test fuel incorporates speculative assumptions that are not justified for the foreseeable future as a basis for such a critical regulatory decision.

EPA cannot and should not try to compensate by imposing an RVP for the certification test fuel that results in more stringent emission tests for vehicles. This is not a legitimate replacement for fulfilling its duty under the Congressional mandate to regulate market fuel RVP. EPA should use 9 psi RVP test fuel in a final Tier 3 rule, until it has had the opportunity to complete its evaluation of RVP regarding market fuel, and if necessary, then review RVP of test fuel.

Tier 3 Test Fuel Gasoline Should Be 9 psi RVP. Vapor pressure is the most important property for engine start-up performance. At higher ambient temperatures, the fuel can vaporize prematurely prior to reaching the injectors, disrupting the fuel flow to the engine and creating "vapor lock." As defined in ASTM D4814, vapor lock conditions arise "if too much vapor is formed, the fuel flow to the engine can be decreased, resulting in loss of power, rough engine operation, or engine stoppage." During cold ambient temperatures, fuels with vapor pressures that are too low can prevent the engine from starting at all or have poor warm-up performance. Thus, the vapor pressure and distillation profile of gasoline are controlled based on seasonal ambient temperatures so that fuel vaporizes easily (higher vapor pressure) in cold weather to assist in engine starting, and vaporizes less easily (lower vapor pressure) in warm weather to prevent vapor lock and reduce evaporative emissions.

ASTM D4814, Standard Specification for Automotive Spark-Ignition Engine Fuel, specifies for Class A fuel a 9 psi maximum for the continental U.S. during the summer low-VOC (Volatile Organic Compound) RVP blending season. The 10 psi market gasoline in some conventional markets is largely due to Congressional action. Enacted in part to increase the volume of renewable fuels in the U.S. marketplace, the Energy Policy Act of 2005 and the Energy Independence and Security Act of 2007 have greatly increased the penetration of E10 in the market. Under section 211(h) 4 of the CAA, these E10 blends are allowed an additional 1 psi of vapor pressure relative to conventional gasoline or other ethanol blends.

EPA states in the NPRM (26): While the volatility (i.e., RVP) of CARB's E10 test fuel is 7.0 psi to be representative of in-use gasoline in California during summer months, conventional E10 in the rest of the country is currently around 10 psi. Thus, should we finalize E10 instead of E15, in the absence of any standard to reduce the in-use RVP of E10 to 9.0 psi or lower, we would also have to consider raising the RVP of certification test fuel to 10 psi to reflect the RVP level of the current in-use fuel.

EPA should not raise the test fuel RVP to 10 psi. Inspection of the 2010-2012 Alliance of Automobile Manufacturers Summer fuel surveys for US States (excluding Alaska, Hawaii and California data) in Figure 1 [Figure 1 can be found on p. 55 of Docket number EPA-HQ-OAR-2011-0135-4461-A1.pdf] show that the 50th percentile of samples is an 8 psi fuel while 10 psi is only found at the 95th percentile of samples. 9 psi would be approximately the 75th percentile of samples. Thus a 9 psi E10 fuel would be a realistic market fuel representation when considering an E10 certification fuel.

But for the one pound waiver, E10 would be 9 psi or lower, which it is in many parts of the country. As discussed further below, for both vehicle performance and environmental benefits, we advocate that EPA reduce market fuel RVP to 9 psi (including 8 psi with a 1 pound waiver to 9 psi for E10). Therefore, it would be consistent to use a 9 psi test fuel. We disagree that there is any technical basis or policy reason for imposing a 10 psi test fuel. Requiring the use of a 10 psi test fuel would have the effect of making the Tier 3 evaporative emissions tests more stringent for vehicles than anticipated, more stringent than California, and would disrupt optimal harmonization efforts.

EPA should make the final Tier 3 gasoline test fuel E10 9 psi RVP.

HDGV and 10 PSI: Industry opposes 10 psi RVP test fuel for use in evaporative emission testing. The use of a 10 psi test fuel would impact the stringency of the evaporative emission standards and prevent a single national harmonized emissions program

E10 & 10 PSI (FR29910): Industry opposes a 10 PSI test fuel. This impacts the stringency of the Tier 3 evap standards and does not harmonize with the ARB LEV III program.

Organization: American Coalition for Ethanol (ACE)

Volatility/Reid Vapor Pressure (RVP) — EPA is proposing to change the Federal certification test fuel specification to a 9 RVP gasoline with 15% ethanol, and while we could support such a change, it again seems inconsistent with past practices and with EPA's goal of having test fuel more accurately reflect the fuels available in the marketplace. The highest volume fuel in the U.S. is 10 lb. RVP E10. [EPA-HQ-OAR-2011-0135-4313-A2 p. 3]

Organization: American Lung Association

We believe that if the Reid Vapor Pressure (RVP) of E10 in current in-use fuel is 10 psi, then the certification fuel should also be 10 psi.

Organization: American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM)

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.

Organization: California Air Resources Board (CARB)

RVP 10 fuel implications for evaporative emission testing: The NPRM requests comment for alternatively requiring E10 with Reid Vapor Pressure (RVP) of 10 psi rather than E15 with an RVP of 9 psi for certification emissions testing. Regardless of which fuel U.S. EPA finalizes for Tier 3, CARB strongly recommends that U.S. EPA maintain an equivalent level of stringency for evaporative emission testing with LEV III evaporative emission standards. If equivalency between Tier 3 and LEV III evaporative requirements is maintained, CARB intends to accept test data from vehicles tested using Tier 3 certification fuel and temperatures to meet the LEV III evaporative emission requirements. See also our more detailed comments on Tier 3 certification fuel on pages 21-22 of this document.

Comment 1 — Gasoline Certification Test Fuel: CARB recommends that the U.S. EPA reconsider the use of E15 as the Tier 3 certification fuel. Instead, CARB recommends a certification fuel with 10 percent volume ethanol (E10) and a 9.0 pounds per square inch (psi) RVP. An E10 certification fuel would be consistent with the current federal commercial fuel. In addition, the 9.0 psi RVP would allow the Tier 3 program and California's LEV III program to be consistent with the certification fuel reciprocity precedent set between the Tier 2 program and California's LEV II program. The evaporative emission difference between U.S. EPA's 9.0 psi RVP Tier 2 certification fuel and California's LEV II 7.0 psi RVP certification fuel was offset by

U.S. EPA's use of a lower diurnal temperature range. California's LEV III certification fuel has approximately a 7.0 psi RVP and CARB staff recommends that U.S. EPA maintain a 9.0 psi RVP fuel such that the evaporative emission offsets between the California LEV III certification fuel and the Tier 3 certification fuel can be maintained.

Organization: Chrysler Group LLC

The certification test fuel for gasoline-fueled vehicles should be an E10, 9.0 psi RVP test fuel, rather than an E15 certification test fuel.

Reid Vapor Pressure of Certification Test Fuel: Chrysler recommends that EPA set the certification test fuel RVP at 9.0 psi rather than the 10.0 psi proposed by EPA for E10 fuel. RVP is a measure of the volatility of gasoline. Because gasoline evaporates more readily the higher the RVP, use of a higher RVP fuel for evaporative emissions testing imposes a more difficult compliance burden on automobile manufacturers (18). Indolene, the current certification test fuel, has an RVP of 9.0 psi. EPA proposes to retain this 9.0 psi RVP if E15 is adopted as the certification test fuel. However, EPA proposes to raise the RVP from 9.0 psi to 10.0 psi should it instead adopt E10 as the certification test fuel. EPA states that raising the RVP to 10.0 psi for E10 fuel is necessary in order to be representative of conventional E10 gasoline. [EPA-HQ-OAR-2011-0135-4326-A2, p. 7]

EPA's reasoning that it is necessary to raise the RVP for E10 certification test fuel is flawed (21). Although it is true that conventional E10 gasoline can have an RVP of up to 10.0 psi during summertime months, it is not the case that E10 gasoline with an RVP of 10.0 psi is representative of in-use fuel. Rather, 9.0 psi fuel is most representative of in-use fuels. First, many states require use of reformulated gasoline, which has a lower RVP than conventional E10 gasoline in the 7.0 to 8.0 psi range. In fact, according to EPA, reformulated gasoline is currently used in 17 states and the District of Columbia, and accounts for approximately 30 percent of gasoline sold in the United States (22). In addition, although conventional E10 gasoline can as a statutory matter have an RVP of up to 10.0 psi, some conventional E10 gasoline has an RVP that is lower than 10.0 psi. Thus, as explained in comments provided by the Alliance of Automobile Manufacturers, 9.0 psi fuel represents the 75th percentile RVP level of U.S. gasoline in summertime months based on samples collected as part of the 2012 Alliance North American Fuels Survey (excluding California, Alaska, and Hawaii, which have even lower RVP levels) (23). Accordingly, 9.0 psi fuel is actually more representative of in-use fuel than 10.0 psi fuel and thus is more appropriate for use as the certification test fuel. [EPA-HQ-OAR-2011-0135-4326-A2, pp. 7-8]

Organization: Ford Motor Company (Ford)

EPA has proposed a new Tier 3 certification test fuel containing 15% ethanol (E15) with a Reid Vapor Pressure (RVP) of 9psi. While the percentage of ethanol in the proposed fuel does not match that of the 10% ethanol (E10) fuel adopted by California in LEV III, the proposed vapor pressure ensures equivalent stringency with respect to evaporative emissions when this fuel is used with the temperatures specified in EPA evaporative test procedures. However, in the NPRM EPA also explored the ramifications of instead proposing an E10 test fuel, indicating that such a change could result in an RVP other than 9 psi. Ford strongly opposes any increase in the RVP of the test fuel since this would require either heavily modified test procedures or higher standards in order to maintain equivalent stringency to CA LEV III.

Recommendation: Ford recommends that EPA adopt a 9 psi test fuel to maintain equivalent stringency with CA LEV III and to ensure that the Tier 3 evaporative emissions standards are achievable. [EPA-HQ-OAR-2011-0135-4349-A2,p.3]

Organization: General Motors LLC (GM)

Although not proposed by EPA, throughout the Tier 3 NPRM, EPA discusses the possibility of a 10 psi (pounds per square inch) Reid Vapor Pressure (RVP) test fuel for evaporative emission testing. GM is strongly opposed to the use of 10 psi test fuel for evaporative emission testing. GM has vast experience conducting evaporative emission testing with both CARB 7 psi and EPA 9 psi test fuels. The Tier 3 regulations were intended to harmonize with the CARB LEV III regulations and to propagate zero evaporative emission vehicle technologies across the nation. GM vehicle designs are predicated on the understood equivalent performance between the EPA and CARB test procedures and test fuels. Moving to a 10 psi test fuel would decouple this basic design premise, destroy the reciprocity agreement between EPA and CARB and would represent a significant stringency increase for vehicles complying with the Tier 3 requirements. Simply put, Tier 3 would not be harmonized with LEV III, and the goal of a single national program would be undermined.

While EPA has used typical or average values for a number of the specific properties to define their proposed test fuel, the Agency made exceptions to its market representative approach for sulfur and RVP. In the case of sulfur, EPA is proposing to impose more stringent market gasoline average sulfur limits, so the test fuel sulfur levels appropriately reflect this change. However, in the case of test fuel RVP, EPA is setting the level to reflect the maximum allowable rather than representative market levels. Although 10 psi RVP fuels are in use in the market as a result of the statutory 1 pound waiver, a 9 psi RVP limit for both an E10 test fuel and summertime market gasoline is a better approach for advanced vehicle technologies and for the environment, as detailed below. [EPA-HQ-OAR-2011-0135-4288-A1, p.11]

U.S. gasoline is supplied with E10 in virtually all markets. The summer RVP for this fuel varies from 7 to 10 psi, depending on local regulations and markets. California recently finalized new E10 7 psi RVP certification fuel (LEV III) based on the market fuel prevalent in California. GM recommends that EPA set the Tier 3 test fuel ethanol level at 10% (E10) which represents over 90% of U.S. gasoline. [EPA-HQ-OAR-2011-0135-4288-A1, p.12]

Likewise, we deem it critical that EPA set the test fuel RVP at no greater than 9 psi, which is toward the high end of the allowed range, appearing in the 75th percentile of the U.S. samples in the 2012 Alliance North American Fuels Survey (excluding California).8 This is discussed further in Section XV. [EPA-HQ-OAR-2011-0135-4288-A1, p.12]

In conversations with members of CARB, an E10 9 psi RVP certification fuel would be acceptable to California for purposes of mutual reciprocity certification. [EPA-HQ-OAR-2011-0135-4288-A1, p.12]

Tier 3 Gasoline Certification Test Fuel Should Be 9 psi RVP: Vapor pressure of gasoline is the most important property for engine start-up performance. At higher ambient temperatures, the fuel can vaporize prematurely prior to reaching the injectors, disrupting the fuel flow to the engine and creating "vapor lock". As defined in ASTM D4814, vapor lock conditions arise "if too much vapor is formed, the fuel flow to the engine can be decreased, resulting in loss of power, rough engine operation, or engine stoppage." During cold ambient temperatures, fuels with vapor pressures that are too low can prevent the engine from starting at all or cause it to have poor warm-up performance. Thus, the vapor pressure and distillation profile of gasoline is controlled based on seasonal ambient temperatures so that fuel vaporizes easily (higher vapor pressure) in cold weather to assist in engine starting and vaporizes less easily (lower vapor pressure) in warm weather so as to prevent vapor lock and reduce evaporative emissions. [EPA-HQ-OAR-2011-0135-4288-A1, p.15]

ASTM D4814, Standard Specification for Automotive Spark-Ignition Engine Fuel, specifies for Class A fuel a 9 psi maximum for the continental U.S. during the summer low-VOC (Volatile Organic Compound) RVP blending season. The 10 psi market gasoline that EPA sees in some conventional markets is largely due to Congressional action. Enacted, in part, to increase the volume of renewable fuels in the U.S. marketplace, the Energy Policy Act of 2005 and the Energy Independence and Security Act of 2007 have greatly increased the penetration of E10 in the market. Under section 211(h) 4 of the Clean Air Act, these E10 blends are allowed an additional 1 psi of vapor pressure relative to gasoline or other ethanol blends.[EPA-HQ-OAR-2011-0135-4288-A1, p.15]

EPA states in the NPRM, "While the volatility (i.e., RVP) of CARB's E10 test fuel is 7.0 psi to be representative of in-use gasoline in California during summer months, conventional E10 in the rest of the country is currently around 10 psi. Thus, should we finalize E10 instead of E15, in the absence of any standard to reduce the in-use RVP of E10 to 9.0 psi or lower, we would also have to consider raising the RVP of certification test fuel to 10 psi to reflect the RVP level of the current in-use fuel." [EPA-HQ-OAR-2011-0135-4288-A1, p.15]

We disagree that there is any technical basis or policy reason for imposing a 10 psi test fuel. Requiring the use of a 10 psi test fuel would have the effect of making the Tier 3 evaporative emissions tests far more stringent for vehicles than anticipated, and far more stringent than California LEV III, completely undermining the harmonization efforts. Further, making certification fuel have a vapor pressure of 10 psi would have the effect of making this high vapor pressure summer gasoline permanent. [EPA-HQ-OAR-2011-0135-4288-A1, p.16]

EPA cannot and should not try to compensate for the widespread use of ethanol by imposing an RVP for the certification test fuel that results in more stringent emission tests for vehicles. This is not a legitimate replacement for fulfilling its congressionally mandated duty to regulate market fuel RVP. EPA should use 9 psi RVP test fuel in the final Tier 3 rule. [EPA-HQ-OAR-2011-0135-4288-A1, p.17]

Inspection of the 2010-2012 Alliance of Automobile Manufacturers summer fuel surveys for U.S. States (excluding Alaska, Hawaii and California data) in Figure 1 show that the 50th percentile of samples is an 8 psi fuel while 10 psi is the 95th percentile of samples. 9 psi would be approximately the 75th percentile of samples. Thus, a 9 psi E10 fuel would be a realistic market fuel representation when considering an E10 certification fuel. [[See Docket Number EPA-HQ-OAR-2011-0135-4288-A1, p.16 for Figure 1.]]

Organization: Marathon Petroleum Company LP (MPC)

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.

Organization: Michigan Department of Environmental Quality (MDEQ)

The MDEQ, Air Quality Division is supportive of a change to the emission test fuel specifications to E-10 as long as this revision is accompanied by a Reid Vapor Pressure (RVP) of 9.0 pounds per square inch (psi). As an ozone compliance strategy, many of the large metropolitan areas throughout the country are required to use reformulated gasoline or fuels with lower RVP limits than the 10.0 psi claimed to reflect fuels in conventional use. The test fuel should be reflective of what is widely used in the marketplace, especially large urban areas where there is high traffic volume.

Organization: Mitsubishi Motors R&D America, Inc (MRDA)

EPA requested comments on a proposal for Federal E10, 10 psi RVP certification fuel. Additionally, Tier 3 evaporative emissions standards are proposed to align with LEV III standards. Though there are differences in the Federal and California test procedure temperature profiles to account for the climatic differences, proper specification of Federal and California certification fuels – specifically RVP – makes the results equivalent. It is commonly known that 9 psi RVP 'Federal' fuel using Federal evaporative test procedures yields similar test results as 7 psi RVP California fuel using California procedures. Therefore, the use of a 10 psi RVP federal certification fuel will no longer allow for harmonized evaporative emissions standards. Clearly, this issue is caused by the statutory one pound waiver that allows market availability of 10 psi RVP fuel as a temporary regulatory mechanism. Therefore, creating a long-term certification fuel should not be based on a temporary waiver. [EPA-HQ-OAR-2011-0135-4281-A1, p.2]

Mitsubishi Motors emphasizes that permanent reciprocity of certification test fuel with the LEV III program should not include a fuel with an RVP higher than 9 psi RVP. Federal certification fuel higher than 9 psi RVP would result in significant challenges in meeting the Tier 3 evaporative emission standards. The lack of harmonization in this area leads to an increased development burden upon automotive manufacturers because they need to account for possible higher vehicle engineering costs, redundant-testing, and increased costs due to additional test fuel stock. We request that EPA focus on incorporating a permanent reciprocity regime with Federal E10, 9 psi RVP fuel and federal test procedures into the Tier 3 Final Rule in order to follow through on its goal to harmonize with LEV III. Doing so would follow the

Administration's call for 'smart regulations' by eliminating areas of duplicative and unnecessary compliance requirements. [EPA-HQ-OAR-2011-0135-4281-A1, p.2]

EPA should not consider a federal certification test fuel higher than 9 psi RVP. [EPA-HQ-OAR-2011-0135-4281-A1,p.2]

Organization: National Automobile Dealers Association (NADA)

EPA should not approve E15 as a test fuel given its lack of presence in the marketplace and should not mandate a test fuel above 9 psi RVP.

To enable Tier 3 evaporative emissions compliance, a Reid Vapor Pressure (RVP) cap should be set at 9 psi for a maximum E10 gasohol test fuel.

Organization: National Corn Growers Association (NCGA)

We concur with EPA's proposed 9 psi vapor pressure specification for an E15 test fuel. The current vapor pressure specification for Tier 2 vehicles is also 9 psi. However, we recommend that in-use ethanol blends between E11-50 be allowed a 1 psi waiver, as applied to E10. Our rationale is further discussed within the In-Use Fuel section of these comments. We do not believe that a 1 psi waiver for E11-E50 necessitates a vapor pressure specification greater than 9 psi for E15 certification fuel, any more than E10 (which has a 1 psi waiver) does for the current certification gasoline. Reformulated Gasoline (RFG) areas and non-RFG areas without a waiver currently have less than 9 psi fuel in the summer; vapor pressure greater than 9 psi only occurs in non-RFG areas with a waiver. EPA did not propose further volatility controls for in-use fuel as a part of the Tier 3 fuel requirements. If EPA were concerned about the emission increases of Tier 3 (or even Tier 2) vehicles certified on 9 psi fuel and operated on 10 psi in the summer, it would have done so as a part of its fuel proposal. [EPA-HQ-OAR-2011-0135-4285-A1, p. 4]

EPA points out in the Tier 3 proposal that vapor generation in motor vehicles using 10 psi fuel in the summer is 25% higher than with 9 psi fuel. However, this does not mean that vehicle emissions are increased by 25% because modern vehicle evaporative emission control systems are designed to capture emissions for a 3-day park at high temperatures. The Tier 3 evaporative emission standards represent a very high level of evaporative emission control, whether the vehicles are operated on 9 psi fuels or in some areas of the country, 10 psi. [EPA-HQ-OAR-2011-0135-4285-A1, p. 4]

Organization: National Marine Manufacturers Association (NMMA)

EPA requests comment regarding the option of allowing the use of CARB E10 certification test fuel through model year 2019 with a Reid Vapor Pressure (RVP) of 10 psi (78 Federal Register 29895). EPA currently provides a 1 psi waiver for E10, but this waiver will not apply to E15. NMMA recommends that the 1 psi waiver also be eliminated for E10. EPA finalized a rule in 2010 that requires boat builders to meet stringent new evaporative emission requirements. California is currently in the process of finalizing a rule. In order to meet these new emission standards, marine engine manufacturers need a combination of new technology and a fuel with a minimum evaporation rate. [EPA-HQ-OAR-2011-0135-4294-A1, p. 4]

Organization: New York State Department of Environmental Conservation

Certification gasoline Dry Vapor Pressure Equivalent should reflect worst case commercial summer conventional gasoline. Currently certification gasoline has a nominal Reid Vapor Pressure (RVP) of 9 psi. EPA's proposed certification gasoline standard has a nominal Dry Vapor Pressure Equivalent (DVPE) of 9 psi. These are the same except for a change in test method (and acronym). While a 9 psi standard is appropriate for E0 or E15 gasoline, it is not appropriate for a certification gasoline standard based on current commercial practice.

In much of the country conventional summer gasoline DVPE is nominally 10 psi through a combination of Clean Air Act Section 211(h)(1)'s summer gasoline maximum RVP of 9 psi and the 1 psi waiver for E10 contained in Section 211(h)(4). As long as this remains the case, it is the worst case for evaporative emissions, and is what evaporative emission control systems should be designed for and certified on.

Organization: Phillips 66 Company

The test fuel specifications for an E10 test fuel should align with the ASTM gasoline specification, D4814. EPA stated that they reviewed refinery test data as one input to set specifications for various test fuel properties. Currently, all conventional gasoline is tested and reported to EPA on a clear basis so would not include the effect of the blended ethanol that is added downstream. A few notes on selected properties: [EPA-HQ-OAR-2011-0135-4463-A1, p. 7]

- Vapor pressure should be set at 10 psi which accounts for the 1 psi vapor pressure waiver allowed for E10 blends throughout most of the United States [EPA-HQ-OAR-2011-0135-4463-A1, p. 7]

Organization: Revecorp Inc.

First, the proposed TIER 3 rule states that testing for evaporative emissions will be conducted on fuel which is lower RVP than the current certification fuel. Unfortunately, at a time which EPA is proposing decreasing the RVP of the certification fuel may, in-use vehicles are being exposed to higher RVP fuel. For example, it is possible that because E85 is being sold and more flexible fuel/E85 capable vehicles are in the fleet that a vehicle could end up with a high RVP fuel in the tank. For instance, if a motorist had than the certification fuel is a good possibility. For example, if an E85 vehicle is refueled with 19 gallons of E10 fuel when it had one gallon of E85 in the tank, the ethanol content of the resulting fuel would be 13.75%, near the highest RVP of any gasoline/ethanol blend, and with an RPV much higher than the new proposed certification fuel. Vehicle testing should be performed with fuel which is representative of the fuel which vehicles are expected to see under the most severe in-use conditions.

Organization: Truck and Engine Manufacturers Association (EMA)

Adopt E10 certification test fuel with a 9psi RVP for light-duty and medium-duty vehicles subject to the Proposed Rule, with future rulemakings to make similar changes to the test fuels for other heavy-duty and nonroad spark-ignition engines

Organization: Volkswagen Group of America, Inc.

VW strongly supports capping both market fuel and testing fuel at 9 psi RVP. This allows current vehicles to operate their evaporative emissions controls more efficiently. An immediate real-world air quality benefit will be soon in non-attainment areas that typically see 10 psi RVP summertime fuels. A 10 psi RVP test fuel will unnecessarily increase the stringency of the Tier 3 evap rule. Since CARB does not view a 10 RVP E10 test fuel as equivalent to their gasoline test fuel for LEVIII, a 10 RVP fuel walks further away from a harmonized National Program.

Our Response:

In addition to our proposal to change the ethanol level of gasoline emission test fuel, we raised the question of which volatility level (or RVP) would be most appropriate. The Clean Air Act Section 211(h)(1) sets a national limit on summertime RVP in northern conventional gasoline areas of 9.0 psi to control ozone pollution. However, Congress included a waiver allowance in Section 211(h)(4) granting an additional 1 psi RVP to 10% ethanol blends, meaning that E10 could have an RVP of up to 10 psi in conventional gasoline areas unless specifically prohibited by state or local rules. (Under Section 211(h)(4), E15 is not covered by the waiver and thus is restricted to 9 psi nationwide.)

Some commenters, including some automakers, recommended leaving the RVP of emissions test fuel at 9 psi for reasons including the fact that raising the specification to 10 psi would increase the stringency of the proposed evaporative emission standards significantly. We agree that the resulting increased vapor generation rates during the refueling test would increase emissions (by about 10 percent and during the hot soak, diurnal, canister bleed, and running loss tests by as much as 25 percent in total). While the likely increase in canister volume in response to higher certification fuel RVP would not be difficult for automakers to accommodate in most cases, there are additional uncertainties regarding cost and feasibility of strategies for removing the larger vapor loads from the canister during vehicle operation (vapor “purging”). Some vehicles have adequate engine vacuum available to accomplish the increased vapor purge, while others may require new or innovative approaches to increase purge volume or efficiency (discussed in more detail in preamble Section IV.C.3).

Several other commenters, including some NGOs and environmental groups, supported setting certification gasoline RVP to 10 psi to be representative of the worst-case volatility vehicles may see in the market, making the test procedure more stringent than in the proposed program and likely bringing further evaporative emission reductions in-use.

Raising the certification test fuel RVP to 10 psi would also impact the equivalency of CARB and EPA evaporative emission test procedures. EPA and CARB have maintained a reciprocity agreement regarding test fuel RVP and test temperatures for hot soak plus diurnal and running loss emissions since the mid 1990’s. (California requires the use of 7 psi RVP test fuel, which, in conjunction with higher test temperatures, produces equivalent results to the federal test procedures using 9 psi fuel for purposes of evaporative control system design.) CARB has accepted ORVR emission test results using Federal test fuels and test temperatures since the 1998 model year. If we were to adopt 10 psi test fuel, we would likely need to develop and adopt new test procedure adjustments in order to maintain the equivalency of CARB and EPA evaporative procedures (and allow reciprocal acceptance of test data generated under either agency's program).

A review of 2011 gasoline batch data submitted to EPA shows that just under half of summertime gasoline was conventional gasoline at 10 psi RVP. An additional third was reformulated gasoline at approximately 7 psi, with the remainder having intermediate RVPs under local volatility control programs. The volume-weighted average RVP of this data is approximately 8.7 psi. Thus, approximately half of summertime gasoline falls above 9 psi and half falls below, suggesting an emissions test gasoline with RVP of 9 psi aligns well with in-use fuel nationwide. In addition, virtually all of the areas that have elevated summertime ozone levels where excess evaporative VOC emissions would be of greatest concern already control in-use gasoline RVP to levels less than 9 psi. Furthermore, under CAA Section 211(a)(5), governors can request that the 1 psi waiver for E10 not apply in their state if it causes an emissions increase that contributes to air pollution. Any state exercising this authority would have in-use E10 RVP levels limited to 9 psi.

After considering these technical and policy issues in the context of the available data and comments received, we conclude that the most appropriate approach is to maintain the RVP at 9 psi for Tier 3 emissions test fuel.

Some comments included in this section also pertain to the ethanol level of emission test fuel, a topic to which we respond in Chapter 4.5.1.1 of this document.

Some comments included in this section also pertain to the RVP of in-use gasoline, a topic to which we respond in Chapter 4.5.1.6 of this document.

Some comments included in this section also pertain to properties of emission test fuel for flexible fuel vehicles (FFVs), a topic to which we respond in Chapter 4.5.2 of this document.

4.5.1.3. Test Fuel Octane

What Commenters Said:

Organization: American Coalition for Ethanol (ACE)

<u>Octane</u> — EPA recommends reducing test fuel octane to around 87 (R+M)/2, to be representative of in-use fuel, and plans to continue to allow manufacturers to test vehicles on premium-grade gasoline should vehicles require it. EPA also plans to continue to allow exceptions for lower-volatility fuel for high altitude testing. There has never been a requirement that manufacturers prove that premium would actually be used by the operator of a premium-only vehicle if that certification method is chosen. The high-altitude exception has been offered

although most vehicles will rarely have that kind of fuel available and if ever operate at high altitude. The current test fuel is not available commercially in any gas stations.

EPA asks whether there should be a maximum octane of gasoline used in certification. ACE conversely suggests that there should be a minimum octane for the base fuel, so that refiners cannot continue to control ethanol in the marketplace by simply creating lower-octane, lower-quality blendstocks or 'BOBs' each time ethanol percentage is increased. This refiner practice prevents automakers from using of ethanol's higher octane to make cleaner vehicles. While EPA has been unfairly charged with 'picking winners and losers' through its rules, failing to maintain a minimum octane for base fuels would effectively allow the oil industry to 'pick winners and losers,' by allowing refiners to retain full control of octane offered by ethanol and other additives, by creating BOBs that swallow all of that octane value before it can reach vehicles and consumers. [EPA-HQ-OAR-2011-0135-4313-A2 p. 2-3]

EPA must maintain high standards for octane, especially because future GHG emissions reductions proposed by the Agency on automakers are very likely to lead to advanced vehicle technologies (turbocharging, downsizing, increasing compression ratios, etc) that require and indeed optimize on clean and high-octane qualities that fuel ethanol delivers. Failing to require higher octane or to protect minimum octane allows choices to be dictated by the petroleum industry.

To update certification fuel with high-octane ethanol but propose to reduce - or even simply maintain - overall octane seems inconsistent.

Organization: Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

Automakers support EPA's proposed option for use of premium grade octane gasoline as test fuel, consistent with California LEV III.

Organization: American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM)

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.

Organization: Biotechnology Industry Organization (BIO)

BIO urges EPA against lowering octane as it allows for higher biofuel content in the emissions test fuel in order to further help meet its air quality and public health goals, as well as to help incentivize automakers and help them meet their CAFE requirements for model vehicles 2017 and beyond. Instead, BIO suggests EPA issue a final Tier 3 rule that maximizes investment in biofuels, while also encouraging the highest achievable level of octane in transportation fuel.

Ethanol and other alcohol fuels including butanol, for instance, have higher octane ratings than neat fuel. Higher octane enables higher compression and more efficient combustion engines. It could actually boost fuel economy in future car models, according to a 2009 report by Sandia National Labs, if automakers concentrate on developing smaller engines with higher compression and turbocharging. For this reason, encouraging higher octane could help incentivize automakers to make cars that run on cleaner fuel.

High octane blends including ethanol offer a means for auto manufacturers to meet higher mileage CAFE standards. In fact, during EPA’s recent public hearing on Tier 3, Mercedes Benz publically announced its support for the Tier 3 proposed emissions test fuel and urged adoption of higher blends including E25. And last year, the Alliance for Automobile manufacturers filed comments to EPA stressing the need to transition to higher blends.

Organization: Chevron Products Company

Similar to CARB, EPA proposes to provide for both 87 and 91 anti-knock index (AKI) certification fuels. This provides a base certification fuel that more closely matches AKI of the currently predominant in-use fuel, while providing a mechanism for vehicle manufacturers to utilize the benefits of a higher octane fuel if they so choose. This plan provides a good balance between OEM flexibility and recognition of customer choice. However, the specification for the ‘Premium’ certification fuel should include a maximum AKI limit in order to ensure certification on a similar octane to that which may be encountered in-use.

Organization: Growth Energy

Growth Energy also recognizes ethanol's important octane contribution to the nation's fuel supply. As it relates to the proposed E15 certification fuel, we feel that it is crucial that any additional octane achieved by adding ethanol should not be lost by making lower-octane gasoline blendstocks (CBOB and RBOB). As such, Growth Energy believes that a higher octane level certification fuel would be more reflective of in-use octane levels of E15 fuels. Specifically, we recommend a base octane level of 88.5 - 90 [(R+M)/2].

Organization: INEOS Bio

INEOS Bio urges EPA against lowering octane as it allows for higher biofuel content in the emissions test fuel in order to further help meet its air quality and public health goals, as well as to help incentivize automakers and help them meet their CAFÉ requirements for model vehicles 2017 and beyond. Instead, INEOS Bio suggests EPA issue a final Tier 3 rule that encourages the highest achievable level of octane in transportation fuel.

Ethanol has a high octane rating and is cleaner burning and more cost effective than the petroleum based octane equivalent. Higher octane enables higher compression and more efficient combustion engines. It could actually boost fuel economy in future car models, according to a 2009 report by Sandia National Labs, if automakers concentrate on developing smaller engines with higher compression and turbocharging. For this reason, encouraging higher octane could help incentivize automakers to make cars that run on cleaner fuel.

High octane blends of ethanol offer a means for auto manufacturers to meet higher mileage CAFÉ standards. In fact, during EPA's recent public hearing on Tier 3, Mercedes Benz publically announced its support for the Tier 3 proposed emissions test fuel and urged adoption of higher blends including E25. And last year, the Alliance for Automobile manufacturers filed comments to EPA stressing the need to transition to higher blends. A higher octane Tier 3 fuel that includes >E15 is needed in order for these engines to meet the new CAFÉ standards for 2017 and beyond.

Organization: Marathon Petroleum Company LP (MPC)

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 are currently meeting an 85 minimum (R+M)/2 and so 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.

Organization: National Automobile Dealers Association (NADA)

Lastly, a minimum 87 AKI octane rating should be specified.

Organization: National Corn Growers Association (NCGA)

The second principle is that ethanol blends above E10 should be splash blended to increase octane above the level of 87 Anti-Knock Index (AKI). This will provide higher-octane fuels (not higher priced “premium” grade fuels) to be widely used by the motoring public and by the automakers in meeting the 2017 and Later Model Year Light-Duty Vehicle GHG and Corporate Average Fuel Economy (CAFE) Standards.

Ethanol has a high octane value which has allowed gasoline refiners to supply gasoline blendstock for blending with ethanol at levels significantly below 87 AKI, typically 84, such that the finished gasoline meets the 87 octane minimum requirement. Virtually all E15 sold at retail today is made using the same 84 AKI octane base gasoline, resulting in a higher blended octane in the range of 88.5 to 90 AKI. EPA has proposed an 87 to 88.4 octane range for Tier 3 test fuel.

We believe the E15 certification fuel octane should reflect the octane of retail E15, ensuing that the octane value of ethanol will continue to be used to raise the octane of finished gasoline above 87 AKI. Our recommendation is that EPA establishes an octane range of 88.5 to 90 AKI for E15. This would also be consistent with an incremental improvement in fuel economy and GHG emission performance of modern vehicle electronic emission control systems to this increase in octane.

Organization: POET, LLC

POET supports a base certification fuel octane level above 88.4. As part of proposing an updated certification fuel (based on E15), EPA proposes lowering the specified based gasoline octane to 87.0-88.4 (R+M)/2 ‘to be representative of in-use fuel, i.e., regular-grade gasoline.’ (26) POET suggests that an octane of 88.5-90 (approximately 1.5 points higher) would more likely reflect in-use octane levels for an E15 certification fuel, and an even higher octane range may be appropriate. Indeed, as vehicle manufacturers move toward downsized and turbocharged engines, octane levels of in-use fuels are likely to increase. As noted above, a recent MathPro refinery study found that increasing the fuel octane to 92 AKI from 88 AKI would result in significant cost savings.

Our Response:

Since more than 80% of the gasoline consumed in the U.S. is regular grade E10 gasoline with an AKI of approximately 87, we proposed changing the octane rating of emission test fuel to 87-88.4 AKI. This is also consistent with CARB's LEV III gasoline test fuel specifications.[1] Manufacturers can continue to use high-octane gasoline (with a minimum octane rating of 91 AKI) for testing of premium-required[2] vehicles and engines as well as for testing unrelated to exhaust emissions. (Comments related to the expected AKI levels of E15 in-use are no longer relevant since we are finalizing E10 test fuel.)

Regarding establishing an upper limit for the octane range of premium test fuel, we have decided to mirror CARB's approach of no upper limit (California is an area where lower-octane premium fuels are likely to be found in-use). Further, manufacturers will design their premium fuel required vehicles for the minimum octane market premium fuel which as discussed by commenters is 91 AKI and any additional octane will not impact the emission performance of the vehicle. Because of this, we do not feel it is necessary to constrain the certification test fuel upper limit which would likely add additional cost to the certification test fuel.

An 85 AKI test fuel was not specified for high altitude regular gasoline because modern spark ignition vehicles are designed and optimized for octane levels around the typical regular grade of 87 AKI, and this is typically stated in the owner's manual. (In the case of mid-grade or premium-required vehicles, the higher octane specification is for all altitudes.) While these modern vehicles can compensate for octane levels less than the manufacturer's design intent, this typically results in loss of performance and can cause an increase in GHG and other emissions. Thus, it did not seem necessary or prudent to specify an additional unique test fuel with lower octane specifications for emission testing at high altitude when manufacturers recommend or require a minimum of 87 AKI or higher for the majority of their modern vehicles.

Some comments we received on the octane specification for emissions test fuel focused on the need for in-use fuels to have higher octane and/or ethanol content. Those commenters appear to have misunderstood the purpose of the change in emission test fuel specifications. EPA is using its Clean Air Act section 206 authority to establish requirements for emission certification testing, including specifications of the emissions test fuels with which vehicles demonstrate compliance with emissions standards, in order to better reflect the ethanol content and other properties of in-use fuels. While we are taking action to limit sulfur content in in-use gasoline under authority in Clean Air Act sections 211(c)(1) and (2), we did not propose other changes to in-use fuels. Any action related to changing the octane level of in-use gasoline is outside the scope of this rulemaking.

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[1] LEV III test procedures, including a description of test fuel, can be found at 13 CCR 1961.2.
[2] Premium-required defined at §1065.710(d).

Some comments included in this section also pertain to the octane level of in-use fuel, a topic to which we respond in Chapter 4.5.1.6 of this document.

4.5.1.4. Other Test Fuel Specifications

What Commenters Said:

Organization: American Coalition for Ethanol (ACE)

Aromatics — We support reductions in aromatics such as benzene and note that EPA acknowledges in the NPRM that has ethanol blending has increased due to the RFS, harmful levels of aromatics in gasoline have declined by nearly twenty percent over the last decade. E15 and other high-level ethanol blends will continue to help reduce aromatics further. Further, there is a growing body of evidence that shows that mid-level ethanol blends (i.e., E30) result in even greater reductions in aromatics and resulting improvements in air quality and improved health for U.S. citizens. We know that the Urban Air Initiative is submitting a detailed set of comments on this particular point that deserve careful consideration by EPA.

Organization: Growth Energy

With the addition of ethanol, it may also be necessary to lower aromatics, benzene and specific distillation temperature limits. ASTM Standard D4814 uses a T50 distillation temperature range of 150 – 190 degrees, while EPA proposed a T50 distillation temperature range of 170-190 degrees. EPA should lower the lower end of the temperature range to be consistent with the ASTM standard. Growth Energy also agrees that additional ethanol use can, and should, lower total aromatics, and that should be reflected in the E15 certification fuel accordingly.

Organization: American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM)

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.

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 T50 minimum distillation temperature should be 150 F for E10. The proposed T50 temperature of 170 to 190 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 T50 point by 20 to 350 F.

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 T10 in the range of 110°F to 130°F and more importantly a relaxation of the minimum T50 to 150°F.

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).

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.

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

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).

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.

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
T10 110°F to 130°F
T50 150°F to 170°F
T90 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.

Organization: Chevron Products Company

The proposed specifications that define the distribution of aromatics in the certification fuel appear to be overdone. This level of detail will encourage certification fuel blenders to blend near-pure components rather than more typical refinery streams. EPA and others have identified examples of test programs in which fuel blends that used atypical refinery streams to blend test fuels produced atypical emissions results. The proposal should be dramatically simplified, at a minimum.

Organization: Chrysler Group LLC

EPA should adopt low sulfur market, refiner and retailer gasoline fuel.

Organization: Mercedes-Benz USA, LLC on behalf of Daimler AG

The primary factors which directly impact the Mercedes-Benz GHG Compliance Plan are sulfur content in market fuel, and ethanol content and octane level in certification and market fuel.

Organization: INEOS Bio

We applaud the EPA for efforts in the Tier 3 proposal to reduce sulfur to 10ppm, change the emissions test fuel to E15 and encourage flexibility to allow for even higher blends, however there were indications that the EPA intended to address the issue of aromatics and higher minimum octane requirements, but this does not appear to be the case. As a cellulosic ethanol producer, INEOS Bio would like to further highlight the benefits of higher ethanol blends and how they can compliment and even improve upon the proposed Tier 3 requirements.

Organization: Marathon Petroleum Company LP (MPC)

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 T50 minimum distillation temperature should be 150 F for E10. The proposed T50 temperature of 170 to 190 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 T50 point by 20 to 35 F.

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 T10 in the range of 110°F to 130°F and more importantly a relaxation of the minimum T50 to 150°F.

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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
T10 110°F to 130°F
T50 150°F to 170°F
T90 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.

Organization: New York State Department of Environmental Conservation

In addition to setting the ethanol content of certification gasoline at 10 volume percent, EPA should specify a T50 range consistent with the norms reported on E10 batch reports. We note that, except for T50, the certification gasoline distillation curve proposed by EPA lines up quite well with data from New York's 2011 and 2012 gasoline sampling program for summer conventional gasoline.

Minimum requirements for certification gasoline aromatics and olefins content, and a realistic distribution of aromatics should be promulgated as proposed.

Current federal certification gasoline standards have no minima for olefins and aromatics. This allows gasoline with unrealistically 'clean' properties to be used for vehicle certification and testing. The Department strongly supports EPA's proposal to specify ranges (minimum and maximum) for aromatics and olefins that are based on actual gasoline production batch reports. Equally important is EPA's proposal to require a realistic distribution of aromatics by carbon number.

These changes will ensure that vehicle development, certification, and compliance testing is conducted on a fuel that reflects the composition of commercial gasoline. Although we can't quantify emissions benefits, we expect that this will lead to more effective emissions control systems and real world air quality benefits.

Organization: Phillips 66 Company

The test fuel specifications for an E10 test fuel should align with the ASTM gasoline specification, D4814. EPA stated that they reviewed refinery test data as one input to set specifications for various test fuel properties. Currently, all conventional gasoline is tested and reported to EPA on a clear basis so would not include the effect of the blended ethanol that is added downstream. A few notes on selected properties:

The T50 minimum should be 150° F. T50 specifications for clear gasoline or subgrades is 170° F while the minimum specification for ethanol blended gasoline is 150° F, accounting for the boiling point depression experienced with ethanol blends.

API and AFPM have included additional detailed comments on other properties based on more recent data and refining experience with gasoline blends, testing, and specifications. We support the comments offered by API and AFPM.

Organization: POET, LLC

POET also suggests that aromatics, benzene, and certain distillation temperature limits may warrant lowering from what EPA has proposed, to reflect a 15% ethanol content. For instance, EPA explains that 'Additional ethanol blending to produce E15 is expected to result in even greater aromatics reductions.' POET agrees that increased ethanol use, including via E15, can lower both total aromatics and benzene, and that lower certification fuel aromatics levels are appropriate. Both ethanol and aromatics are a source of octane, but ethanol provides a more cost-effective and less toxic source of octane.

Organization: Renewable Fuels Association (RFA)

Further, RFA suggests the EPA recognize the T50 temperature allowed for ethanol blended gasoline of 150°F in the ASTM International "Standard Specification for Gasoline for use in Spark Ignition engines." RFA strongly recommends EPA align the certification fuels for non-road engines as soon as possible with on road engine certification fuel. This ensures a uniform capability of spark ignition engines thereby streamlining the fuel options in the retail marketplace.

Organization: National Automobile Dealers Association (NADA)

To enable Tier 3 tailpipe standard compliance, EPA should establish a 10 ppm gasoline sulfur average with a 25 ppm cap. To enable Tier 3 evaporative emissions compliance, a Reid Vapor Pressure (RVP) cap should be set at 9 psi for a maximum E10 gasohol test fuel.

Our Response:

We are adjusting gasoline distillation temperatures to reflect in-use E10 gasoline to the extent practical. This includes adjustments to our proposed T10, T90 and FBP ranges based on review of updated Alliance of Automobile Manufacturer (AAM) fuel surveys and refinery batch data. Regarding T50, these data show a range of approximately 150°F to 220°F in in-use gasoline. Adopting a wide specification range for test fuel may have undesirable effects on consistency of results between facilities and over time. Therefore, we have chosen a range of 190-210°F to represent both conventional and reformulated gasoline (as well as maintaining some overlap with CARB's specification of 205-215°F).

We are lowering the sulfur content of test fuel to 8-11 ppm to be consistent with the Tier 3 in-use gasoline sulfur standards. Sulfur level has a significant effect on emissions so it is important to adjust the test fuel specification to match in-use fuel.

We are setting a benzene test fuel specification of 0.5-0.7 volume percent to represent in-use fuel under the MSAT2 regulations. The MSAT2 standards, which took effect January 1, 2011, limit the gasoline pool to 0.62 volume percent benzene on average. [33]

We are lowering the range of aromatics content in the test fuel to better match today's in-use E10 gasoline, and narrowing the range to limit variability of results. Data from recent gasoline batch data as well as AAM surveys support a specification of 22-26 volume percent. In

[33] 72 FR 8434 (February 26, 2007).

addition to total aromatics and benzene, the updated test fuel requirements place boundaries on the distribution of aromatics by carbon number (i.e., prescribed volume percent ranges for each of C7, C8, C9, and C10+ hydrocarbons). There is evidence that the heaviest aromatics in gasoline contribute disproportionately to PM emissions, so compliance with emission standards should be demonstrated on fuel with a composition representative of in-use gasoline.

Some commenters raised concerns about specific ranges for distribution of aromatics resulting in use of pure compounds in test gasoline, which would not be representative of in-use fuels. On the contrary, historically, emissions test gasoline has often been found to have been produced using high proportions of single components (e.g., toluene, iso-octane), and therefore having additional targets for distribution of aromatics may actually increase the number of blending components required to meet the specification.

We are adjusting the olefins specification to a range of 4-10 volume percent to better match in-use E10 gasoline.

We are setting a range of 8-11 ppm sulfur in test fuel to mirror the expected in-use range after phase-in of the in-use sulfur standard of 10 ppm average.

We are adding distillation residue, total content of oxygenates other than ethanol, copper corrosion, solvent-washed gum, and oxidation stability specifications to better control other performance properties of test fuel. These specifications are consistent with ASTM's D4814 gasoline specifications and CARB's LEV III test fuel requirements.

We are updating some of the gasoline test methods previously specified in §86.113 with more appropriate, easier to use, or more precise test methods for ethanol-blended gasoline. Key changes include replacement of ASTM D323 with ASTM D5191 for measuring vapor pressure; replacement of ASTM D1319 with ASTM D5769 for measuring aromatics and benzene; and replacement of ASTM D1266 with three alternative ASTM test methods (D2622, D5453 or D7039) for measuring sulfur. The most current versions of these standards were specified where possible and appropriate. Additional response to comments on test methods can be found in Chapter 6.1.1.7 of this document.

Some commenters raised concerns about over-reliance on AAM fuel surveys, as well as lumping premium and regular grade fuel data together, when performing our analyses. We have generally performed parallel analyses using both refinery batch as well as AAM survey data where possible, and have focused on regular grade fuel where we believed that inclusion of premium would bias the results.

More information on data and analyses related to test fuel specifications can be found in Chapter 3 of the RIA.

4.5.1.5. Alternative Test Fuel Option / E30

What Commenters Said:

Organization: Advanced Biofuels USA (ABFUSA)

As part of the recently proposed Tier 3 motor vehicle fuel and emission regulations, EPA included a very forward looking idea that could bring higher octane, higher ethanol gasoline to the marketplace.

However, Advanced Biofuels USA recommends the following changes to assure consumers get maximum fuel economy and climate change mitigation benefits from the EPA proposed higher octane, higher ethanol gasoline.

- Advance Biofuels USA fully supports EPA's recognition of the importance of higher octane, higher ethanol (in the range of E30) gasoline as a cost-effective way to allow manufactures to maximize the efficiency of smaller, more efficient engines that utilize high combustion pressures to meet 2022 EPA CO2 vehicle emission standards.
- To provide a smooth path to making this "higher octane, higher ethanol content gasoline" available nationwide EPA Tier 3 regulations should not require individual vehicle manufacturers to certify the availability of this fuel. Instead, EPA should use their authority under section 211 of the Clean Air Act to provide for the commercial availability of this "higher octane, higher ethanol content gasoline."
- In using the Clean Air Act authority to assure that "higher octane, higher ethanol content gasoline" is available nationwide EPA should implement a reasonable phase-in schedule tied to manufacturer production plans required to meet 2017 and later EPA GHG requirements. This schedule should be based on the "vehicles would not operate appropriately on other available fuels, and such a fuel would result in equivalent emissions performance," information.
- EPA should allow vehicle manufacturers that certify new vehicles with the "higher octane, higher ethanol content gasoline" to also certify that those vehicle are able to also operate on existing E10 or E15 fuels. These vehicles would be called "E30 capable."
- By building up the number of these "E30 capable" vehicles that could get the same mileage with a lower cost fuel, the demand for E30 would increase. This demand would create a nationwide E30 infrastructure that would then allow for the marketing of "E30 Optimized" Vehicles designed to provide the fuel economy and GHG reductions necessary to meet 2022 CO2 reduction standards.
- Since a higher proportion of lower cost ethanol is used to produce E30, the "higher octane, higher ethanol content gasoline" would probably not be priced above current 87 octane E10 regular. Therefore, it should not be referred to as "premium" fuel in final regulations or for purposes of marketing but rather should be labeled differently. For example, "E30 capable/E30 optimized regular" fuel.
- EPA should also provide flexibility in the Tier 3 regulations so that other renewable, negative GHG (as compared to petroleum) octane additives could be substituted for 30% ethanol when they are commercially available. In order to qualify, these additives should have to meet the applicable EPA regulations for fuel composition, aromatic content, and certification testing. This flexibility would promote competition in the biofuel marketplace that would result in the most sustainable low GHG solutions possible.

By adopting a flexible, market-based Tier 3 higher octane, higher ethanol content gasoline program, EPA would send a clear Demand Certainty Signal to markets and fuel providers. This clear signal will provide the currently missing certainty to the financial markets that will be needed to provide the capital for total-biomass ethanol and other advanced biofuel plants that will be needed to provide the "higher octane, higher ethanol content."

This clear market signal would be the most effective way to meet EPA's stated goal to, "provide a market incentive to increase ethanol use beyond E10 and enhance the environmental performance of ethanol as a transportation fuel by using it to enable more fuel efficient engines."

EPA has the Authority under Section 211 of the Clean Air Act to Implement Nationwide Marketing of "Higher Octane, Higher Ethanol Content Gasoline".

As stated in this proposed rulemaking on pages 32-33, "We are proposing to adopt gasoline sulfur controls pursuant to our authority under section 211(c)(1) of the CAA. This section allows EPA to establish a fuel control if at least one of the following two criteria is met: (1) The emission products of the fuel cause or contribute to air pollution which may reasonably be anticipated to endanger public health or welfare; or (2) the emission products of the fuel will impair to a significant degree the performance of any emissions control device or system which is either in general use or which the Administrator finds has been developed to a point where in a reasonable time it will be in general use were the fuel control to be adopted." Using the first criteria, the establishment of a higher fuel octane gasoline standard (fuel control) would reduce CO2 emissions from direct injection/turbocharged/high compression engines below what they would be with lower octane, lower ethanol content gasoline. This reduction in CO2 emissions, which have previously been determined by EPA to endanger public health and welfare as climate change inducing Greenhouse Gas (GHG) emissions, would come from two effects:

1. These engines would run at higher efficiency with the higher octane fuel meaning less fuel/mile would be used resulting in less CO2 emissions/mile.
2. The increase from 10% to approximately 30% ethanol would decrease life-cycle GHG emissions when compared to the petroleum gasoline components it would replace. This decrease would become especially significant as proportion of total biomass (i.e. cellulosic) ethanol increases in accordance with the previously Congressional enacted Renewable Fuel Standard (RFS).

It making this determination to require higher octane, higher ethanol content gasoline, it is also important to recognize that these interrelated engine design features (the Ford Ecoboost is an example) are being implemented for the sole purpose of meeting the 2022 EPA CO2/DOT mpg standards while also providing enough power to compensate for the extra weight requirements of DOT safety standards, and are not being introduced for high performance reasons. Therefore, engines using this integrated package of design features are as much emission control devices as the catalytic converters that caused EPA to issue lead elimination and sulfur reduction fuel control regulations to ensure lower HC, NO_x, and CO emissions.

Organization: Algenol Biofuels Inc.

Algenol appreciates EPA's effort -- as it proposes to strengthen the Tier 3 Vehicle Emission and Fuel Standards-- to accomplish that objective in a way that maximizes the role which can be played by biofuels blending. We believe EPA correctly seeks to implement the emissions reduction and biofuels blending programs in the most mutually reinforcing way.

In particular, we wish to endorse and encourage the Agency's proposal, in part IV.D. of the proposed Tier 3 rule, to allow vehicle manufacturers to specify an appropriate alternative test fuel, such as an E30 fuel, (a) for vehicles designed to be operated with higher octane, higher ethanol fuel,, optimized to run on an E30 or higher blend, (b) and/or for flex-fuel vehicles (FFVs). If properly constructed, this option will help to increase the demand for biofuels and facilitate their use by the driving public. We understand that Mercedes and other major auto manufacturers have expressed serious interest in this opportunity.

Auto makers and the driving public could benefit from having such fuel available and used in designated vehicle models because it would enable the manufacturers to raise compression ratios and improve fuel efficiency in such vehicles as a step towards complying with 2017 and later greenhouse gas and CAFÉ fuel economy standards. The public would also benefit, economically and environmentally, from such an incentive for increased ethanol use, especially insofar as the ethanol involved is from a low-cost source such as Algenol.

EPA proposes, in Part IV.D.1 of the proposed Tier 3 rule, to allow manufacturers to petition for use of such a mid-level blend in government-required emission certification tests for designated vehicles if the manufacturers demonstrate that (1) such fuel would be available nationwide, (2) such fuel would be used by operators of such vehicles, (3) the vehicles would not operate appropriately if other fuels were used, and (4) the fuel would result in equivalent (or better) emissions performance to that attainable with other fuels.

We believe that the first condition above is beyond what can realistically be expected for auto manufacturers to demonstrate. Instead, EPA needs to take regulatory action, under its existing statutory authorities, to mandate that the E30-type fuel be available in adequate quantities by a date certain. One precedent is EPA's action in the 1970s to mandate the availability of unleaded gasoline to match the introduction of vehicle models with catalytic converters to prevent "poisoning" of those catalysts which greatly reduced automotive emissions below prior level. (The writer supervised that action while at the Agency.)

We also urge that EPA give careful consideration to any reasonable requests that auto manufacturers may make regarding the 2d – 4th Agency-proposed criteria listed above. The 3rd and 4th criteria seem generally appropriate, depending on how they are actually interpreted and applied, but the second criterion – that drivers will use the fuel -- may need to be modified somewhat or at least applied with some flexibility. For example, this condition probably should not be construed to mean there is no conceivable way that some perverse drivers might not circumvent the intent of the program even though they would risk damaging the vehicle and possibly paying more for the inappropriate fuel they used.

As a company that will be well along into commercial production of ethanol by the time an E30 type option would go into effect, Algenol has a strong and legitimate interest in urging that the conditions for allowing use of E30 type fuels for vehicle testing be realistic to meet so that the statutory objective of expeditiously expanding use of ethanol can be meaningfully met. This

Algenol interest is consistent with the public interest which gave rise to the Congressional directive that EPA act to maximize biofuels use in vehicles insofar as this reasonably supports its other mandates such as minimizing vehicle emissions.

Organization: Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

Recommendations concerning Optional Alternative Test Fuels. Vehicle manufacturers understand there could be a need for new test fuels in the future, such as higher octane, higher ethanol blends, depending on how market fuels develop and vehicle technology needs evolve.

For example, there are potential benefits from such blends, assuming the octane grades of the underlying gasoline blend-stocks do not decline. Higher octane/higher ethanol content can improve vehicle efficiency and lower emissions. Automakers concur that EPA needs to replace the flawed existing regulations applicable to use of alternative test fuels [40 C.F.R. Sec. 1065.701(c)], discussed further below. We look forward to working with the Agency and other stakeholders to develop better options for use of alternative test fuels.

One pathway to improved vehicle efficiency and lower GHG emissions is to increase the engine compression ratio (CR). However, an increased compression ratio may result in the engine then requiring a fuel with a higher octane number (ON), a measure of the fuel's resistance to auto-ignition that causes engine knock. Since ethanol has a higher ON than gasoline, a mid-level gasoline-ethanol blend (prepared by blending denatured ethanol into an E10) will have a higher octane number than the E10, allowing the engine to be designed with a higher CR. Ethanol's high heat of vaporization, which produces an in-cylinder cooling effect, and its high octane number compared to that of gasoline, can increase engine efficiency. The resultant efficiency gains can also enable a downsizing of the engine to reduce weight, thereby further reducing fuel consumption and CO2 emissions.

The Coordinating Research Council (CRC) conducted studies investigating the body of literature on the effects of fuel octane quality and ethanol on engine and vehicle fuel economy and emissions. Additionally, Ford conducted a study comparing the effects of E10, E20, and E30 on fuel economy and CO2 emissions from a turbocharged direct-injection engine. This engine was tested with CRs of 10:1 (current production) and 11.9:1. The selected E20 fuel operated in an engine with 11.9:1 CR gave similar knock performance to the E10 fuel operated in the same engine set to 10:1 CR. Similarly, the E30 fuel run at 11.9:1 CR resulted in knock performance equivalent to E20 at 10:1 CR.

In a vehicle simulation study, the E20 at 11.9:1 CR provided a 5% reduction in CO2 emissions compared to the E10 at 10:1 CR, and the fuel economy (MPG) was about the same, even though the energy content of fuel was lower as the ethanol content was increased. To provide the desired high knock resistance, the higher-ethanol fuels should be formulated by using a blend-stock that retains the octane quality of the current blend-stock used for regular-grade E10.

While higher ethanol, higher octane fuels can be useful in all types of engines to varying degrees, they are of particular benefit to direct-injection (DI) engines. Ethanol has a much greater heat of vaporization when compared to gasoline. Thus, in a port fuel injected (PFI) engine, the chemical octane rating increase can be realized, but since much of the fuel is inducted into the cylinder after it has vaporized, the cooling effect is not captured. In a DI engine, however, the fuel is introduced directly into the cylinder in liquid form and its vaporization in the cylinder results in a larger cooling effect compared to the PFI case, thereby reducing the octane number requirement of the engine. However, advanced design for either type of engine can benefit from higher octane fuels.

EPA Should Replace Flawed Regulations Governing Use of Alternative Test Fuels. Automakers agree that alternative test fuel provisions in the current regulations at 40 C.F.R. §1065.701(c) are flawed and cannot work in practice. For dedicated vehicles, the regulation requires that the new fuels are commercially available in the marketplace, and it appears to presume the fuels would be widely available without any vehicles being available to use them, which underscores the unresolved “chicken and egg” dilemma.

In addition, automakers would have to show that the vehicles will not run or be durable on standard test fuel. Alternatively, automakers could show that the vehicles would not meet emissions limits on standard test fuel, any of which would likely make them virtually unsellable.

Finally, Sec. 701(c) does not address F Factors that would have to be determined for these alternative fuel types. Rather than imposing unrealistic regulatory pre-conditions, EPA needs to replace them. Were an OEM (Original Equipment Manufacturer) to petition to test using E15 test fuel under these provisions, meeting the criteria would be very challenging. Automakers would be happy to work with the Agency to develop a workable process and criteria for access to alternative test fuels.

Approval of a fuel for certification test purposes does not change the CAA requirements that a new fuel be independently approved by EPA as substantially similar (or a waiver provided) with full notice and comment rulemaking before use as market fuel (other than for FFV use for up to E85). Likewise, mechanisms to avoid mis-fueling in vehicles or equipment not designed for a particular fuel use would also have to be addressed.

EPA’s Approach to Use of Premium Octane Grade Test Fuel is Sound:

Automakers support consistent reliance on communications in the Vehicle Owner Manual regarding vehicle care and fueling recommendations, and terms of warranty protection. Owner Manuals requiring (as opposed to recommending) use of Premium Octane Grade fuel are the best means to determine which vehicles should be allowed to test on it. Also, EPA’s approach provides critical consistency with California’s requirements.

EPA is seeking comment on the need for limiting the maximum octane of gasoline used in the certification of premium-required engines and vehicles. Automakers agree that there is no need to limit the maximum octane of gasoline used in the certification of premium-required engines and vehicles. Doing so would be an obstacle to the development of highly efficient optimized vehicles.

EPA should finalize its provision for testing on premium grade octane fuel as written.

Organization: Clean Fuels Development Coalition (CFDC)

That notwithstanding, we respectfully draw your attention to several key points that warrant repeating. First is the issue of an E30 certification fuel and providing this option to automakers. Many have indicated their support for high octane fuels and recognize ethanol's outstanding octane properties. For those automakers that choose to do so allowing them a pathway to E30 certification is another key step in expanding ethanol markets. For those who find this an attractive option, a poison pill can easily be viewed as the requirement that automakers must demonstrate the commercial availability of such fuel. We believe that is unnecessary and quite impractical. The successful CAFÉ credits afforded to automakers for example in the production of flex-fuel vehicles, was achieved completely independent of fuel supplies and automakers responded to market developments and regulatory signals by making more FFVs available. We believe this would certainly be the case with E30 capable or optimized vehicles and if not corrected in this Rule would be a huge impediment to them. Similarly, infrastructure would follow as more of these vehicles were on the road.

Organization: American Coalition for Ethanol (ACE)

Alternative Certification Fuel (such as high-octane E30):
To the contrary, EPA suggests auto manufacturers can chose to certify on higher ethanol blends only if they 'could demonstrate that such a fuel would be used by the operator and would be readily available nationwide.' ACE believes such a requirement gives control of fueling decisions to the oil industry, which has historically only allowed new blends of ethanol when they have been required to do so by law. Oil company contracts banned E10 when it came to the marketplace, effectively restricted E85 to only a small percentage of stations, and currently prevent branded stations from marketing E15. The oil industry would likely continue to limit E15 and place an outright ban on E30 if it believed it could keep car manufacturers from building cars that can run on those fuels that compete with their petroleum fuels.

ACE appreciates that EPA proposes to allow automakers who wish to increase compression ratios and make other advanced technology improvements to engines in order to comply with the 2017 and later GHG/CAFE standards, to specify an alternative high-octane test fuel such as E30. As such, we strongly recommend that EPA establish an E30 (or comparable midlevel blend of ethanol and gasoline) certification fuel for model year 2017 and beyond, with incentives offered to encourage automakers to make that conversion earlier. As mentioned earlier, ACE strongly objects to EPA's suggestion that approval of such a certification fuel is contingent upon automakers' demonstrating commercialization of the fuel.

That suggested requirement is undoubtedly based on E85 history and the lack of E85 fueling stations. ACE believes that to be an inaccurate comparison. Automakers did not build E85 vehicles. They built Flex-Fuel Vehicles. As such, since FFVs could also use unleaded gas or E10, station owners already had fueling infrastructure to provide fuel for FFVs. Buying new tanks, lines, and dispensers to offer fuel to vehicles a station could already serve only made sense at times of large price advantage, and later, when marketers learned how to use E85 and blender pumps to recover some of the ethanol blending margin that refiners were taking through pre-blended E10. Had automakers built E85 vehicles, station owners would have had to decide whether to concede that market to competitors or offer E85 for a competitive edge.

In an effort to set aside the infrastructure discussion, while ACE prefers a higher octane fuel with a minimum ethanol content requirement such as E30 for use as a certification fuel, as an alternative, we feel so strongly about ethanol's octane value that we could support a transitional certification fuel that specifies only the octane of the fuel. Existing fuel infrastructure could be used to sell a 95 octane consumer fuel product, for example, so the burden of infrastructure development would not fall on ethanol. We believe other properties of ethanol will make octane from ethanol more attractive to automakers, and ACE believes in a truly competitive marketplace, ethanol's low-cost will present profit opportunities for station owners that far outweigh costs to upgrade, while still allowing late adapting fuel stations an option for fueling new vehicles with high octane gasoline.

In either case, it is imperative that automakers let fuel station owners and consumers know well in advance what kind of fuel — either by octane or by ethanol content, or both - they plan to use in the future, so that both have time to adjust for that fuel.

A recent *New York Times* article[1] reports that an alternative certification fuel such as E30 enjoys widespread support from technical automotive experts. Mr. William H. Woebkenberg, senior engineer for fuels policy in the U.S. at Mercedes-Benz, says in that article than an E30 blend in an engine designed to use it would be attractive to consumers with 'ridiculous power and good fuel economy,' and that those car owners would seek out the fuel.

As EPA balances the administration of Tier 3, CAFE-GHG, and the RFS; adoption of higher octane blends such as E30 will be critical to achieving the desired impact of each policy. As such, EPA should more directly facilitate higher octane blends like E30 by independently approving a cert fuel for these types of higher octane blends.

Organization: California Air Resources Board (CARB)

CARB staff also supports the proposed requirements for midlevel ethanol blends, as well as promoting the power plant design advantages of an E30 blend.

Organization: Chevron Products Company

Per the request for comment on the appropriateness of the alternative test fuel provisions at §1065.701(c), the regulatory language already in place appears to be adequate given that it: 1) requires EPA approval for the specifics of the test fuel; and 2) requires that there be evidence of commercial availability. The existing language presents no barriers to the certification of a higher octane, higher ethanol content test fuel and there is no need to more precisely specify the makeup of potential alternative fuels. The current language allows for innovation in vehicle and fuel technology. A more prescriptive approach which dictates the nature of such fuels would only create barriers to such innovation. It should be noted that the example of a higher octane, higher ethanol fuel to be used in dedicated vehicles is in fact an alternative fuel rather than gasoline and should be treated as such.

Organization: American Council on Renewable Energy (ACORE)

Furthermore, I believe there are several additional critical points that should be considered before EPA finalizes Tier 3 regulations, and propose actions that should be taken as soon as possible. I make these proposals based on my experience as the Director of the Office Regional Operations at the Federal Energy Administration (FEA). There I learned the hard way that oil companies, during our national transportation fuels crises in the mid-1970s, illegally took action to gain corporate power and position at the expense of the American people. The FEA took many of the oil companies to court and won fines large enough to fund the energy offices in all 50 states for about two decades. During this critical period of fuel shortage, they were still able to boost profits, eliminate the lower levels of their competition (some independent fuel suppliers and most of the “mom and pops” that were involved in their own communities) to further concentrate their dominance of the transportation fuels market.

From then on, I made a personal commitment to find an alternative to oil as the primary source of transportation fuels. With the help of EPA Administrator Russell Train and C. Boyden Gray, Council to Vice President Bush, I was able to help pioneer the ethanol industry starting in 1975 and the biodiesel industry in 1980.

It is critically important that the United States Congress and the Administration take into full consideration critical factors impacting America’s biofuels program. Congress should not be swayed by the powerful and widespread exaggerations berating ethanol orchestrated by the oil industry and their colleagues, who seek lower corn prices. The animal feeders and those formerly enjoying the benefits of subsidized corn through lower meat prices, at the taxpayers’ expense, want a return to the earlier lower corn prices that were below free market costs. This would lead to the U.S. being forced to return to price subsidies that would disrupt free market forces to the disadvantage of corn farmers worldwide; and, at the expense of the U.S. taxpayers.

The ethanol industry has eliminated the need for corn subsidies in the U.S., resulting in free market prices worldwide for both corn and ethanol. This was due to the major contributions by the ethanol industry and the wisdom of the Congress and the Administration to terminate the VETEC that was subsidizing ethanol.

Additionally, this rhetoric, focused on discounting critical factors such as resource availability, technological and scientific advances, the U.S commitment to keep the world’s oil lanes open for commerce, true climate change factors, and the value of additional externalities, swayed the political process so that these factors are no longer principal determinants in establishing market share for various transportation fuels. These conditions have been overpowered by political clout influenced by misinformation and there are two very recent examples of this. The first is when Harley Davidson motorcycle riders circling the Capitol building and visiting congressional offices to persuade votes against E-15. EPA regulations do not allow the use of this fuel in motorcycles, and motorcycles have easy access to ethanol free gasoline. The second entails restaurant associations demonstrating on the Hill and in the media against the RFS claiming that corn-based ethanol leads to an increase in meat and dairy prices. It is well established that oil costs have a greater impact on these prices than the cost of corn, and the availability of distillers grains replacing a good percentage of the feed for animals is further offsetting in reducing the cost of meat. Then there is the issue that meat, particularly fatty meats, is losing popularity; already leading to less corn in some animal diets. These factors and other mentioned externalities including sustainability, climate change, short and long range economics, and job creation -- not misleading rhetoric must be used in the making process. One can assume the connection to the bikers and the restaurateurs to the oil industry are not hypothetical.

The oil industry was using similar spin tactics almost a century ago to promote dangerous lead in gasoline to attain needed octane for advanced engines. They defeated cleaner-burning ethanol preferred by many, including Henry Ford. They were able to knowingly allow the introduction of lead into the blood of millions of Americans for almost a half century at enormous expense to human health, including very significant reductions in the IQs of kids living in traffic-congested cities until it was phased out and replaced by methyl tertiary butyl ether (MTBE). This chemical is a known ground water contaminant; again, large oil conglomerates restrained the use of 113 octane ethanol while advancing that contaminant. When MTBE was phased out because of ground water contamination and other health problems, their preference shifted to aromatics for most of their octane, leaving it up to free market forces, the marketplace and legislation (the Renewable Fuel Standard—RFS) to incorporate ethanol into gasoline at the 10% level. The oil industry, the public, and the environment benefited from the RFS because of its lower financial cost as an octane enhancer and the other previously mentioned externalities. However, oil began to lose market share. About that time, EPA was considering authorization of the additional use of ethanol (E-15), and it was becoming apparent that the auto industry was looking into 93+ octane fuels to permit the transition to direct injected, high compression/turbo charged engines. The oil industry knew this combination could open the way for higher blends of ethanol and increasing numbers of flex-fuel vehicles (FFV) on the road, serviced by blender pumps. The market share for gasoline was being seriously threatened – totally unacceptable to the oil industry.

They turned to their proven power base: money, political clout, and disinformation. Their decade-long campaign has been overwhelmingly successful throughout society, especially in the Congress that is well attuned to: public opinion and their support; successes of U.S. oil and gas production; reduced oil import dependence; and, of course, endless anti-ethanol rhetoric. This all leads to good news for fossil fuels and bad news for ethanol.

Also, allow me to share with you my reaction to the President's speech on climate change. Thankfully, he mentioned a commitment to biofuels, but without proposed action except for support for the Renewable Fuels Standard and biofuels in general. I believe he has a stronger commitment to ethanol, but was restrained by the threatening climate orchestrated by the oil industry and their compatriots. That is the key reason for my concern. The President of the United States, his key staff members, Congress, and the public have, for quite some time, been pressured by the oil industry and their colleagues influenced by the involved animal feeding industries. This powerful force has set the stage for their victory. Non corn-based biofuels in general still has good support. The corn-based ethanol industry had a strong support base while pulling the industry to today's point of providing 10% of the gasoline mix while contributing billions of dollars annually to the nation's economy. In recent years, however, it has essentially lost most of its support across the board in a variety of ways. This is all good news for the fossil transportation fuels, and bad news for biofuels, particularly the pioneering corn-based ethanol. I believe President Obama would like to fix this inequity; but political and public conditions signal otherwise. However, EPA has the authority and the reasons to come to the support of the President, the nation and the environment.

Without EPA action, all of this signals a possible demise of the ethanol industry unless EPA embraces it's legally imposed responsibilities, the compelling signals from the marketplace, and its mandate to protect the environment (including the consequences of climate change and public health). Comments by the Coalition/Urban Air Initiative (EFC/UAI) provide all the evidence needed for EPA to immediately move to correct "oversights" and delays in their actions over the past 35 years, since the forced phase-down of lead in gasoline. The agency should not be delayed further by current political and public opinion, nor mislead by a massive and prolonged anti-ethanol campaign.

To further reinforce the EFC/UAI comments and my recommendation, attached is a copy of my article published in the Physicians for Social Responsibility: Environmental Health Policy Institute that reinforces my comments on the unacceptable negative health effects of excessive aromatics in gasoline. It also touches on the positive environmental benefits of corn and it conversion in a biofuels.

EPA must carry out their responsibilities and opportunities under the law to protect public health, the environment, and the best interest of the nation. It should fully support the President's commitment to biofuels and the essential need to reduce carbon emissions, and not continue to bow to the powerful influence of those committed to the continuation of oil's dominance in the transportation sector.

In summary, here are the benefits to the nation, using existing authorities, to reduce aromatic levels in gasoline, boost levels of renewable alcohols, incentivize the production of FFV, and encourage funding support at the state and federal levels for the inclusion of blender pumps at refueling stations:
Reduce oil dependency
Reduce gasoline prices
Give drivers cleaner fuel options

Reduce carbon emissions (Heavy carbon emissions in gasoline are 40% greater than diesel fuel due to the heavy carbon nature of ultra fine particulates (UFP)). This is in addition to the reduced carbon footprint of ethanol production and use, both of which are steadily improving. This is not the case with oil based gasoline that is not sustainable and whose carbon footprint will only rise as oil gets harder to obtain while getting heavier and dirtier

Reduce health-related costs by tens of billions of dollars annually as verified by studies at Harvard and elsewhere and also highlighted in the EFC/UAI comments and my enclosed article.

Permit the auto industries to transition up to 93 octane gasoline as a standard fuel thereby optimizing engine performance through direct injected and higher compression/turbocharged engines. (Many high-powered new cars use 93 octane fuels)

Permit the attainment of CAFÉ standards by 2025 – 54.5 MPG

Reduce greenhouse gas emissions and put America on the path to sustainability

Provide drivers choices based on costs and desires in terms of sustainability and carbon footprints

Catch up with Brazil in terms of the availability of FFV and fuel choices. See the chart on FFV growth in Brazil.

Maintain the U.S. as a world leader in biofuels. If we are governed by the preferred policies of big oil, we could fall behind rapidly as indicated by the following:

In France, Amyris and Total announced a successful demonstration flight at the Paris Air Show of its renewable jet fuel made from Amyris Biofene, and ultimately, from plant sugars. The Airbus A321 aircraft powered by two Snecma CFM56 jet engines flew from Toulouse to Paris with a blend of renewable jet fuel produced by Amyris and Total. This demonstration flight was in support of the French Initiative for Future Aviation Fuels, which seeks to produce and commercialize alternative, renewable, and sustainable aviation fuels in France in the coming years.

We are now at a critical junction internationally and domestically in terms of the future of transportation fuels in the United States. EPA has the legal authority to take the positive actions outlined above. Doing so would ensure a bright future for the nation in respect to biofuels. If the EPA allows itself to be driven by the financial and political clout of non-renewable transportation fuel, biofuels will likely be seriously weakened in the U.S. This is an advantage the oil industry, Brazil, Europe, and other regions including China will gain. The EPA's failure to adequately support FFVs and reductions in the authorized level of aromatics in gasoline has already placed us on the downhill slide.

It is not to too late for the EPA to take the steps they are authorized to implement, and are morally compelled to do so. While updating of their pertinent models and the imputing of good and sensible data will fully justify the recommendations cited above, timing is critical. There is already fully enough data compelling EPA to act now, and they must do so in the best interest of the United States and world's population, as well as the environment.

America has made great strides in reducing emissions and improving the efficiency of our transportation system and technologies. But simply utilizing less petroleum, while essentially relying on it as the single transportation fuel source is not sufficient to meet the energy, economic and environmental security we need. What would happen if the Iranians decided to close down the Strait of Hormuz? Despite expanded oil production in our country, the price of oil, determined on the global market, would immediately jump to $150-200 per barrel, severely impacting our economy. There are also many plausible terrorist and natural disaster scenarios that would produce a similar impact.

Every barrel, every percentage of oil that we can displace as America's primary fuel for transportation with clean, domestic biofuels mitigates against the potential negative impact of an oil price spike on our government, military, overall economy and individual consumers. Therefore, efforts to improve vehicle emissions and reduce sulfur content must include the utilization of greater amounts of clean, domestic biofuel.

Higher amounts of biofuel in our gasoline have significant economic benefits. In 2011, an ethanol blend of 10% reduced gasoline prices by $1.09. At the same time, over 200 ethanol plants and refineries supported economic growth across America's heartland. As a whole, the ethanol industry employs over 400,000 Americans across the country, especially in rural regions of the country, and is doing so during a time where many Americans need steady employment and good jobs.

The economic benefits of incorporating higher amounts of ethanol into our gasoline are significant, but so are the positive environmental impacts at the local, regional and global level. Higher octane/ higher ethanol content gasoline will reduce the harmful air emissions that lead to an estimated 50,000 premature deaths a year. Ethanol is the cleanest and most affordable source of octane on the market today, displacing toxic aromatics such as benzene and toluene. In addition, ethanol reduces greenhouse gas emissions by 40-50% when compared directly to gasoline.

Organization: A 2nd Opinion Inc.

As an informed consumer I am very concerned about the use of gasoline containing up to 15% ethanol (E15). My owner's manuals approve the use of gasoline containing up to 10 percent ethanol (E10) and imply that if I use other fuels my warranties are not valid. I know the Environmental Protection Agency (EPA) thinks E15 will not harm cars produced since 2001. I also know that the Coordinating Research Council (CRC) has tested cars and fuel system components and concluded that millions of cars could have fuel system failures if they use E15. No one will know whether the EPA or the CRC is right for several years. But as a senior citizen consumer, I do not want to take the risk. Therefore I am proposing as a compromise, that you ask the Renewable Fuels Association (RFA) to administer a Federal Auto Repair Trust. Here is an outline of how it would work:

Each ethanol producer/importer would volunteer to deposit one cent for every gallon of fuel grade ethanol produced in or imported into the United States in the trust which RFA should volunteer to administer.

Owners of gasoline powered vehicles that are not certified as flex fuel (E85) that experience fuel system failures after using E15 can recover their out of pocket repair costs from the trust. The trustee may use trust funds equal to %5 of the disbursed repair costs to cover administration costs.

Effective with the 2014 model year, all gasoline powered vehicles sold to U.S. consumers must be certified to perform on high ethanol content gasoline.

Ten years after all gasoline powered new cars sold in the United States are required to be compatible with E15 or five years after the last claim was paid whichever is later, the RFA would be required to disburse the unused FART to the ethanol producers/importers who made the FART deposits. If EPA is right, the depositors get all their FART deposits back. If CRC is right each depositor would get a pro rata share of the residual FART. (Individual FART deposit*(Total FART deposits minus 105%FART costs)/Total FART deposits))

I selected the acronym to get your attention and to have a little fun. I hope it did brighten your day. But, I am serious about wanting environmental justice concerning these repair costs. The people should not pay for repairs to fuel system damage caused by the ethanol industry. Nor should the refining industry. The industry that profits from E15 should provide environmental justice and 0.15 cent's per gallon gasoline is cheap.

EPA should encourage RFA to jump on this opportunity as a good compromise.

Organization: American Lung Association

EPA outlines a process whereby a manufacturer could design vehicles to operate on higher octane and higher ethanol content gasoline, i.e. E30 or higher. We support the approach that allows for a petition for certification on such fuels if demonstrated that such fuels will be readily available nationwide, will be used by the vehicle operators, vehicles would not operate appropriately on other available fuels, and such a fuel would result in equivalent emission performance. All confirmatory testing should be conducted on fuel that matches the certification fuel.

Organization: American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM)

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.

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?

Organization: E.I. du Pont de Nemours and Company

The second provision that could encourage larger volumes of renewable fuels involves allowing vehicle manufacturers to request approval for an alternative certification fuel such as high-octane E-30. This provision would give vehicle manufacturers the requisite flexibility to improve vehicle efficiency for purposes of complying with 2017 and later CAFÉ standards. DuPont supports allowing vehicle manufacturers to request alternative certification fuels. This policy could promote higher octane fuels coming to market with lower cost as compared to their high octane petroleum fuel counterparts. High octane petroleum fuels are more expensive than gasoline with an 87 rating, but higher biofuel blends with higher octanes should cost less per gallon of regular gasoline.

The Tier 3 rule objectives go hand in hand with CAFÉ standards and would create the flexibility that automobile manufacturers need to comply with both CAFÉ and the Tier 3 rule. The purpose of CAFÉ standards is to reduce energy consumption that will help address our country's dependence on imported oil, save consumers money at the pump, and reduce emissions of greenhouse gases that contribute to global climate change. Higher ethanol blends will help make significant contributions to these objectives.

Opponents of the Tier 3 rule have argued that "proposed fuel specifications should be based on sound science in order to accommodate vehicle technologies that automakers will commercialize in significant volumes within the same timeframe required of fuel providers." They fault EPA for not identifying "automotive technologies that would be utilized to comply with increased CAFÉ standards or a Tier 3 standard that would benefit from lower sulfur gasoline."

These arguments seek to solidify the current obstacles that prevent both higher blends of biofuels and advanced vehicle technologies. Without the availability of higher ethanol blends on the market, automobile manufacturers are hesitant to develop engines that can accept the fuel. Likewise, without advanced engines, market demand for advanced fuels is lacking. DuPont believes that the Tier 3 rule is an opportunity to make progress towards overcoming these obstacles.

The second provision that could encourage larger volumes of renewable fuel involves allowing vehicle manufacturers to request approval for alternative certification fuel, such as E-30. And that would give vehicle manufacturers the requisite flexibility to improve vehicle efficiency for purpose of complying with the 2017 rules.

We support allowing vehicle manufacturers to request approval for alternative certification fuels, higher octane fuels, because ethanol cannot be used as an octane booster. High octane petroleum fuels are more expensive than gasoline with an 87 rating. But higher ethanol blends with higher octane should cost less per gallon than regular gasoline.

Organization: Biotechnology Industry Organization (BIO)

Biofuels and Their Supportive Policies Are Important to the U.S. Fuel Supply; The federal RFS, enacted in 2005 and updated in 2007, is an important tool in achieving the objectives of energy independence and pollution reduction. The RFS is the single most important federal policy driving investment and commercialization of conventional and advanced biofuels. Biofuel production under the RFS has already displaced nearly 10 percent of gasoline consumption and will account for more than 20 percent of U.S. transportation fuel by 2022. Biofuel production under the RFS reduced the need for imported oil by more than 462 million barrels in 2012.

Investment in biofuels, largely spurred by the RFS, has led to the development of facilities like INEOS Bio's in Vero Beach, Florida, and KiOR's in Columbus, Mississippi, which represent several hundred million dollars of investment in the United States and are poised to begin production of the next generation of renewable fuel from non-food feedstocks this year. Dozens more advanced biofuel projects are planned or under construction, as highlighted in the attached Appendix I, illustrating the visible success the RFS has had in driving development of highly skilled, well-paying jobs in rural America. Biofuel production under the RFS has led to the employment of 380,000 Americans. And, 800,000 employment opportunities could be created by 2022.

BIO firmly believes that the limits to market access for biofuels commonly referred to collectively as the "blend wall" represent a series of barriers contrived by obligated parties to prevent biofuels from gaining access to the marketplace. Multiple avenues exist for blending additional volumes of biofuel into the nation's fuel supply. For instance, as the proposed rule recognizes, E15 blends are approved and ready for use, and production of flex fuel vehicles continues to increase. These options, combined with the introduction of new "drop-in" fuel molecules, provide a suite of opportunities for the growth of the entire biofuels industry and RFS compliance.

The main obstacle to this growth and compliance is the dilatory tactics of obligated parties to pursue the options available to them. Obligated parties have had over five years to begin establishing the infrastructure necessary to distribute RFS-mandated biofuel volumes, but have taken few steps to do so. EPA should therefore resist all efforts by obligated parties to postpone updating the U.S. certification fuel for emissions from light duty cars and trucks and heavy duty gasoline vehicles, or to reduce RFS obligations based on blend wall claims. Any concession by

EPA to accommodate these assertions regarding the blend wall will only serve to embolden obligated parties in their effort to resist compliance with the Clean Air Act.

Instead, as it is able through the proposed rule and other administrative actions, the Agency should encourage the development of biofuels – and the engines and infrastructure to support them. This development can readily grow the supply of biofuels in the market and overcome the blend wall by allowing Renewable Identification Numbers (RINs) to truly reflect their market value. It will also help drive the market and encourage retailers to adopt new infrastructure as reflected in Appendix I.

EPA should also seek to identify opportunities to grow biofuel markets, including for drop-in biofuels. Reconsideration of the gasoline base fuel would enable engine manufacturers to optimize beneficial characteristics of biofuels in engine design, while expedited approval of new molecules would provide obligated parties with additional options for compliance not subject to blending limitations.

BIO believes the final Tier 3 rule has the potential to continue the progress of the biofuels industry and help alleviate the “blend wall” as described above. BIO commends EPA’s efforts to transition the certification test fuel for emissions from light duty cars and trucks and heavy duty gasoline vehicles (“the emissions test fuel”) to better reflect the current and future in-use fuel as it begins to contain greater volumes of biofuels resulting from the continued development and commercialization of biofuels and increased RFS volumes in the market.

BIO believes that EPA should work to finalize its Tier 3 rulemaking and set the emissions test fuel to encourage further investment and adoption of biofuels, including advanced drop-in biofuels, ethanol and other fuel molecules. Encouraging biofuels, including higher blends of ethanol and drop-in biofuels would help meet EPA’s overall goal in this rulemaking to address the impacts of motor vehicles and fuels on air quality and public health. For instance, advanced drop-in biofuels have the same molecular make-up of traditional petroleum-based fuels, but they contain little or no sulfur and have significantly reduced GHGs. In addition, ethanol combusts without producing air toxics, which are the main source of particulate matter. Blending ethanol in gasoline also reduces the need for unhealthy detergent additives which are mandated to reduce the formation of engine deposits from gasoline that increase exhaust emissions and result in the loss of fuel economy and performance. These benefits of biofuels only rise with higher blends. BIO encourages EPA to issue a final rule that maximizes investment and adoption of all biofuels, including higher blends and drop-ins.

EPA requests comment on various ways to transition the emissions test fuel, including: starting with a transition to E10 with a transition to E15 as that fuel becomes more widely available on the market; transitioning to E15 after a few years to allow time for this greater market availability or by setting a date certain by which the transition should be made to help drive E15 market availability; or, allowing “vehicle manufacturers to request approval for an alternative certification fuel, such as a high-octane 30 percent ethanol by volume (E30) for vehicles they might design or optimize to use such a fuel” so that it may “help manufacturers that wish to raise compression ratios to improve vehicle efficiency, as a step towards complying with the 2017 and later light-duty greenhouse gas and CAFE standards.”

As BIO describes above, we urge EPA to issue a final Tier 3 rule that maximizes investment and adoption of biofuels. We agree with EPA's assertion that E10 is widely available and in use in today's market, and that E15 and E85 are the most likely near term biofuels that have the potential to be widely available. We believe the final rule should allow for and encourage ongoing and greater use of E85 and E15, as well as the transition to higher blends of ethanol, and drop-in biofuels.

To this end, BIO urges EPA to issue a final rule that recognizes that new biofuel molecules are beginning to enter the market for blending with gasoline in order to help achieve the goals of the RFS. As such, we urge EPA to ensure that any transition in the certification fuel not create unintended barriers and burdensome costs to companies working to register these new biofuel molecules under Part 79 fuel and fuel additive registration.

As EPA suggests, one way to accomplish this goal may be to allow vehicle manufacturers to request approval for an alternative certification fuel such as a high-octane E30 blend for vehicles they might design or optimize for use on such a fuel. BIO is aligned with EPA's assertion in the proposed rule that "[t]his 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...[t]his in turn could help provide 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." Preliminary results from Oak Ridge National Laboratory and the University of Wisconsin suggest that moderate biofuel blends increase the benefits of the use of Reactivity Controlled Compression Ignition (15). Therefore in order to further help manufacturers develop engines which can utilize biofuels which deliver reductions in greenhouse gas emissions; BIO recommends EPA sets the "R-factor," which may be considered as the efficiency with which the vehicle engine adapts to fuel variations, at a value of 1.0. By doing so, EPA will ensure the final rule does not discourage manufacturers from developing engines that can utilize new cleaner burning biofuels in order to achieve the overall goals of the proposed rule.

BIO believes the final Tier 3 rule has the potential to compliment other transportation related policies, including the RFS, which promote the continued development, commercialization and use of biofuels. We commend EPA's efforts to transition the emissions test fuel to help promote the goals of the RFS. BIO believes that EPA should work to set the emissions test fuel to maximize investment and adoption of all biofuels, including higher ethanol blends and drop-ins, while also maximizing the level of octane in the U.S. fuel supply. This action would help EPA meet one of its stated goals of this rulemaking to address the impacts of motor vehicles and fuels on air quality and public health.

To this end, we believe the final rule should allow for and encourage ongoing and greater use of E85 and E15, as well as the transition to higher blends of ethanol and drop-in biofuels.

BIO also supports EPA's proposal to allow vehicle manufacturers to request approval for an alternative certification fuel such as a high-octane E30 blend for vehicles they might design or optimize for use on such a fuel. As described above, we agree with EPA that this provision could help auto manufacturers meet their CAFE requirements.

BIO and its members look forward to working with EPA and the affected parties of this rulemaking to ensure implementation of a final Tier 3 rule that promotes the continued development of the biofuels industry as expressed in these comments, while complimenting other transportation regulatory requirements, including under the RFS and CAFE.

Organization: Energy Future Coalition and Urban Air Initiative

Together, we file these comments in response to EPA's questions in the Proposed Rule about whether to approve "an alternative certification fuel such as a high-octane 30 percent ethanol by volume (E30) blend" to enable more efficient engine design. Our comments will show not only the advisability of approving a mid-level ethanol blend certification fuel, but also the need to facilitate its use in order to comply with EPA's obligation to regulate mobile source air toxics (MSATs or "hazardous air pollutants"). We hope EPA will take advantage of this opportunity to usher in a new era of cleaner, higher-efficiency fuel, improving the lives of millions of American citizens and protecting both public health and the environment.

The Proposed Rule will deliver substantial economic, health, and environmental benefits to the nation; however, it inadequately considers the opportunity to enlarge those benefits and save tens of billions of dollars annually by facilitating a gradual shift in the content of motor vehicle fuel for light-duty vehicles. A mid-level ethanol blend fuel, created by splash-blending ethanol with a gasoline blendstock that meets current standards, would maximize benefits to air quality and public health, automotive performance, and consumer costs:

As another example, the Proposed Rule notes, "as the ethanol level increases, the volatility increase caused by blending ethanol with gasoline begins to decline, such that at E30 there is only about a 0.5-psi RVP increase." Indeed, a recent study by a team from Ford Motor Company and AVL Powertrain Engineering, Inc. concluded that RVPs match that of base gasoline at ethanol concentrations of 30%. This has positive implications for the cost and ease of compliance with the Proposed Rule.

- Automotive performance: As the Proposed Rule notes, the use of a 30% ethanol blend "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." The Ford/AVL team reviewed 10 properties of ethanol blends and concluded that "a mid-level ethanol blend (greater than E20 and less than E40) appears to be attractive as a long-term future fuel for the US, especially if used in vehicles optimized for such a fuel." Despite the lower energy content of ethanol, in an optimized vehicle with an E30 blend, vehicle fuel economy and range can be maintained. An E30 blend in an engine designed to use that fuel would have "ridiculous power and good fuel economy," one senior automotive engineer said.

- Consumer costs: Numerous economic analyses suggest that the replacement of gasoline with ethanol reduces the cost of gasoline. A recent study at Louisiana State University, for example, found that each additional billion gallons of ethanol reduces gasoline prices as much as $0.06 per gallon. Considering U.S. ethanol production in 2010 was more than 13 billion gallons, this would suggest savings of up to $0.78 per gallon of gasoline. Since Americans consume more than 130 billion gallons of gasoline annually, this amounts to more than $100 billion a year in savings. Increased ethanol use would further reduce gasoline consumption, increase those savings, and lessen the nation's vulnerability to economic disruption due to fluctuations in oil prices.

For all these reasons, we commend EPA for requesting comment on whether it should approve "an alternative certification fuel such as a high-octane 30 percent ethanol by volume (E30) blend for vehicles [automobile manufacturers] might design or optimize for use on such a fuel." Our answer to this is an emphatic 'yes.' But in order to achieve this environmentally sound and technologically progressive result, EPA must remove certain hurdles erected by the current regulatory regime, described below in Part II.

EPA Leadership Is Needed on Fuel Content for Certification and Consumer Use. In its Proposed Rule, EPA requests comment on whether the Agency should approve "an alternative certification fuel such as a high-octane 30 percent ethanol by volume (E30) blend for vehicles [automobile manufacturers] might design or optimize for use on such a fuel." Our answer to this is an emphatic 'yes.' But in order to achieve this environmentally sound and technologically progressive result, EPA must remove certain hurdles erected by the current regulatory regime. Under current EPA regulations, automobile manufacturers must show that a fuel is "commercially available" before the Agency will approve it for emissions and fuel economy certification. In its proposed Tier 3 Rule, EPA states that the fuel must "be readily available nationwide" to meet this standard and that the onus is on automobile manufacturers to make this showing. However, EPA also asks for comment on whether this standard is appropriate. In the case of a new mid-level ethanol blend, we believe that this standard is not appropriate.

Automobile manufacturers are not in a position to ensure that a fuel is available to consumers nationwide. The market will not produce and distribute a fuel until there are vehicles that run on it, and automobile manufacturers will not mass-produce vehicles optimized to run on a new fuel without assurance that these vehicles can be certified on that fuel, and that the fuel will be available to consumers. Moreover, Congress has prohibited the introduction of commercial fuel that is not already "substantially similar" to an existing certification fuel, so even if automobile manufacturers were capable of creating a market for a new fuel by themselves, they would not be allowed to do so until that fuel, or one like it, had already been approved as a certification fuel. The current regulatory regime thus imposes a catch-22 on the industry: The fuel necessary for the next generation of motor vehicle engines cannot be introduced into the market until it is approved as a certification fuel, and it cannot be approved as a certification fuel until it is available in the market. EPA should take the initiative to solve this collective action problem by (1) approving for new motor vehicle certification a high-octane, mid-level ethanol blend, subject to the environmentally relevant parameters discussed below, (2) ensuring that such fuel can be made commercially available, and (3) removing the regulatory disincentives that currently inhibit the development of efficient vehicles optimized or dedicated to operate on this fuel.

A market shift from current light-duty motor vehicle fuel to a mid-level ethanol blend would result in numerous benefits to the environment, to American drivers, and to the public at large. Increasing the ethanol content of fuel would reduce the United States' dependence on foreign oil and achieve corresponding benefits to national security. A mid-level ethanol blend would provide desirable gains in clean octane, enabling better engine performance and efficiency. Finally, and of primary significance for the purpose of these comments, adding ethanol to fuel would allow EPA to satisfy its statutory obligation to regulate air toxics in motor vehicle fuel by reducing aromatic hydrocarbons that naturally occur in gasoline and are added to motor vehicle fuel as an octane enhancer. Reducing these harmful additives by adding octane-rich (and less expensive) ethanol would substantially reduce the environmental impact of fuel emissions with direct health benefits and lower pollution control costs to the public, especially in urban areas.

EPA Should Approve a Splash-Blended Mid-level Ethanol Blend Certification Fuel. Requiring automobile manufacturers to demonstrate that a fuel is "commercially available" as a precondition to EPA's approval of it as a certification fuel stifles technological progress and blocks environmental benefits, as described above. By seeking comment on this requirement, EPA opens the door to the kind of Agency leadership on air toxics that Congress contemplated in section 202(l). EPA should make the first move in this direction by approving a splash-blended mid-level ethanol blend as an optional certification fuel. In due course, EPA should require all new motor vehicles to be certified on this fuel and then phase down the aromatics content of fuel in response to its obligation to reduce MSATs. In other words, the Agency should over time make a mid-level ethanol blend the standard, rather than an alternative, certification fuel.

It is important, however, to ensure that the quality of the gasoline portion of the fuel is not permitted to deteriorate before blending with ethanol, thereby reducing the environmental benefits of aromatics reduction. In its notice of proposed rulemaking, EPA asks for comment on whether the Agency needs "to specify more precisely the makeup of [a higher octane, higher ethanol content] fuel" in terms of "ethanol content, as well as other fuel parameters." The answer is yes. Since ethanol contains only one molecule, with unvarying chemical properties, it is critical that, when regulating fuel blends for environmental purposes, EPA specify certain parameters of the gasoline "blendstock for oxygenated blending" or "BOB," that is, the gasoline portion of the fuel to which ethanol will be added. This is crucial because the gasoline blendstock is the only portion of the fuel that has variable characteristics.

As noted above, the components of motor vehicle fuel evaporate at different temperatures, and the components that evaporate at high temperatures have the worst environmental and health effects.

Because ethanol, unlike gasoline blends, contains just one molecule, it has a single, relatively low, boiling point. Ethanol's T50 is the same as its T90—78.4 degrees Celsius—this is the temperature at which every molecule of ethanol would evaporate at sea level. Standard gasoline, on the other hand, is capped at a T50 of 121 degrees Celsius and a T90 of 190 degrees Celsius by ASTM, a non-governmental standards-setting organization. (The ASTM limit is a ceiling, not a floor; refiners are free to create fuel blends with lower T90 values (and T50 values as low as 77 degrees Celsius), and ethanol makes this possible.) In other words, standard gasoline contains much higher distillates than ethanol and is therefore more conducive to tailpipe pollution. Mixing ethanol directly with current blendstock for oxygenate blending ("splash blending") reduces the distillation temperatures of the finished fuel proportionally, thereby reducing tailpipe pollution.

The Agency's EPAct model, referred to in the proposed rule only with respect to CO2 emissions, purports to measure the effects of various fuel blends on many forms of pollution. However, EPAct does not model splash blending of ethanol with standard gasoline blendstock, but rather models what would happen if refiners were allowed to alter the gasoline portion of the fuel by adding dangerous levels of high-distillate aromatics before blending with ethanol. In other words, EPAct models the pollution effects of ethanol blends containing high-distillate gasoline formulations that are themselves not permitted to be sold as consumer fuel.

In the real world, EPA should not allow refiners to make gasoline blendstocks more dangerous before mixing them with ethanol. If only the final fuel needs to maintain certain parameters such as octane and T50, T90, and endpoint distillation temperatures, refiners could make gasoline blendstocks dirtier and lower octane, thereby canceling out the performance and environmental benefits of ethanol. EPA should not permit this to happen. As the Agency noted with regard to E51-83, "only blendstocks (including butane and NGL) that meet [certain] specifications would ensure the final blend would always meet the standards." We agree with the Agency that in blending ethanol into motor vehicle fuel, the use of previously approved blendstocks and "gasoline that has previously been demonstrated to comply with applicable EPA specifications . . . prevents inappropriate blending components from being used in the production" of the resulting ethanol blend. Maintaining current blendstock standards is also necessary to maximize the engine performance benefits of a mid-level ethanol blend. Thus, EPA should mandate that any mid-level ethanol blend approved for market and certification fuel be made up of (1) a certain percentage of ethanol by volume, and (2) a corresponding volume percentage of gasoline which itself meets all relevant EPA and ASTM standards. In other words, EPA should approve a "splash-blended" mid-level ethanol fuel.

EPA Should Remove Regulatory Disincentives that Currently Impede the Production of Vehicles that Run on a Mid-Level Ethanol Blend. In the proposed rule, EPA requests comment on how the Agency might "provide an incentive for, or remove obstacles to, the development of highly efficient vehicles optimized for use on higher level ethanol blends." EPA also requests comment on whether an adjustment is warranted in the compliance calculation for light-duty GHG standards. These two questions should be viewed through the same lens. EPA should remove current regulatory disincentives to the production of vehicles designed to run on a mid-level ethanol blend, while paving the way for a national transition to this fuel by incentivizing increased production of FFVs. These incentives can be achieved without relaxing GHG emissions standards, simply by allowing auto manufacturers to account for the life-cycle GHG benefits of ethanol in their GHG compliance calculation.

In order to begin to phase in a cleaner, higher-ethanol fuel that significantly reduces air toxics and other dangerous pollutants, while at the same time helping manufacturers design more efficient engines to reduce GHG pollution, EPA should allow all vehicles capable of running on a mid-level ethanol blend (dedicated, optimized, or FFV) to be certified for purposes of GHG emissions and fuel economy on the new high-octane, mid-level ethanol blend.

Organization: Volkswagen Group of America, Inc.

Other Fuel Properties

VW supports working with the Agencies on a higher octane/higher ethanol certification fuel that can be optionally used by the light duty fleet. Vehicles specifically designed for known fuels can take advantage of efficiencies available. VW sees value in ensuring the specially-designed vehicles have access to an analogous market fuel. EPA must then ensure that vehicles not designed for this fuel do not attempt to use it, i.e., gas station pump labeling must assist customers in choosing the proper fuel for their vehicle. VW supports a 9RVP E 15 and 9 RVP E30 created by splash blending the appropriate level of ethanol into gasoline.

Organization: Ford Motor Company (Ford)

We also commend EPA on their forward-looking approach for future opportunities for increased vehicle efficiencies through the request for comments on a higher octane rated alternative certification fuel. Treating fuels and vehicles as a system is vitally important as fuel quality improvements are needed to enable the advance technologies that will be needed to meet requirements of the ONP as well as Tier 3. Thus, further modifications to the market fuel quality parameters (vapor pressure, elimination of the use of metallic additives, increased detergency requirements, increased octane rating for gasoline, and increased cetane rating for diesel) are necessary to allow for a complete integration of vehicles and fuels as a system.

Alternative Certification Fuel: In the NPRM, EPA proposes 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 designed or optimized for use on such a fuel. EPA requests comments on an alternative test fuel that is a “higher octane, higher ethanol content gasoline”. While we support the initiative for future collaboration between original equipment manufacturers (OEMs), government agencies and other stakeholders to maximize vehicle efficiency in tandem with use of renewable fuels, we believe that there is still further development needed on the higher ethanol/high octane certification fuel option. Additional information and recommendations concerning this proposal can be found in Part II (Fuels section) of this document.

Recommendation: Ford strongly recommends that EPA pursue regulations and other measures to facilitate the introduction of higher octane rating market fuels, which offer the potential for the introduction of more efficient vehicles. Progress on this issue will be a key parameter for consideration in the “One National Program” mid-term evaluation process, as well as for all phases (current and future) of the medium and heavy-duty GHG and fuel economy standards.

Alternative Certification Fuel Opportunity: As noted above, Ford supports the development and introduction of an intermediate level blend fuel (E16-E50), with a minimum octane rating of 91 anti-knock index (AKI) that increases proportionally as ethanol is splash-blended on top of the base Tier 3 gasoline emission test fuel. The development of such a fuel would enable the first steps to the development of a new generation of highly efficient internal combustion engine vehicles. We look forward to future collaboration with the EPA on this item. We recognize that a number of issues will need to be resolved in order to move this concept forward, but there is concurrence that it is important to work through the details to allow more efficient vehicles to be made available to American consumers.

In response to the request for comment, Ford provides the following observations and recommendations as outlined in the following section. Literature has shown that increased ethanol in gasoline paired appropriately with the resultant commensurate increase in octane rating of the final blend leads to future opportunities for increased engine efficiency and therefore, reduced GHG emissions. The addition of ethanol to gasoline blends has many potential benefits, which have been extensively studied10,11,12,13,14,15 (see Appendix A). Ethanol is a renewable fuel which displaces petroleum and has been shown to reduce wells-to-wheels CO2. Ethanol can be produced domestically, therefore offering the potential to support domestic energy goals. Advanced engine designs operating on ethanol (with increased octane rating) have a slightly higher thermal efficiency and produce fewer tank-to-wheels CO2 than engines operating on straight gasoline. If octane rating is allowed to increase with the added ethanol, there is opportunity to optimize the engine for further improvements in engine efficiency (see Appendix). In the U.S., the Energy Independence and Security Act of 2007 (EISA 2007) mandates 36 billion gallons of renewable fuels in use by 2022. Since starched-based ethanol is limited to 15 billion gallons in EISA 2007, excess ethanol has been exported to other fuel ethanol consuming countries. Ethanol has a lower vapor pressure than gasoline; however, the addition of ethanol at a concentration of about 10%-15% by volume increases the blended vapor pressure by approximately 1 psi. At levels above this range of ethanol, the vapor pressure of the resulting mixture begins to decrease. The decrease in vapor pressure allows for decreased evaporative emissions, however, too low vapor pressure can result in engine starting issues in colder climates.

The higher octane number (109 Research Octane Number [RON] for ethanol versus today's regular gasoline 91 RON) and higher heat of vaporization associated with gasoline-ethanol blends can improve engine efficiency through engine redesign and use of higher compression ratios. However, the oxygen content in ethanol can result in enleanment for engines with uncalibrated control modules due to the change in stoichiometric air/fuel ratio (A/F). For example, assuming E0 has a stoichiometric A/F of 14.6, this A/F then becomes 14 for E10, 9.9 for E85 and 9.0 for E100. In addition, ethanol's energy density is less than that of gasoline, with E100 having a net heating value (NHV) of 21 MJ per liter of fuel whereas gasoline has a NHV of 33 MJ per liter of fuel. The difference in energy density results in reduced volumetric fuel economy of ethanol-gasoline blends versus pure gasoline in non-optimized engines. Even though ethanol's higher octane rating can improve the thermal efficiency of the engine at knock limited operating conditions, the net result is degraded volumetric fuel economy and this is most pronounced in E85 blends, which has about 27% less energy per gallon than gasoline.

However, increased octane rating from increased ethanol content has the potential to allow for fuel economy, performance and emissions improvements through more efficient engine designs. Raising the minimum octane rating requirement would allow manufacturers to design engines with greater thermal efficiency through higher compression ratios and/or smaller displacement turbo-charged engines. Current engines in the fleet could also benefit from the higher octane rating through more aggressive spark timing during certain driving conditions. High compression ratio engines are already found in Europe, where 95 RON fuel is typically available in contrast to the lower 87 AKI (approximately 91 RON) fuel that is most common in the US. The introduction of higher octane rated/intermediate level ethanol blend fuel would allow for a faster introduction of more efficient vehicle designs from Europe with lower CO2 emissions and increased efficiency that are designed to operate on 95 RON (~91 AKI) market fuel without the need for significant design changes as for products destined for the U.S. market.

Of course, there needs to be a long-term strategy for the introduction of such a fuel, and a number of phase-in issues must be addressed in the meantime. Protection grade fuel must remain available for those consumers with legacy products as the new alternative fuel is phased in. The current flexible-fuel vehicle (FFV) fleet can be used in the interim as the transition from lower (E10) to higher ethanol level blends occurs across the United States. The timing and details regarding the introduction of optimized vehicles dedicated to the use of the new fuel will need to be addressed as it becomes important to promote flexibility in this transitional timeframe. Considering the added complexity in the production of vehicles capable of greater than E10 or FFVs, continued incentives to build such vehicles will likely be necessary. EPA should consider an extension of the current FFV credit policy (F-factor) to allow credits to be generated for vehicles with the capability of operating with intermediate ethanol blend fuels. Considering the complexity and transitional nature of the entire scenario, such burden of proof with respect to fuel use should not be placed upon either the vehicle manufacturer or vehicle owner. Alternatively, such credits could be allocated based on national ethanol use beyond that which can be allocated to an E10 marketplace and then distributed to manufacturers based on sales volumes of capable vehicles.

The inevitable quandary of sufficient fuel infrastructure must be also addressed. As observed in the literature cited in this document (see Appendix), sufficient nationwide availability of the next-generation blend must be assured as future fuels and engine technologies should progress synergistically, with a consistent, open dialogue between stakeholders and policymakers.

The next-generation fuel must also be favorably valued by consumers in order to incentivize consistent use throughout the market. As stated above, FFVs offer an opportunity for current technology vehicles to bridge the gap until the new fuel is available in sufficient quantities throughout the market. Finally, to assist in the market introduction of the next-generation fuel to consumers, fuel certification must be addressed and aligned at a federal level. Ford recommends the use of market fuel specifications that are developed through ASTM working groups (ASTM D5798, ASTM D4806) as well as subsequent successful working groups.

Recommendation: Ford strongly recommends that EPA pursue regulations and other measures to facilitate the introduction of higher octane rated market fuels, which offer the potential for the introduction of more efficient vehicles. Progress on this issue will be a key parameter for consideration in the “One National Program” mid-term evaluation process,16 as well as for all phases (current and future) of the medium and heavy-duty GHG and fuel economy standards.

Organization: General Motors LLC (GM)

EPA Should Replace Flawed Regulations Governing Use of Alternative Test Fuels. GM agrees that alternative test fuel provisions in the current regulations at 40 CFR 1065.701(c) are flawed and cannot work in practice. For dedicated vehicles, the regulation requires that the new fuels be commercially available in the marketplace; in addition, the regulation appears to presume the fuels would be widely available without any vehicles being available to use them, which underscores the unresolved "chicken and egg" dilemma.

In addition, manufacturers would have to show that the vehicles will not run or be durable on standard test fuel. Alternatively, manufacturers could show that the vehicles would not meet emissions limits on standard test fuel (i.e., measured emissions would be "substantially unrepresentative"), all of which would likely make them practically unsellable.

Were an OEM to petition to test using E15 test fuel under these provisions, meeting them would be very challenging. Rather than imposing unrealistic regulatory pre-conditions, EPA needs to replace them. GM would be happy to work with the agency to develop a workable process and criteria for access to alternative test fuels.

Within the rulemaking, EPA puts forward the concept of producing "dedicated E30 vehicles or FFVs optimized to run on E30 or higher alcohol blends." While there is no way to couple a FFV and an optimized vehicle together, GM supports the future of higher octane and higher ethanol content in order to provide a pathway to improved vehicle efficiency and lower GHG emissions. However, the use of an R-factor less than 1.0 discourages the voluntary use of any fuel with energy content less than that of the 1975 emissions certification fuel.

Organization: Mercedes-Benz USA, LLC on behalf of Daimler AG

The synergy of increased efficiency, afforded by high octane and the reduced carbon intensity mid-blend ethanol can offer, along with gasoline direct-injection and other technologies, can provide remarkable reductions in CO2 output. Mercedes-Benz endorses the concept of a higher octane, mid-blend ethanol certification fuel such as E25, as suggested in the Tier 3 proposed rulemaking, and requests consideration of the aforementioned corporate annual CO2 burden reduction proposals.

Organization: National Corn Growers Association (NCGA)

The first principle is that the RFS volume of biofuels in the future should be met in order to preserve the 150 million metric tons of annual CO2 equivalent emission reductions attributed to the RFS 2 program by EPA. These emission reductions are directly dependent on the production of biofuels and not on the fuel economy of the light-duty on-road motor vehicle fleet. The volume of biofuels utilized is in turn dependent on having vehicles that are flexible-fuel capable and those certified on high octane mid-level blends plus a retailer infrastructure offering energy-competitive pricing. The Tier 3 proposal thus has a direct bearing on the availability of vehicles to implement the RFS.

Further, we support the recognition that a high octane mid-level ethanol blend (MLEB) would help automakers achieve the 2017 and later GHG and CAFE standards.

High Octane E30 Alternative Certification Test Fuel: EPA suggested the concept of producing "dedicated E30 vehicles or FFVs optimized to run on E30 or higher alcohol blends." NCGA supports fuels with higher octane and higher ethanol amounts that provide a pathway to improved vehicle efficiency and lower GHG emissions. It is important to establish the composition of a new fuel early to facilitate design and optimization. NCGA recommends two options for the base gasoline blendstock for oxygenate blending (BOB) and several options for ethanol content. For base gasoline or BOB, the options are conventional gasoline BOB or CBOB, an 88 research octane (RON) hydrocarbon that becomes regular E10 when blended with 10 percent ethanol, and a high octane "premium" gasoline BOB or PBOB, a 91-93 RON hydrocarbon that becomes premium E10 when blended with 10% ethanol. Although EPA mentions 30 percent ethanol as a candidate blend, other ethanol blend rates such as E25 or E35 may represent a more optimum blend for vehicle and engine design.

NCGA does not believe that the alternative test fuel provisions at §1065.701(c) are practical since they assume that a new fuel would become widely available prior to the availability of vehicles designed to use it. Further, a specification for the new fuel is needed ahead of time as a guide for fuel providers and auto manufacturers.

Were EPA to determine that some sort of "actual use" demonstration of the high octane high ethanol fuel is required, NCGA would look to recent EPA guidance on this subject. EPA, in its Draft Guidance for E85 Flexible Fuel Vehicle Weighting Factor for Model Year 2016-2019 Vehicles, stated that the F-Factor (proportion of actual use) "...must be based on the projected use of the alternative fuel over the life of the ... vehicles." If the determination of the amount of alternative fuel used requires the vehicles to reach full useful life first, then it is clear that EPA will have to offer guidance on what this F-Factor value would be because of the uncertainty of this value.

EPA has the authority to ensure the availability of this new fuel formulation as the vehicles designed to use it become available if it believes such a fuel would enable meeting the 2017 and Later Model Year CAFE and GHG Emission regulation and the RFS regulation (8). Consistent with EPA's expressed belief that improved engine efficiency and reduced GHG emissions would result from a high octane MLEB and engines designed for its use, we recommend that EPA consider requiring the nationwide availability of such a high octane fuel.

Perhaps a more workable alternative would be to require a phase-in of all gasoline fueled light duty vehicles as FFVs beginning in 2017 (50% in 2017 and 100% in 2018). This approach would clearly communicate EPA's support for the GHG reduction benefits of the RFS program, and would clear the way for FFVs to become the "bridge" to a new generation of vehicles designed and optimized to run on a higher octane MLEB. Requiring 2017 and later gasoline vehicles to be FFVs would remove any limits on ethanol usage, and would provide a clear incentive to service station owners to offer more gasoline/ethanol fuel choices through the use of blender pumps. One of the key impediments to additional biofuel use is the number of vehicles with flexible fuel capability to use blends above E15. With a current penetration of about 18 million vehicles, FFVs are still significantly less than 10% of the vehicle fleet. E85 is sold in approximately 3,000 service stations, less than 10 percent of the 165,000 stations, not nearly enough to support increased ethanol consumption volumes under the RFS. It is our belief that if EPA required 2017 and later vehicles to be certified as FFVs, automakers would more seriously consider petitioning EPA for a high octane MLEB. A preferred MLEB for both consumers and automakers would then likely emerge from this process. An FFV requirement would also eliminate any non-FFV "misfueling" concerns with the 2017 and later fleet. Finally, requiring gasoline vehicles in 2017 and later model years to be FFVs would significantly enhance energy security in the United States by encouraging the use of renewable, domestically produced fuels.

At least two major automakers have reported research programs evaluating advanced technology gasoline direct engines with high octane MLEBs.

Organization: Natural Resources Defense Council (NRDC)

Alternative, high-octane certification fuels must be sustainably produced and be the in-use fuel for vehicles certified on the fuel to receive greenhouse gas or fuel economy credits.

Alternative, High-Octane Certification Fuels Must be Sustainably Produced and be the In-Use Fuel for Certified Vehicles to Receive GHG or Fuel Economy Credits. EPA proposes to allow automakers to certify vehicles on an alternative high-octane renewable-blend fuel. NRDC supports automaker efforts to reduce carbon pollution and increase fuel economy by optimizing their operation for clean fuels. However, an alternative, renewable certification fuel must be sustainably produced and available as the regular in-use fuel. NRDC opposes the adoption of E30 as a certification fuel in this rulemaking because today there is no clear timeline in which E30 made from sustainably-produced ethanol could be available on a national scale. Establishing a process to certify vehicles on E30 today would signal support for greater production of ethanol from food crops such as corn, which have significant environmental and economic risks.

If a renewable, high-octane fuel can be produced on a large scale, it must be widely available. For an automaker to receive GHG emissions and fuel economy ratings based on the alternative certification fuel there must be certainty that the certified vehicle is being primarily operated on that fuel during use by the vehicle consumers.

Organization: POET, LLC

EPA should finalize an optional E30 certification fuel, without unnecessary gating criteria. EPA proposes '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.'

An optional E30 certification fuel should be allowed and finalized as soon as possible. POET agrees with EPA that an E30 certification fuel '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,' which '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.'

An E30 certification fuel promotes the development of high-octane, clean-running vehicles that reduce toxic air pollutants and other health-based pollutants such as PM. The use of MLEBs also provides a clear pathway to meeting RFS mandates for biofuels use.

However, EPA also references certain 'gating' criteria to be able to use an E30/MLEB certification fuel, including requirements to '[1] demonstrate that such a fuel would be used by the operator and would be readily available nationwide, [2] vehicles would not operate appropriately on other available fuels, and [3] such a fuel would result in equivalent emissions performance.'

Each of the three 'gating criteria' regarding the use of an E30/MLEB certification fuel is unnecessary and should be avoided.

First, a mandate to demonstrate that 'such a fuel would be used by the operator and would be readily available nationwide' is unworkable, unnecessary, contrary to EPA's treatment of other fuels and vehicles, and counter to EPA's stated purpose of the Tier 3 rule. Practically, requiring that a fuel be 'used by the operator' is unworkable because an auto manufacturer cannot be expected to make a driver's fueling choice for a vehicle that by design is intended to offer 'fuel flexibility.' Economics and preferences will dictate which available fuel a driver will select. Furthermore, this criterion is unnecessary because ethanol, and therefore gasoline blends containing ethanol, are less expensive and are projected to remain so for the foreseeable future according to the Energy Information Administration 2013 Annual Energy Outlook. So EPA should be comfortable that MLEBs will in fact be used in E30-optimized vehicles.

A mandate that a fuel be 'readily available nationwide' is contrary to EPA's treatment of other fuels and vehicles. For example, manufacturers are not required to demonstrate that 'fuel' for electric vehicles or fuel cell vehicles will be available nationwide to obtain certain benefits under EPA's CAFE/light-duty vehicle rule. In fact, electric and fuel cell vehicles do not have a nationwide refueling availability. Just as automakers are not punished for the limited availability of electric and fuel cell vehicle 'refueling' stations, which is largely out of the automaker's control, automakers should not be punished for pursuing vehicle technology that leads to lower emissions but similarly relies on the availability of fuel, which is provided by another party.

Furthermore, a requirement that a fuel is 'readily available nationwide' is more punitive than, and inconsistent with, existing provisions for using an alternative certification fuel in existing 40 CFR § 1065.701(c), which merely requires that the fuel in question must only be 'commercially available.' E10 is available nationwide, but gasoline refiners and producers have sought to limit the availability of E15 and higher-level ethanol blends.

Additionally, a mandate that a fuel be 'readily available nationwide' is counter to EPA's stated purpose of the Tier 3 rule. This requirement is counterproductive because it exacerbates the 'chicken-or-egg' problem that alternative fuels already face: in order to successfully enter the marketplace, there must be both sufficient alternative fuel and vehicles available to use the fuel. EPA should do all that it can to promote and expand the use of MLEBs because they can effectively reduce particulate matter and other toxic air emissions covered by the Proposed Rule. Unnecessary gating criteria frustrate these emission reduction goals.

A gating criteria mandate to demonstrate that 'vehicles would not operate appropriately on other available fuels' is inappropriate as it would defeat the purpose of creating 'flex-fuel' vehicles.

FFVs are specifically designed to be able to operate on multiple fuels. Gating criteria should not unnecessarily limit the flexibility that these vehicles are designed to provide.

Finally, a gating criteria mandate that 'such a fuel would result in equivalent emissions performance' is unnecessary. EPA already requires that vehicles achieve specific emissions limits for pollutants (and some emission limits may be specifically tailored for individual fuel types while maintaining a high overall level of environmental protection).

To address concerns regarding emissions on E30/MLEB-optimized vehicles when using 'other available fuels' and 'equivalent emissions performance' (i.e., gating criteria 2 and 3, above), an E30/MLEB-optimized vehicle could also be tested on the E15 certification fuel, for the purposes of demonstrating compliance with minimum emission standards. A similar approach is currently used for 'E85' flex-fuel vehicles where they are also currently tested on E0.

If an E30/MLEB-optimized vehicle is not designed to be run on HLEBs, manufacturers should be allowed the option of using labeling to clarify that HLEBs should not be used in such vehicles. Such a labeling is similar to that used for 'premium-only' gasoline vehicles today, and should be sufficient to address any concerns regarding an E30 vehicle running on HLEBs.

Two alternative certification fuels for FFVs should be available depending on what blend-range the FFV is optimized for. Within the Ethanol Fuel Family, a manufacturer should be able to use one certification fuel for vehicles designed to be run on HLEBs (E51-E85) and should be able to opt to use the E30 certification fuel for vehicles optimized for E30/MLEB blends. POET believes that these two certification fuels would be representative of in-use fuels for which MELB and HLEBs would be designed to operate and, pursuant to Clean Air Act Section 206, reflect 'actual current driving conditions under which motor vehicles are used.'

Regarding vehicles optimized for E30/MLEBs, POET supports EPA's proposal for an optional E30 certification fuel, as discussed above. POET believes that an E30 certification fuel would reflect actual, in-use fuels for which vehicles using MLEBs and the 'actual current driving conditions under which motor vehicles are used' pursuant to CAA Section 206. Furthermore, an E30 certification fuel would be 'within the range of fuel mixtures' that are 'expected to be found in use.'

In fact, ethanol cost-effectively provides a high-octane, clean-burning fuel that is important for meeting recently-tightened corporate average fuel economy (CAFE) and greenhouse gas emissions standards promulgated by EPA. The Proposed Rule notes that MLEBs 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.' 78 Fed. Reg. at 29,825.

Ethanol also provides other important energy security and economic benefits. Significant hikes in oil prices immediately preceded 10 of the last 11 U.S. recessions. Ethanol today makes up approximately 10% of the gasoline market, expanding our fuel supply and adding diversity, which dampens the impact of fuel supply disruptions. Ethanol also supports over 365,000 U.S. jobs.

Looking ahead, as more stringent emissions standards come into play, automakers will need higher-octane fuel to improve engine efficiency. Automobile engineers have found that ‘a mid-level ethanol blend (greater than E20 and less than E40) appears to be attractive as a long-term future fuel for the U.S., especially if used in vehicles optimized for such a fuel.’ Furthermore, according to a recent MathPro Refinery study, increasing the fuel octane to 92 AKI from 88 AKI would result in significant cost savings. Ethanol represents the most likely source for achieving the fuel mix needed.

As noted above, ethanol costs less than gasoline and expands the available domestic fuel supply. Additionally, improving the fuel distribution infrastructure to accommodate higher ethanol blends is cost-efficient. A recent Stillwater Associates study estimates the cost of updating pump infrastructure nationwide to accommodate higher blends such as E30 at a range of 0.0024 cents per gallon to 0.0056 cents per gallon on a 15-year amortized basis.

Organization: Governors’ Biofuels Coalition

Consequently, we commend the EPA for acknowledging the use higher-octane E30 blends. The Coalition, however, respectfully recommends that EPA make the following changes to its final Tier 3 rule:

EPA should indeed establish an E30 certification fuel for model year 2017 and beyond. In answer to the Agency’s questions about the “appropriateness” of the current rules concerning approval of new certification fuels, the burdens of commercializing such a fuel should not be placed on the automakers as the relevant rule currently requires, since they have no control over the fuel manufacturing or distribution system. Instead, EPA should follow the successful 1970s transition from leaded to unleaded gasoline.

Organization: Growth Energy

Demonstration of Ethanol’s Emissions Benefits and Growth Energy’s Support of a Workable E30 Certification Fuel: We wholeheartedly agree with EPA’s assessment that the proposed standards “represent a ‘systems approach’ to reducing vehicle-related exhaust and evaporative emissions by addressing the vehicle and fuel as a system.” Growth Energy made substantive comments in this regard on the Agency’s proposed Greenhouse Gas Emissions and Corporate Average Fuel Economy Standards for 2017 and Later Model Year Light-Duty Vehicles aimed to aid the automakers as they design the next generation of vehicles to take advantage of ethanol’s octane and emissions properties, as well as a means to achieve the goals of the RFS. Numerous studies have shown that as our nation moves to smaller, higher-compression engines, higher octane fuels using ethanol will be required. These higher-octane fuels using ethanol should not be more expensive – like today’s premium. Later in these comments we present the results of a study that shows these fuels will likely be lower cost than today’s regular. EPA should insist that refineries and fuel producers not reduce the quality of our nation's fuel and potentially jeopardize the nation's air quality.

In particular, Growth Energy fully supports the use of E15 emission certification fuel and the introduction of a high octane, low-emission E30 certification fuel. We also have several concerns about some of the hurdles to the potential use of an E30 certification fuel. We also continue to stress the Agency's importance to the deployment of higher ethanol blends into the marketplace in order to fulfill the goals of improving air quality, reduce greenhouse gas emissions as well as to achieve the RFS volumes.

Growth Energy Supports a Workable, E30 Certification Fuel: Based on these findings, Growth Energy is very supportive of the Agency moving forward with an E30 certification fuel for emissions; however, we have significant concerns about some of the unnecessary hurdles that automakers would experience in order to use such a fuel based on EPA's proposal.

First, a requirement that the fuel be readily available nationwide is not workable. The distribution of fuels is largely dependent on some of ethanol's fiercest critics in the oil industry that continue to stifle the growth of any blends of ethanol above 10 percent. EPA should not hold the automakers accountable for the oil industry's effort to limit the availability of these fuels, and instead, should either allow the automakers to immediately certify their vehicles on E30 or otherwise require that it be made available nationwide.

Secondly, as we have shown, midlevel ethanol blends make significant contributions to our nation's air quality. As such, EPA should consider using its authority and weight to make E30 and other midlevel ethanol blends more available in the marketplace and should not penalize automakers for making vehicles capable of using such fuels. By requiring automakers to "demonstrate that vehicles would not operate appropriately on other available fuels" would run completely counter to their already well-established FFV production and the intent of making a Flexible Fuel vehicle.

Growth Energy is also concerned that the R-Factor of 0.6 in the current fuel economy equation could also prevent automakers from using an E30 certification fuel option because of its impact on the fuel economy standards. The current factor is based on the use of older engine technology using ethanol-free gasoline. Based on information contained in the docket for the proposal (Aaron Butler, "Analysis of the Effects of Changing Fuel Properties on the EPA Fuel Economy Equation and R-Factor"), a higher R-factor of 0.8 – 0.9 would be more accurate and may encourage automakers to use an E30 test fuel.

Finally, while we believe it is essential to remove these hurdles in order for automakers to use E30 as a certification and in-use fuel; we do, however, want to offer the agency the benefit of the extensive work and research we have done to get an in-use high octane, low-emission fuel into the national marketplace. Growth Energy commissioned two studies to look at both the refining cost, and distribution costs of developing a 92 Anti-Knock Index (AKI), E30 gasoline. These studies found that an E30 high octane blend can be produced for less than the cost of current gasoline, and that the development of the infrastructure over time is very affordable. Specifically, a 92 AKI E30 can be produced for between $11.7 billion and $30.8 billion per year less than the cost of current 88 AKI regular gasoline. Additionally, the costs to develop infrastructure at terminals and gas stations across the country ranged from $0.0024 to $0.0056 per gallon on a 15-year amortized basis. The complete studies are attached and are briefly summarized here:

MathPro Refinery Study Shows E30 is Less Expensive Than Today's Gasoline: The MathPro Refinery study [This study is can be found in Docket number EPA-HQ-OAR-2011-0135-4681-A4.] employed a linear programming (LP) model of the U.S. refining sector to estimate the main economic effects in the U.S. refining sector (including changes in the refining costs of transportation fuel) and on consumers of future fuel standards requiring the use of 92 AKI gasoline in HiTech vehicles. The refinery LP model incorporates the molar concentration blending method to represent ethanol's blending octane in the various ethanol/hydrocarbon BOB blends considered. This method produces estimates of the effective blending octane of ethanol in given ethanol/BOB blends that are functions of the molar fraction of ethanol in the blend, the octane of the BOB, and the octane of neat ethanol (109 RON/90 MON). After calibrating the refinery LP model to replicate reported operations of the U.S. refining sector in 2011, MathPro used the model to assess alternative assumptions on how the new fuel economy standards and increased ethanol use in the target years would affect the volume of U.S. gasoline exports in those years. They estimated the effects on refining economics and consumer costs of the various 92 AKI ethanol blend options by comparing the estimated costs returned by the refinery model in the 92 AKI Study cases with those in the corresponding 88 AKI Reference cases. Finally, they developed estimates in this manner for each of two assumed ethanol price scenarios: Low ethanol price: energy parity (¢/K BTU) with the wholesale price of 88 AKI E10, and High ethanol price: volumetric parity (¢/gal) with the wholesale price of 88 AKI E10. MathPro determined that the impact on the cost of transportation fuel was that the 92 AKI gasoline would be between $11.7 billion per year (ethanol at volumetric parity) and $30.8 billion per year (ethanol at energy parity) *less* than the current AKI 88 regular gasoline.

Stillwater Associates Marketing and Distribution Study Shows E30 Infrastructure is Very Affordable**:** Stillwater Associates examined the marketing and distribution costs of widespread distribution of E30 fuel to 2017 and later motor vehicles (and FFVs). Marketing and distribution costs consist of bulk transport of additional ethanol, modifications to terminals that store and blend ethanol with gasoline, and modifications to gasoline stations. Stillwater modeled three cases. In the first case, it was assumed that E30 would be blended at the terminal and delivered to the station. Both terminals and stations would incur costs because they are not currently capable of delivering E30 except for a limited number of Midwest localities. The cost of this case is estimated at $3.5 billion, an average of $37 thousand per participating service station or$.0024/gallon on a 15-year amortized basis. The second case recognizes that gasoline quality regulations could drive a different solution. This second case looked at a combination of terminal blending and service station blending. The case recognizes that in regions where Reid Vapor Pressure (RVP) is controlled by reformulated gasoline regulations or by State Implementation Plans, current gasoline can be blended with fuel ethanol through a "blender pump" at the service station to make E30 without requiring a special E30 blendstock. In the Conventional Gasoline areas where RVP is subject to the 1-psi waiver, the E30 would have to be blended with a separate gasoline blendstock at the distribution terminal and delivered to the gas station. The cost of the second case is estimated at $5.8 billion, an average of $62 thousand per participating service station or $.0040/gallon on a 15-year amortized basis. The third case examined the cost of doing all the E30 blending at the service station through blender pumps and assumes the RVP regulatory issues for E30 have been addressed. This option provides the retailer with the greatest level of flexibility for offering different blend levels, but also has the highest cost. The estimated cost of this case is $8.1 billion, or $87,000 per participating station. Spread over the 15 year life of the equipment, the cost of the changes is estimated to be $0.0056 per gallon.

Organization: INEOS Bio

INEOS Bio is helping develop new and innovative ways to help fuel America and the world; providing cleaner burning cellulosic ethanol that helps reduce greenhouse gas emissions and provide more sustainable sources of fuel and energy. Achieving our nation's goals of less dependence of foreign sources of oil and cleaner fuels will require our economy to transition to sustainable energy resources and higher levels of energy efficiency. Toward this end, federal policy and regulations—including the proposed rule as well as the federal Renewable Fuel Standard (RFS) and EPA's consistent support and implementation of that policy—play an important role in helping to drive the commercialization of these technologies. The importance of federal policy is particularly critical in the transportation fuel sector. The U.S. transportation system is overwhelmingly and unsustainably reliant on petroleum fuels. These traditional fuels are a large component of the U.S. greenhouse gas (GHG) emissions inventory and our overdependence on foreign sources of energy. Rapid transition to more alternative transportation fuels is essential to reducing GHG emissions and reducing U.S. reliance on foreign sources of energy.

INEOS Bio also supports EPA's proposal to allow vehicle manufacturers to request approval for an alternative certification fuel such as a high-octane E30 blend for vehicles they might design or optimize for use on such a fuel. INEOS Bio is aligned with EPA's assertion in the proposed rule that "[t]his 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.

We commend EPA's efforts to transition the emissions test fuel to better reflect the current and future in-use fuel as it begins to contain greater volumes of biofuels resulting from the continued development and commercialization of biofuels and increased RFS volumes in the market. INEOS Bio believes that EPA should work to set the emissions test fuel to promote the highest achievable level of ethanol and octane in the U.S. fuel supply and thus lower the maximum aromatics and lowest additive concentration (LAC) content in gasoline accordingly. This action would help EPA meet one of its stated goals of this rulemaking to address the impacts of motor vehicles and fuels on air quality and public health without increasing gasoline prices. To this end, we believe the final rule should allow for ongoing and greater use of E85 and E15, as well as the transition to higher blends of ethanol and advanced biofuels.

INEOS Bio also supports EPA's proposal to allow vehicle manufacturers to request approval for an alternative certification fuel such as a high-octane E30 blend for vehicles they might design or optimize for use on such a fuel. As described above, we agree with EPA that this provision could help auto manufacturers meet their CAFE requirements and further displace aromatics content in gasoline. The benefits of Tier 3 that include lower sulfur, aromatics reductions, combined with higher octane and increased use of renewables are significant, and I urge you to work to finalize this standard as soon as possible and subsequently include them in any future joint proposals such as CAFÉ, and National Program standards.

Organization: International Council on Clean Transportation (ICCT)

The draft proposal requested comments on the use of E30 in certification testing: ‘We are 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.’

The ICCT is supportive of all ways to increase efficiency. In particular, the ICCT would strongly support increasing the minimum required octane for all gasoline.

Despite this, the ICCT could support the E30 provision only if the vehicles actually used E30 the vast majority of the time in-use. However, this would create major infrastructure difficulties: how would the E30 infrastructure be developed in advance of offering E30-capable vehicles? It also has potentially troubling consequences related to food-based high-iLUC ethanol, as discussed above with respect to E15.

An entirely new infrastructure would be needed for E30, which means a huge chicken-and-egg problem. Just like with E85, one way to attempt to solve this is to offer credits to E30 vehicles, whether or not they actually use E30 in-use. The ICCT is extremely concerned that this will become another loophole, with large credits against the CO2/CAFE standards granted and little use in the real world, reducing the benefits of the standards. Our concerns are magnified by the recent EPA Manufacturer Guidance Letter on E85 usage, which proposed to grant flexible-fueled vehicles a 20% E85 usage rate (F-factor), even though E85 usage in the real world has remained steady at 1.1% since 1998.

Our infrastructure concerns are exacerbated by the fact that E30 has 10% lower energy content than gasoline. Certainly some of this can be recaptured with higher efficiency, but it won’t be a 10% efficiency improvement. Thus, customers will be able to travel further on gasoline (or E10 or E15) than with E30, unless the vehicle is designed so that it does not run well on E10 or E15.

Which raises another concern with vehicles designed for E30. A recent SAE paper on the impacts of ethanol blends reviewed what happens when a vehicle designed for E30 is run on 87-octane gasoline:

‘With engine downsizing, the reduction in full load torque with regular grade 91 RON fuel will be proportional to the amount of downsizing, and can result in unacceptable vehicle performance attributes for aggressive levels of downsizing.’

This loss of performance on regular fuel just makes the chicken-and-egg problem worse. Engines that require E30 are going to be a tough sell in the market.

Given the infrastructure concerns, E30 must offer substantial efficiency benefits to justify the investment in a new infrastructure. Thus, the key question is: What is the efficiency benefit of running on E30 compared to alternative technologies? The Stein 2013 SAE paper concluded: 'From an engine standpoint, the primary motivation for increasing ethanol content is improved knock resistance'. However, high EGR rates also offer improved knock resistance. If E30 basically duplicates the benefits of boosted-EGR, it is hard to see how creation of a new infrastructure can be justified.

Given all of the above, E30 should only be allowed if the manufacturer can demonstrate that the vehicle will almost always be refueled with E30 in-use. Given the historical abuse of similar provisions, such as FFV credits and the recent proposal for 20% F-factor for FFVs, the ICCT is very concerned about the potential to also abuse this provision.

The ICCT is also concerned about the revision to use E-15 for test fuel. This is acceptable for certification vehicles, but it appears the EPA is also proposing to use E-15 for fuel economy testing. Fifteen percent ethanol provides significant evaporative cooling in the cylinder, which would allow manufacturers to make modifications to improve fuel economy in the test cycles, but which would not necessarily be achieved end use.

Organization: Marathon Petroleum Company LP (MPC)

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?

Organization: National Association of Convenience Stores (NACS) and Society of Independent Gasoline Marketers of America (SIGMA)

Neither stakeholders nor regulators can predict all future changes in gasoline vehicle technologies or in-use fuels. The proposal contains specific specifications for high-octane formulations, but specifies that these fuels would be ethanol-based, such as E30. Other high-octane fuel formulations would require different fuels to undergo a potentially lengthy and expensive petition process for approval as test fuels.[6] The final rule should not pick winners and losers in this regard. Ethanol may be the octane of choice at present, but EPA should allow for and encourage new fuels to come to market rather than impose artificial impediments to innovation.

Organization: National Marine Manufacturers Association (NMMA)

NMMA testified at the CARB Board hearing requesting that the board also allow for the use of an alternative California certified advanced biofuel, if available.

EPA requests comment regarding an option that would allow vehicle manufacturers to certify using a 30 percent by volume ethanol blend (E30) in recognition that E85 has not met EPA's expectations and to encourage light duty vehicle manufacturers' efforts to continue to determine what might be the optimal ethanol content. Given the large difference in oxygen content between E10 and E30 this approach will only cause further confusion and misfueling of marine engines when E30 reaches the marketplace, as would appear to be inevitable based on EPA's proposal. This bifurcated approach of allowing E10, E30 and E85 in the marketplace does nothing to address the root problems associated with ethanol-enhanced fuels: ethanol is not gasoline.

Organization: Renewable Fuels Association (RFA)

We support the proposal allowing vehicle manufacturers to request approval for an alternative certification fuel.

The RFS2 calls for the continuing increase of ethanol content in gasoline. RFA supports the continued oversight by EPA on upcoming vehicle and fuel technology (specifically, recent research that suggests increasing the ethanol content in gasoline commensurate with improvement in octane can provide a vast improvement in vehicle efficiency, fuel economy and emissions). The auto industry has requested the use of increased ethanol content with increased octane in an effort to achieve future requirements for the reduction of greenhouse gas emissions. (Auto Alliance letter dated October 2013.) Further, the RFA commissioned a study of future influences and importance of fuel octane on future engine developments by Ricardo. Auto manufacturers will continue to build vehicles reliant on liquid motor fuels that rely on newly developed engineering improvements to address converging regulatory requirements for reductions in greenhouse gas emissions and pollutants. Ricardo concludes that "during the next decade internal combustion engines will become significantly more efficient due to pressures from regulatory and consumer preference. Similarly, higher minimum fuel octane number will facilitate the engine technologies that will boost specific power and engine efficiency. Future powertrain solutions will have a natural thirst for higher octane fuels."

Extensive research is being completed by Original Equipment Manufacturers and others to further understand the benefits to increasing ethanol content in the current motor fuel pool.

The most significant benefit of higher ethanol blends is the boost to the fuel blend’s octane rating, nearly a 4 to 7 Research Octane Number increase from an additional 10 to 20% ethanol. A recent Ford Motor Company publication concludes “higher minimum octane ratings for regular-grade fuel would enable higher compression ratios in future vehicles and is an opportunity to provide greater engine efficiency and meet increasingly stringent fuel economy regulations and expectations. Additionally, the change could benefit all vehicles powered by spark-ignited engines, including PFI and DI engines, hybrid electric vehicles (HEVs), and plug-in hybrid vehicles (PHEVs).”

This newly developing evidence suggests that ethanol’s contribution to the octane level of the gasoline pool may only beginning to be realized; additional and greater benefits of using ethanol to increase gasoline’s octane provide benefit beyond optimum performance.

However, we are concerned that EPA’s proposed criteria for acceptance of a petition for an alternative certification fuel may be unrealistic and could discourage automakers from pursuing such a petition. Specifically, the proposed conditions that an automaker must “...demonstrate that such a fuel would be used by the operator and would be readily available nationwide,” and that “...vehicles would not operate appropriately on other available fuels” may severely limit the automakers’ ability or desire to utilize the alternative certification fuel petition process.

Organization: Mercedes-Benz USA, LLC on behalf of Daimler AG

Mercedes-Benz acknowledges the EPA’s request for comment on the incorporation of a higher octane, mid-blend certification fuel such as E25 as a key enabler for GHG reduction. Octane is the single most important property of gasoline when determining engine design. Higher octane fuels permit higher compression ratios which directly improve efficiency while downsizing engines also results in greater fuel efficiency. The optimized combination of those two actions with gasoline direct-injection provides remarkable gains in fuel economy but requires high octane market fuel - higher octane than is available today. Additionally, higher octane, traditionally provided through selective petroleum refining and blending, can be further increased through the addition of ethanol in blends between 20-25 percent by volume. This powerful fuel enjoys both reduced carbon intensity as well as the renewable aspects of ethanol. A vehicle equipped with a powertrain which is optimized for a high-octane, mid-blend ethanol fuel (hereafter referred to as ‘Tier 3 Fuel’) can simultaneously fulfill what the customer desires - performance and economy, while reducing the environmental impact. Mercedes-Benz vehicle offerings include those with E25 capability in various global markets and could be introduced them to the US market if regulatory and commercial conditions warrant. However, in order to harmonize with global markets, ethanol blend levels should be limited to 25% v/v as the effort to perform engine development, validation and certification for blends greater than E25 is quite substantial and necessary to determine hardware compatibility.

One aspect not reduced is the customer expectation of performance, even in the wake of regulations mandating improved fuel economy. Thus, another key enabler in reducing greenhouse gas contributions while maintaining performance is increased octane and gasoline. Octane is the single most important property in gasoline when determining engine design.

Higher octane fuels permit higher compression ratios which directly improve efficiency. Downsizing engines also results in greater fuel efficiency.

The optimized combination of these two actions with gasoline direct injection provides remarkable gains in fuel economy, but requires high octane market fuel, higher octane than is available today. Additionally, higher octane traditionally provided through selective petroleum refining and blending can also be further increased through the addition of ethanol and blends greater than 20 percent by volume. This powerful fuel enjoys both reduced carbon intensity as well as the renewable aspects of ethanol.

A vehicle equipped with a power train, which is optimized for a high octane mid-blend ethanol fuel can simultaneously fulfill what the customer desires, performance and economy, while reducing the environmental impact. In fact, Mercedes-Benz vehicle offerings include those with E-25 capability in various global markets, and can introduce them in the U.S. if regulatory and commercial conditions warrant.

To summarize, the synergy of mid-blend ethanol and higher octane based fuel in the proposed rulemaking opens the door to far greater possibilities in greenhouse gas and criteria emission reduction. Mercedes-Benz fully supports these proposed changes in certification and market fuel,

Organization: American Motorcyclist Association (AMA)

In its Tier 3, rule, the EPA proposes to change the certification fuel to E15, with an allowance for manufacturers to petition the EPA for an E30 certification. This, proposal, if promulgated, will create an environment where this country will have a bifurcated fleet of engines requiring different types of fuel.

Organization: Truck and Engine Manufacturers Association (EMA)

EPA requests comment regarding an option to certify Tier 3 on-highway vehicles using a 30 percent volume ethanol blend (E30). (78 Fed. Reg. at 29938.) In many respects, a bifurcated certification test fuel option to certify engines/vehicles utilizing an ARB-aligned (E10) certification test fuel, or a new alternative E30 certification test fuel, could provide a viable strategy for both RFS-2 compliance and engine/vehicle compatibility on a long term basis.

Existing light-duty flexible-fuel vehicles would provide a market for E30 fuels until such time as engines/vehicles designed specifically for E30 would be available in the marketplace. If a manufacturer of a gasoline-fueled nonroad, motorcycle, heavy-duty on-highway engine determined there was sufficient customer interest, unique E30-certified products could be developed and marketed utilizing the alternative E30 certification test fuel.

EMA recommends that EPA work with industry to identify and implement the appropriate ethanol content for such an alternate certification test fuel.

Our Response:

We received a large number of comments regarding our statement that manufacturers under certain situations could utilize an existing regulatory provision, 40 CFR 1065.710(c), to petition the Administrator for approval of an alternative test fuel such as a higher octane, higher ethanol content gasoline. Many of these comments focused on whether it is appropriate for EPA to use its authority to encourage or require widespread availability and/or use of such alternative fuels (e.g., higher octane blends, E30, isobutanol, etc.) These commenters appear to have misunderstood the purpose of the change in emission test fuel specifications. EPA is using its Clean Air Act section 206 authority to establish requirements for emission certification testing, including specifications of the emissions test fuels with which vehicles demonstrate compliance with emissions standards, in order to better reflect the ethanol content and other properties of in-use fuels. While we are taking action to limit sulfur content in in-use gasoline under authority in Clean Air Act sections 211(c)(1) and (2), we did not propose other changes to in-use fuels. Any action related to increasing the ethanol level of in-use fuels is outside the scope of this rulemaking.

The alterative certification fuel provisions are intended to allow manufacturers to request approval from EPA to certify vehicles that they design, build, and market to run on fuels other than those for which we have established certification test fuel requirements. In the past, the Agency has approved alternative fuels such as natural gas in response to petitions under this provision.

4.5.1.6. Changes to In-Use Gasoline Other than Sulfur Content

What Commenters Said:

Organization: Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

Benefits of Lower RVP:
In the summer of 2011, EPA sponsored a testing program that was designed to monitor evaporative emissions, canister loading profiles, and breakthrough emissions from extended multiday diurnal testing using 9 and 10 psi RVP fuels on 9 vehicles. In the spring of 2012, the Alliance and Global Automakers sponsored follow-on testing on a subset of the original vehicles, using 7 psi RVP E10 fuel in order to provide a more comprehensive set of data. The results of the study were published in Effects of 7, 9, and 10 psi Vapor Pressure Fuels on Multi-Day Diurnal Evaporative Emissions of Tier 2 and LEV II Vehicles, © SAE paper 2013-01¬1057, which was presented at the 2013 SAE World Congress in Detroit, MI. The light-duty vehicles used in the testing program were either certified to Tier 2 federal standards or the current most stringent evaporative emission standard in the U.S. – California's Low Emission Vehicle (LEV II) Partial Zero Emission Vehicle (PZEV) standard. The test procedure for both phases of the testing program consisted of continuous monitoring over 14 days, which is 11 to 12 days beyond normal testing procedures, of the federal diurnal cycle for evaporative emissions (72° F to 96° F). Figure 2.

For all five vehicles tested, the 7 psi RVP fuel resulted in the least amount of hydrocarbon slip emissions from the vehicle's carbon canister over the 14-day period, relative to the 9 and 10 psi RVP fuels. The data show that the 7 psi RVP fuel resulted in the least amount of evaporative emissions, with the 9 psi RVP fuel resulting in more evaporative emissions relative to the 7 psi RVP, and the 10 psi RVP resulting in the most hydrocarbon slip emissions. This demonstrates that appropriate reductions in fuel vapor pressure lead to reduced evaporative emissions.

Meeting the more stringent evaporative emissions standards of Tier 3 is made possible through coordination of the "fuels and vehicle as a system" -- as consistently emphasized in the Tier 3 NPRM. The reduction in summertime market fuel vapor pressure could benefit the entire car park from day one. In the NPRM, the EPA notes that "attention is needed to insure better in-use performance of current evaporative emissions." A reduction in market fuel summertime vapor pressure would reduce the evaporative emissions performance of in-use vehicles and address EPA's concern.

Tier 3 Summertime Market Gasoline RVP Cap should be 8 psi (9 psi for E10) (per Federal VOC Control Season):
This would result in a maximum 9 psi RVP E10 market fuel, including the statutory one pound waiver. The most effective method of controlling prospective evaporative emissions in conventional gasoline use areas would be to move promptly to lower the maximum allowable RVP to compensate for the 1 psi waiver, perhaps to 8 psi. When the statutory mandate for the 1 psi ethanol waiver is added, the fuel would then become 9 psi, as it was before the introduction of ethanol. Similar to EPA's proposed market sulfur standard, this would bring about an immediate reduction in summer light duty evaporative emissions without waiting for the fleet to turn over. In addition, there would be reductions in evaporative emissions from all gasoline powered equipment, further enhancing the benefits of this approach.

10 psi RVP gasoline hinders States seeking to avoid backsliding out of attainment, or neighboring states trying to meet State Implementation Plans (SIPS) to reduce criteria pollutant emissions.

9 psi RVP Market and Test Fuel is Important to Avoid Emission Backsliding: EPA has an overdue obligation under the Congressional mandate in §209 of EISA (and implemented in section 211(v) of the CAA) which requires EPA to complete an anti-backsliding study, and promulgate fuel regulations to implement appropriate mitigation measures, if needed, based upon that study. EPA should complete that study immediately and undertake its mitigation rulemaking to address market fuel RVP.

Organization: American Coalition for Ethanol (ACE)

Along those same lines, ACE recommends immediately extending the 1 lb waiver to blends from E11 to E50), as each additional percentage above 10% ethanol lowers Reid vapor pressure below that of nearly all gasoline sold in the United States. Adding ethanol to E10 will lower its volatility, and much in the same way EPA has suggested its rules might allow biobutanol to be added under an 'averaging' policy, we believe a similar approach would allow ethanol to be added to E10 to create compliant fuels with between 11 and 50 percent ethanol. Rather than singling out E15, E30, or any other higher ethanol blend and requiring it to meet higher standards than other fuels, we believe that rules should welcome blends that are cleaner than the current industry standard E10.

Organization: National Marine Manufacturers Association (NMMA)

EPA requests comment regarding the option of allowing the use of CARB E10 certification test fuel through model year 2019 with a Reid Vapor Pressure (RVP) of 10 psi (78 Federal Register 29895). EPA currently provides a 1 psi waiver for E10, but this waiver will not apply to E15. NMMA recommends that the 1 psi waiver also be eliminated for E10. EPA finalized a rule in 2010 that requires boat builders to meet stringent new evaporative emission requirements. California is currently in the process of finalizing a rule. In order to meet these new emission standards, marine engine manufacturers need a combination of new technology and a fuel with a minimum evaporation rate.

Organization: General Motors LLC (GM)

But for the one pound waiver, E10 would be 9 psi or lower, which it is in many parts of the country. As discussed further below, for both vehicle performance and environmental benefits, we advocate that EPA reduce market fuel E10 RVP to 9 psi (by making the vapor pressure standard at 8 psi, which, with the E10 one pound waiver, would make E10 9 psi).

Tier 3 Certification Fuel RVP and Marketplace Fuel RVP Should both be 9 RVP during the Summer VOC Control Season. Benefits of Lower RVP: In the summer of 2011, the EPA sponsored a testing program that was designed to monitor evaporative emissions, canister loading profiles, and breakthrough emissions from extended multiday diurnal testing using 9 and 10 psi RVP fuels on 9 vehicles. In the spring of 2012, the Alliance of Automobile Manufacturers and the Association of Global Automakers sponsored follow-on testing on a subset of the original vehicles, using 7 psi RVP E10 fuel in order to provide a more comprehensive set of data. The results of the study were published in Effects of 7, 9, and 10 psi Vapor Pressure Fuels on Multi-Day Diurnal Evaporative Emissions of Tier 2 and LEV II Vehicles, © SAE paper 2013-01-1057, which was presented at the 2013 SAE World Congress in Detroit, MI. The light-duty vehicles used in the testing program were either certified to Tier 2 Federal standards or the current most stringent evaporative emission standard in the U.S. – California's LEV II Partial Zero Emission Vehicle (PZEV) standard.

For all five vehicles tested, the 7 psi RVP fuel resulted in the least amount of hydrocarbon slip emissions from the vehicle's carbon canister over the 14-day period, with the 9 psi RVP fuel resulting in more evaporative emissions relative to the 7 psi RVP, and the 10 psi RVP resulting in the most hydrocarbon slip emissions. This demonstrates that appropriate reductions in fuel vapor pressure lead to reduced evaporative emissions.

Meeting the more stringent evaporative emissions standards of Tier 3 is made possible through coordination of the "fuels and vehicle as a system" as consistently emphasized in the Tier 3 NPRM. The reduction in summertime market fuel vapor pressure could benefit the entire car park from day one. In the NPRM, EPA notes that "attention is needed to insure better in-use performance of current evaporative emissions." A reduction in market fuel summertime vapor pressure would reduce the evaporative emissions of in-use vehicles and address EPA's concern.

Tier 3 Summertime Market Gasoline RVP Cap should be 8 psi (9 psi for E10): The most effective method of controlling prospective evaporative emissions in conventional gasoline use areas would be to move promptly to lower the maximum allowable RVP to compensate for the 1 psi waiver, perhaps to 8 psi. When the statutory mandate for the 1 psi ethanol waiver is added, the fuel would then become 9 psi, as it was before the introduction of ethanol. Similar to EPA's proposed market sulfur standard, this would bring about an immediate reduction in summer light-duty evaporative emissions without waiting for the fleet to turn over. In addition, there would be evaporative emissions reductions from all gasoline powered equipment, further enhancing the benefits of this approach.

10 psi RVP gasoline hinders states seeking to avoid backsliding out of attainment, or neighboring states trying to meet State Implementation Plans (SIPS) to reduce criteria pollutant emissions.

9 psi RVP Market and Test Fuel is Important to Avoid Emission Backsliding: EPA and the U.S. Congress are concerned about the air quality impacts of the higher RVP E10 blends that have swept across large portions of the nation. Under the Energy Policy Act of 2005, EPA is mandated to undertake a "backsliding analysis" consisting of the following components: draft analysis, final analysis, emissions model, and a permeation effects study including evaporative emissions. Not content with the direction contained within the 2005 Energy Policy Act, Congress, within the Energy Independence and Security Act of 2007, wrote a section, 209, entitled "anti-backsliding". In this section, Congress again directed that "the Administrator shall complete a study to determine whether the renewable fuel volumes required by this section will adversely impact air quality as a result of changes in vehicle and engine emissions of air pollutants regulated under this Act." Further, Congress directed that "Not later than 3 years after the date of enactment of this subsection, the Administrator shall— '(A) promulgate fuel regulations to implement appropriate measures to mitigate, to the greatest extent achievable, considering the results of the study under paragraph (1), any adverse impacts on air quality, as the result of the renewable volumes required by this section; or (B) make a determination that no such measures are necessary.'''

EPA has a congressionally mandated duty to complete the anti-backsliding study and to promulgate fuel regulations to implement appropriate mitigation measures based upon that study. It is in that mitigation rulemaking that EPA should determine the appropriate RVP of gasoline (certification and market gasoline). To regulate certification fuel RVP in this Tier 3 rule puts the cart before the horse. Moreover, EPA is trying to fix a problem it sees with in-use gasoline RVP that Congress has instructed EPA to study and fix with fuel regulations under its RFS authority. GM does not believe that increasing certification fuel stringency for an evaporative emissions test that will phase in over the next seven years qualifies as "to the greatest extent achievable." EPA must pursue the appropriate mitigation measures through a separate rulemaking that is informed by the results of its study.

Organization: National Automobile Dealers Association (NADA)

EPA should adopt a nationwide Tier 3 summertime market RVP cap of 8 psi for E0 and 9 psi for E10. In addition to enabling Tier 3 compliance, doing so result in evaporative emission reduction benefits for the in-use fleet.

Organization: Ford Motor Company (Ford)

Market Fuel Vapor Pressure Must be Controlled Based on Seasonal Ambient Temperatures: Vapor pressure is the most important property for engine start-up performance. At higher ambient temperatures, the fuel can vaporize prematurely prior to reaching the injectors, disrupting the fuel flow to the engine and creating “vapor lock”. As defined in ASTM D4814, vapor lock conditions arise “if too much vapor is formed, the fuel flow to the engine can be decreased, resulting in loss of power, rough engine operation, or engine stoppage.” During cold ambient temperatures, fuels with vapor pressures that are too low can prevent the engine from starting at all or have poor warm-up performance. Thus, the vapor pressure and distillation profile of gasoline must be controlled based on seasonal ambient temperatures so that fuel vaporizes easily (higher vapor pressure) in cold weather to assist in engine starting and vaporizes less easily (lower vapor pressure) in warm weather so as to prevent vapor lock and reduce evaporative emissions. Evaporative emissions of hydrocarbons from the fuel system can occur not only during vehicle operation, but while the vehicle is at rest during periods of increasing ambient temperatures. Numerous studies have shown that the vapor pressure has a profound effect on the amount of hydrocarbon evaporative emissions.

Recommendation: Ford supports the reduction in market fuel vapor pressure as detailed in the Alliance comments. Ford supports an ambient temperature (seasonally) appropriate 8 psi (9 psi for E10 due to the 1psi waiver) vapor pressure maximum for market fuels. Likewise, Ford also supports a 9 psi maximum Tier 3 certification fuel.

Organization: POET, LLC

RVP limits must not be a barrier to the use of higher ethanol blends. RVP is a measure of gasoline volatility that EPA regulates to address summer ozone (smog) issues. Under the statutory framework, CAA Section 211(h) mandates that EPA shall limit introducing ‘into commerce gasoline with a Reid Vapor Pressure in excess of 9.0 pounds per square inch (psi)’ and further limit RVP in certain nonattainment areas.

Notably, the RVP provisions in CAA Section 211(h) only control ‘gasoline.’ Because E10 and E15 have been considered part of the gasoline family, these ethanol blends have been regulated by these provisions. However, ethanol alone doesn’t cause RVP issues, because ethanol itself has very low vapor pressure. Furthermore, EPA notes that as ‘the ethanol level increases, the volatility increase caused by blending ethanol with gasoline begins to decline.’

Because ethanol blended with gasoline to make E10 can have a RVP slightly above the regulatory limit, CAA Section 211(h)(4) provides a 1 psi RVP ‘ethanol waiver.’ In particular, section 211(h)(4) specifies that ‘For fuel blends containing gasoline and 10 percent denatured anhydrous ethanol, the Reid vapor pressure limitation under this subsection shall be one pound per square inch (psi) greater than the applicable Reid vapor pressure limitations.’

Although ethanol blends greater than 10% generally have lower RVP than E10, such blends may nonetheless be slightly over the regulatory limit and thus merit the use of the 1 psi waiver. These ethanol blends over 10% are critical to ensure that the RFS standards are met, and they provide a host of environmental and energy-security benefits. It would be the height of poor policy design by EPA to bar cleaner fuels that nonetheless may slightly tick over an RVP threshold when a waiver is given to fuels with a higher RVP.

If RVP issues are not otherwise addressed, then the current 1 psi waiver should be applied to all ethanol blends over E10 (i.e., E11 and above).

Alternatively, the above statutory provisions in CAA Section 211(h)(4) granting the 1 psi waiver to ethanol blends should be read as only requiring a minimum 10% ethanol content. EPA wrongly rejected this approach whereby the ‘10 percent’ threshold should be construed as requiring ‘at least’ 10 percent ethanol. EPA reached this approach by indicating that its interpretation ‘harmonizes’ sections 211(h)(4) and 211(h)(5). Section 211(h)(5) requires EPA to not apply the 1 psi waiver on petition by the Governor of a State that the waiver will ‘increase emissions that contribute to air pollution in any area in the State.’

However, EPA’s bar on extending the E10 waiver to E15 is not compelled by the statutory language. EPA ignores that in subsections 211(h)(4) and 211(h)(5) the references to ‘fuel blends containing gasoline and 10 percent’ ethanol used in both can (and should) be interpreted to mean gasoline fuel blends containing at least 10% ethanol. Additionally, the statute here references ‘blends’ in the plural, suggesting that an EPA interpretation focusing only on E10, while ignoring other blends with at least 10% ethanol, is improper.

Furthermore, EPA’s bar on extending the E10 waiver to E15 is inconsistent with prior rulemakings, and Congress’ understanding of these prior rulemakings. Congress based the 1 psi waiver in section 211(h)(4), in part, on EPA’s 1987 rulemaking that established national volatility limits for gasoline but expressly allowed E10 to exceed the general RVP limits by 1 psi. In EPA’s 1987 rulemaking, EPA established a minimum ethanol content ‘to assure that fuel containing only trace amounts of alcohol does not qualify’ for the waiver. Furthermore, EPA’s 1 psi waiver prior to the 1991 amendments expressly applied to fuels containing ‘at least 9% ethanol.’

Additionally, EPA’s current approach is inconsistent with legislative history in enacting 211(h)(4). In particular, Section 216 of House Bill 3030 (1990), which eventually merged with Senate Bill 1630 to amend the CAA, made clear the 1 psi waiver was applicable to ‘gasoline containing at least 10 percent ethanol.’

Additionally, EPA’s current approach bars the use of an environmentally preferable fuel (E15), because its improved RVP still merits use of the 1 psi waiver, which is illogical.

Furthermore, EPA glosses over the fact that 211(h)(5) was enacted as part of the Energy Policy Act of 2005 whereby Congress set RFS targets that would mandate the greater use of ethanol blends. EPA’s barring the extension of the 1 psi waiver (1) conflicts with precedent, and (2) frustrates the flexibility to use different ethanol blends to meet RFS targets enacted in the same

EPAct 2005 legislation, and should be reversed. And EPA can do so by simply changing its statutory interpretation.

Additionally, subsequent to EPA's 2011 misguided interpretation, blend wall concerns that have arisen placing a premium on EPA allowing the increased distribution of E15 into commerce. Quite simply, EPA should change its interpretation and allow extension of the 1 psi waiver to blends that contain at least 10% ethanol, as the statute allows. By doing so, EPA would promote the distribution of E15 and MLEBs and help to 'ensure' that the mandated RFS volumes are met.

Organization: Renewable Fuels Association (RFA)

RFA believes EPA should provide equal RVP treatment for E10 and E15. EPA should be consistent in its treatment of RVP requirements for all ethanol blends up to 15% by volume. EPA's initial decision to grant the 1 psi waiver to E10 blends was based on two fundamental findings: 1) that supplies of low-RVP gasoline blendstock for E10 blending were insufficient, and 2) that the increased volatility associated with the 1 psi waiver was more than offset by reduced carbon monoxide and exhaust hydrocarbon emissions from E10. Recent analyses have shown that the vapor pressure of E15 is lower than it is for E10. Further, there is evidence that E15 provides greater reductions in carbon monoxide and exhaust hydrocarbon emissions than E10. Currently there is insufficient low-RVP gasoline blendstock to accommodate E15 blending (i.e., without a 1 psi waiver). Thus, the same two findings that led EPA to issue the 1 psi waiver for E10 also apply to E15. As such, if the 1 psi waiver continues to apply to E10, there is no logical reason that it should not also be applied to E15.

On the other hand EPA should consider eliminating the 1 psi waiver for E10 provided that RVP caps are administered consistently across all ethanol blend levels. That is, if EPA decides to discontinue the 1 psi waiver for E10, it should do so immediately so that E10 and E15 are being treated consistently in the marketplace with regard to RVP. This is a critical issue for the near term for E15 to expand in the marketplace. Discrepancies in the treatment of RVP limits for E10 and E15 are impeding the introduction of E15. Consistent treatment of RVP requirements for ethanol blends up to E15 will reduce the potential for more "boutique fuels" and maximize flexibility for refiners and gasoline marketers.

Organization: Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

A national minimum octane number of 87 AKI without regard to altitude is needed as a Federal Tier 3 standard for regular gasoline

A uniform, nationwide minimum octane grade of 87 AKI (Antiknock Index) is needed to support MY 2017 vehicle performance, fuel efficiency, and emission reductions. 85 AKI octane grade is no longer relevant for high altitude use, and lower octane can cause newer engines to perform poorly. For some time, all OEMS have designed and engineered vehicles to run on 87 AKI, and all recommend use of minimum 87 AKI for regular gasoline (without regard to altitude) in vehicle owner's manuals.

Federal action is specifically needed to avoid a patchwork of State octane standards allowing for use of 85 octane grade gasoline, even in some locations that don't qualify as high altitude, such as South Dakota where access to >85 AKI gasoline in the western part of the State became limited and problematic. EPA should prevent backsliding of octane levels in refinery BOB (blend stock for oxygenate blending) because it leads to sub-grade octane product, and in some areas also stimulates interest in use of metallic additives to boost octane, which are opposed by automakers (see below).

The AKI (octane number of gasoline, also referred to as the octane grade or rating, is a measure of its antiknock performance, or resistance to engine knock (often called spark knock because it is affected by the spark timing of the engine, among other factors). It is based on an index taken from an average of two different test outcomes, the RON (Research Octane Number) and the MON (Motor Octane Number). The higher the AKI octane number, the greater the fuel's resistance is to knock. Spark knock is an abnormal combustion event that creates an acoustic wave in the combustion chamber, causing a pinging sound. If the knock is severe enough, it can damage the engine.

It is widely documented that a gasoline's octane number rating and a vehicle's performance are directly linked.

The U.S. General Accounting Office (GAO) reported on the importance of consumers understanding the proper gasoline octane rating number to select for their vehicles. The GAO stated: "Consumers need to buy gasoline with an octane rating that matches their engines' octane requirements. Buying gasoline with too little octane can cause engine knock, which can damage an engine, lower engine efficiency, reduce mileage, and increase emissions'.

Since the mid-1980s, U.S. vehicles have included computer controls to monitor combustion performance and mitigate auto-ignition (knock) by way of three mechanisms: retarding or delaying ignition timing, fuel enrichment to cool the in-cylinder end-gas environment, and, in the case of pressurized air induction equipped vehicles, reducing the level of boost or super-charging in order to rapidly and momentarily reduce engine output. These mechanisms protect the engine from acute and potentially severe damage. However, they result in sub-optimal combustion, lower engine efficiency, and in the case of ignition timing delay, result in higher exhaust temperatures. Although the sophistication and speed of modern vehicle computer controls has increased greatly since the 1980s, these three primary mechanisms of knock control are still widely used.

As vehicle manufacturers strive for increasingly efficient designs, the vehicle hardware and calibrations have been significantly upgraded, putting modern vehicles closer than ever to spark knock limited operation. For example, as a result of increased number of transmission gears, more frequent operation at lower engine speeds for a given vehicle speed puts the engine at a risk of low speed spark knock. Additionally, exhaust emission reduction catalysts are increasingly "close coupled" to the exhaust manifold to enable their early light-off and high oxidation efficiency; however, this makes them more susceptible to temperature spikes (thermal stresses) from auto-ignition events. And because vehicle sizes and therefore their masses remain relatively high while engine displacements are quickly dropping, the load factor under which an engine operates is rapidly increasing. In total, today's vehicles and their computer controls are constantly monitoring and optimizing to the available gasoline octane number in the vehicle's fuel tank.

The continued presence of 85 and 86 AKI octane grade gasoline, predominantly in the U.S. Rocky Mountain States, is limiting vehicle efficiency and performance.

U.S. automobiles have been designed for 87 AKI gasoline since the mid-1970's, when the octane-enhancing organometallic additive tetra-ethyl lead was phased out. As a result of lead removal, the predominant gasoline octane number of Regular Unleaded was reduced from 91 / 92 AKI to 87 AKI and engine compression ratios were reduced from 9.0 – 10.5: 1 to 7.5 – 8.5:1. By contrast, a review of 2012 Model U.S. Car and Light Truck Specifications and Prices from the Wards Auto group shows compression ratios have again risen substantially since the 1970's to 10.5 – 11.5:1 for naturally aspirated engines, while the predominant U.S. Regular Unleaded gasoline octane rating remains at 87 AKI. [

Recent Vehicle Performance Testing using 85 AKI Gasoline [

NOTE: The information in this section of the comments is from an unpublished Alliance study; it is Alliance work product and protected under copyright. [

In early 2013, the Alliance completed the test portion of a study to measure the magnitude of performance effects of operating vehicles on lower octane rating gasoline than for which they were designed. For this study, two 2012 production vehicles were tested in the General Motors Milford Proving Grounds "variable altitude" emissions facilities during January and February, 2013. The two vehicles are Regular Unleaded (87 AKI) calibrated vehicles and the tests were conducted using standard chassis dyno emissions test cycles at Sea Level (0 Ft). The emissions test cycles were chosen to be moderate to heavy customer driving, the LA92 and US06 cycles, respectively. During the emissions testing procedures, the vehicle's speed was maintained within a precise window of operation by the trained driver by opening and closing the throttle (part throttle).

The two octane ratings for the test fuels were 84.8 AKI and 87.8 AKI as reported on the fuel supplier's Certificate of Analysis, and all other fuel composition properties were held very close to each other. Ideally, the AKI rating of the "87 AKI" fuel would have been closer to 87.0, but based on the very large differences in vehicle performance measured (as fuel economy and emissions), it is expected that this would have made only a marginal change in results.

The vehicle performance data shown below [Table 4 can be found on p. 84 of Docket number EPA-HQ-OAR-2011-0135-4461-A1] is the percent difference in each parameter from operating the vehicles on 87 AKI gasoline compared to operating the vehicle on 85 AKI gasoline. The results for the two repeat US06 cycles were combined and then compared in an "A-B" (87 – 85) format. A vehicle data logger recorded the Engine Control Module (ECM) serial port information and no test drift is anticipated from these signals. While operating on the proper (i.e., owner's manual specified) 87 AKI gasoline, the vehicles utilized less throttle, required less load on the engine, and less fuel enrichment, and where applicable, less boost pressure to maintain the vehicle speed traces of the standardized emissions test cycles. [EPA-HQ-OAR-2011-0135-4461-A1, pp. 83-84]

The vehicle emission and fuel economy effects can be seen below [Table 5 can be found on p. 85 of Docket number EPA-HQ-OAR-2011-0135-4461-A1] and were analyzed in an “A-B-A” format (85-87-85) to account for any test drift from the catalyst response. Substantial improvements in fuel economy and emissions performance can be seen while operating on the proper 87 AKI gasoline during these controlled chassis dyno tests.

Sales of 85 AKI gasoline represent less than 4 % by volume of the total U.S. gasoline production, but they have an impact on 100% of the vehicle fleet.

A recent study by the Coordinating Research Council (CRC) Performance Committee Octane Group has determined that it requires about 4 – 5 RON units to allow an increase of one (1) number in an engine’s compression ratio. Auto manufacturers must protect for the lowest octane in the market, because they cannot know in which U.S. State their vehicles will be sold and operated, so the presence of an 85 AKI gasoline represents about 0.4 – 0.5 compression ratio of inefficiency yet to be utilized. This is not to say that powertrain compression ratios would rise by 0.4 -0.5 units if the U.S. had a national 87 AKI minimum limit, but rather there is an equivalent amount of efficiency gain still unrealized either in terms of higher compression ratios, less fuel enrichment, more optimal combustion phasing, or higher boost. Additionally, if 87 AKI was the national minimum market fuel standard, vehicles already on the road would operate a greater percentage of time without fuel enrichment.

Prompt federal action is needed under Tier 3, to avoid a patchwork of State octane standards and proliferation of use of 85 AKI gasoline.

Currently, the most widely referenced gasoline specification in the U.S. is ASTM’s D4814, “Standard Specification for Automotive Spark-Ignition Engine Fuel.” ASTM does not specify mandatory octane minimum limits. Determination of the proper octane number to be sold in the marketplace is left to the discretion of the fuel marketers. Likewise, the NIST Handbook 130 (Laws and Regulations) does specify the proper octane number naming convention at retail, but does not specify the actual octane number minimums. Because of this uncertainty, some States have adopted D4814, some have adopted Handbook 130, and some have written their own specification. For example, South Dakota currently has a “hybridized” octane standard. Historically, 87 AKI has been sold throughout the U.S. as Regular Unleaded except in Rocky Mountain States where a mix of 85 and 86 AKI is sold. Also, recently it has been reported that in certain regions of the country with an excess of hydrocarbons resulting from new fracking techniques, it has become profitable to truck in 85 and 86 AKI gasoline to lower elevation regions of the country. This is going backwards in terms of emissions, engine efficiency, and real fuel economy, for highly localized refinery and retail savings.

Furthermore, in the event that EPA does not set a national minimum 87 AKI octane market gasoline standard, gasoline with octane lower than that of federal emission test fuel is not “substantially similar” to the certification test fuel. By closely regulating the octane of emission test fuel, EPA has signaled that this is a critical fuel parameter. Under CAA §211(f) all gasoline must be “substantially similar” to fuels used for certification. Such fuel should not be allowed to remain in the market place since new vehicles will be certified to a higher octane fuel (unless fuel producers can demonstrate such fuels will not cause or contribute to the failure of any vehicle/engine to meet emission standards, subject to notice and comment).

In support of Tier 3 and other vehicle needs, EPA should promptly set a federal minimum standard mandating 87 AKI as the minimum octane grade for regular gasoline, without regard to altitude.

Organization: Ford Motor Company (Ford)

Elimination of Sub-Regular (<87 AKI) Octane Grades: As stated above, the use of fuel with higher octane ratings will allow improved performance (increased efficiency) for newer vehicles with certain advanced technologies. However, the use of fuel with an antiknock or octane rating lower than the required amount may result in vehicle performance loss or engine damage. Engines equipped with knock sensors will compensate for the reduced octane rating by retarding spark timing, but this can result in increased fuel consumption and reduced power and may not completely prevent the engine from knocking. Although altitude and weather have been shown to affect a vehicle’s antiknock requirement for most pre-1984 vehicles, modern vehicles in today’s fleet require the same antiknock index as stated in their owner’s manual, regardless of ambient temperature or altitude. Despite this requirement, several western states with higher altitude areas in the U.S. continue to offer 85 AKI instead of 87 AKI for their “regular grade” market fuels, with the potential for expanded availability. This availability and any further spread of sub-regular grade market octane rating fuels amounts to “back-sliding” in market fuel quality and subsequently emissions inventory. This is in direct conflict with the agenda outlined in both the Tier 3 rules and the ONP rules, which will require increased fuel economy in tandem with decreased CO2 emissions. In order to meet the increasingly stringent requirements of the ONP, manufacturers will continue to implement a host of new technologies (cylinder deactivation, hybridization, continuously variable transmission, 9-speed transmissions, Atkinson engines, downsized turbocharged direct injection engines) that will require a commensurate increase in market fuel quality and market fuel octane ratings. EPA must recognize that gasoline octane has become a critical factor in the development and sale of vehicles with newer advanced technologies, and this issue needs to be addressed on a nationwide basis. As noted above, the typical octane rating of U.S. marketplace fuel needs to increase, and the sale of gasoline with sub-regular octane (less than 87AKI) needs to be eliminated nationwide.

Recommendation: Ford supports the Alliance comments calling for a national minimum octane number of 87 AKI for regular grade gasoline, without regard to altitude.

Organization: Mercedes-Benz USA, LLC on behalf of Daimler AG

The primary factors which directly impact the Mercedes-Benz GHG Compliance Plan are sulfur content in market fuel, and ethanol content and octane level in certification and market fuel.

Organization: International Council on Clean Transportation (ICCT)

What is really needed is higher octane for regular fuel, regardless of the ethanol content. For example, the Mazda had to reduce the compression ratio of the Skyactiv engine for the US market, compared with Europe. Also OEMs simply won't try to sell a mass-market non-luxury vehicle that requires mid- or high-grade gasoline in the US.

Unfortunately, when fuel providers added ethanol to gasoline in the past, the fuel providers took out the non-ethanol octane elements - so that, in practice, there has never been a gain in octane through increased ethanol blends. It is likely that E15 will be the same—we won't actually get more octane. Rather than focus on ethanol requirements, the EPA should raise the minimum octane requirements for all gasoline.

Organization: General Motors LLC (GM)

Gasoline Octane is Important for Emissions – Certification and Market Fuels:
Octane rating of both marketplace gasoline and Tier 3 certification fuels is critical to vehicle performance, including their exhaust emissions. For this reason, GM specifies the octane requirement of every vehicle in the vehicle owner's manual. GM fully supports the Alliance/Global comments on octane.

Organization: National Marine Manufacturers Association (NMMA)

For the past three years, NMMA has been working with the US Department of Energy and Argonne National Laboratory to evaluate a better alternative to ethanol, both as an oxygenate and a biofuel. Our research and testing of isobutanol is a result of the problems associated with increased levels of ethanol being used as a fuel additive. Our research findings include:
- Ethanol raises the Reid Vapor Pressure of gasoline, which at higher levels increases evaporative emissions. Meeting US EPA and CARB RVP standards for ethanol blends therefore requires refineries to perform additional processing.
- Ethanol is corrosive and is typically shipped via railcar or truck versus less expensive pipelines.
- Ethanol is splash blended at the end of the gasoline refining process, adding additional storage and labor cost.
- Ethanol is hygroscopic, meaning it has an affinity for water.
- Ethanol at 10% by volume contains approximately 2.5% oxygen. Increasing ethanol content in gasoline increases the oxygen level (referred to as enleanment) causing open loop engines to experience increased combustion temperatures.

Rather than simply oppose all ethanol and biofuels, NMMA has dedicated considerable resources over the past three years to evaluate isobutanol in order to contribute meaningful data to steer future biofuels policy and ensure compatibility with millions of non-road engines and boats.

Recreational marine engines and vessels represent a worst-case environment in which to validate the reliability and compatibility of advanced biofuels such as isobutanol due in part to the usage cycles of marine products, open-vented fuel systems, likelihood of introducing saltwater into fuel systems and open-loop engine operation. Successful demonstration of isobutanol-extended gasoline in the marine environment may ensure that engine emissions, engine and vessel performance, engine durability and product safety (fuel system related) could be maintained for millions of small engines including recreational marine engines and vessels. Moreover, successful testing in a worst-case marine environment will allow for a more streamlined acceptance of advanced biofuels outside of on-road vehicles, potentially minimizing the effects of the current bifurcated fuel system.

NMMA has conducted tests on a variety of marine engines and vessels using 16% isobutanol by volume, which has similar oxygen content to E10, without the other negative properties of ethanol identified above. The results of our documented and published research thus far indicate that isobutanol at 16% by volume yields very similar engine emissions, durability, power and performance as E10.

This summer, NMMA is conducting tests with Argonne National Laboratory under the direction of the U.S. Department of Energy on a tri-fuel blend of 5% ethanol, 8% isobutanol and 87% gasoline to determine the effects on emissions, performance and overall fuel compatibility with recreational marine engines and vessels. Our preliminary analysis has shown that isobutanol acts to lower Reid Vapor Pressure, while also increasing the overall biofuel quantity in gasoline.

NMMA strongly urges EPA and DOE to take a leadership role in appealing to Congress and the President to freeze ethanol at 10%, while neutral party technical evaluation are conducted to assess alternatives that can be introduced at a higher concentration without the negative effects of ethanol.

Commenter: Refinery Automation Institute, LLC

The EPA proposal lacks transparency and seems politically motivated, in that uses words to describe ‘implied’ changes in Aromatics, Olefins, Vapor Pressure, and Distillation temperatures. This promotes ‘back-door’ regulations by ‘selling’ and unambiguously implying ‘harmonization’ with California’s CARB RFG3 specs (Attachment II). The impact on costs is misleading in EPA’s Tier 3 proposal.

Our Response:

Some commenters suggested that the 1-psi RVP waiver be extended to all ethanol blend levels, or be eliminated altogether, either of which would create a more level playing field for higher ethanol blend s in the market. Some commenters expressed support for raising the minimum octane of in-use gasoline, or for limiting ethanol content and/or encouraging the use of other oxygenates (e.g., isobutanol). EPA is using its Clean Air Act section 206 authority to establish requirements for emission certification testing, including specifications of the emissions test fuels with which vehicles demonstrate compliance with emissions standards, in order to better reflect the ethanol content and other properties of in-use fuels. While we are taking action to limit the sulfur content of in-use gasoline under authority in Clean Air Act sections 211(c)(1) and (2), we did not propose other changes to in-use fuels. Any action related to other changes to in-use fuels is outside the scope of this rulemaking.

Some commenters supported revoking the 1-psi waiver on the basis that large reductions in evaporative emissions would be expected in the in-use fleet, and that EPA should use authority given under Clean Air Act section 211(v) to accomplish this. The requirements of that section include completion of the anti-backsliding study, which is still underway. Once the study finalized, EPA will assess what, if any, regulatory action is warranted.

One commenter expressed concern regarding implied changes in fuel properties and harmonization with California. The commenter appears to be confusing EPA's actions to adjust the properties of certification test fuel with potential changes to in-use fuel. The Tier 3 rulemaking is only requiring changes to the sulfur level of in-use gasoline.

4.5.2. Proposed Flexible Fuel Vehicle Test Fuel

What Commenters Said:

Organization: Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

Automakers agree with EPA that it is important that the fuel used to test FFVs reflect the composition of actual in-use E85 (30). ASTM has revised specification standard, ASTM D5798- The most significant driver for the recent revisions to the ASTM E51-83 specifications has been the inability of terminals to blend E85 that met the requirements of the E85 specification using current gasoline and BOBs (Blend-stocks for Oxygenate Blending). After significant study, the ASTM task group decreased the minimum allowable ethanol percentage to 51% as the best way to enable E51-83 blends with compliant RVPs (Reid Vapor Pressure).

There is currently little data available on actual E51-83 fuel composition in the field. Previous studies on E68-83 showed that much of the field fuel did not meet the ASTM requirements. These results drove the re-evaluation and revision of the specification mentioned above. Later this year, the National Renewable Energy Lab, in conjunction with the Coordinating Research Council, will survey field E51-83 quality. This is the first survey since the revisions were implemented to ASTM specification D-5798: Ethanol Fuel Blends for Flexible-Fuel Automotive Spark Ignition Engines. EPA should wait to finalize specifications until it can take into consideration the results of the NREL-CRC survey when they become available.

EPA should implement our recommended specifications for E85, CNG and LPG detailed above.

Organization: American Lung Association

For Flexible Fueled Vehicles (FFV) test fuel, we support an approach that includes the standard certification fuel, E10 until such time as EPA revises to E15 if market conditions warrant, as discussed above, with additional denatured fuel ethanol to meet the 80-83 volume percent.

Organization: American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM)

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.

Organization: General Motors LLC (GM)

GM fully supports the Alliance/Global comments on both E85 and CNG/LPG certification fuels.

Organization: Growth Energy

Growth Energy Supports a Workable Flex Fuel Vehicle (FFV) Certification Fuel: EPA also proposed a specific "E85" test fuel with an ethanol concentration of E80-E83 that would be made by blending ethanol (either denatured fuel ethanol or neat ethanol) with the E15 test fuel.

Growth Energy continues to believe that Flexible Fuel vehicles will be essential to use the higher ethanol blends needed to meet the future volumes of the RFS. As such, it only makes sense to develop a specific test fuel for FFVs. However, we do not think that the specifications are representative of E85 found in marketplace, especially since ASTM has published its "Flexible Fuel" specification.

Growth Energy would suggest that the RVP of the FFV certification fuel should be at 9 psi and the ethanol content should be somewhere in the range of 70-78 percent (E70 – E78).

Organization: Marathon Petroleum Company LP (MPC)

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.

Organization: National Association of Convenience Stores (NACS) and Society of Independent Gasoline Marketers of America (SIGMA)

The Proposal would make E80-83 the default test fuel for FFVs. While it necessary to develop regulatory specifications for E85 test fuel blends, the Proposed Rule does not account for the fact that certain jurisdictions contain caps on ethanol content in E85 below 80 percent. The final rule should accommodate fuels that will actually be in the market.

NACS and SIGMA applaud the Agency for developing regulatory specifications for E85 test fuel blends. The lack of specifications up to this point has caused confusion and inconsistency in the market. There is concern, however, that the proposed specifications of 80-83 volume percent does not accommodate fuels that will actually be in the market. Indeed, ASTM specifications for E85 include a fuel containing between 51 – 83 volume percent ethanol[5]. In addition, different jurisdictions in the country contain various restrictions on ethanol content for E85 fuels. Some of these jurisdictions contain caps below 80 volume percent ethanol. As a practical matter, this means the Agency is proposing default test fuel that simply will not be utilized in these areas.

It is important that the final rule accommodates fuels that will actually be in the market. The revised ASTM definition for E85 enhances marketers' ability to provide consumers with a fuel product that might be offered at a more attractive price and provide greater fuel efficiency than is currently being experienced with blends containing 80-83 volume percent. This flexibility should be encouraged. NACS and SIGMA would be happy to work with the Agency to develop a policy for accomplishing this objective in the final rule.

Organization: National Corn Growers Association (NCGA)

And, while we are generally supportive of establishing new certification fuel requirements for FFVs, we are concerned that the proposed approach would inhibit future development of FFVs and the development of dedicated vehicles designed for the exclusive use of an high octane MLEB. Both FFVs and high octane utilizing vehicles are critical to ensuring that the 150 million metric tons of GHG emission reductions from the RFS volumes are attained.

We support the development of specifications for FFV certification test fuel. As the RFS requirements ramp up beginning in 2015 and later, we believe the incentive will increase to produce more ethanol-containing fuels, and that E85 use in FFVs is likely to increase. Now that ASTM has published and refined its ASTM 5798 "Flex Fuel" specification, it is reasonable to provide a more complete and comprehensive specification for the FFV certification test fuel.

EPA proposed the E85 ethanol test fuel concentration be limited to E80-E83 and that this could be achieved by blending ethanol into E15 test fuel utilizing denatured fuel ethanol or neat ethanol. EPA also indicated that the vapor pressure of the test fuel should be between 6.0 and 6.5 psi. However, we are concerned that EPA's specification of E85, at E80-E83 with a vapor pressure of 6.0 to 6.5 psi, could inhibit the development of FFVs meeting the lowest NMOG+NOx standard bins of the Tier 3 proposed rule.

We recommend that EPA consider the unique challenges and additional costs of designing FFVs to comply with Tier 3 Bin 20, 30 and 50 standards, and not create FFV test fuel specifications that unnecessarily increase the stringency of the emission standards and discourage production of FFVs. We are aware that the U.S. Department of Energy National Renewable Energy Laboratory and the Coordinating Research Council are beginning another field survey of E85 to compare the fuel quality to the most recent ASTM D5798-13 specification (16). We recommend that EPA use information from this survey to select specifications for FFV test fuel from the data rather than selecting a specification such as E80-83.

16 - CRC Project no. E-85-3, "E-85/E-85-2/E-85-3 National Surveys of E85/Flex Fuel Quality", project description available at http://www.crcao.org/news/Mid%20Level%20Ethanol%20program/E-85-3%20Summary.pdf.

Organization: New York State Department of Environmental Conservation

Higher level ethanol blend fuels for use in Flexible-Fuel Vehicles need to be subject to sufficient regulation to ensure proper function of vehicle emission control systems.

Current regulation of fuels (other than gasoline) for use in Flexible-Fuel Vehicles (FFVs) is inadequate. As EPA staff note in a memo to the docket for this rulemaking (2) the commercial fuel must be substantially similar to a heretofore unspecified certification fuel...

We agree with EPA's decision to promulgate standards for FFV test fuel, and believe that such standards are overdue.

2 - Memo from Jeff Herzog, Assessment and Standards Division, to Docket EPA-HQ-OAR-2011-0135, dated April 8, 2013 (docket item number EPA-HQ-OAR-0135-0529).

Organization: POET, LLC

Similarly important is the increased use in FFVs of fuel blends that contain from 51-85% ethanol (referred to in these comments as high-level ethanol blends or HLEBs).

Regarding an HLEB certification fuel, EPA proposes that the certification fuel ethanol content must be from 80 to 83 volume percent.' (62) Under Clean Air Act Section 206, test fuels should reflect 'actual current driving conditions under which motor vehicles are used.' EPA should base an HLEB certification test fuel that is more likely to be representative of HLEBs on which FFVs are likely to run. (63) POET suggests that an appropriate FFV/HLEB certification fuel is likely to have a % ethanol content in the 70s.

Otherwise, POET supports the Proposed Rule discussion of HLEB certification fuel logistics with regard to how the test fuel is prepared for a particular blend level. In particular, EPA notes that 'Rather than specify ranges for the other fuel parameters as we have done for gasoline test fuel ... we are proposing that the FFV test fuel would be defined based on the results from blending the proposed E15 standard gasoline test fuel with ethanol.' (64) The Proposed Rule would also allow the use of butane to trim RVP. In the alternative, BOB and undenatured ethanol could be used to prepare the test fuel. (65) POET approves of this approach.

62 - Id. at 29,912.
63 - By comparison, 40 CFR 86.113-94(d) provides specifications for methanol fuels for flexible fuel vehicles and states 'Mixtures of petroleum and methanol fuels used for exhaust and evaporative emission testing and service accumulation for flexible fuel vehicles shall consist of the appropriate petroleum fuels ... and a methanol fuel representative of the fuel expected to be found in use ... and shall be within the range of fuel mixtures for which the vehicle was designed.' (emphasis added). By the same logic, the ethanol fuel family could have two certification fuels, and those certification fuels need only be representative of the range of ethanol blends 'within a range' of mixtures 'expected to be found in use.'
64 - Id. at 29,912.
65 - Id.

Organization: Renewable Fuels Association (RFA)

EPA's proposed certification fuel for flexible fuel vehicles may discourage FFV production due to potential difficulty in meeting NMOG+NOx standard bin levels.

Our Response:

As discussed in Section IV.F.3 of the preamble to the final rule, EPA is finalizing specifications for the fuel used in flexible fuel vehicles (FFV) emissions testing including certification testing (see Section IV.F.3. of the preamble to the Tier 3 final rule). Establishing these specifications for FFV test fuel will resolve confusion and inconsistency among FFV manufacturers in carrying out their certification and other testing requirements and help to ensure that FFV emissions are appropriately controlled over the range of in-use fuels.

The base fuel stock used to formulate FFV emissions test fuel must comply with the specifications for the standard E10 emissions test fuel as described in Sections IV.F.1 and IV.F.2 of the preamble to the Tier 3 final rule. This practice avoids the need to specify the ranges for a number of fuel parameters as we have done for gasoline test fuel and helps to minimize the number of test fuels that a vehicle manufacturer must store. Denatured fuel ethanol (DFE) that meets the specifications in the Tier 3 final rule must be blended into this base fuel stock to attain an ethanol content of 80 to 83 volume percent in the finished test fuel. Commercial grade normal butane can be added as a volatility trimmer to meet a 6.0 to 6.5 psi RVP specification for the finished test fuel.[34]

As an alternative to the use of DFE to formulate FFV test fuel, neat (undenatured) fuel grade ethanol can be used. As an alternative to using a finished E10 standard gasoline test fuel to produce FFV test fuel, the gasoline blendstock used by the fuel provider to produce a compliant E10 test fuel can also be used to produce the FFV test fuel. This would allow ethanol to be blended only once to produce FFV test fuel. In such cases, a sample of the subject gasoline blendstock must be tested after the addition of ethanol to produce a finished standard E10 gasoline test fuel to demonstrate that the blend meets all of the requirements for standard gasoline test fuel.

Substantial publicly available literature exists to demonstrate that the ethanol content of fuel used in FFVs has a significant effect on vehicle emissions. The effect of ethanol content on FFV emissions becomes more pronounced with increasing ethanol concentration. The current ASTM specification for E85 provides that the ethanol content of E85 may vary from 51 to 83 volume percent depending on climactic conditions.[35] Consistent with our long standing policy regarding the emissions testing of FFVs, FFVs must comply with all applicable emissions control requirements for each consumed fuel or blend of fuel. This policy ensures vehicles are designed and calibrated for emissions performance across the full range of potential in-use fuel formulations. To ensure that FFV certification testing adequately accounts for in-use emissions performance, we are finalizing the ethanol content of FFV emissions test fuel at 81-83 volume percent as proposed. Exhaust emissions testing conducted using a fuel containing 81-83 volume percent ethanol will provide results that represent the effect of ethanol on FFV emissions performance when this effect is most pronounced. The complimentary emissions certification testing for FFVs on E10 will ensure that the effect on FFV emissions from the full range of potential in-use ethanol concentrations is represented. Although certain local jurisdictions may

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[34] The specifications for commercial grade butane are contained in 40 CFR 80.82.
[35] ASTM International D5798-13, "Standard Specification for Ethanol Fuel Blends for Flexible-Fuel Automotive Spark-Ignition Engines".

limit the ethanol content of FFV fuel to below the maximum 83 volume prevent set by ASTM, EPA must set test fuel specifications to ensure adequate emissions control performance throughout the U.S., including areas that do not have such additional limitations. Given the need to ensure that FFV emissions certification testing is representative of the full range of potential in-use ethanol blends, it would be inappropriate to set the required ethanol concentration for FFV emissions test fuel based on typical in-use levels as suggested by some of the commenters.

Similarly, we are setting the RVP of FFV emissions test fuel to assure emissions performance over the range of in-use fuels. When ethanol and gasoline are blended to produce high level ethanol blends, the RVP can be and often is very low. As a result, ASTM included a minimum RVP for E51-83 of 5.5 psi. Given that low volatility fuels can make the control of cold start emissions more challenging, we are finalizing the RVP of FFV emissions test to be near the minimum RVP that will be encountered in-use. The 6.0 to 6.5 RVP specification will help to ensure that FFVs are designed and calibrated to maintain their exhaust emissions performance across the range of in-use fuels. A 9 RVP specification of FFV emissions test fuel, as suggested by some commenters, would not provide assurance of exhaust emissions performance with lower RVP fuels that are present in-use. We are also finalizing separate RVP specifications for the test fuel used for FFV evaporative and refueling emissions testing as discussed in Sections IV.C. and IV.F. of the Tier 3 final rule preamble.

The levels of other fuel parameters for FFV test fuel are determined by the levels of these parameters present in the gasoline blendstock used as diluted by the addition of ethanol.[36] Therefore, we believe that requiring that the levels of these other fuel parameters present in FFV emissions test fuel be determined by the dilution of the levels present in gasoline emissions test fuel appropriately reflects their potential effect on emissions performance. Given the considerations discussed above in determining the FFV emissions test fuel specifications, we do not believe that there would be a substantial benefit in waiting for the completion of the E51-83 fuel quality survey currently underway to finalize FFV test fuel specifications.

As discussed in Section V.H. of the Tier 3 final rule, although we sought comment on in-use standards for E51-83 fuel for use in FFVs, we are not finalizing such standards at this time. To the extent future implementation of in-use fuel standards for E51-83 might impact in-use E51-83 quality, we may revisit the need to amend the FFV test fuel specifications finalized in the Tier 3 FRM.

With respect to the comment on the development of vehicles that are designed to operate on high octane fuels, mid-level ethanol blend fuels, EPA allows manufacturers to request approval certify on alternative certification fuels. Responses to comments on this topic are discussed in more detail in Chapter 4.5.1.5 of this Summary and Analysis of Comments document.

[36] Additional ethanol may either be added to the E10 emissions test fuel or to the gasoline blendstock used to formulate a compliant E10 emissions test fuel to meet the 80-83 volume percent ethanol specification that we are finalizing for FFV emissions test fuel.

4.5.3. Implementation Schedule

What Commenters Said:

Organization: Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

EPA/California Mutual Reciprocity Should be Made Permanent – to Assure The Automaker Option to Certify on Either the LEV III or the Tier 3 Test Fuel/Test Regime. EPA and California each should extend permanent reciprocity (mutual acceptance) of either LEV III test fuel/testing or Tier 3 test fuel/testing for purposes of both LEV III and Tier 3 certifications. EPA should not require use of Federal test fuel/test procedures after MY 2019 (28) for Tier 3 certification, as proposed. This is critical to facilitate OEM use of one fuel/one testing regime per vehicle model, a longstanding goal for harmonization between LEV III and Tier 3 standards toward One National Standard. The purpose of the arbitrary date cutoff in the proposal is not clear.

For in-use compliance purposes, the same fuel (LEV III or Tier 3) selected for certification should also be used for in-use testing.

Broadening future Federal Test Fuel options for OEMs should not negate reciprocity with California, or the option to use either LEV III test fuel/test regime or Tier 3 test fuel/tests for both California and Federal certification.

(If no permanent reciprocity) EPA should accept carry-over certifications on LEV III certification gasoline beyond MY 2019

ARB cannot amend the LEV III regulations until after EPA finalizes Tier 3. Thus, there will be a significant period (at least a year or two) of uncertainty where each agency has different certification gasoline requirements.

The proposed Tier 3 regulations allow manufacturers to use LEV III certification gasoline only through the 2019 model year (MY). Beginning in the 2020 MY, all vehicles must be certified using Tier 3 certification gasoline and carryover of emissions data is not allowed. (See §86.113-07, Fuel Specifications). If there is no permanent reciprocity, despite our strong support of that, then EPA should allow carryover of emissions data after 2019 MY. Manufacturers tend to carryover emissions data for several years.

Without an extension, this could result in manufacturers retesting and recertifying vehicles for no other reason than to change the certification gasoline. For example, a 2016 MY vehicle certified to LEV III standards on LEV III gasoline might be required to recertify on Tier 3 gasoline, rather than carry over the LEV III certification data through the 2020 or even 2021 MY until a redesign requires a new certification. This would be an unnecessary waste of resources and we do not believe this is EPA's intent.

Consequently, we recommend that EPA allow carryover of certification data using LEV III gasoline through at least 2022. Assuming there is no reciprocity, new certifications beginning in

2020 could be required to certify on Tier 3 gasoline and Tier 3 evaporative emissions standards. This will provide sufficient time for ARB to amend its regulations to accept Tier 3 gasoline and test procedures. In the event ARB chose not to amend their regulations, EPA, ARB, and industry could develop an alternative that would prevent unnecessary testing.

There should be permanent reciprocity between California LEV III and Tier 3 so that automakers can test one time on one test fuel to certify for both LEV III and Tier 3, as originally envisioned toward One National Program.

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28 - 78 Fed. Reg. 29908 at 29869 (May 21, 2013).

Organization: California Air Resources Board (CARB)

Additionally, CARB recommends reciprocity with California's gasoline certification fuel beyond 2020 and throughout the lifetime of the Tier 3 program. CARB offers the following comments in support of our recommendation in an effort to further harmonize certification fuel program requirements of the two agencies.

As proposed, Tier 3 provides reciprocity for certification fuel between the LEV III and Tier 3 programs until model year 2020, at which time U.S. EPA will only recognize emission certification on federal certification fuel. Traditionally, the two agencies have granted reciprocity for certification fuel when demonstrating emission compliance, thus providing a degree of compliance flexibility to vehicle manufacturers without impacting the emission benefits of the California or federal programs. CARB believes this should continue to hold true whether Tier 3 certification fuel is E15 as currently proposed or E10 (see our previous comment though on the impact of an RVP of 10 on reciprocity concerns for evaporative emission testing) and strongly recommends continuing the practice of providing reciprocity for certification fuel in the Tier 3 program beyond 2020 and throughout the lifetime of the Tier 3 program.

Organization: Chrysler Group LLC

Chrysler supports EPA's proposal to allow as an option certification using ARB test procedures, which include E10 fuel at 7.0 psi RVP, but believes that this option should be available permanently (past Model Year 2019). Notwithstanding this option, Chrysler believes that the primary certification test fuel, using federal test procedures, should be E10 fuel at 9.0 psi RVP.

Recommendation: Chrysler recommends that EPA adopt an E10, 9.0 psi RVP certification test fuel requirement, which is representative of real-world in-use conditions. Chrysler further recommends that EPA extend the option of using E10 fuel at 7.0 psi and ARB test procedures to be permanent (past Model Year 2019), at least until EPA and California can agree on a harmonized test fuel with a methodology for designating a certification fuel that is the predominate fuel in the marketplace.

Organization: General Motors LLC (GM)

GM supports the harmonization of Federal Tier 3 and California LEV III vehicle emission programs. While there are some differences in requirements, we continue to support permanent mutual reciprocity that allows OEMs to use one test fuel and its related testing regime per test vehicle, either LEV III or Tier 3, for purposes of both Federal and California certification. Reciprocity with CARB's LEV III regulation should be applicable to all aspects of EPA's Tier 3 rulemaking: all test fuels, evaporative requirements, exhaust requirements, etc.

Tier 3 and LEV III – Full Reciprocity should be made Permanent: Full and permanent reciprocity assures OEMs the option to certify to either Tier 3 or LEV III regulations (all aspects). Reciprocity is an essential compliance flexibility that minimizes duplication of emissions compliance efforts and minimizes development costs and workloads, without risking increase in vehicle emissions.

We encourage and need EPA and California to extend permanent reciprocity (mutual acceptance) of either LEV III test fuel/testing or Tier 3 test fuel/testing. There shouldn't be a requirement to use Federal test fuel/test procedures after MY 2019 for Tier 3 certification, as proposed. This is critical to facilitate OEM use of one fuel/one testing regime per vehicle model, a longstanding goal for harmonization between LEV III and Tier 3 standards toward "one national standard". The purpose of the arbitrary date cutoff in the proposal is not clear.

If permanent reciprocity is not possible, EPA should accept carry-over certifications on LEV III certification gasoline beyond MY 2019:

CARB cannot amend the LEV III regulations until after EPA finalizes Tier 3. Thus, there will be a significant period (at least a year or two) of uncertainty where each agency has different certification gasoline requirements.

The proposed Tier 3 regulations allow manufacturers to use LEV III certification gasoline only through MY 2019. Beginning in MY 2020, all vehicles must be certified using Tier 3 certification gasoline and carryover of emissions data is not allowed. (See 40 CFR 86.113-07, Fuel Specifications). If there is no permanent reciprocity, despite our strong support, then EPA should allow carryover of emissions data after MY 2019. Manufacturers tend to carryover emissions data for several years. Without an extension, this could result in manufacturers retesting and recertifying vehicles for no other reason than to change the certification gasoline. For example, a MY 2016 vehicle certified to LEV III standards on LEV III gasoline might be required to recertify on Tier 3 gasoline, rather than carry over the LEV III certification data through MY 2020 or even 2021 until a redesign requires a new certification. This would be an unnecessary waste of resources and we do not believe this is EPA's intent. Consequently, we recommend that EPA allow carryover of certification data using LEV III gasoline through at least MY 2022.

Organization: Mitsubishi Motors R&D America, Inc (MRDA)

In the current Tier 2 program, certification test fuel is Indolene (E0). The proposed Tier 3 program introduces an ethanol-based certification fuel, i.e. E15 with a 9 psi RVP (Reid Vapor Pressure), while California's LEV III program includes a California E10 certification test fuel with a 7 psi RVP. In order to avoid duplicative certification testing and to support the production of 50-state vehicle fleets, we request that the Tier 3 Final Rule include permanent reciprocity of certification test fuel with California's LEV III program. Specifically, we request that EPA permanently allow the optional use of LEV III certification gasoline and LEV III evaporative emissions test procedures as equivalent to federal certification fuel and evaporative emissions test procedures. This would allow OEMs the option of performing either procedure with its appropriate certification fuel to satisfy the regulatory requirement of BOTH agencies.

-Toward EPA's goal to harmonize with LEV III, we ask that EPA permanently allow the optional use of LEV III certification test fuel (E10, 7 psi RVP) and LEV III evaporative emissions test procedures, or Federal certification test fuel (E10, 9 psi RVP) and federal test procedures.

Our Response:

We recognize that test fuels are an important element of a national program. Vehicle manufacturers have emphasized in their comments the desire to reduce their test burdens by producing one vehicle that is tested on a single test procedure and on a single test fuel and that meets both California and federal requirements. Although we have been able to reasonably align the Tier 3 program with the LEV III program in most key respects, we recognize that the Tier 3 and LEV III test fuels are different, and that some differences may still exist in emissions performance between vehicles tested on the two fuels. The largest difference between the two fuels is the Reid Vapor Pressure (RVP), and other differences in distillation properties and aromatic levels also exist (largely related to differences in actual in-use fuel nationally and in California). We are finalizing as proposed the requirement that manufacturers certify vehicles on the new Tier 3 E10 test fuels[37] beginning with the first model year that a vehicle model is certified to the FTP NMOG+NO_X Bin 70 or lower.[38] (The heavy duty and evaporative and evaporative provisions are detailed in preamble Section IV.F.) This requirement may apply as early as MY 2017 for vehicles up to 6000 lbs GVWR and MY 2018 for vehicles greater than 6000 lbs GVWR.[39] This requirement also applies to vehicles certified at Bin 70 and lower that are brought into the Tier 3 program under the Early Tier 3 option described in preamble Section IV.A.7.b, with the exception of the specific provision allowing the use of LEV III fuels discussed below. Beginning in MY 2020, all gasoline-fueled models will need to certify on the Tier 3 test fuels for all exhaust emission requirements, regardless of their certification bin.[40] As discussed in preamble Section IV.A.7.c, manufacturers must also meet the 150,000 mile useful life requirements for NMOG+NO_X standards for these same vehicles as they are certified to Bin 70 and lower.

During the transition period from Tier 2 fuel to the new Tier 3 and LEV III E10 fuels, manufacturers have indicated that they face a substantial workload challenge of developing and

[37] This includes fuels used for cold temperature and high altitude testing and durability requirements. See preamble Section IV.F.
[38] The lower Bins are Bin 0, Bin 20, Bin 30 and Bin 50.
[39] Vehicles above 6000 lb GVWR choosing the alternative phase-in schedules described in preamble section IV.A.2.c generally would begin using the Tier 3 test fuels for MY2019.
[40] Diesel-fueled and alternative-fueled vehicles will continue to be tested on the fuels used under the Tier 2 program except for E85 fueled vehicles, for which we are finalizing new test fuel specifications (see preamble Section IV.F).

certifying each vehicle model to the two new fuels simultaneously. We recognize this transitional challenge and are including an additional option. We are finalizing as proposed an option that vehicles certified in MYs 2015 through 2019 to California LEV III standards using California LEV III E10 certification test fuels and test procedures can be used for certifying to EPA Tier 2 or Tier 3 exhaust emission standards, including PM. A manufacturer may submit LEV III test data on vehicles tested using the new LEV III E10 fuels for Tier 2 or Tier 3 certifications. Consistent with existing Tier 2 policy, EPA may test vehicles certified to Tier 2 standards using LEV III test results on Tier 2 fuel for confirmatory or in-use exhaust testing. For vehicles certified in MY 2017 through 2019 to Tier 3 standards using LEV III E10 fuels, EPA will only use LEV III E10 fuels for confirmatory and in-use testing (except for high altitude or cold CO and hydrocarbons testing, as described below). Vehicles certified to the provisions of Early Tier 3 (preamble Section IV.A.7.b) will be treated the same as Tier 3 vehicles certified in MY 2017. For example, for MY 2015 and 2016, EPA will consider Early Tier 3 vehicles to be part of the Tier 3 program for purposes of fuel-related testing obligations. We will not accept test results using LEV II fuels for Tier 3 vehicle certification, including Early Tier 3 certifications, with the exception of the PZEV exhaust carry-over provision described below.

California does not have fuel specifications for high altitude testing or cold CO and hydrocarbon testing. For this reason, we are finalizing that for vehicles that manufacturers choose to certify using LEV III fuel and test procedures, manufacturers must use program-specific federal test fuels to comply with these federal-only requirements (i.e. Tier 2 vehicles will use Tier 2 fuel and Tier 3 vehicles will use Tier 3 fuel). Similarly, high altitude and cold CO and hydrocarbon confirmatory and in-use testing for these vehicles will be performed on the federal fuel that the manufacturer is required to use at certification as specified above regardless of whether LEV III or federal fuel is used for other testing.

We proposed the requirement that after MY 2019, all Tier 3 certification, confirmatory and in-use emission testing be required to use only the proposed Tier 3 E15 test fuel because it was believed to be a worst case fuel for emissions. Because we are finalizing Tier 3 E10 test fuels which are very similar as explained above to LEV III E10 test fuels, and not considered a worst case fuel, we are not finalizing the requirement for all testing to be performed on Tier 3 E10 test fuel. Instead, for certifications after MY 2019, EPA will continue to allow LEV III test results to be submitted for certification to Tier 3 standards, consistent with protocol under the Tier 2 program. However, if a manufacturer chooses to submit certification results for compliance with Tier 3 standards using the LEV III test fuel, then for confirmatory and in-use testing we will hold vehicles to the Tier 3 standards while using the Tier 3 fuel in addition to the LEV III test fuel; we will not allow new or carry-over certifications using LEV II or Tier 2 certification test fuels after MY 2019. CARB has indicated that they will accept Tier 3 test data (on federal certification test fuels) to obtain a California certificate as early as MY 2015. In this manner manufacturers should be able to avoid compliance testing on more than one fuel, since vehicles certified to Interim or Final Tier 3 status using federal certification test fuels could also obtain LEV III certification.

Auto industry commenters noted that the LEV III program provides an allowance for manufacturers to carry over PZEV-certified vehicle exhaust data[41] from the LEV II program into LEV III compliance in MY 2015 through MY 2019. Thus, CARB allows these PZEV vehicles to use emission testing results using LEV II fuel (i.e. California Phase II test fuel) to meet the LEV III obligations. The commenters suggested that EPA allow manufacturers to carry over such PZEV 150,000 mile useful life exhaust emission data to meet the Tier 3 standards. We agree that this approach is appropriate during the transition, and we are finalizing this provision for MY 2015 through MY 2019, including allowing Early Tier 3 compliance at the Bin 30 level as a combined NMOG + NOX standard. EPA will hold vehicles certified using this provision to the Tier 3 emission requirements when they are tested on the LEV II fuel for confirmatory and in-use. Compliance testing of these vehicles for all other Tier 3 obligations (i.e., high-altitude testing and Cold CO and hydrocarbons testing) must be performed using Tier 3 fuel, and these vehicles will be required to meet the Tier 3 standards for Bin 30.

4.5.4. Potential Implications on CAFE Standards, GHG Standards, and Fuel Economy Labels

See 78 FR 29912-29913, May 21, 2013 for full details.

4.5.4.1. Need for Adjustment to GHG, CAFE, and Fuel Economy Labeling Program Calculations

What Commenters Said:

Organization: Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

Maintain Consistency with CAFE and Gas Guzzler Regulations: While Tier 3 is predominantly a criteria emissions regulation, proposed changes to the energy content (percent ethanol) of the certification test fuel and proposed requirements to test on four wheel drive dynamometers (dynos) significantly impact vehicle fuel economy. The changes proposed by EPA are not consistent with statutory law, the regulatory history and intent of the CAFE and GHG programs, or the 2017-2025 greenhouse gas and fuel economy agreements signed by EPA, NHTSA, California, and many automobile manufacturers governing the calculation and stringency of fuel economy values for CAFE and gas guzzler tax purposes. The Energy Policy and Conservation Act (EPCA) specifies that EPA determine the manufacturer's CAFE value for passenger automobiles using the "same procedures for passenger automobiles the Administrator used for model year 1975…or procedures that give comparable results." Section 503(d) of EPCA prohibits EPA from changing the stringency of the CAFE standards through test procedure changes. We therefore request that EPA comply as soon as possible with its legal obligation to issue fuel economy test procedure adjustments.

[41] California's PZEV exhaust standards are the same as their SULEV standards and the Tier 3 Bin 30, and are certified to a 150,000 mile useful life.

EPA's proposed changes to dyno requirements and to the ethanol content of test fuel would directly impact the measurement of fuel economy, which is used for CAFE reporting, for fuel economy labels and the Gas Guzzler Tax and for compliance with the two GHG rules. Industry recommends that EPA reconsider these proposals and instead adopt industry's suggested modifications below in order to avoid introducing significant and costly changes to the fuel economy procedures.

Organization: BMW of North America, LLC

Furthermore, BMW urges EPA to adjust the fuel economy test procedures for Corporate Average Fuel Economy (CAFE) in order to account for the substitution of E0 with E10. If not adjusted, fuel economy testing with E10 would result in a more stringent CAFE standard.

Organization: Volvo Car Group

Emissions and GHG require the same test procedures and certification fuels. Thus, it is not only emissions that are becoming more stringent but also the GHG/CAFE indirectly through enhanced requirements regarding testing.

Organization: Mitsubishi Motors R&D America, Inc (MRDA)

EPA needs to modify the fuel economy equations to account for the introduction of an ethanol-containing certification fuel; therefore, we request the following: EPA must establish new fuel economy and CREE equations for ethanol certification fuels in the Tier 3 rulemaking. An R-factor of 1 in the fuel economy and CREE equations is considered appropriate based on industry analysis.

Organization: National Automobile Dealers Association (NADA)

Clearly, engineering and technology resources necessary to meet Tier 3 compliance will directly compete with those necessary to meet GHG reduction mandates. Given EPA's recognition of the need for a mid-term review process to assess critical assumptions associated with it's MY 2017-25 GHG mandates, the agency should recognize similarly the importance of revisiting critical assumptions associated with its Tier 3 regulations. In addition, the apparent benefits that appropriate fuel designs (i.e., low-sulfur content) offer for GHG reduction strategies should in the context of the mid-term review and otherwise.

NADA concurs with suggestions made in the joint comments of the Alliance of Automobile Manufacturers and the Association of Global Automakers regarding the need to avoid introducing unnecessary, significant, and costly changes to fuel economy procedures that could negatively impact fuel economy rating, fuel economy labeling, and CAFE requirements.

Organization: Advanced Biofuels USA (ABFUSA)

In order to provide equality in EPA fuel economy calculations for higher octane, higher ethanol fuels, the "R" fuel energy content factor should be set at "1." This change is necessary since EPA has previously recognized that the engine technology used to set the "R" in the 1970s has reached levels of efficiency not envisioned at the time and as a result the factor does not represent the current reality.

Organization: American Coalition for Ethanol (ACE)

While discussion of the 'R-factor' is not technically part of this rulemaking, ACE agrees that the current fuel economy 'equation' unfairly punishes ethanol blends based on old data, primarily due to an out-dated 'R-factor.' EPA correctly notes that change in fuel economy is not directly proportional to change in energy content of the test fuel, and mentions that manufacturers have suggested that a higher R value may be warranted. ACE believes more current and accurate data has been available for some time, and supports EPA's continued investigation into the issue, and looks forward to that hurdle being removed in the near future.

Organization: Clean Fuels Development Coalition (CFDC)

There are other impediments to widespread commercialization of higher octane ethanol fuels and one is the "R" factor noted in the NPRM and what appears to be a failure to recognize increased efficiencies since the original "R" factor formulas were established.

Our Response:

EPA agrees with the commenters that action is needed to assess and potentially address the impact of changing test fuel on compliance with GHG, CAFE, and fuel economy labeling program requirements. We further agree that the adjustments should be such that the stringency of these programs is not affected. The preamble to the final rule discusses our future plans to obtain the data for future action in these areas. Note that at this time EPA is not adopting any new testing requirements for 4WD dynamometers.

4.5.4.2 Test Procedure Adjustments

What Commenters Said:

Organization: Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

Applicable Law Requires Test Procedure Adjustments (TPAs): The Tier 3 NPRM proposes lower octane ethanol containing test fuel and dyno requirements which impact CO_2, fuel economy, and the measurement of fuel economy for labeling, CAFE, the Gas Guzzler Tax, GHG, and medium-duty chassis cert compliance. EPA did not address the changes to measured fuel economy that will be caused by the proposed changes to test fuel and dyno requirements in the Tier 3 NPRM, nor the costs and benefits of the proposals. Instead, EPA's supporting analyses simply alluded to a "future action" which would address these impacts. Deferring consideration of fuel economy impacts from test procedure changes runs counter to EPA's own rules (50 Fed. Reg. 27183, 1985) that require EPA to issue test procedure adjustments at the same time that it promulgates final regulations incorporating the test fuel and dyno changes. In addition to statutory and regulatory requirements, EPA must adhere to the commitments entered into between the agencies and manufacturers for achieving the 2012-2016 and 2017-2025 GHG rules. The Alliance and Global Automakers request that EPA comply as soon as possible with its legal obligation to issue fuel economy test procedure adjustments.

Whenever EPA modifies the test procedures for measuring fuel economy, it is required by law to give adjustments for measured fuel economy to compensate for the changes. 49 U.S.C. Chapter 329 sets forth the statutory provisions relating to CAFE. The test procedures to be used for calculating CAFE are addressed in 49 U.S.C. §32904(c), which reads in relevant part as follows:

"The Administrator shall measure fuel economy for each model and calculate average fuel economy for a manufacturer under testing and calculation procedures prescribed by the Administrator. However ... the Administrator shall use the same procedures for passenger automobiles the administrator used for model year 1975 (weighted 55 percent urban cycle and 45 percent highway cycle), or procedures that give comparable results." Will not

The requirement for "procedures that give comparable results" indicates that when EPA promulgates changes to the test procedures that have an impact on the CAFE results for manufacturers, the method of calculating CAFE should be modified so that the results are comparable to those that would have been obtained in the absence of any change to the test procedures. Such modifications are commonly referred to as TPAs. This section imposes a "comparability" requirement on EPA: EPA must issue adjustment factors upon changing emissions or fuel economy test procedures so that measured fuel economy is comparable to results obtained using the 1975 test procedure. Attached as Appendix 7 is a discussion of the statutory and other requirements for EPA to issue TPAs for the test fuel and dyno requirement changes being proposed in the Tier 3 rule.

Organization: Mitsubishi Motors R&D America, Inc (MRDA)

Fuel Economy and CREE Equations: With the introduction of an ethanol-containing certification fuel in the Tier 3 NPRM, there will be implications upon vehicles' fuel economy due to the lower energy content of ethanol-containing fuels. Under the Energy Policy and Conservation Act (EPCA), EPA must ensure that fuel economy test procedures for passenger cars produce results comparable to the 1975 fuel economy test procedures. The 1975 test procedures are based on the use of EC) certification test fuel. A change in the ethanol content in the certification test fuel will result in changes to fuel economy calculations, and therefore an adjustment factor is necessary to produce comparable results to the 1975 test procedures. The current R-factor of 0.6 was established using an EO certification test fuel. Changing the certification test fuel to an ethanol-containing fuel severely impacts the calculation for fuel economy, and therefore requires an adjustment to the R-factor.

Fuel Economy/CREE Equations: EPA must establish new fuel economy and CREE equations, with an R factor of 1 for ethanol-containing certification fuels in the Tier 3 rulemaking.

Organization: National Corn Growers Association (NCGA)

Fuel economy testing originated in 1975 using the FTP-75 procedure and a pure hydrocarbon certification fuel with a specific gravity of 0.739 and a carbon weight fraction of 0.866. EPA is required to provide average fuel economy adjustments for test procedure changes that would cause a vehicle to achieve fuel economy results different from those that would be achieved under the 1975 test procedure. Changes in test fuel energy content qualify as a test procedure change that requires an adjustment.

EPA has proposed new certification fuels containing ethanol with slightly lower net heating values on a per gallon basis. A simple way to adjust for energy content for vehicles not designed and optimized to use a mid-level blend high octane fuel is to use a ratio of the volumetric energy content of the new test fuel to that of the 1975 test fuel. EPA has proposed this approach in the past (10, 11). However, 30 years ago when EPA originally corrected for fuel changes, vehicle technology did not fully compensate for fuel energy changes. EPA modified the approach by adding the "R-Factor" which may be considered as the efficiency with which the vehicle engine adapts to fuel energy variations. A factor of 0.6 was derived from data gathered from vehicles from the 1970s and early 1980s. An R-Factor less than 1 implies the vehicle is less efficient on fuels with higher energy content than the 1975 test fuel and more efficient on fuels with lower energy content than the 1975 test fuel.

EPA first applied the equation containing the R-Factor of 0.6 to a test fuel with oxygenates, California Phase 2 gasoline, in 1995 (12). In applying the 0.6 R-Factor EPA acknowledged "Data indicate that this [corrected] mpg value is partially corrected for the difference in fuel properties between Phase 2 test fuel and the 1975 EPA test fuel."(13) The R-Factor of 0.6 was derived from vehicles that are now over 30 years old and nearly 20 years ago EPA acknowledged that the 0.6 value did not fully compensate for the fuel energy change and needed to be revised. Nonetheless, the factor of 0.6 is still in use today.

Recent test data indicate a somewhat higher R-Factor than 0.6. The Auto-Oil test program on 1989 model year vehicles (14) determined an R-Factor value of approximately 0.93. More recently, The U.S. Department of Energy published its own analysis indicating values ranging from 0.92 to 1.03 (15). For virtually all vehicles evaluated, the 95% confidence intervals shown include the 1.0 value that EPA initially proposed in 1976. The authors noted that: "Additionally, there is uncertainty present in the ASTM results for heating value, carbon weight fraction, and specific gravity that have not been included in the confidence intervals. Inclusion of these uncertainties would increase the confidence intervals." Of course, in all these tests, the vehicles tested were not designed for a higher octane mid-level blend.

We request that EPA review the R-Factor and determine whether the use of the value of 0.6 would be an impediment to automakers to petitioning EPA for the use of a MLEB as a certification fuel and revise the R factor as necessary.

Commenter footnotes

[10] Impact of Gasoline Characteristics on Fuel Economy and its Measurements, 76-10 JLB.
[11] Corrections for Variations in Test Fuel Properties, EPA-AA-SDSB-84-3.
[12] EPA "Dear Manufacturer" Letter CD-95-09.
[13] Ibid.

[14] A. Hochhauser et al., "Fuel Composition Effects on Automotive Fuel Economy-Auto/Oil Air Quality Improvement Research Program," SAE paper 930138, SAE International, March 1993.
[15] S. Sluder and B. H. West, (2013) Preliminary Examination of Ethanol Fuel Effects on EPA's R-factor for Vehicle Fuel Economy; http://info.ornl.gov/sites/publications/Files/Pub42819.pdf, (2013).

Our Response:

EPA has reviewed the text of the main comments from the Alliance and Global Automakers as well as appendix 7. EPA acknowledges that changes in testing and calculation procedures prescribed by the Administrator should give comparable test results to those used for the 1975 model year for passenger automobiles. In the NPRM we expressed our commitment to the principle that test procedure adjustments related to the change in test fuel properties will not affect the stringency of CAFE requirements for passenger automobiles and other vehicle classes covered by the CAFE requirements. EPA understands the need to make these adjustments in a timely manner and the manufacturers' perspective that EPA should implement the new requirements for criteria pollutant emission testing, CAFE, and GHG at the same time. However, in the NPRM we deferred action on adopting a new R factor and other potential related adjustments because we did not have the requisite data on the new test fuel (E10) and the current test fuel (E0) on Tier 3 technology vehicles. Without the requisite data we could not be certain that the principles outlined in Appendix 7 would be followed. By requiring CAFE and GHG testing on Indolene or E0, the interim requirements established in the FRM assure that the stringency for the CAFE and GHG standards are not affected. This approach will also help to ensure that the data needed to make the test procedure adjustments based E0 and E10 emission test data on Tier 3 technology vehicles is available in a timely manner.

4.5.4.3. R-Factor Value

What Commenters Said:

Organization: Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

In addition, EPA proposes to change the definition of gasoline test fuels to include E10 and E15 test fuels, but EPA does not propose to change the fuel economy equation used for CAFE to compensate for the change in volumetric energy content on Tier 3 compliant vehicles. EPA is obligated to release a new fuel economy equation for ethanol containing test fuels within the Tier 3 Final Rule, and data supports that the R factor should be set to 1.0. Changing the fuel economy equation would be consistent with statutory law and the regulatory history governing the calculation of fuel economy values for CAFE and gas guzzler tax purposes. [EPA-HQ-OAR-2011-0135-4461-A1, pp. 93-94]

EPA proposes to change the test fuel used by manufacturers to test vehicles for criteria emissions and GHG and Fuel economy from the current "Indolene" test fuel containing no ethanol to a test fuel with ethanol added. EPA proposes E15 for the ethanol level; elsewhere in these comments, the Alliance and Global Automakers discuss specific recommendations regarding the correct test fuel, level of ethanol, and Reid Vapor Pressure (RVP). The following discussion focuses on implementing required TPAs for ethanol containing fuel.

Data Supports R Factor = 1.0: A factor used to represent the response of a vehicle's fuel economy to changes in the fuel's ethanol content as measured by the fuel's energy content is the "R Factor." In a separate memorandum to the docket[88] EPA concludes that an appropriate range for the R-factor for ethanol containing fuels is 0.8-0.9. This conclusion was based on an examination of the data in the EPAct study.[89] The Alliance performed a similar analysis on this dataset and identified an error in the measured properties for one of the EPAct fuels that biases the R-factor results - correcting this error results in an R-factor of 0.96. Industry met with EPA on May 20, 2013 to review this new information and to provide the results of a reanalysis that included all the fuels included in the EPAct dataset except the above mentioned fuel (Attached as Appendix 8 is a summary of that reanalysis).

Industry met with EPA again on June 13, 2013, and reviewed a new report from Oak Ridge National Labs (ORNL) to determine R Factor.[90] The report was based on an analysis of test data gathered in the U.S. Department of Energy (DOE) mid-level blends test program.[91] The ORNL report concluded that:

"Analysis of city cycle Federal Test Procedure (FTP) fuel economy test results and fuel analyses from the catalyst durability study indicates that the average R-factor for modern vehicles is very close to unity at about 0.94±0.04 (or 0.96±0.04 if the one problematic vehicle omitted)."

In summary, available data strongly supports an R-Factor equal to 1.0. Therefore, industry recommends that EPA adopt a fuel economy equation for gasoline fuels containing ethanol (i.e. E10, E15) with an R-Factor of 1.0 in the Tier 3 Final Rule.

Commenter footnotes

[88] EPA Technical Memorandum "Analysis of the Effects of Changing Fuel Properties on the EPA Fuel Economy Equation and R-Factor" by Aron Butler, et al.; also available in the docket (Tier 3 Docket #EPA-HQ-OAR-2011-0135).

[89] EPA Technical report "EPAct/V2/E-89: Assessing the Effect of Five Gasoline Properties on Exhaust Emissions from Light-Duty Vehicles Certified to Tier 2 Standards, Final Report on Program Design and Data Collection", Report Number EPA-420-R-13-004, March 2013; also available in the docket (Tier 3 Docket #EPA-HQ-OAR-2011-0135).

[90] Oak Ridge National Laboratory, US Department of Energy, report "Preliminary Examination of Ethanol Fuel Effects on EPA's R-factor for Vehicle Fuel Economy," Report Number ORNL/TM-2012/198, June 2013; accessed at: http://info.ornl.gov/sites/publications/Files/Pub42819.pdf

[91] West, Brian H., Scott Sluder, Keith Knoll, John Orban, Jingyu Feng, Intermediate Ethanol Blends Catalyst Durability Program, ORNL/TM-2011/234, February 2012, available at http://info.ornl.gov/sites/publications/Files/Pub31271.pdf

Organization: General Motors LLC (GM)

On page 29913 of the proposed rule, EPA discusses the potential impacts that the proposed gasoline test fuel change will have on corporate average fuel economy (CAFE). Additionally, EPA states that "it is almost certain that the same vehicle tested on a test fuel with 15 percent ethanol content will yield a lower fuel economy value relative to the value if it were tested on the current test fuel with zero ethanol content." Indeed, the Department of Energy concluded after extensive testing of ethanol blended fuels on a fleet of late model U.S. vehicles: "'Fuel economy was decreased … consistent with the energy density of the test fuel."[1]

Pursuant to 49 U.S.C. Section 32094 (c) and the provisions of 40 CFR 600.510-12(f), EPA is required to provide average fuel economy adjustments for test procedure changes that would cause a vehicle to achieve fuel economy results that would differ from results that would be achieved under the 1975 test procedure. However, EPA has proposed to defer any modifications to the average fuel economy calculations to a possible 'future action' based on the fact that the current gasoline fuel economy equation already contains an adjustment for the energy content of the fuel. This would be true and acceptable if the total adjustment in this equation was solely based on energy content. However, the current gasoline fuel economy equation includes a factor, commonly referred to as the R-factor, which provides a partial energy adjustment to more accurately represent the fuel economy that would be achieved if the vehicle were to be tested under 1975 conditions. The R-factor is part of the current test procedure adjustment that accounts for changes in test fuel energy content; therefore, changes to the R-factor must be made concurrently with changes to the test fuel.

One issue with the current R-factor of 0.6 is that it was developed under conditions where the energy content of the test fuel was tending to increase. It should not be applied when the energy content of the fuel is decreasing. As a matter of fact, in EPA technical report 'Corrections for Variations in Test Fuel Properties' (EPA-AA-SDSB-84-3), EPA states this concern as follows:

"A second area of questionable accuracy with the GM approach [referring to the inclusion of an R-factor] occurs when the energy content per unit volume of the fuel decreases. In this case, the efficiency term reduces or discounts the calculated correction… It is unlikely that vehicles could tolerate a significant decrease in energy density of the fuel without experiencing an equivalent decrease in fuel economy."

Therefore, continued use of an R-factor designed for use with higher energy content test fuel is inappropriate when migrating to a lower energy content test fuel.

Commenter footnote

[1] K. Knoll, B. H. West, et al, Effects of Intermediate Ethanol Blends on Legacy Vehicles and Small Non-Road Engines, Report 1 – Updated.

Organization: Ford Motor Company (Ford)

Since discussions began in June 2012, the EPA and manufacturers have made considerable progress in developing the FE equation for low-level ethanol blends. This equation differs from the current "E0" equation in two respects: (1) an updated "R-factor" to better reflect the efficiency of current vehicle technology when operated on the proposed fuel, and (2) a factor for non-methane organic gases (NMOG) that accounts for the increase in oxygenated hydrocarbons resulting from the addition of ethanol to gasoline. While the inclusion of the NMOG factor in the equation has been a relatively straight-forward exercise, determining the most appropriate value for the revised R-factor has been a more complex task. Ford's analysis of the EPAct2 data set

(Alliance/Global Comments, Appendix 8) used an established R-factor methodology3 to show that once an anomalous fuel is removed, the data set strongly supports an R-Factor very close to "1". This result was corroborated using a second, independent data set in a paper published by Oak Ridge National Laboratory4. Based on these findings, Ford agrees that the most appropriate value for the revised R-factor is 1, as proposed in the Alliance/Global comments.

Recommendation: Ford recommends that EPA adopt the fuel economy equation for E10 and E15 test fuels as proposed in the Alliance/Global comments, with an R-factor equal to "1", at the earliest possible date. Additionally, Ford recommends that EPA permit optional usage of the current "E0" fuel for all fuel economy purposes through 19MY for vehicles required to use E10 or E15 for certification testing.

Organization: Mitsubishi Motors R&D America, Inc (MRDA)

Recent analyses of data have demonstrated the Net Heating Value of ethanol-containing fuels result in an R-factor of 1. An R-factor of 1 is necessary to adjust the fuel economy values based on the proposed ethanol-containing certification fuel in order to be equivalent to the baseline 1975 CAFE values.

An R-factor of 1 in the fuel economy and CREE equations is considered appropriate based on industry analysis.

Organization: Renewable Fuels Association (RFA)

EPA should set the "R-factor" for fuel economy calculations at 1.0 to reflect the latest research and to avoid unnecessarily complicating automaker compliance with CAFE standards.

In its discussion of proposed changes to the certification test fuel, EPA briefly references potential implications for compliance with the CAFE program and GHG emissions standards. EPA states it is "...committed to the principle of ensuring that the proposed change in test fuel would not affect the stringency of either the CAFE or GHG emissions standards, and that the labeling calculations would be updated to reflect the change in test fuel (emphasis added)." In spite of this commitment, EPA fails to propose any actions to revise the "R-factor" used in the existing fuel economy equation. Maintaining the existing R-factor of 0.6 would indeed "affect the stringency" of CAFE standards and make it considerably more difficult for automakers to meet fuel economy requirements if the certification test fuel is E15 or other ethanol blend.

The R-factor was developed to account for a vehicle's relative ability to compensate for changes in fuel energy content. The existing R-factor of 0.6 is based on data from vehicles tested more than 30 years ago and was first used in fuel economy calculations in 1988. Control systems in modern light duty vehicles have evolved substantially since establishment of the 0.6 factor, and recent testing data demonstrate modern vehicles are able to entirely compensate for changes in fuel energy content. A detailed analysis published in June 2013 by the Department of Energy (DOE) evaluated fuel economy data collected during mid-level ethanol blend catalyst durability testing to determine the proper value for the R-factor.[1]

According to the DOE work, "Calculating modern vehicle fuel economy with the existing CFR equation with an R factor of 0.6 when ethanol blends are used produces significant errors (emphasis added)." The DOE analysis found that the actual average R-factor for modern vehicles is "very close to unity" at about 0.94±0.04 (or 0.96±0.04 with one problematic vehicle omitted). DOE determined that fleet-wide average R-factor values for vehicles using E10 and E15 ranged from 0.95 to 1.03. Accordingly, the DOE researchers concluded, "The current factor of 0.6 which is called out in CFR is clearly too low, and a proper factor for modern vehicles is closer to unity [i.e., 1.0], as might be expected from improved air/fuel ratio control common for more modern vehicles." Based on the DOE work, EPA should revise its R-factor to 1.0.

Commenter footnote

[1] S. Sluder and B. H. West, (2013) Preliminary Examination of Ethanol Fuel Effects on EPA's R-factor for Vehicle Fuel Economy; http://info.ornl.gov/sites/publications/Files/Pub42819.pdf

Organization: Mercedes-Benz USA, LLC on behalf of Daimler AG

Given that the volumetric energy content of an E25 Tier 3 fuel would be almost 9% lower than an E0 fuel, it is also necessary then to consider an R factor = 1. Per 'Corrections for Variations in Test Fuel Properties, EPA-AA-SDSB-84-3', the R factor, 'considered as the efficiency with which the vehicle engine adapts to fuel variations', should = 1 when an engine applies precise closed-loop feedback control for A/F ratio. Since the engine can take thermodynamic advantage of fuel properties but not fully adjust for volumetric energy content, as in the case of an E25 fuel, variations in volumetric efficiency are more related to engine-specific hardware and other vehicle attributes designed to optimize thermodynamic efficiency than to the specific test cycle itself. An R-factor of 0.6, as is currently the case, would result in approximately 5% volumetric fuel efficiency loss for an E25 fuel, which mathematically hinders any manufacturer seeking to certify a vehicle on such a fuel. Thus an R factor = 1 is a necessary step for the acceptance of mid-blend ethanol fuels.

Organization: International Council on Clean Transportation (ICCT)

The ICCT has similar concerns on any future use of engines using E30. In addition, we are concerned that E30 could open the door to E30 credits against the CAFE and GHG standards, similar to what has already occurred for FFVs. It would be much better for EPA to focus on increasing the octane rating of all gasoline. The ICCT supports updating the R-factor in the carbon balance equation for NHV changes. Specifically, the R-factor determined by ORNL for Tier 2 vehicles without the data outlier should be used, or R=0.96.

The R-factor is an adjustment made by EPA to maintain compatibility with the test procedures used in 1975 for calculating fuel economy, as required by the 1975 EPCA. The R-factor is used to adjust the FE test results for changes in the net heating value (NHV) of the test fuel. EPA is accomplishing this by incorporating the R-factor into the carbon balance equation, instead of doing the adjustment after calculation of the fuel economy.

Specifically, the R-factor is the sensitivity of the fuel economy to changes in NHV. Ethanol blends reduce the NHV of the test fuel. To the extent that NHV affects engine efficiency, this change must be accounted for under the 1975 EPCA.

Current, an R-factor of 0.6 is in the regulations. This was based upon data submitted by GM and others in 1985 on primarily carbureted vehicles. In the past there was not a lot of variation in fuel properties of Indolene, so this R-factor had a minor effect and there was no need to revisit it.

However, switching to E10 as the test fuel will cause a much larger change in the NHV - about 3.5% for E10 (and over 5% for E15). Using an R-factor of 0.6 would give an artificial upward adjustment of over 2% (0.4 x 5%) to E15 vehicles.

ICCT commends EPA for having the foresight to readdress the R-factor. A contractor report for EPA by ORNL, based upon test data on recent vehicles using E0, E10, E15, and E20, calculated R-factors for the entire fleet, Tier 2 vehicles only, and with and without exclusion of an outlier vehicle (12).

The existing R-factor is clearly outdated and needs to be replaced. Vehicles certified to Tier 2 are representative of current vehicles and are the closest representation of future Tier 3 vehicles, so data from older non-Tier 2 vehicles should not be used. The Honda Accord data is clearly an outlier and is likely the result of an error in testing. It is standard practice in statistics to exclude such obvious outliers. Thus, the ICCT recommends that the R-factor found in the report for Tier 2 vehicles without the outlier, 0.96, be adopted in the final rule.

Commenter footnote

[12] Sluder, S. and West, B., “Preliminary Examination of Ethanol Fuel Effects on EPA’s R-factor for Vehicle Fuel Economy”, ORNL report for EPA, June 2013.

Our Response:

As indicated by the comments, there is disagreement between EPA and the industry with regard to the appropriate value for the R-factor. The NPRM cited two memos discussing the issue, but in EPA’s view there was not adequate data at the time of the NPRM to settle on an R-factor revised value for the proposal. Thus, no specific value was proposed and EPA indicated that a revised R-factor would not be included in the final rule. EPA met with the commenters on August 7, 2013 to further discuss the analysis they provided which supported their perspective that an R= 1.0 was justified. EPA’s view of the data was that a value of approximately 0.9 was more appropriate[42]. EPA and GM met the following day on the same issue, and at EPA’s request, GM provided additional input to clarify a few technical perspectives.[43,44] There was agreement that further work would be helpful to understand the data relative to the effects of

[42] Passavant, G. (August, 2013). EPA, “Alliance, and Global Automakers Meeting on Issues Related to Tier 3 Cert Fuel and the CAFE "R" Factor”. Memorandum to the docket.
[43] Passavant, G. (August, 2013). “EPA and GM Meeting on Issues Related to Tier 3 Cert Fuel and "R" Factor”. Memorandum to the docket.
[44] Fronetti, S. (August 2013).”GM Input on R-factor”. E-mail from S Fronetti to G Passavant.

other fuel qualities on the R-factor and that the data set had several limitations related to technology types and ethanol content of the test fuels.

The current fuel economy equations already have a means by which to adjust for elements such as volumetric energy density, specific gravity and net heating value which are fuel specific. The R-factor is more vehicle technology related so it best assessed on vehicles using Tier 3 technology.[45] The approach laid out in the FRM and prescribed in §86.600.113 will help to ensure that the R-factor is based on E0 and E10 emission results for Tier 3 technology vehicles. As mentioned in the GM comments, the use of an R=0.6 is not ideal with E10 emission test results and is thus providing the manufacturers the option to use E0 fuel in litmus assessments if it does not think E10 test results with R=0.6 is appropriate.

We acknowledge the comments of Mercedes Benz USA (MB) regarding the relationship of E25 and the R-factor. Fundamentally, the issue of the appropriate R factor value needs to be assessed since the test fuel is changing. We note MBs view that an R=1.0 is appropriate for E25, and will consider test data if and when E25 becomes a primary or optional test fuel.
We do not agree with the comments from the ICCT. They seem to misunderstand the role of the R value term in the fuel economy equation and believe it is already covered by the change in net heating value (NHV) for E10 versus E0 in the fuel economy equation. R factor is the efficiency with which the vehicle/engine adapts to changes in fuel qualities. It is determined empirically based on vehicle test data. We do not agree with ICCT that a value of 0.96 is appropriate because it is not based on the results for Tier 3/LEV III technology vehicles tested on Tier 3/LEV III fuels. The approach laid out in the FRM will allow EPA to gather the requisite data and conduct the analysis needed to see if a change in the R factor value is needed and if so, what value should be proposed.

4.5.4.4. Related Test Procedure Adjustment Calculations

What Commenters Said:

Organization: Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

EPA should address Fuel Economy and CREE Equations for E10-25 Certification Fuels as follows:
The Tier 3 proposal requires that 50-state E10 certifications use ethanol test fuel for fuel economy label litmus tests and for fuel economy. This is not possible without an updated R factor and fuel economy equation. Measuring the oxygenates for all E10 or E15 tests is labor intensive, requiring ethanol and aldehyde measurement in the chemistry lab which is very expensive and delays results for a very small and negligible change in fuel economy. Oxygenated species contribution to fuel economy and CREE with E10 or E15 is insignificant (less than 0.005%) but will be included in the NMOG term in the denominator of the proposed

[45] The R-factor may be considered as the efficiency which the vehicle/engine adapts to changes in fuel qualities.

fuel economy equation below. The NMOG term is calculated based on the NMHC to NMOG equations proposed in §1066.665 in the Tier 3 Part 1066 test procedures without the requirement for direct measurement of ethanol and aldehyde. Accordingly, the Alliance and Global Automakers recommend the following equations (with an R factor of 1.0) be used for E10 and E15 fuel economy, CREE and ADCREE conversion factor calculations:

$$_{10-25} = (5174 \times 10^4 \times \quad)/[[\quad \times (\quad + \quad_4)+(0.429 \times \quad)+(0.273 \times \quad_2)]x \quad]$$

$$_{10-25} = (\quad /0.273)(\quad + \quad_4)+(1.571 \times \quad)+ \quad_2$$

$$2 \times \quad = (5174 \times 10^4 \times \quad)/(0.273 \times \quad)=$$

Where:
– 5174x10^4 = density of H20 @ 60°F * SG of 1975 reference fuel * NHV of 1975 reference fuel
– CWF is the carbon weight fraction of the test fuel
– NHV is the net heating value of the test fuel [Btu/lbm]
– HC is the total hydrocarbons [g/mi] in the exhaust gas
– CO is the carbon monoxide [g/mi] in the exhaust gas
– CO_2 is the carbon dioxide [g/mi] in the exhaust gas

Organization: General Motors LLC (GM)

An added benefit of setting the R-factor at 1.0 is that it would simplify the fuel economy equation and avoid future controversy if EPA were to ever propose another test fuel.

GM proposes that EPA include this change in the final Tier 3 rule by establishing a new fuel economy equation for vehicles tested on Tier 3/LEV III E1x test fuels that includes an R-factor of 1.0. This equation would be:

FE = (5174x10^4 x CWF) / {[(CWF x (NMOG + CH_4)) + (0.429 x CO) + (0.273 x CO_2)] x NHV}
where,

– 5174x10^4 = density of H2O @ 60° F x specific gravity of 1975 reference fuel x NHV of 1975 reference fuel – CWF is the carbon weight fraction of the test fuel

– NHV is the net heating value of the test fuel [Btu/lbm]

– NMOG is the non-methane organic gas [g/mi] in the exhaust gas as determined in accordance with 40 CFR 1066 test procedures

– CH_4 is the methane [g/mi] in the exhaust gas– CO is the carbon monoxide [g/mi] in the exhaust gas

– CO_2 is the carbon dioxide [g/mi] in the exhaust gas

It should be noted that although oxygenated hydrocarbons are an insignificant contributor to the fuel economy value, their effect has been included by virtue of using NMOG in the equation.

Organization: General Motors LLC (GM)

One of GM's primary concerns with the use of any new certification test fuel, regardless of chemical composition, is the test fuel's effect on CAFE fuel economy, which is intimately linked to EPA's exhaust emissions regulations. The current fuel economy adjustment R-factor of 0.6 was first developed by EPA and GM in 1984 as a means to compensate for drift in the composition and energy content of Federal emissions certification fuel relative to the original 1975 emissions certification fuel. This practice established the precedent that each time the emissions certification fuel formulation changed, the fuel energy content would be partially normalized (to the extent of the R-factor) back to that of the 1975 certification fuel to reduce changes in fuel economy regulation stringency. Going forward, no vehicles meeting Tier 3 emissions will use the open loop control systems that were used to develop the R-factor back in the 1970s and early 1980s. Modern closed loop control systems fully adjust for changes in the heating value of the fuel. Indeed they must do so to maintain stoichiometry and minimize emissions of HC, CO and NOx. An R-factor of 1.0 reflects the full control system adjustment to the fuel. However, the Test Fuel section of the introductory material of the NPRM states, "EPA will continue to investigate this issue (R-factor) and if necessary address it as part of a future action."

Our Response:

EPA did not propose to change the fuel economy equations of 40 CFR 600.113 in the Tier 3 NPRM. The equations proposed by the commenter differ from those now in the CFR in that the R factor value is set at 1.0 (and this is not shown), the HC value is replaced by ($NMOG+CH_4$), and an additive value of 5174 is missing from the denominator of the FE_{10-25} equation because the R factor is 1. The term ADCREE is not used in the current CFR, but is reflected in an EPA guidance letter to the manufacturers.[46] The manufacturers suggest that the use of NMOG + CH_4 in the fuel economy equations provides sufficient accuracy relative to the measurement of aldehyde values. EPA is not adopting any changes to the fuel economy equations in the Tier 3 rule, but the commenters should raise these ideas in comments on the follow-on action where EPA proposes the test procedure changes related to the fuel economy equation. In that forum adjustment to the terms and values in the fuel economy equations and any related guidance letters can be fully considered.

4.5.4.5. Timing for the GHG, CAFE, and Fuel Economy Labeling Program Adjustments

What Commenters Said:

[46] CD 12-03.(February, 2012)." Analytically Derived CO2 and Carbon-Related Exhaust Emissions (CREE) for Light-Duty Vehicles".

Organization: Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

EPA is Obligated to Release a New Fuel Economy Equation for Ethanol Containing Test Fuels Within the Tier 3 Final Rule:
Under 49 U.S.C 32904(c) and 40 C.F.R. 600.510-12(f), EPA is required to provide average fuel economy adjustments for test procedure changes that would cause a vehicle to achieve fuel economy results that would differ from results that would be achieved under the 1975 test procedure. The current regulations contain a fuel economy equation with an R-factor equal to 0.6 that applies to testing on “gasoline.” Additionally the regulations currently define E10 and E15 fuels [§86.113-04(a); §86.113-07(a); and §1065.710(a)] as being gasoline. Hence when the NPRM proposed to change the test fuel to either E10 or E15 without changing the applicable mpg equation, the resultant proposed regulations could be interpreted as requiring use of the current equation with an R-factor of 0.6. This creates a change in test procedures relative to the 1975 baseline required for the CAFE program. For this reason, EPA must adopt a test procedure adjustment to account for the change. EPA either needs to provide a separate test procedure adjustment to account for the effects of the test fuel change or it needs to make the necessary revisions to the mpg equation, including incorporating the appropriate R-factor, to appropriately adjust for the effects of the fuel change.

This situation arises as a result of the proposed regulations and hence must be resolved in the final regulations. EPA has indicated that it does not believe it can finalize the R-factor in the Tier 3 rulemaking. While the agency has verbally committed to do a follow-up rulemaking to handle this issue, this will result in an unacceptable delay. Such a delay would result in a changed test procedure but without all of the conditions and consequences being established. This would make planning for compliance difficult. We believe that language that already exists in the current regulations plus what EPA has proposed in the NPRM sets up the conditions that effectively should enable EPA to resolve the R-factor issue in this rulemaking. In fact these conditions arguably require that it must be done in this rulemaking. The proposed test fuel change satisfies the five criteria in the Rules for issuing CAFE test procedure adjustment. First, preliminary EPA/auto industry testing has confirmed that a directional (downward) change in the measured fuel economy of an average vehicle can be anticipated from EPA’s proposed test fuel change. Second, this directional change in measured fuel economy can be quantified once sufficient testing has been performed to develop appropriate and reliable data. Third, the proposed FTP changes do not fall within the parameters of 40 C.F.R. § 600.510-86(f)(3), which is intended to close "loopholes" that may have permitted manufacturers to gain measured improvements in fuel economy without corresponding actual improvements in fuel economy. Fourth, the proposed FTP revisions are not the type referenced in 40 C.F.R. §600.510-86(f)(4), which relate to test procedure changes providing manufacturers with improved ability to receive credit for real fuel economy improvements. Fifth, the proposed FTP changes are being initiated and required by EPA, and not implemented solely by a manufacturer on its own initiative, in its own laboratory. Thus, EPA is required to issue appropriate CAFE adjustments for changes to the test fuel, with the appropriate R factor of 1.0.

Organization: General Motors LLC (GM)

In the NPRM, EPA indicates it would be evaluating whether R-factor changes should be included in a future action. GM sees no reason for delaying the establishment of an R-factor for the new EPA E1x test fuel as well as CARB LEV III E10 test fuel. We believe that there is sufficient data available for EPA to make the R-factor determination now and that the data supports the establishment of an R-factor value of 1.0, including a new report from Oak Ridge National Labs[3] and data analysis provided in the Alliance/Global comments. [4]

GM is very concerned with this language leaving the R-factor of 0.6 in place and believes EPA must address the R-factor as part of Tier 3 rule-making instead of waiting and issuing a "Dear Manufacturer's Letter" sometime in the future. The extra degree of certainty and expediency by doing so is needed by the automakers to assist in their compliance planning.

(B) The manufacturer must also use this E10 fuel for fuel economy measurements, with any appropriate corrections related to ethanol content in the fuel.
EPA has long promised that it will revisit the correction factor (R-factor) regarding ethanol content.[5] The final value of the R-factor and its timing are unknown. In Section II of these comments, GM recommends that EPA set an R-factor of 1.0. If EPA does not set the R-factor in time for these early certifications, then GM requests EPA give manufacturers the option to use today's E0 fuel for fuel economy testing . Although this is a burden for manufacturers (dual testing, E0 and E10), the penalty of requiring the use of an inappropriate correction factor is much more damaging.

Commenter footnote

[3] Oak Ridge National Laboratory, US Department of Energy, report 'Preliminary Examination of Ethanol Fuel Effects on EPA's R-factor for Vehicle Fuel Economy,' Report Number ORNL/TM-2012/198, June 2013; accessed at: http://info.ornl.gov/sites/publications/Files/Pub42819.pdf
[4] See Alliance/Global comments, Appendix 6: Reanalysis of R Factor Data.

Our Response:

EPA agrees that an assessment of the impact of the change in test fuel qualities on the measurement of fuel economy is needed and that test procedure adjustments should be made if appropriate. Referring back to the comments, the second point above "…this directional change in measured fuel economy can be quantified once sufficient testing has been performed to develop appropriate and reliable data. " In the case of the Tier 3 rule there are two variables to consider: changes in fuel quality and changes in vehicle technology as a result of the new emission standards. Thus, we believe EPA's approach as laid out in the FRM is appropriate. It does not change the fuel economy test requirements now specified in 600.113-12 are not changed. Test data based on Tier 3/LEVIII fuel in Tier 3/LEVIII technology vehicles will provide the data needed to determine any appropriate test procedure changes. The data available now such as that discussed in Appendix 8 of the Alliance and Global Automakers comments may inform the analysis but are not sufficient to meet the needs of the assessment since it does not focus fully on the fuels and vehicles of interest. EPA agrees with GM that fuel economy testing should be permitted on E0 fuel if the R factor is not revised in the Tier 3 rule. In fact it the use of E0 will be required for fuel economy testing.

Organization: Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

While no substitute for adopting a new fuel economy equation in the Tier 3 Final Rule, EPA should also optionally allow manufacturers to continue to perform fuel economy testing on E0. As vehicles are certified on the new test fuel, it becomes important to set up processes that will minimize manufacturer testing burdens and maintain a level playing field for fuel economy labeling because not all competing products will phase-in to the new test fuel at the same time. The fuel economy label for a product adopting new ethanol test fuel should still accurately reflect its comparative performance relative to a competing product certified on non-ethanol test fuel. Without adopting a new fuel economy equation appropriate for ethanol-containing fuels, EPA creates a period of uncertainty where vehicle programs, which begin development work several years before certification, must continue to develop and establish targets based on the assumption that E0 will be used for all fuel economy measurements. Allowing optional use of E0 test fuel for a predefined period of time would allow manufactures to better manage the task of migrating to the new fuels and prevent disruption of vehicles program that are underway when the new fuel economy equation is made available. We recommend that EPA allow the optional use of E0 test fuel for fuel economy purposes as an option through MY 2019 to help to mitigate level playing effects due to different products phasing-in at different times and to manage uncertainly regarding the timing of the new fuel economy equation.

Organization: Ford Motor Company (Ford)

Although the Tier 3 NPRM proposes a new E15 certification fuel, it does not provide a new fuel economy (FE) equation that can be appropriately used for such low-level ethanol blends– including CA LEV III E10–for fuel economy, CAFE or "litmus test" purposes (EPA does note that this could be accomplished via a "future action"). As a result, several aspects of the rule cannot be carried out by manufacturers as proposed, including the requirement that E15 be used for all fuel economy purposes when required for certification (§86.113-07 (a)(1)) and that CA E10 be used for fuel economy testing for 50-state certification in 2015 and 2016 model years (MY) (§ 86.113-04 (a)(2)(ii)(B)). Although these requirements could be changed in the final rule to alleviate the immediate concerns regarding their non-executable nature, the absence of firm timing for the adoption of a fuel economy equation for E10 and E15 (E1x) still creates a period of uncertainty for manufacturers, who must continue to use the current "E0" fuel not only for official testing but also as a basis for development testing and program target setting, both of which take place several years ahead of final certification. To address this uncertainty, we recommend that in addition to prompt adoption of the new FE equation for E1x fuels, EPA also specify a pre-defined period of time where testing on "E0" would remain optional for FE purposes, independent of the date the new E1x FE equation is eventually finalized. Such a provision would also allow manufacturers to phase the new fuel into FE testing in such way to avoid mid-stream program disruptions, better manage carryover issues, and mitigate any competitive issues related to competing products moving to the new test fuel in different model years.

Our Response:

Manufacturers have presented two points of view with regard to when the potential new requirements (including a revised "R" factor and other possible test procedure changes/adjustments related to CAFE, GHG, and fuel economy labeling) should take effect assuming a future rule is proposed and finalized. Some have stated that use of the new provisions should be available for use as soon as possible after the rule is completed. This would minimize the need for any future duplicate emission testing and put manufacturers on course for fully aligning with the new requirements quickly. Others have asked that there be lead time provided before the application of the new requirements becomes mandatory. The manufacturers have expressed concern that the use of the new requirements more quickly by one manufacturer versus another could create a competitive imbalance. At the same time, manufacturers do not necessarily want to be forced to certify all products to the new requirements by a cut-off date (e.g., 2020 model year) without EPA consideration of phase-in or phase-out provisions and data carryover.

EPA understands the manufacturers' various issues and concerns in this area. Based on the information available at this time, EPA is expecting to allow the optional use of any future adjustments for compliance calculation and labeling purposes as soon as the potential future rule mentioned above becomes effective. Furthermore, we expect that the mandatory use of any such new adjustments with all Tier 3 certifications would be required for the 2020 MY. These initial timing considerations are subject to revision based on timing of the completion of the future action and the data and record developed in that future rulemaking.

4.5.5. Consideration of Nonroad, Motorcycle, and Heavy-Duty Engine Emissions Test Fuel

What Commenters Said:

Organization: American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM); Marathon Petroleum Company LP (MPC)

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.

Organization: Outdoor Power Equipment Institute (OPEI)

The Outdoor Power Equipment Institute (OPEI) is pleased to provide initial comments in response to EPA's Notice of Proposed Rule Making (NPRM) "Control of Air Pollution from Motor Vehicles: Tier 3 Motor Vehicle Emission and Fuel Standards". Specifically, the OPEI comments address changes to gasoline certification test fuels, and the implications to non-road engines.

OPEI is the major international trade association representing the manufacturers and their suppliers of small off-road engines and consumer and commercial outdoor power equipment (OPE). These products are commonly found in most American households and include products such as lawnmowers, garden tractors, utility vehicles, trimmers, edgers, chain saws, snow throwers, tillers, leaf blowers and other lawn and garden implements. While OPE consumes a small percentage of the nation's fuel supply, their ownership by the American consumer is ubiquitous. As a result, there exists an inventory of as many as 200 million OPE legacy products currently in use.

In response to Section IV.D.5 of the subject NPRM (page 29914) "Consideration of Nonroad, Motorcycle, and Heavy-Duty Engine Emissions Test Fuel", and specifically whether a different test fuel (other than E15) would be more appropriate for the subject categories, OPEI is pleased to provide these initial comments:

Increasing the use of mid-level ethanol blended fuels in retail fuel distribution as well as for future certification test fuel presents enormous risks, burdens, and challenges to OPE manufacturers and users. As stated in EPA's E15 partial waiver decision notice (FR Vol. 75, No. 213, page 68098) "The Agency has reasons for concern with the use of E15 in nonroad products, particularly with respect to long-term exhaust and evaporative emissions durability and material compatibility" as a result of "more basic engine designs". Similarly, in section IV.D.5 of the subject NPRM (page 29914), EPA recognizes small non-road engine concerns stating "Because of lower level of technology, emissions from these engines are potentially much more sensitive to changes in fuel quality." These concerns, as expressed by EPA, are consistent with those of the small spark-ignited engine and outdoor power equipment industries.

Currently, there are numerous technical challenges and constraints for legacy and current production that were developed, manufactured and certified to EPA's current E0 certification fuel. These constraints and challenges would first need to be resolved through practical regulatory and engineering solutions (that are a long way from being developed or implemented)—before making any certification test fuel change beyond E10 for these products.

With few exceptions, small spark-ignited engine powered OPE is not designed or warranted to run on gasoline fuel containing more than 10 percent ethanol by volume (E10). At its fuel distribution core, today's carburetor technology still widely limits the reliable ethanol operating range of most small spark-ignited engines. While carburetors can be calibrated to allow product to run on fuels exceeding E10, the limited 10% operating range does not change. Additionally, sensitive and critical fuel system components and materials can be damaged by E-15. Consequently, when running carbureted engines on fuel outside their designed operating range, excessive heat, emissions and safety issues may result. Accordingly it is critical that every retail gas station continue to offer dedicated E10 or less fuel pumps to support the growing contingency of legacy product independent of future certification fuels.

Small spark-ignited engines may ultimately be designed to run on mid-level ethanol fuel blends, given adequate lead time for design changes and assurance that the retail fuel ethanol content is within a limited and acceptable range of the certification test fuel specified by EPA for emissions compliance. However, any consideration of certification test fuel changes should recognize the significant investments and lead time required of manufacturers. An extended time period would be required to complete design and recalibration work as well as necessary consumer education programs for each new certification test fuel. Therefore small spark-ignited engine certification test fuel changes would need to be nationally harmonized based on a limited number of re-design iterations, representative of established and consumer accepted ("real world") fuels, not based on incremental changes as required by the Renewable Fuels Standard (RFS).

Non-harmonization of certification test fuel for small spark-ignited engines will further complicate manufacturing and consumer decision making. Similar products each designed to operate on unique certification test fuels will add consumer confusion and increase the potential of detrimental misfueling. In line with today's market fuel, recent California Air Resources Board (CARB) rulemaking established E10 certification test fuel requirements for 2020 and later for small spark-ignited engines. CARB's new regulation permits the use of E10 certification test fuel as early as 2013 and suggests no certification test fuel changes thereafter. Similarly, EPA worked with the industry on a small spark-ignited engine direct rule amendment which permits E10 certification fuel through 2019. While this effort is appreciated, the new rule does not provide the harmonization certainty needed beyond 2019. OPEI recommends a continued optional alignment path with CARB E10 certification test fuel beyond 2019.

In summary, today's E-15 certification test fuel proposed rulemaking for motor vehicles is not appropriate for small spark-ignited engines. In response to EPA's request for comments regarding appropriate certification test fuels for small spark-ignited engines, OPEI recommends a continued harmonization path with CARB E10 certification test fuel for 2020 and later model years. Furthermore, aside from further CARB E10 certification test fuel harmonization, OPEI recommends that longer-term certification test fuel rulemaking for small spark-ignited engines be postponed until the future of the RFS and retail fuel marketplace is clear.

At this time OPEI's recommendations are limited to EPA's specific request for comment from the nonroad industry in section IV.D.5 of the subject NPRM (page 29914). Consequently, OPEI may have further comments, concerns or issues with the NPRM as it continues to review the potential impact on its members.

Organization: Truck and Engine Manufacturers Association (EMA)

Exhaust emissions certification test fuel for other heavy-duty, motorcycle, and nonroad categories:
EPA has requested comment regarding the implications of changing the exhaust emission certification test fuel for gasoline-fueled nonroad engines (large spark-ignited (LSI), small sparkignited (SSI), recreational vehicle, marine spark-ignition), motorcycle, and "other" heavy-duty engines in a future rulemaking. (78 Fed. Reg. at 29919.)

Those product categories fall into a broad category of engines, vehicles, or equipment that EPA previously determined would be adversely affected by the use of gasoline blends greater than E10. (75 Fed. Reg. No. 213, 68094-68510, November 4, 2010; 76 Fed. Reg. No. 17, 4662-4683, January 26, 2011.) Those products are substantially different from the 2001 and newer light-duty vehicles that EPA determined would not be adversely affected by gasoline with an ethanol content up to E15. EMA agrees with EPA's previous determination regarding product categories deemed to be adversely affected by E15, but we remain concerned about the misfueling controls and fuel availability issues that we identified in comments provided during the E15 waiver determination process. (Docket No. EPA-HQ-OAR-2010-0448; Comments of the Engine Manufacturers Association, January 3, 2011). During the waiver determination process, EPA asserted that both the potential for misfueling, and continued availability of E10 and lower ethanol blends, were adequately controlled. However, in the Proposed Rule, EPA suggests that it is contemplating future rulemakings whereby the products deemed to require E10 and lower blends would be redesigned to utilize the proposed light-duty E15 certification test fuel and the misfueling mitigation measures would be revised.

As we have discussed with EPA, and as we set forth in EMA's comments submitted during the E15 waiver decision process, engine manufacturers cannot make product changes associated with frequently-changing certification test fuel or marketplace gasoline-ethanol blends. The light-duty Tier 3 proposed change to E15 certification test fuel does not appear to be the end but, rather, the beginning of changes driven by the requirements of the Renewable Fuel Standard (RFS-2). The stated premise for the proposed change to E15 certification test fuel in the pending rulemaking is EPA's intent to reflect marketplace fuel for the next 10 to 15 years. (78 Fed. Reg. at 29909.) However, increasing ethanol content requirements required by the RFS-2 are not being met by increased consumption of E85 as originally projected by EPA. In addition, in separate action, EPA and the National Highway Traffic Safety Administration have promulgated regulations that require significant increases in light-duty fuel efficiency.

As noted in the preamble, the ARB LEV III standards require use of an E10 certification test fuel for on-highway vehicles. Similarly, ARB recently adopted regulations that require all nonroad spark-ignition exhaust emission certification requirements to be met utilizing E10 certification test fuel beginning in model year 2020. To facilitate the transition to E10 fuel, ARB's nonroad spark-ignition regulations allow the use of E10 certification test fuel at the manufacturer's option for the 2013 through 2019 model years. EPA is in the final stages of promulgating a regulatory change for nonroad small spark-ignition engines to allow an option to utilize the ARB E10 certification test fuel through the 2019 model year, after which time the option will no longer be available. (Heavy-Duty Engine and Vehicle, and Nonroad Technical Amendments; Direct Final Rule, June 17, 2013; 78 Fed. Reg. No. 116, 36369, 36384-36385.) Those changes will provide for harmonization of EPA and ARB exhaust emission test fuel requirements in the near term, but will result in disharmony between EPA- and ARB-required certification test fuels beginning in the 2020 model year. As noted above, engine manufacturers cannot make product changes associated with such a frequently changing certification test fuel scheme.

EMA recommends that EPA adopt the same E10, 9 psi RVP certification test fuel for heavy-duty on-highway, motorcycle, and nonroad categories that EMA recommends EPA adopt for Tier 3 on-highway vehicles. EPA should adopt stable, harmonized certification test fuel requirements.

Evaporative emission certification test fuel for nonroad categories:
Currently, EPA specifies E10 certification test fuel for all nonroad spark-ignition engine evaporative compliance determinations. (40 CFR Part 1060.) The current E10 test fuel is not prescribed beyond a splash blend of E0 certification test fuel and 10 percent volume ethanol. EPA requests comments on the impact on evaporative emissions if EPA were to require certification test fuel to be 10 psi RVP E10. (78 Fed. Reg. at 29895.)

EMA recommends that EPA specify that the certification test fuel for evaporative emission certification for all nonroad categories be E10 with an RVP of 9 psi. The use of an E10 test fuel with 9 psi RVP will provide manufacturers the ability to design and implement emission control systems that meet both ARB Small Off-Road Engine and EPA Nonroad Small Spark- Ignited Phase 3 requirements, which balances the lower 7 psi RVP California certification test fuel against the higher testing temperature requirements imposed by ARB. EPA should propose and adopt a change to 40 CFR Part 1060 to replace the splash blended E10 with the regulatory certification test fuel specification. EMA looks forward to working with EPA to adopt such changes.

Organization: National Marine Manufacturers Association (NMMA)

The California Air Resources Board (CARB) recently approved a staff recommendation requiring all nonroad spark-ignition exhaust emission certification requirements to be met utilizing E10 certification test fuel beginning in model year 2020. NMMA testified at the CARB Board hearing requesting that the board also allow for the use of an alternative California certified advanced biofuel, if available.

Organization: Renewable Fuels Association (RFA)

We are disappointed that EPA did not require that the proposed new certification fuel also apply to non-road and small engines. We believe it is necessary to ensure new non-road and small engine equipment are properly engineered for future commercial fuels.

Our Response:

Several manufacturers of gasoline nonroad equipment and small engines have commented in support of harmonization with CARB's adoption of an E10 test fuel for their products. However, in discussions during the development of the rule, a number of manufacturers raised concerns to EPA about the level of ethanol in the new fuel, the cost of recertifying emission families on the new fuel, the impact on nationwide product offerings, and the cost impact of complying with the existing standards on the new test fuel. While engines in some of these categories employ levels of technology similar to light-duty vehicles and trucks, the vast majority have much simpler designs, with many of the engines being carbureted with no electronic controls. As a result, emissions from these engines are potentially much more sensitive to changes in fuel quality.

While EPA believes it is important that the test fuel for nonroad equipment and small engines reflects real-world fuel qualities, we have elected to defer moving forward at this time with a change to test fuel for those products. It is important to better understand the effects of test fuel specifications on the wide range of engines, vehicles, equipment and fuel system components covered. This includes impacts on the levels of the emissions standards as well as other issues raised by the manufacturers. EPA plans to explore such a change in a separate, future action.

4.5.6. Consideration of CNG and LPG Emissions Test Fuels

What Commenters Said:

Organization: Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

In the NPRM Preamble, EPA requests comment on the appropriateness of changing 40 C.F.R. §86.113 to reference 40 C.F.R. Part 1065 for both natural gas and LPG test fuels. EPA further requests comment on amending these specifications to better reflect in-use fuel characteristics, and in particular on the appropriateness of aligning the sulfur specifications with those that apply for gasoline test fuel. Changing the sulfur specifications would depend on establishing that the new specification is consistent with the range of properties expected from in-use fuels (31).

Automakers agree with EPA that Sec. 86.113 should reference 40 C.F.R. Part 1065 for both natural gas and LPG test fuels. For ease of comparison, we have included the two tables, one for CNG and one for LPG. From “left to right” each table shows the specified fuel parameters of interest, summaries of new final California LEV III and proposed EPA emissions cert fuel standards, and then a brief summary of U.S. marketplace fuel quality (32).

In general, we support the proposed Tier 3 CNG and LPG certification fuel standards...

Additionally, for CNG, the dissolved Oxygen content should be raised slightly, to 0.5 mole %, to better represent the recent market survey results. Particularly for LPG in-use vehicle operation, it can be seen that the surveyed marketplace LPG fuel does not follow the total sulfur, reactive sulfur (e.g., hydrogen sulfide), water content, and hydrocarbon residues detailed in the proposed Tier 3 certification fuel specification.

U.S. CNG and LPG industries are at the front end of what appears to be the start of a long term growth trend, so it is an appropriate time to establish market and test fuel standards, including for sulfur.

Recommendations:
- Current alternative test fuel regulations should be revised, as noted above.
- EPA should implement our recommended specifications for E85, CNG and LPG detailed above. [This comment is also found in section 4.5.2. of this comment summary regarding FFV (“E85”) emissions test fuel.] [EPA-HQ-OAR-2011-0135-4461-A1, p. 64, The suggested detailed CNG and LPG test fuel specifications are location on pages 62 and 63 of the comment document]

31 - 78 Fed. Reg. 29908 (May 21, 2013).
32 - U.S. CNG and LPG Market Quality Surveys, SGS Labs, Germany, SGS Group Geneva, Switzerland

Organization: American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM); Marathon Petroleum Company LP (MPC)

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.

Organization: National Propane Gas Association (NPGA)

EPA also requested comment on LPG emissions test fuel. Specifically, the Agency seeks input on the appropriateness of revising 40 CFR 86.113 to reference 40 CFR 1065.720, which includes an 80 ppm maximum sulfur specification for heavy duty highway engines and non-road engines.5 Given that this is already a requirement and that we are unaware of any issues associated with this sulfur level for test fuel, NPGA would not object to this change.

Organization: NGVAmerica

The proposal requests comment on whether natural gas should have to meet an in-use standard as well as a test fuel standard. EPA regulations currently include test fuel standards for natural gas but do not include any controls on sulfur levels.

Based on the foregoing and as explained here, it would be premature to establish test-fuel specifications or in-use specifications for natural gas sulfur levels.

Organization: Robert Bosch GmbH, Gasoline Systems, Germany

The best approach would be a standardization on a basis of the actual CEN standardization for CNG fuel in Europe.

Organization: General Motors LLC (GM)

GM fully supports the Alliance/Global comments on both E85 and CNG/LPG certification fuels.

Our Response:

As discussed at proposal, there are currently no sulfur specifications for the test fuel used for certifying natural gas (CNG) vehicles. There is also no sulfur specification in §86.113 for the test fuel used for certifying liquefied petroleum gas (LPG) light duty vehicles. The LPG certification test fuel for heavy-duty highway engines and for nonroad engines in 40 CFR

§1065.720 includes an 80 ppm maximum sulfur specification. We requested comment on the appropriateness of amending §86.113 to reference 40 CFR part 1065 for all natural gas and LPG test fuels. We further requested comment on amending these specifications to better reflect in-use fuel characteristics, and in particular on the appropriateness of aligning the sulfur specifications with those that apply for gasoline test fuel. We noted that revising the sulfur specifications would depend on establishing that the new specification is consistent with the range of properties expected from in-use fuels.

As discussed in Chapter 5.7.2. of this Summary and Analysis of Comments document and in Section V.J. of the preamble to the Tier 3 FRM, additional time is needed for EPA to work with industry to collect data on current CNG/LPG sulfur content, to determine whether additional control of in-use CNG/LPG sulfur content is needed, and to evaluate the feasibility and costs associated with potential additional sulfur controls. Therefore, we are deferring finalizing in-use quality and certification test fuel specifications for CNG and LPG.

4.6 Small Business Provisions

4.6.1. Lead Time and Standards

What Commenters Said:

Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global Automakers):

EPA proposed that small volume manufacturers (SVMs), defined as manufacturers with average annual USA sales of 5,000 units or less, would be allowed a delayed start date for the proposed Tier 3 standards. SVMs would continue to meet the current tailpipe, evaporative and refueling emissions standards through MY 2021. Then in MY 2022, EPA proposes to require SVMs to meet the same FTP fleet average as other manufacturers, as well as use the new certification fuel and meeting the other Tier 3 requirements (i.e. SFTP, evaporative emissions, etc.), ultimately requiring compliance with the 30 milligrams per mile (mg/mi) fleet average in MY 2025. EPA would, however, also provide hardship relief on a case-by-case basis for SVMs.

EPA's proposal generally follows the Agency's past practice of allowing SVMs more lead time to comply (because of the need for additional flexibility) but requiring SVMs to ultimately meet the same standards as other manufacturers. This requirement ensures that SVMs are held to the same technological requirements as large manufacturers. However, there is a flaw in this argument, which is created by the current regulatory framework of fleet average emissions standards, as compared to historical standards. The use of fleet average emissions standards emerged when EPA adopted the Tier 2 fleet averaging approach for oxides of nitrogen (NOx) emissions. Prior to Tier 2, all vehicles produced in a particular model year had to meet the same NOx emissions standards. Starting with Tier 2, manufacturers were allowed to design individual models to meet one of several emissions bins, each of which had varying NOx emissions values; however, the weighted average mix of vehicles produced in a particular model year had to meet a declining NOx fleet average year by year.

So a large manufacturer could produce a high performance, luxury model and certify it to a higher emission bin and offset this model with sales of other lower emitting models. On the other hand, a SVM, which only has limited models (in some cases, only one model) primarily sold in niche markets, does not have other lower emitting models to use for averaging. As EPA recognized in the proposal, “Small manufacturers that typically do not have more than one or two emission families generally cannot use averaging to the same extent because of their limited product offerings” (78 Fed. Reg. 29915). Consequently, the use of fleet average standards penalizes SVMs by holding them to higher level of technology than large manufacturers that produce the same types of vehicles. Under the proposed Tier 3 standards, EPA is expanding the use of fleet average standards to include both NOx and tailpipe hydrocarbons (NMOG+NOx), thus putting SVMs in even further jeopardy.

Another aspect of the Tier 3 proposal is that manufacturers, including SVMs, are allowed to comply using an approach based on credits banking and trading. Thus, an SVM could accumulate and bank credits that could then be used, if needed, in future years for compliance purposes. Additionally, SVMs could purchase another manufacturer’s excess credits, if available, for compliance purposes. While these types of credits options have been available under EPA regulations, it is our understanding that for criteria emissions, there has been very little, if any, trading of credits among manufacturers. Some believe that the credits trading market may become more robust in the future; however, today this can only be based on speculation. The fundamental problem remains that, in a competitive market such as the auto industry, manufacturers do not have much incentive to make credits (which they may need in the future) available to competitors nor do they wish to rely on the possible availability of credits from competitors as a regulatory compliance strategy.

Furthermore, the demands on SVMs should be balanced against their environmental footprint. SVMs’ vehicles are typically driven less per year, as well as over their lifetime, compared to other vehicles, resulting in lower overall emissions. Plus due to the limited sales of these vehicles, there are far less of these vehicles in the fleet. For example, a composite fleet of SVM vehicles (5,000) driven 5,000 miles per year at a fleet average standard of 51 mg/mi would result in approximately 1.4 tons of NMOG+NOx in one year.

> *footnote:* According to Polk data, less than 4,000 new units were registered in combination for Aston Martin, Ferrari, Lotus, and McLaren in calendar year 2012. Company data suggests that average miles driven is less than 5,000 per year, on average.
> *footnote:* For example, McLaren Mercedes SLR showed that for a sample of over 1000 vehicle between one and three years old, the annual VMT was 1,360. Aston Martin estimated that worldwide average VMT of their vehicles since 2004 is 4,500 miles per year, and Lotus used a range a 4,500 to 7,000 miles per year based on 200 units in warranty.

The remaining fleet of vehicles (14.8 million) certified to an average of 30 mg/mi and driven an average of 13,446 miles per year would result in approximately 6,580 tons of NMOG+NOx. The difference between the two grows when considering the lifetime vehicle miles traveled by SVMs’ vehicles compared to the rest of the light-duty vehicle fleet; SVMs’ vehicles typically do not exceed 60,000 miles over the entire life of the vehicle, even though they will be certified for 150,000 miles of use under the Tier 3 standards. The resulting impact of SVMs fleets on air quality is insignificant in comparison to that of the rest of the fleet.

In light of these considerations, while we support the initial relief proposed for SVMs through MY 2021 and the hardship relief, we believe that EPA should provide additional lead time and flexibility in MY 2022 and beyond for SVMs.

EPA continually states throughout the proposal that their main goal is to create a harmonized program with ARB. Yet, EPA's proposed standards for SVMs do not align with ARB's requirements and would result in more stringent requirements. In its final Low Emission Vehicle (LEV III) rule, ARB required that SVMs meet a fleet average of 125 mg/mi in MY 2022-2024 and 70 mg/mi in MY 2025 and beyond. We recommend that EPA align with ARB's requirements for SVMs for MY 2022-2024 to meet EPA's stated goal of harmonization and provide the necessary lead time flexibility that SVMs need to comply with the Tier 3 regulations.

Furthermore, we believe that additional relief in MY 2025 is appropriate. We understand that the SVMs do not believe that they can meet the 30 mg/mi fleet average in MY 2025, but, in combination with the additional lead time and the flexibility in MY 2022-2024 (125 mg/mi fleet average), they believe that they can meet a fleet average lower than 70 mg/mi in MY 2025.

Therefore, we support a fleet average of 51 mg/mi in MY 2025 and beyond for SVMs; this level equates to the industry fleet average in MY 2022.

Recommendation: We recommend that EPA revise the requirements for SVMs according to the following: In MY 2022-2024, harmonize with ARB's LEV III SVM requirements of a fleet average of 125 mg/mi. In MY 2025 and beyond, adopt a fleet average of 51 mg/mi for SVMs.

Aston Martin Lagonda Ltd:

EPA have proposed that SVMs would enter the Tier 3 proposal for NMOG+NOx at 51mg/mi in 2022MY, then follow the slope through the following model years to 30mg/mi at 2025MY.

The NMOG+NOx standard decreasing year on year does not fundamentally work for SVMs with their limited test groups and model ranges. It would effectively incur additional testing or early compliance with lower standards than is necessary, mainly due to product lifecycle timings. For example it may become necessary to certify to the proposed 2022MY 51mg/mi NMOG+NOx requirement as early as 2018MY based on current program plans. This could reasonably be seen as unfair.

We would propose that, as a minimum, 125mg/mi applies up to 2021MY, followed by 51mg/mi from 2022MY onwards. Preferably, the possibility of the temporary Small Business Provision of 125mg/mi applying all the way to 2024MY would allow for even greater certification timing flexibility.

During the Tier 3 and LEV III formulation periods Aston Martin, Mclaren and Lotus jointly urged EPA and CARB to adopt less stringent standards for SVMs based on our inherently limited fleet averaging capabilities. CARB understood this thinking and adopted a 70mg/mi NMOG+NOx 2025MY SVM standard. EPA has ignored the opportunity to harmonise with CARB in this ruling despite the fact that EPA always stated that this was their goal.

EPA made the assumption that SVMs would have ready access to technologies by 2022MY to enable them to meet a 30mg/mi NMOG+NOx fleet average by 2025MY. The demonstration of capability by the large volume manufacturers does not automatically mean that those same technological enablers are available to SVMs in the given timeframe. It is therefore unreasonable to base a rule on an assumption of this nature.

Within the Small Business Provision wording, EPA have acknowledged the CARB flexibilities for SVMs and have requested comment on a relaxed standard proposal extending from 2022MY (the entry point onto the slope for SVMs) thru 2024MY that is based on a 125mg/mi NMOG+NOx FTP standard. Aston Martin fully supports this flexibility.

To clarify, Aston Martin would find the 2022 to 2025MY slope fleet average almost impossible to meet. As a manufacturer with one or two test groups the slope based fleet average starting in 2022MY would effectively push us to meet the 2025MY 30mg/mi standard as early as 2022MY in order that we do not incur burdensome extra testing of vehicles already certified for 2022MY. There are many theoretical scenarios with regard to meeting a certain standard at a particular MY but typically as an SVM we would have to treat a fleet average as a cap standard thereby ensuring that all vehicles sold within either of our two test groups do not adversely contribute to that fleet average requirement. As we have noted on a number of occasions previously the fleet average nature of any criteria emissions standard is fine if you have many model lines, and therefore test groups, over which to average, but SVMs generally have a (very) limited model range leading to the fleet average becoming a cap standard. Additionally SVMs do not have the capability to manipulate sales in order to meet the fleet average requirements and are reliant upon sales and marketing strategies to gain sales of any and every model in their fleet without recourse to sales manipulation.

Alternatively EPA should harmonise with the CARB SVM standard, again with a midterm review to determine capability to meet a later, more stringent, standard.

Aston Martin still feels strongly about meeting the 30mg/mi NMOG+NOx standard from 2025MY. We would propose that SVMs are asked to meet a final 51mg/mi standard from 2025MY with a midterm review of capability with the individual SVMs in the 2022MY timeframe to establish the possibility of meeting a 30mg/mi NMOG+NOx standard.

Aston Martin would propose that SVMs are only held to a 51mg/mi NMOG+NOx standard that is applicable from 2022MY onwards and additionally that there is a midterm review of capability to meet a more stringent standard after 2025MY.

There is a general understanding that due to the small number of vehicles sold by SVMs and the low level of annual mileage accumulation by those vehicles their contribution to fleet criteria emissions levels is de minimis. This fact should allow for a more lenient standard to be promulgated without it being viewed as contentious.

California Air Resources Board (CARB):

California has traditionally provided relief to Small Volume Manufacturers (SVM) (primarily producers of high performance vehicles), recognizing that they are at a competitive disadvantage with larger manufacturers in terms of both investment and engineering resources. In addition, they must compete with full line manufacturers who are able to offset the emissions of their low volume high performance vehicles with higher volume, lower emission vehicles. For these reasons, LEV III provides slightly less stringent emission standards for SVMs.

Unlike LEV III, Tier 3 requires SVMs to defer compliance with the Tier 3 fleet average standards until 2022. The Notice of Proposed Rulemaking (NPRM) requests comment on this and an alternative requirement that matches LEV III requirements through 2024 and then requires that SVMs meet Tier 3 fleet average requirements in 2025. Since harmonization of SVM requirements will allow these manufacturers to certify the same vehicle to both programs, CARB recommends that U.S. EPA consider finalizing the alternative requirement by matching Tier 3 requirements with LEV III through 2024. Since Tier 3 allows SVMs to apply for hardship relief under certain conditions, thereby addressing their concerns on competing with full line manufacturers, CARB will review the Tier 3 SVM requirements when finalized and determine whether alignment between LEV III and Tier 3 requirements for SVMs beginning in 2025 is appropriate.

Light-Duty NMOG+NOx Certification Options:
The LEV III program sets forth a separate option for certifying light-duty vehicles to the SFTP NMOG+NOx standards, primarily to accommodate small volume manufacturer. While the proposed Tier 3 program does not include an equivalent option, alignment between the two programs is not necessary because Tier 3 would accommodate small volume manufacturers through a different mechanism. Specifically, Tier 3 would delay SFTP compliance for small volume manufacturers until model year 2022. Accordingly, CARB does not intend to propose any changes to the LEV Ill program for this issue.

Ferrari:

Ferrari has built its reputation in the market segment in which we compete on production of vehicles with key attributes—excellent power, superior handling, hand craftsmanship, cutting edge to classic body design, signature engine sound and overall superior quality. This is the DNA of all Ferrari vehicles, and these factors remain key to Ferrari's continued success in the ultra-competitive, low-volume market segment in which we operate. Ferrari must design and build vehicles that prospective owners aspire to purchase. Without the passion for motoring that is built into every Ferrari vehicle, Ferrari would be "just another vehicle manufacturer." The key to Ferrari's future success is to continue to design and build vehicles with the DNA that has made Ferrari a vehicle people aspire to own and drive.

In addition, as Ferrari has previously noted in other EPA rulemakings and likely due to the DNA of our vehicles, these are not driven to the same extent as other manufacturers' vehicles. For example, it is exceptionally rare for a Ferrari to be driven for even 100,000 miles; indeed, an exceedingly small number of vehicles, if any, would ever reach the full useful life of 150,000 miles. Typically, the average Ferrari owner will drive the vehicle for 3000-4000 miles per year.

It is with both the Ferrari DNA and the very low mileage of our vehicles in mind that Ferrari offers the technical and policy comments and suggestions below.

EPA has proposed that SVMs (manufacturers with average annual USA sales of 5,000 units or less) be permitted to delay meeting the proposed Tier 3 emission standards. During the period up to and including 2021 MY, SVMs would have to meet current emission standards. During the period of MY 2022-2024 EPA has indicated that a more stringent set of standards would apply. Under the proposal, in 2025 MY, SVMs would be required to meet the same standards as large volume manufacturers – 30mg/mi of NMOG+NOx.

The following comments are made supposing that EPA will treat the operationally-independent manufacturers SVMs in the same way as other SVMs. As noted above, if EPA does not finalize a provision that would treat operationally-independent SVMs similarly to how such manufacturers are addressed for purposes of the GHG standards, then Ferrari will submit additional comments explaining the very different impact this approach would have on our ability to meet Tier 3 standards.

Taking into account the technologies today available on the market, Ferrari has determined that the fleet standards of 51 mg/mi of NMOG+NOx in 2021 MY and of 30 mg/mi in 2025 MY are not technically feasible without affecting the Ferrari DNA.

The current technology of catalyst systems and relative wash-coating, even in combination with higher loading of precious metals (200-250 g/ft3) could not guarantee our vehicles' compliance with the fleet standards required during the MY 2022-2024 period. The only possible solution could be a closed coupled warm-up catalyst and a main catalyst both with a high cells density (600-800 cells/inch2), but this will affect performance, sounds and, in general, the typical overall Ferrari engine characteristics.

Moreover, the reduction of exhaust emissions would require the development of a complex OBD system, able to detect any defect of the catalytic converter system by analyzing the increase of exhaust emissions in a much lower range.

In conclusion, taking into account Ferrari's expected status as an operationally-independent small-volume manufacturer, the technologies today available on the market and the importance of the keeping alive our models' DNA, Ferrari kindly requests that EPA establish two separate fleet standards for SVMs/operationally-independent manufacturer:
- 120 mg/mi of NMOG+NOx in 2022 MY;
- 70 mg/mi of NMOG+NOx in 2025 MY.

Ferrari, being an operationally-independent SVM, typically does not have more than two engine families. Therefore, unlike much larger manufacturers, Ferrari cannot use averaging to reach a lower emissions standard due to its limited product offerings. In other words, for an SVM like Ferrari, the fleet standard corresponds to the standard for each engine family. Moreover, Ferrari models are characterized by a particularly long life cycle (about 7 years for each model). This obviously means less capability to renew our fleet over a short period of time. As a result, it is absolutely unfeasible for Ferrari to assure compliance with fleet standards on a year-to-year basis as the standards become more stringent each model year.

Therefore, Ferrari kindly requests that EPA establish “stair-step” standards for SVMs and operationally-independent SVMs that decrease over a longer time period. Ferrari suggests the following time frames: 2017-2020 MYs, 2021-2024 MYs, 2025-2030 MYs.

Ferrari is continuously working in order to reduce the emissions in its vehicles. For this reason, Ferrari suggests to EPA to reconsider in MYs 2017-2018 the emission standards for the MYs 2022-2030, by examining at that point in time whether SVMs and Operationally-Independent SVMs could in fact meet a fleet standard below 70 mg/mi. Whether SVMs can meet a standard below 70mg/mi will largely depend on the availability of new technologies able to reduce emissions without affecting Ferrari DNA. Ferrari continues to work diligently toward this goal. But at this time, we do not see a way to reach these standards while retaining the characteristics that are key to Ferrari’s continued success in the highly-competitive market segment in which we operate.

In the LEV III rulemaking, CARB recognized the particular conditions of SVMs (and operationally-independent SVMs) and, consequently, defined SVM-specific fleet NMOG+NOx standards. Ferrari has determined that the LEV III standards for SVMs are challenging but still feasible. Therefore, we strongly support EPA’s harmonization with CARB.

Lotus Cars Ltd.:

Vehicle Services Consulting, Inc. (VSCI), who advises Lotus on small volume manufacturer matters relating to safety and emissions issues, has prepared and submitted comments regarding this proposed rule. Lotus fully endorses these comments.

McLaren Automotive Limited:

For manufacturers with limited product lines where fleet averaging is not possible, the proposed 30mg/mi target from MY 2025 is not a fleet average limit but effectively a minimum requirement, hence the flexibility of fleet averaging afforded to Large Volume Manufacturers is not available to Small Volume Manufacturers (SVMs).

There is no confidence to date that the 30mg/mi minimum requirement can be met without jeopardising high performance characteristics of McLaren products.

There is no apparent reason for EPA to deal with SVMs differently from CARB.

Background:
EPA identifies Small Volume Manufacturers (SVMs) as those with average annual nationwide sales of 5,000 units or less on the three year average of actual nationwide sales for MYs 2012-2014.

In the NPRM EPA allow SVMs the following flexibilities.
- Postpone compliance with the standards and other Tier 3 requirements, including use of the proposed new certification test fuel, until model year 2022.
- Apply, under the hardship provisions, for additional time to meet the 100 percent phase-in requirements for exhaust and evaporative emissions.
- Use of assigned deterioration factors.
- Delay using the new test fuel until model year 2022.

For model year 2022 and later, Small Volume Manufacturers would be subject to the same Tier 3 exhaust and evaporative requirements as other manufacturers, including moving to the declining FTP fleet average NMOG+NOX curve and complying with the fully phased-in standard of 30 mg/mi, as well as certifying on E15 test fuel.

EPA also propose that "in light of the CARB Board-approved implementation schedule for small manufacturers described above, we also request comment on an option that would not provide a permanent relaxed standard for small manufacturers, but would provide a temporary relaxed standard matching the California standard from model year 2022 through 2024. This option would apply to the Tier 3 exhaust emission standards starting in 2022, except that a relaxed NMOG+NOX standard of 125 mg/mi would apply in model years 2020-2024 for FTP testing. For model years 2025 and later, the standard would be the same as for all other manufacturers, or 30 mg/mi. Under this option, small manufacturers would have to take some action to reduce emissions in 2022 and could postpone meeting fully phased-in Tier 3 standards until 2025."

The above can be briefly summarised as follows.
- A business with annual nationwide sales of 5,000 units or less (calculated on the three year average of actual nationwide sales for MYs 2012-2014) will be allowed to comply with the current standards during the period to and including MY 2021.
- During the period MY 2022-2024 EPA may apply more stringent standards.
- In MY 2025 SVMs would be required to meet the same standards as Large Volume Manufacturers.

With regard to the above, McLaren Automotive Ltd. appreciate EPA effort to introduce flexibility for small volume manufacturers in their NPRM regarding Tier 3 standards however, we note that a number of concerns have not been addressed by EPA, to date. We believe that EPA current position is strongly at risk of jeopardising Small Volume Manufacturers business and competitiveness in the US market.

Fleet average mechanism unfairness to SVMs:
The limited product ranges of SVMs' make it impossible for them to make use of the fleet average emissions standards applicable to large manufacturers.

As a consequence of fleet averaging being not feasible for SVMs, McLaren consider that the proposed Tier 3 NMOG+NOx fleet average standard places SVMs at a significant disadvantage compared to Large Volume Manufacturers (LVMs).

Manufacturers like McLaren will not have possibilities to fleet average their emission results hence translating the actual EPA requirement to a fixed standard.

As a consequence, whilst being given the possibility to comply with the proposed standard later in time, EPA is denying SVMs the flexibility allowed to the niche vehicles of LVMs that compete directly with our products. Such flexibility will allow LVMs to produce niche vehicles that do not have to meet what is effectively a criteria emission limit for equivalent products produced by SVMs.

The policy issue in connection with the fleet average mechanism is simply one of fairness, since LVMs are able to produce niche vehicles using their fleet average but SVMs are not able to do the same.

For 30 years EPA has taken the position not to promulgate SVM-specific standards (contrary to CARB). The issue now is whether history should take precedence over fairness.

The fairness issue is touched by EPA themselves in The Draft Regulatory Impact Analysis: Tier 3 Motor Vehicle Emission and Fuel Standards, March 2013, par 1.2 (FTP NMOG+NOX Feasibility), EPA clearly recognise that "the proposed new emission requirements include stringent NMOG+NOX standards over the FTP that would require new vehicle hardware and additional control of gasoline sulphur levels in order to achieve the 30 mg/mi fleet average level in 2025. The type of new hardware that would be required would vary depending on the specific application and emission challenges.

Smaller vehicles with corresponding smaller engines would generally need less new hardware while larger vehicles and other vehicles with larger engines may need additional hardware and improvements beyond what would be needed for the smaller vehicles. Additionally, the fleet average nature of the standards would allow more challenged vehicles to be offset by vehicles that could outperform the required fleet averages."

Clearly, small volume manufacturers like McLaren will have to face the challenge of engineering additional hardware and improvements without taking any advantage of any "fleet average nature of the standards".

In the NPRM, EPA reports their position on a series of comments raised. Citing from the NPRM, "during the SBAR Panel process, one small entity representative (SER) recommended that EPA adopt relaxed exhaust standards for small manufacturers.

The SER noted that the exhaust emission averaging program being proposed by EPA would allow large manufacturers that have many engine families to certify their small, niche products at emission levels numerically higher than the standards.

Small manufacturers that typically do not have more than one or two emission families generally cannot use averaging to the same extent because of their limited product offerings. The SER was concerned that the high-performance vehicles produced by large manufacturers which they compete against would be able to certify at numerically higher levels at less cost than the SER would incur."

Whilst we appreciate the consideration that EPA have shown in reporting these comments, it is notable that the EPA did not provide any comment with respect to the SER concern that "EPA would allow large manufacturers that have many engine families to certify their small, niche products at emission levels numerically higher than the standards."

McLaren strongly believe that this is a key issue in the extent that it highlights how McLaren (and SVMs in general) must compete with niche products from large OEMs that need not comply with the same standard limit. This is an unfair situation created by the current Tier 3 proposal.

Technological feasibility assessment pending:
As a Small Volume Manufacturer with limited development resources, McLaren must develop a high performance product that produces class-leading CO_2 emissions, fuel economy and driveability.

In general the relatively low sales volumes of SVMs mean that a return on investment must come from astute platform engineering and an extended life cycle for the base powertrain.

In EPA comprehensive "Draft Regulatory Impact Analysis: Tier 3 Motor Vehicle Emission and Fuel Standards", main technological aspects for FTP NMOG+NOX have been studied and EPA anticipates that "to achieve the proposed NMOG+NOX FTP emissions standards, vehicle manufacturers will focus on three areas to reduce emissions:

- reducing the emissions produced by the engine before the catalyst reaches the light-off temperature;
- reducing the time required for the catalyst to reach the light-off temperature; and,
- improving the NOX efficiency of the catalyst during warmed-up operation."

Whilst we appreciate EPA analysis on available and future technologies that will be developed in order to meet the new requirements and whilst we understand and share the effort in controlling the country's pollution, we believe that EPA is incorrect in believing "that these standards are technologically feasible and can be readily achieved with the additional lead time we are proposing as the technology would have already been demonstrated by other manufacturers, in some cases on the very same engines used by the small manufacturers."

Given the inapplicability of fleet averaging to SVMs, the EPA's assumption that SVMs will be able to achieve the 30mg/mi target is incorrect because SVMs cannot rely upon the technology demonstrated by other manufacturers. In fact, as stated in previous paragraphs, the Tier 3 proposal would allow LVMs to produce vehicles with similar characteristics and performance but with higher NMOG+NOX emissions than SVMs.

Independently from LVMs, SVMs are exploring technologies that would enable the Tier 3 standards to be achieved without compromising the essence of our products and are constantly working on assessing the potential of new technologies and innovations that could contribute towards achieving future legislative requirements and provide product differentiation in the market place.

SVMs like McLaren have already developed their own new engine using optimised technological and engineering solutions (Variable Valve Timing (VVT), Secondary Air Injection (SAI), electronically controlled twin thermostats, very high precious metal loading on catalysts, close-coupled catalyst, etc.).

With reference to the aforementioned EPA Impact assessment, after extensive research, McLaren would respectfully suggest that more time is needed to assess the feasibility of the 30mg/mi limit which EPA is effectively setting as a minimum requirement for SVMs.

McLaren studies to date show that, although combustion system, emissions and after treatment research and development projects are being suitably funded and pursued aggressively by McLaren, a technology package that will enable a niche sport car engine to both:

- deliver the 30mg/mi proposed Tier 3 NMOG+NOx emissions requirements; and,
- meet the very high specific power and low weight requirements demanded by this market segment has not yet been identified.

Conclusions:
McLaren believe that the Tier 3 rulemaking should provide an alternate SVM standard.

- The proposed 30mg/mi target from MY 2025 is not a fleet average limit but a minimum requirement, hence the flexibility of fleet averaging afforded to Large Volume Manufacturers is not available to Small Volume Manufacturers
- There is no confidence to date that the 30mg/mi minimum requirement can be met without jeopardising high performance characteristics of McLaren products.
- There is no apparent reason for EPA to deal with SVMs differently from CARB

McLaren would therefore suggest that a fair and reasonable Tier 3 SVM solution would be as follows.
Appropriate phase-in and interim SVM NMOG+NOx fleet standards

- Model year 2014-2016: 160mg
- Model year 2017-2021: 125mg
- Model year 2022+: 51mg

At this time it is not demonstrably feasible to design a high-performance niche-market powertrain to achieve a 30mg/mi NMOG+NOx standard and as such, SVMs must be permitted the time to assess the outstanding technical issues.

McLaren recommends that the 51mg/mi standard, consistent with CARB policy, should be set in Tier 3 for SVMs.

McLaren proposes that time be permitted to allow industry development to demonstrate feasibility of meeting standards below 51mg/mi in high performance engines from MY2025 on. It is proposed that a review of feasibility to reduce targets below 51mg should be held by 2018.

Vehicle Services Consulting, Inc (VSCI):

We focus on two key points – That the 'fleet average' system is unfair in how it affects SVMs compared to the niche carlines of large volume manufacturers (LVMs); and
That to remedy (in part) this inherent unfairness, for SVMs the MY 2022 51mg fleet standard should not continue downward to 30mg unless and until there is clear evidence that SVMs – with their limited model offerings (and hence limited number of test groups) – can in fact attain the 30mg level.

EPA has proposed that SVMs — manufacturers with average annual USA sales of less than 5,000 units – be permitted to delay meeting the proposed Tier 3 emission standards. 2

During the period to and including MY 2021, SVMs would have to meet current Tier 2 emission standards.

During the period MY 2022-2024 EPA has indicated that a set of more stringent interim standards would apply.

In MY 2025, SVMs would be required to meet the same standards as large volume manufacturers — 30mg of NMOG+NOx. In other words, in MY 2025, a company that sells 25 cars per year in the US would have to meet the same standards as a company like GM that sells 2.5 million cars per year in the US.

> *footnote:* Indeed, EPA is not even proposing that businesses which meet the Small Business Administration definition of 'small entity' would be subject to more lenient requirements. This is manifestly unfair.

SVMs have urged EPA to adopt less stringent standards specifically applicable to small volume manufacturers — the philosophy that the California Air Resources Board (CARB) has adopted. The basis for this SVM request is a key fact which EPA itself has acknowledged – that the emission averaging program used by EPA allows large manufacturers, which have many engine families, to certify their small, niche products at emission levels numerically higher than the fleet standard. SVMs, on the other hand, which typically do not have more than one or two engine families, generally cannot use averaging to reach the same result due to their limited product offerings. SVMs have therefore been concerned that LVM high-performance vehicles with which SVMs compete will be certified at numerically higher emissions levels and at less cost than the levels and costs that SVM would face. Indeed, CARB recognized this very issue in adopting its LEVIII standards, and promulgated an SVM-specific fleet NMOG+NOx standard. 4

In view of the above, SVMs recommended to EPA that Tier 3 include less stringent, SVM-specific NMOG+NOx standards in order to reach an equitable result for SVMs, while at the same time harmonizing with California — a clearly stated goal of EPA.

No one disputes that the total number of SVM vehicles per year in the US has an insignificant — de minmis — impact on US air quality.

The NPRM's Small Volume Manufacturer Language:
From the NPRM, it is clear that EPA has not agreed with the SVMs' suggested approach. Although EPA is proposing a delay in Tier 3 requirements as they apply to SVMs, EPA is not proposing an SVM-specific fleet standard when the Tier 3 rulemaking phase-in ends. We believe that EPA's decision is insufficient and inequitable.

EPA believes that the large volume end-of-phase-in standards are technologically feasible for SVMs, and that they can be readily achieved with the additional SVM lead time being proposed.5 We strongly disagree.

We have not seen hard evidence to support EPA's conclusion. EPA alleges that by 2022 'the technology would have already been demonstrated by other manufacturers, in some cases on the very same engines used by the small manufacturers'. EPA is therefore assuming that the necessary technology will be available to SVMs. But such assumptions are an insufficient foundation on which to base a rule's applicability. Under the Administrative Procedure Act it would be impermissibly arbitrary and unreasonable to base the SVM standards on an assumption of this magnitude.

Indeed, what would happen if an SVM used a Tier 2 Bin 5 engine sourced from a large volume manufacturer? Under Tier 3, the LVM could continue to use and certify this engine based on the LVM's fleet average. The SVM, however, would be precluded from using the engine under Tier 3 since the Bin to which the engine was certified would be above the fleet standard. This result is simply unjust.

EPA also notes in the Tier 3 preamble that 'the compliance costs for many of these [SVM] vehicles, even if higher on an absolute basis, may still be lower on a relative basis given the higher average cost of the vehicles'. But this remark begs the question, since there are niche products of large manufacturing groups that indeed compete with SVM products and are sold at similar prices to SVM vehicles.
In short:
We strongly believe that fairness requires that small manufacturers be allowed to meet less stringent, SVM-specific, NMOG+NOx exhaust emission standards over the long term, as reflected in the LEVIII rules from CARB. We support EPA's harmonizing with CARB.

> *footnote:* In view of EPA's firm stance against harmonization, however, as discussed below, we propose herein an SVM solution that diverges from CARB, notwithstanding our firm support both for CARB's decision and for harmonization

But the heart of the problem remains that EPA seeks to compel SVMs to meet the fully phased-in large volume Tier 3 NMOG+NOx fleet standard for model years post 2022 (and specifically the MY 2025 standard of 30 mg/mi). This is neither fair nor feasible.

> *footnote:* EPA has asked SVMs to provide evidence of infeasibility. But few people would argue that it is easy – or even possible – to prove a negative.

EPA's justification for only proposing extra lead-time for SVMs — even in the face CARB deciding otherwise — has been that extra lead-time has always been EPA's policy for SVMs and has worked adequately under Tier 2. But this response is hollow — amounting to 'we have always done things this way so we will continue to do them this way.' EPA's rationale overlooks how, as standards become more and more stringent, new flexibilities must be considered.

footnote: Justice Oliver Wendell Homes wrote in 'The Common Law' that: 'The truth is that the law is always approaching and never reaching consistency.'

Conclusions:
SVMs would therefore suggest that a fair and reasonable Tier 3 SVM solution would be as follows:

1) Appropriate phase-in and interim SVM NMOG+NOx fleet standards

Model year	2014-2016	2017-2021	2022+
	160mg	125mg	51mg

2) We note that, for MY 22 an SVM NMOG+NOx fleet standard of 51 mg would be the same as the large volume fleet standard for that year.

3) But under our suggested approach, the SVM standard would remain at 51mg as the interim SVM standard, while the large volume standard would continue to tighten down to 30mg for MY 2025.
footnote: For small entities, we urge EPA to allow a 125mg standard through MY 2024 and then to require the 51mg standard in MY 2025.

4) The above proposal actually brings forward by four years a more stringent (ULEV) SVM standard (compared to the NPRM and CARB).

5) The above SVM solution is in reality a leadtime issue. We are not saying that SVMs should not be required to meet a 30mg standard. Rather, we are taking issue with WHEN SVMs should be so required. We believe that it should be after MY 25 and thus that any SVM standard lower than 51mg should be set by a further rulemaking.

6) The SVM longer term issue can be revisited in CY 2017-18 to examine at that point in time, whether SVMs could in fact meet a fleet standard below 51 mg in the post MY 2025 timeframe.

In closing, we raise the following query: if EPA promulgated the proposed SVM language as a final rule, then would not SVMs find themselves in the awkward position of either having to accept an EPA conclusion that 30mg is doable in MY 2025 or to challenge immediately the EPA rule in order to avoid waiving their right to seek judicial review of the issue?

Our Response:

As described above, commenters provided a variety of information and a number of conclusions drawn from this information in support of our assessment that Tier 3 implementation flexibility for small entities is warranted. These commenters include trade associations that represent both large and small manufacturers of motor vehicles. None of the commenters opposed our granting such flexibility.

We received comments from SVMs (but none from non-SVM small businesses subject to the Tier 3 vehicle standards) about our specific proposed small entity phase-in provisions, as well as from the Alliance of Automobile Manufacturers and the Association of Global Automakers, arguing that the proposed phase-in for small entities did not provide adequate lead time relief for SVMs, and that the long-term Tier 3 standards for light-duty vehicles are not technologically feasible for SVMs. They referred to the ability of large manufacturers to offset high emissions from high-performance, luxury models by averaging with their low-emitting models, while competing SVM products must be designed to actually achieve low emissions while still meeting customers' performance expectations. The limited production of these SVM models can also result in emission control technology suppliers placing a lower priority on SVM orders than on those of larger, high-volume manufacturers.

Because of these factors, SVMs suggested that their companies meet a slightly more stringent $NMOG+NO_X$ standard (125 mg/mi) than what we proposed for SVMs in the early years of the program and a permanently relaxed standard of 51 mg/mi beginning in MY 2022. Ferrari suggested a compliance schedule for SVMs similar to that of the California LEV III program, with either a permanently relaxed standard (matching the California LEV III 70 mg/mi long-term standard) or a delay until MY 2030 to meet the primary 30 mg/mi Tier 3 standard (when they suggest that SVMs could potentially comply). VSCI suggested that EPA's long-term standard-setting be deferred to a subsequent rulemaking, characterizing it as a leadtime issue—not a matter of "if" the SVMs should be required to meet a 30 mg/mi standard but of "when". CARB comments supported Tier 3 adoption of its LEV III provisions for SVMs, including the long-term 70 mg/mi standard beginning in MY 2025.

After considering the comments, we agree with SVMs that their unique logistical and technological challenges, especially in the later years of the primary NMOG+NOx FTP standards phase-in schedule, warrant a significant period of relaxed standards for these manufacturers. However, we have found no fundamental reason why, given sufficient lead time, all manufacturers, regardless of company size and vehicle characteristics, will not be able to meet the Tier 3 standards. Thus, we are finalizing an optional program for SVMs, available to non-SVM small businesses as well, under which they can choose an alternative 3-stage FTP NMOG+NOx fleet average standard phase-in schedule: an initial standard of 125 mg/mi for MYs 2017 through 2021, a more stringent standard of 51 mg/mi for MYs 2022 through 2027, and the final Tier 3 standard of 30 mg/mi thereafter.

Commenters' argued against a 30 mg/mi long-term standard for SVMs based on their fundamental inability to use emissions averaging to build high performance cars that have emissions above the standards over the long run, in contrast to competing large manufacturers with high-performance products, who sell many lower-performance vehicles with which to average. Commenters also point out that the lack of opportunity for SVMs to average emissions is paralleled by the lack of a robust credit trading market in this sector. Manufacturers with credits have thus far not been greatly interested in selling them.

However, none of the commenters addressed the most recent experience with this issue in the Tier 2 program, which phased in several years ago based on a bin and fleet average concept that, as pointed out in comments from the Alliance and Global Automakers, is very similar to the Tier 3 phase-in concept central to the SVMs' expressed Tier 3 concerns. In a 2010 review of the impacts of the Tier 2 rule on small businesses, performed under Section 610 of the Regulatory Flexibility Act, we concluded that the Tier 2 rule needed no revisions at that time to minimize impacts on small entities (75 FR 79853, December 20, 2010). No comments from SVMs were submitted in the public comment opportunity for that review. We have not received any other information or comment that SVMs have become non-competitive in the high-performance car market over these years as the result of Tier 2 regulations and the long-standing ability of large competitors to gain an advantage through fleet-wide averaging under the Tier 2 program. Though we acknowledge additional factors such as differences in the overall economic climate, the recent setting of greenhouse gas emissions standards, and the relative stringency of Tier 2 and Tier 3 standards, this experience under the Tier 2 program bolsters our confidence that, with the additional implementation flexibility provided in the final Tier 3 rule, SVMs will be able to meet the long-term 30 mg/mi standard by MY 2028 without becoming non-competitive in their market segment.

Ferrari also raised technical concerns with application of the 30 mg/mi standard, arguing that the use of a close-coupled warm-up catalyst and main catalyst with 600-800 cells/inch2 cell density to meet the standard would affect engine performance and acoustics. McLaren also provided technical comments, pointing to progress with variable valve timing, secondary air injection, electronically controlled twin thermostats, very high precious metal loading on catalysts, and close-coupled catalysts, but suggesting that more time is needed to assess the feasibility of the 30 mg/mi limit while maintaining the very high specific power and low weight requirements demanded by this market segment, and to develop associated OBD systems. We agree that the successful application of these technologies to high-performance vehicles will require some time, and have concluded that the additional extension to the phase-in period we are adopting for SVM compliance with the final standard in MY 2028 (under the 3-stage alternative), coupled with the extension of credit life and availability of hardship relief, adequately address the SVMs' concerns.

What Commenters Said:

VNG.CO (VNG):

Extended Lead Time: The NPRM proposes extending to SVMs only a special lead time of five additional years (until 2022) before they must meet the full Tier 3 exhaust and evaporative standards, based on the rationale that small manufacturers have limited resources available for developing new designs to comply with new emission standards.

OEMs will also face significant engineering requirements unique to the production of NGVs under the proposed rules, and may have similarly limited resources to devote to these requirements if the market for NGVs is still relatively small in 2017. One of the chief impacts of the Tier 3 program will be to move OEM gasoline vehicles from the use of port fuel injection

(PFI) to gasoline direct injection (GDI) technology, which can achieve significantly lower emission levels as well as higher fuel economy. Howver, as noted in the NPC Future Transportation Fuels study, additional investments in research and development and engineering will be necessary for OEMs to utilize this technology for gaseous fuels because of several new challenges unique to converting vehicles to operate on CNG, including:
- Thermal management of GDI fuel delivery system components such as the high-pressure pump and injectors needs to be addressed as a result of no cooling offered to the gasoline injector when operating on natural gas.
- Engine oil pumps, nozzles, and coolers may require design changes in order to manage heat due to the high combustion chamber temperatures in natural gas mode.
- Adapting base vehicle GDI controls to CNG PFI, and accommodating PFI components in base engine GDI architecture.
- Turbocharger designs may need to change in order to achieve a faster response time to minimize performance differences between gas.

While it will clearly be necessary for these OEM investments to be made in order to ensure a long-term future for NGVs, it is not clear that market growth in the near term will be sufficient to justify these investments in time for the 2017 model year. Thus, EPA should also grant OEM production of gaseous-fuel small-volume test groups an option for an extended phase-in period for the Tier 3 standards identical to that proposed for SVMs.

Our Response:

We disagree with VNG's assessment that small-volume test groups of large manufacturers should have until 2022 to comply with Tier 3. The technical challenges outlined by VNG have to do with converting gasoline vehicles to run reliably and durably on natural gas. Although these conversion challenges may increase for the new generation of turbocharged GDI vehicles, we have no evidence or vehicle manufacturer comments indicating that meeting Tier 3 standards is significantly more difficult for natural gas vehicles than for gasoline vehicles. We are providing some reduction in regulatory burden for small volume test groups in the form of assigned deterioration factors, but not because of feasibility concerns. Rather, we believe that assigned deterioration factors provide a sufficient alternative to the extensive process of developing a unique factor for each low-volume vehicle model. We find no justification to delay compliance with Tier 3 standards for larger manufacturers' low-volume models as requested by VNG. We did not receive comments from vehicle manufacturers on this issue raised by VNG.

4.6.2. Useful Life and Assigned Deterioration Factors

What Commenters Said:

McLaren Automotive Limited

Useful life requirements are unrealistic for SVMs:
EPA is proposing extension of the regulatory useful life to 150,000 miles, from 120,000 miles.

Data from MP4-12c customers has shown average annual Vehicle Miles Travelled of 4100 miles. Consequently, it is extremely unlikely that McLaren vehicles will reach 150,000 miles in their lifetime.

McLaren believe that lower VMT per annum and over a lifetime, is typical for an SVM produced vehicle, as these are niche vehicles bought by enthusiasts and collectors who typically own a large number of vehicles.

The combination of low sales volumes and low annual mileage means that the actual pollution impact of McLaren vehicles as a proportion of the USA fleet is extremely small.

Consequently, a 150,000 mile useful life for SVM vehicles is unrealistic and such a durability requirement would place an excessive liability on SVMs.

Our Response:

The Tier 3 useful life requirement is 150,000 miles or 15 years, whichever occurs first (alternatively 120,000 miles/10 years for vehicles under 6,000 lbs GVWR certified to a numerically lower NMOG+NOx standard level). For vehicles driven 4100 average annual miles, the Tier 3 useful life would elapse after 15 years, not the 36 years it would take to accumulate 150,000 miles. We expect that a 15 year vehicle life is not uncommon for such vehicles, and that emissions control systems designed to perform well for this period are feasible in the Tier 3 timeframe. Key elements of emissions control design that are more prone to mileage-based degradation than to time-based degradation, such as irreversible catalyst poisoning, would be more challenging for higher annual mileage vehicles than for vehicles like those built by McLaren that, at 4100 average annual miles, would surpass their 15 year useful life before accumulating 62,000 miles. We believe any remaining concerns SVMs may have about establishing durability for EPA certification will be mitigated by our allowing the use of EPA-assigned deterioration factors and, where useful, pre-certification discussion between the manufacturer and EPA regarding useful life durability demonstration requirements. McLaren did not provide any specific technical information to support its statement about excessive liability.

What Commenters Said:

Aston Martin Lagonda Ltd:

We would welcome the opportunity to use EPA assigned DFs [deterioration factors] as an alternative to manufacturer DFs but must reiterate the need for those DFs to be kept up to date with LVM capabilities in order for them to be useful to SVMs. EPA have indicated that they recognize this, can it be confirmed that EPA assigned DFs will be regularly updated?

Our Response:

In response to Aston Martin Lagonda's request that the Agency confirm that it will keep these factors up to date as durability data accumulates, we can state that we are committed to periodically updating and publishing these assigned deterioration factors.

4.6.3. Reduced Testing Burden

What Commenters Said:

VNG.CO (VNG):

Reduced OBD Testing Requirements – Today: Current EPA rules allow alternative fuel conversion SVMs to meet much less stringent OBD requirements than OEMs certifying small volume test groups, with as few as four tests of major diagnostic monitors (including fuel trim lean & rich, catalyst deterioration, engine misfire, and oxygen sensor) instead of the many more typically required for OEM certification. As illustrated above, the NPC Future Transportation Fuels report notes that "certification, OBD, aftertreatment and calibration" are a significant source of per-vehicle incremental costs for current OEM NGV production. This is particularly the case for pickup trucks, where it is the single largest cost component at about $4,500 per vehicle, or nearly 40% of the total incremental cost.

Harmonizing OEM small vehicle test group OBD testing procedures with the reduced OBD testing requirements for alternative fuel converters is consistent with the 'level playing field' provided in most other respects between these categories of vehicles, and represents a major opportunity to reduce NGV incremental costs for consumers without sacrificing the efficacy of the certification process.

> *footnote:* Existing EPA regulations (40 CFR 86.1806–01) already afford flexibility in OBD testing requirements and allow EPA to reduce them if requested to do so by the applicant, particularly in the case of alternative fuel vehicles. EPA should encourage *both* SVM converters and OEMs certifying NGVs in small-volume test groups to request and utilize these reduced OBD requirements.

Our Response:

We proposed to apply CARB's OBD requirements to Tier 3 vehicles, with an exception for small alternative fuel vehicle converters to instead meet our existing OBD requirements (40 CFR 86.1806-05). VNG objected that the proposed exception disadvantages larger manufacturers and should be made equally available to all vehicle manufacturers' small volume test groups. We expect that larger manufacturers that produce alternative fuel vehicles will be familiar with CARB's OBD requirements and well-positioned to implement these requirements in Tier 3. We note that larger OEMs themselves did not request an extension of this provision to themselves. We are finalizing the exception to the Tier 3 OBD requirements as proposed. However, as discussed in Chapter 4.4, we are willing to consider reduced OBD requirements for small volume test groups of OEMs (perhaps on a transitional or interim basis) in the future, although we cannot at this time commit to applying the changes under consideration in California.

What Commenters Said:

Aston Martin Lagonda Ltd:

We accept the rationale behind the small business waiver for PM testing, but of course the statement of compliance for PM standards also requires some knowledge of the capability of the EDV (and indeed all engines/permutations contained in that test group) for each test group which in turn drives the need for testing!

Our Response:

We agree that a manufacturer's statement of compliance with the PM standard could depend on testing to provide confidence in its validity. It is not our intent to prescribe or limit actions a manufacturer considers necessary to gain this confidence. Nevertheless, we believe the waiver from certification testing will reduce burden for small businesses.

4.6.4. Hardship Relief

What Commenters Said:

Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global Automakers):

In light of these considerations [*detailed above in Chapter 4.6.1*], while we support the initial relief proposed for SVMs through MY 2021 and the hardship relief, we believe that EPA should provide additional lead time and flexibility in MY 2022 and beyond for SVMs.

Aston Martin Lagonda Ltd:

Aston Martin appreciates the Hardship provision being proposed and the flexibilities contained in the wording. If we are talking about more time to comply as a hardship provision I would point EPA towards the temporary relaxed NMOG+NOx standard noted in the NPRM and commented on in the first paragraph above, and the fact that this provision alone would give SVMs added flexibility to accommodate the need to meet the 30mg/mi standard by 2025MY. Additionally (and also as noted above) I believe that SVMs would appreciate a midterm review of capability that would allow them to give EPA adequate notice of any hardship requirement.

Ferrari:

Ferrari faces significant technical challenges in meeting the 30mg/mile standard. Ferrari produces only two engine families, meaning that the ability to average emissions and offset an engine family with higher emissions is extremely limited, particularly when compared to large volume manufacturers. In addition, Ferrari must continue to produce vehicles that still retain the Ferrari DNA and meet customer expectations for performance.

To reflect the unique challenges faced by a small volume manufacturer producing high-performance vehicles under the proposed Tier 3 NMOG+NOx standards, Ferrari proposes revised regulatory language that would provide compliance flexibility to small volume manufacturers facing technical hardship. As currently written, the economic hardship provisions do not adequately address the technical issues we face. Therefore, Ferrari suggests that EPA establish a similar but separate provision allowing a small volume manufacturer to request an extended compliance deadline for the NMOG+NOx fleet average standard beginning in MY2028 if the manufacturer demonstrates technical—rather than economic—hardship.

Lotus Cars Ltd.:

Vehicle Services Consulting, Inc. (VSCI), who advises Lotus on small volume manufacturer matters relating to safety and emissions issues, has prepared and submitted comments regarding this proposed rule. Lotus fully endorses these comments.

Vehicle Services Consulting, Inc (VSCI):

We commend EPA for proposing an SVM hardship provision which will allow SVMs to apply for additional lead-time on a case-by-case basis.

> *footnote:* EPA has proposed a hardship provision for SVMs — see reference in footnote 5 above. Under the hardship provision, small businesses would be allowed to apply for additional time to meet the 100 percent phase-in requirements for exhaust and evaporative emissions. All hardship requests would be subject to EPA review and approval. Petitions for hardship relief would need to be made in writing and submitted before the earliest date of potential noncompliance. The request would need to identify how much extra time is requested. It must also include evidence that the noncompliance would occur despite the manufacturer's best efforts to comply, and must contain evidence that severe economic hardship would be faced by the company if the relief were not granted. Thus, the hardship provision could provide the opportunity for small businesses to obtain more time to comply with the new Tier 3 standards. While the existing hardship provisions in part 1068 limit the extra time that can be requested to 1 year, EPA is proposing that such limit not be included in the Tier 3 rule. SVMs support this proposal. However, we point out that while a hardship provision is a significant step in the direction of equity and fairness, the hardship provision by itself does not afford SVMs a sufficient basis on which to reasonably develop business and engineering plans beyond 2021.

Our Response:

Commenters generally supported the proposed provisions for hardship relief, within the context of a revised approach to small volume manufacturer lead time, discussed in Chapter 4.6.1. In response to Ferrari's additional request to expand the proposed hardship relief provision, we believe the hardship provision already addresses Ferrari's concern over non-economic technical hardship. The economic case we are requiring, involving a showing of "severe economic hardship" will not be difficult for an SVM having problems certifying to Tier 3 standards to make, considering the limited product offerings of the SVMs. Inability to certify and therefore sell vehicles would be almost certain to create a severe economic hardship.

4.6.5. Applicability of Flexibilities

What Commenters Said:

Advanced Biofuels USA (ABFUSA):

While nothing in these regulations should throw up unneeded barriers to true low-volume manufacturers, EPA should proceed cautiously on the determination of what is a "low-volume" manufacturer. There are three circumstances that need to be considered.

1. While a manufacturer listed as a US company may fall in the <5,000 or 5,001-15,000 US vehicles sold category it's worldwide sales total may well exceed that. Aston Martin most probably falls in that category.
2. While a manufacturer listed as a US company may fall in the <5,000 or 5,001-15,000 US vehicles sold category it is actually a part of a larger motor vehicle company that sells many more vehicles that 5,000 or 15,000 worldwide. Ferrari USA, which is part of Fiat, Porsche USA, which is part of Volkswagen/Audi, and Jaguar USA, which is part of Tata all fall in that category.
3. While a manufacturer listed as a US company may fall in the <5,000 or 5,001-15,000 US vehicles sold category it is actually a part of a larger motor vehicle company that has a business plan to greatly increase US sales above the initial "beachhead" number of a few thousand in a short timeframe.

In each of these cases, especially number 3, EPA would run the risk of approving a once low-volume vehicle that turned into a US market 250,000/year seller two or three years later without adequate long-term performance data that could predict consumer in-use issues including potential recalls.

California Air Resources Board (CARB):

Independent operational manufacturers are a subset of small volume manufacturers. These manufacturers would qualify for small volume manufacturer status, except they are owned by a larger manufacturer and their sales are currently aggregated with the larger manufacturer when determining emission compliance. Both the California and federal greenhouse gas programs allow these manufacturers to meets small volume manufacturer emission requirements if they can demonstrate that they operate completely independently from the owner manufacturer (design and manufacture of powertrains, receive no fiscal support from owner manufacturer, etc.). The LEV Ill program extends SVM status to these manufacturers for criteria emission requirements and CARB recommends that this manufacturer category be included in the Tier 3 program. [EPA-HQ-OAR-2011-0135-4261-A1, attachment pp. 1-2]

Ferrari:

An Operationally-Independent Manufacturer for GHG Purposes Should Have the Same Status for Tier 3 Emission Standards. EPA has proposed to allow small volume manufacturers that have demonstrated operational independence for purposes of the Agency's greenhouse gas standards to also have the option of complying with the SVM emission standards established under the Tier 3 program (78 Fed. Reg. at 29,917). Ferrari supports this proposal and recommends that EPA issue a final rule that considers manufacturers who have met the criteria for operational independence under 40 C.F.R. § 86.1838-01(d) for purposes of the GHG program as also operationally-independent and similarly eligible for SVM provisions under the Tier 3 program.

Ferrari supports this approach for several reasons. First, there is no reason why a manufacturer that has been found by EPA to be an operationally independent SVM for purposes of the GHG program should not be treated the same way under the Tier 3 exhaust emission standards program. Further, this option would be consistent with EPA's past practice of allowing SVMs to follow an alternate path to certification using assigned deterioration factors and other, more streamlined approaches. It also would ensure that manufacturers are subject to the same certification procedures for both the GHG and Tier 3 emission standards. Otherwise, a manufacturer could potentially be treated as an SVM for GHG purposes but not for the Tier 3 program; this could result in unnecessarily duplicative or even conflicting certification test procedures.

In addition, the comprehensive examination of a manufacturer's relationship (or lack thereof) to other related manufacturers that is required before a determination of operational independence can be made highlights the comparatively low sales volume of SVMs and the need for the more flexible SVM compliance options. Also, the extremely detailed application process for a determination of operational independence ensures that manufacturers cannot abuse the system and the SVM compliance option.

Finally, adopting this option would be consistent with the approach taken by the California Air Resources Board (CARB) in its 2012 LEV III final rule. In that rule, at 13 C.C.R. § 1900(22), CARB revised the definition of SVM to include operationally-independent manufacturers such as Ferrari. CARB's definition applies both to the GHG program and to emission standards for conventional exhaust pollutants. Harmonizing with California would allow manufacturers to more efficiently certify vehicles to both EPA and CARB emission standards.

To accomplish this goal, Ferrari recommends that EPA revise the language in 40 C.F.R. § 86.1838-01(a) to clarify that a manufacturer that has fulfilled the requirements for being classified as an operationally-independent SVM shall be treated as an SVM for the purposes of all EPA emission standards. Ferrari suggests that EPA revise § 86.1838-01(a) as follows, with our recommended revision in underlined text:

> § 86.1838-01 Small volume manufacturer certification procedures.
> (a) The small-volume manufacturers certification procedures described in paragraphs (b) and (c) of this section are optional. Small-volume manufacturers, <u>including small-volume manufacturers that have satisfied the criteria for operational independence under paragraph (d) of this section</u>, may use these optional procedures to demonstrate compliance with <u>all of</u> the general standards and specific emission requirements contained in this subpart.

Finally, these comments are drafted based on the assumption that EPA will treat operationally-independent SVMs as eligible for the Tier 3 SVM provisions, similar to the way in which EPA has treated such SVMs under the GHG program. If EPA does not issue a final rule adopting this approach, then Ferrari will submit additional comments because this would have a vastly different impact on our operations and vehicles.

Our Response:

We requested comment on extending eligibility for the Tier 3 SVM provisions to small manufacturers that are owned by large manufacturers but are able to demonstrate that they are operationally independent. We established such a provision in the light-duty greenhouse gas (GHG) program, and CARB did so in LEV III. Comments from CARB and Ferrari supported this extension. No commenters opposed it; however, Advanced Biofuels USA recommended caution to avoid advantaging SVMs capable of leveraging parent company resources to drastically increase U.S. market share within 2-3 years. Given the establishment of this provision in our GHG program, and the value of this extension for harmonization with LEV III, we are adopting this change into Tier 3 using the same eligibility criteria as in our GHG program, set forth in 40 CFR 86.1838-01(d). We believe these criteria are sufficiently strict and objective to address the concerns expressed by Advanced Biofuels USA.

What Commenters Said:

National Propane Gas Association (NPGA):

Among the changes proposed by EPA is the incorporation of CARB's OBD requirements into the federal EPA regulations, thereby requiring compliance with CARB's provisions. EPA is proposing that small business alternative fuel converters have the option to continue to comply with EPA's existing OBD requirements when the Tier 3 standards become effective. EPA goes on to state that the OBD requirements would then have to be met by small entities by the 2022 Model Year. Likewise, as it pertains to exhaust and evaporative emission standards, EPA proposes to allow small manufacturers to postpone compliance with the standards and other Tier 3 requirements until MY 2022, but then require them to meet all the Tier 3 standards for MY 2022 and later.

NPGA believes that EPA should increase the threshold for small volume manufacturers beyond the 15,000 units per year level and that the flexibilities allowed small businesses as noted in the NPRM should be allowed to remain in place beyond MY 2022. Small businesses and small volume manufactures have limited resources, lower production volume over which to spread their compliance costs and limited product lines, which hinder their ability to take advantage of the phase-in and averaging, banking and trading provisions. These changes would facilitate the increased availability of alternative-fueled vehicles.

VNG.CO (VNG):

Small-Volume Manufacturer Threshold: Under current Tier 2 rules, compliance flexibilities are available to SVMs producing up to 15,000 vehicles per year or OEMs producing up to 15,000 units of a given small volume test group. The NPRM proposes to decrease this threshold to 5,000 vehicles for SVMs (but not small volume test groups), based on the rationale that this definition was used in the recent 2017-2025 greenhouse gas regulations and that "the 5,000 unit cut-off for small volume manufacturers would include all of the vehicle manufacturers, ICIs, and alternative fuel converters that currently meet the applicable SBA definition as well as a few additional companies that have similar concerns to small businesses."

While EPA is certainly correct that a 5,000 vehicle cutoff would pose no risk to conversion companies currently, the proposed rules will cover the years 2017 and onwards, at which point there could be significant growth in the NGV market. Under such a scenario, this changed threshold could potentially limit the ability (or willingness) of SVMs to scale up production by forcing them to choose between increased sales and increased regulatory burdens at much lower production level. Finally, 15,000 vehicles is still just 0.1% of an annual US light-duty vehicle market of 15 million vehicles. For all these reasons, EPA should continue to define SVMs as producing up to 15,000 vehicles per year.

Our Response:

We do not believe that the SVM relief provisions are so significant as to cause the self-limiting of sales suggested by VNG, except perhaps for a company very near the threshold. Even if this were to happen, moving the threshold to 15,000 would not prevent the same dynamic from potentially occurring at that sales level. Furthermore, our use of a three-year average of sales for determining SVM eligibility protects the SVMs from being disadvantaged for having an especially good year not reflective of its long-term sales trend. See the 2017 and later light-duty GHG final rule for a discussion of our basis for adopting the 5,000 vehicle threshold (77 FR 62793, October 15, 2012). NPGA suggested that the small business sales threshold be increased to a level over 15,000 but did not provide any detailed reasoning or indicate what that level should be. For these reasons, we are not altering the SVM sales threshold from what we proposed. The issue of extending small business flexibilities beyond MY 2022 is discussed in Chapter 4.6.1.

What Commenters Said:

VNG.CO (VNG):

Level Playing Field Between Small-Volume Manufacturers and Small-Volume Test Groups: While existing regulations ostensibly maintain a "level playing field" between converters (small volume manufacturers) and OEMs producing limited volumes of a vehicle model (small volume test groups), there is an important difference in current administrative requirements for on-board diagnostic (OBD) systems testing that disadvantages OEM small-volume production. Moreover, the current Tier 3 proposals risks entrenching this inequality for the long term and introducing others for both OEMs and converters.

Because of the current lack of CNG refueling services and a more general uncertainty over the market appeal of NGVs, automakers have been cautious about producing NGVs in high volumes. They therefore utilize the same types of low-volume manufacturing processes used by alternative fuel conversion companies – and face similar per-vehicle cost challenges.

In its recent, comprehensive Future Transportation Fuels study, the National Petroleum Council of the U.S. Department of Energy developed a detailed breakdown of the sources of incremental costs for NGVs under both the current low-volume production model as well as under a medium-term (2020) high-volume original equipment manufacturer (OEM) production scenario. As shown below in the examples of a small car and a pickup truck, at low volumes (2010) these costs are dominated by fixed costs for design as well as certification and on-board diagnostic (OBD) system costs that must be spread over a small volume of vehicles. These incremental costs can fall to zero or near-zero with the move to high-volume production (i.e., the 2020 scenario), under which these fixed costs would be spread across a similar number of vehicles as high-volume gasoline-fueled cars and trucks.

Sources of NGV Incremental Costs				
	Pickup Trucks		**Small Cars**	
Cost Component	**2010**	**2020**	**2010**	**2020**
CNG Fuel Storage (Type I)	$2,144	$2,144	$1,590	$1,365
Compound Mass	$945	$899	$655	$623
Engine Hardening	$310	$0	$155	$0
Certification, OBD, Aftertreatment and Calibration	$4,481	$0	$1,535	$0
Engine & Vehicle Fuel Delivery System & Safety Integration	$3,788	$419	$3,670	$345
Total Incremental Cost	$11,668	$3,462	$7,605	$2,333

Source: National Petroleum Council, Future Transportation Fuels: Natural Gas Analysis pp. 53-58

While OEMs are much larger entities than conversion companies and could potentially produce NGVs at much lower incremental costs with high-volume, assembly line production, automakers are highly competitive and are unlikely to risk committing resources required to move to high-volume production until natural gas refueling availability improves and the mass-market appeal of NGVs is better established. This results in a "vicious cycle," with automakers and converters producing low volumes of high-priced NGVs which limits their market appeal and which in turn limits the development of natural gas fueling services infrastructure, which in turn reinforces the low-volume/high-cost production model.

This vicious cycle could be changed into a "virtuous cycle" by ensuring a truly level playing field for both OEMs and converters that would allow for fully-harmonized, reduced regulatory barriers to entry for both at production volumes of up to 15,000 vehicles per SVM or per OEM small-volume test group. Encouraging gradually greater quantities of small-volume NGVs to be introduced by both converters and OEMs would stimulate accelerated development of CNG fueling services infrastructure, which in turn would increase the market appeal of NGVs, which would ultimately lead to the production of low-cost NGVs on a high-volume basis that would then meet full large-volume certification requirements. This dynamic has already been successful in building the market for NGVs in Europe, where several OEMs have developed the market through the production of a wider range of models on a small-volume conversion basis.

40 CFR §86.1838–01 ostensibly provides such a path by allowing OEMs to use small-volume manufacturer (SVM) certification procedures – including the use of assigned deterioration factors and reduced in-use testing requirements – for test groups of vehicles which total less than 15,000 units, called small-volume test groups. However, as discussed below, in the area of OBD system demonstration, EPA allows for significantly reduced requirements for only SVM converters. Moreover, the current NPRM risks entrenching this arbitrary distinction between OBD requirements for SVM converters and OEM small-volume test groups while creating other inequalities between these two classifications. This runs contrary to the EPA's own goal of maintaining "a level playing field for OEMs and conversion manufacturers," as expressed in its revised aftermarket certification rules in 2011:

> EPA also believes that a certification demonstration requirement for new vehicle and engine conversions is prudent to maintain a level playing field for OEMs and conversion manufacturers. The certification requirement for new vehicle and engine conversions reduces any incentive that might otherwise exist for OEMs to circumvent requirements by certifying a traditional configuration and then converting it, rather than certifying the alternative fuel configuration in the first place.

This level playing field should work both ways, ensuring that both types of entities can produce small volumes of alternative fuel vehicles with reduced and harmonized regulatory obligations. Some disharmonies included in the NPRM risk undermining incentives for OEMs to produce NGVs in small volumes; others have the potential to risk discouraging conversion companies from scaling up their own production. In both cases, it is critical for EPA to avoid placing unnecessary regulatory burdens on the production of NGVs at this early stage of the market, or it risks making the present "vicious cycle" a permanent feature of the market, with NGV production limited to small-volume, high-cost vehicles with limited customer appeal.

A true level playing field can be accomplished by making changes to the proposed Tier 3 rules in the following three areas:

1. OBD testing requirements
2. Extended lead time provisions
3. Small-volume production thresholds

The Tier 3 rules are projected to have enormously positive impacts for local air pollution issues. However, if not implemented carefully, they could also inadvertently impede the development of vehicles fueled by natural gas – a critical clean fuel for the highly efficient internal combustion engines of the future as well as a bridge to zero-emission hydrogen FCEVs. Conversely, if these rules are implemented thoughtfully, they could provide an opportunity for EPA to reinforce the support for NGVs it showed in the 2017-2025 GHG rulemaking, as well as the support for this technology that President Obama has repeatedly asserted.

The proposals outlined in these comments would significantly reduce the regulatory barriers to entry for OEMs producing limited quantities of NGVs by more fully harmonizing rules for small-volume test groups with the rules for small-volume conversion manufacturers – particularly in the critical area of OBD system testing requirements. Additionally, by avoiding unnecessary sulfur requirements for CNG fuel, EPA will assure gas producers, utilities, and retailers that the development of the NGV fueling market can proceed without unexpected regulatory roadblocks. In combination, these efforts can help transform the current "vicious cycle" of low-volume, high-cost NGVs and sparse CNG fueling into a "virtuous cycle" of high-volume, low-cost NGVs with plentiful CNG availability.

Our Response:

The flexibilities we are adopting for small companies are prompted by their limited access to engineering resources and credit opportunities, as discussed in Section IV.G of the preamble to the final rule. These issues are far less present for larger OEMs, even for their small volume test groups. Many new technologies must undergo start-up challenges similar to those described by VNG for NGVs, and manufacturers will often discount the retail price of vehicles using these technologies so as to help overcome these challenges, or will partner with others to spread development and implementation costs. Given that manufacturers have significant latitude in defining test groups, extension of small business flexibilities to large manufacturers' small volume test groups could provide large unintended incentives to artificially create small volume test groups and seriously hamper the Tier 3 program, and could introduce new competitive issues, including for the small companies these provisions are designed to help. We believe that the small manufacturer flexibilities should remain firmly focused on the specific issues that arise for small businesses under the Tier 3 program. We note that larger OEMs themselves did not argue for extension of these flexibilities to their small volume test groups.

4.6.6. Credits

What Commenters Said:

Ozone Transport Commission (OTC):

EPA's proposal would prevent the carryover of Tier 2 credits for use in meeting the Tier 3 standards. However, while large volume manufacturers may be well-positioned to achieve compliance with the Tier 3 standards using only the credit flexibility mechanisms included in the proposed rule, small volume manufacturers may have more difficulty achieving the reductions necessary for early credit generation. These manufacturers have limited model lines with which to comply with fleet average requirements, and lesser availability of investment and engineering resources to meet more stringent standards. Therefore, they may be disadvantaged under the current credit structure. Therefore, OTC recommends that EPA allow carryover of Tier 2 credits for small volume manufacturers with a mechanism similar to California's carryover provisions between the LEV II and LEV III programs, under which credits are initially available at full value, but then discounted over time. OTC believes that this option best accounts for the challenges small volume manufacturers may face in complying with the program, and levels the playing field for firms that may be unable to utilize the currently proposed flexibility mechanisms.

Our Response:

Under our Tier 2 program, credits may be earned for NOx but not for NMOG+NOx, so allowing manufacturers to port excess Tier 2 credits into Tier 3 to demonstrate compliance with NMOG+NOx standards would introduce significant complexities. Instead we decided to allow the generation of Tier 3 NMOG+NOx credits early, and this flexibility is available to large and small manufacturers alike. However, as pointed out by a number of manufacturers, the ability of SVMs to take advantage of averaging, banking, and trading flexibilities of any sort is limited by their limited product offerings, and for this reason we are adopting special flexibilities for SVMs that do not depend on credits. Additional discussion of comments requesting conversion of pre-Tier 3 credits to Tier 3 NMOG+NOx credits can be found in Chapter 4.2.5.

Ferrari:

Ferrari suggests a debit/credit trading mechanism in order to be able to guarantee compliance with the emissions standards proposed by EPA for 2022 and subsequent MYs. A debit/credit trading scheme would enable Ferrari to internally generate credits through over-compliance, or obtain credits from other manufacturers for their over-compliance with the fleet average emission standards. This approach would not result in any harm to the environment as the same overall net emissions level would be maintained. In fact, due to the very low mileage that is typical of most Ferrari vehicles, a credit trading program could result in a net environmental benefit because the credits would cover full useful life emissions while the mileage of most Ferraris does not even approach 150,000 miles.

Ferrari proposes that EPA allow NMOG+NOx credits earned by small volume manufacturers to expire after ten years instead of five. As explained in our November meeting with you, meeting the 30mg/mile standard in 2028 would require the introduction of vehicles with much lower emissions as early as 2022, which may be extraordinarily difficult to do. The extended credit lifespan would provide Ferrari with the lead time to ensure compliance with the proposed standards without sacrificing the performance or character that is expected of each Ferrari vehicle. Ferrari agrees that any credits earned during an extended compliance period may not be sold, traded, or otherwise transferred to another manufacturer.

Our Response:

As discussed in Section IV.A.7.m of the preamble to the final rule, in response to comments we received on the proposal, we are extending the life of NMOG+NOx credits earned in MY 2017-2024 (MY 2018-2024 for larger light-duty vehicles), to as long as 8 years, compared to the 5 years we proposed. For SVMs choosing to take advantage of the 3-stage compliance option, these credits could be earned beginning in MY 2022 when the second-stage standard takes effect. We believe that this credit life extension substantially addresses Ferrari's concerns. The low-emissions vehicles they would introduce in MY2022 (as well as those sold in MY2023-2025) can earn credits that may be used anytime through MY2030. This provides 3 model years, MY2028-MY2030, in which these banked MY 2022-2025 credits can be used to demonstrate compliance with the 30 mg/mi standard under the SVM 3-stage compliance option.

4.7 Compliance Provisions

4.7.1. Exhaust Emission Test Procedures

What Commenters Said:

Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

NMOG+NOx contribution factor for Plug-In Hybrid Electric Vehicles (PHEVs): PHEVs only use electricity for a portion of their driving time and generate no exhaust pollution (NMOG, NOx, PM, etc.) during this portion. Thus, these vehicles produce less real-world pollution than a vehicle certified to the same standard that does not have the off-vehicle charge capability. For example, a PHEV that operates half the time on electricity only, will emit half the criteria exhaust emissions. Although the benefit is clearly operator dependent, it could be roughly approximated by the battery-only range of the vehicle (i.e., a longer battery-only range will result in more battery-only miles).

Recognizing this characteristic of PHEVs, the LEV III regulations include the NMOG+NOx Correction Factor for Off-Vehicle Charge Capable Vehicles in §1961.2(b)(1)(B)1.c.2. Under LEV III, the NMOG+NOx emissions used to calculate the fleet average emissions are reduced by up to the next lowest category based on the battery-only range (i.e., longer range = greater reduction). For example, this could allow a PHEV certified to Bin 125 to be treated in the fleet average as a Bin 70. Regardless of range, the lowest value that a Bin 125 could use in the fleet average is 70 mg/mile; it could not, for example, be treated as a Bin 50. Thus, the correction factor in ARB's LEV III regulations is conservative but is an appropriate recognition of the technology's benefits. EPA did not include a similar correction factor at all in its proposed regulations and should adopt this allowance in the final rule.

Manufacturers and ARB are gathering data on PHEV usage. This data is expected to influence the NMOG+NOx contribution factor. For example, it's possible that a Bin 70 PHEV with a long range should use 35 or 25 mg/mile for the fleet average calculations.

Manufacturers will introduce significant volumes of PHEVs in the coming years. A change to incorporate the NMOG+NOx contribution factor for PHEVs is essential to harmonize the programs and prevent manufacturers from being forced to manage separate federal and California fleets.

Recommendation: We recommend that EPA harmonize with the LEV III allowance for PHEVs. Once more data is available, we would also like to work with both agencies to determine if the cap at the next lowest category is appropriate or should be eliminated.

BMW of North America, LLC

Plug-in hybrid vehicles offer a promising technology on the path towards ambitious GHG targets and further reduction of oil dependency in the transport sector.

Depending on the trip length and zero emission driving capability of the vehicle, a portion of vehicle miles travelled (VMT) with PHEVs is based on mere use of electricity hence reducing the overall exhaust emissions of the PHEV substantially. CARB acknowledges and rewards the electric drive share of PHEVs through allowing for an HEV contribution factor which based on Zero-Emission VMT reduces the NMOG+NOx value for PHEVs.

BMW proposes harmonizing Tier 3 with LEV III through adoption of the PHEV allowance in Tier 3 final regulation for all 50-state certified PHEVs.

Our Response:

The CARB ZEV mandate requires manufacturers to produce and sell zero emission vehicles. The LEV III program provides manufacturers with emission adjustments for advanced vehicles like PHEVs. The adjustments are based on expected emissions reductions from the electric operation portion of driving in the California market. Similar information was not provided to EPA and since Tier 3 does not have a ZEV requirement, we did not propose and are not adopting PHEV adjustment factors.

What Commenters Said:

Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global):

PHEVs were introduced just a few years ago, and both the agencies (EPA and ARB) and automakers are still developing the vehicles and the test procedures for those vehicles. In 2009, before any PHEVs had been introduced, ARB adopted PHEV test procedures for California. In June, 2010, the Society of Automotive Engineers (SAE) J1711 Committee (which includes EPA, ARB, automakers, and automotive suppliers) approved a recommended practices document that contains detailed test procedures for PHEVs. The test procedures contained in SAE J1711 represent the latest and best collaborative effort to test these new vehicles. Most recently, EPA adopted PHEV test procedures in July, 2011. The EPA requirements reference many of the test procedures contained in SAE J1711.

Since EPA adopted PHEV test procedures in 2011, manufacturers and the agencies have gained significant experience developing, validating, testing, and certifying these vehicles, with a growing number of PHEVs are on the road from more manufacturers with more attribute sets. As this occurred, industry worked to develop a set of recommended changes to the PHEV test procedures that we believe maintain the stringency of the standards and the benefits of these vehicles, while streamlining the testing.

We have met with EPA and ARB staff several times over the last few months and sincerely appreciate the efforts of both agencies to consider and discuss our recommendations. Appendix 2 [See the attachment in Docket number EPA-HQ-OAR-2011-0135-4461-A3] contains a comprehensive list of the changes we have recommended to the EPA (and ARB) test procedures. We highlight two important issues below, although these are also addressed in Appendix 2.

CS Worst Case, Manufacturers Attest That CD Emissions Will Be Lower when the Utility Factor (UF) is Used: PHEVs have two primary operating modes – charge depleting (CD) and charge sustaining (CS). In CD mode, the battery provides all, or at least some, depending on the PHEV's design, of the power to drive the vehicle. In CS mode, the gasoline engine provides all of the power to drive the vehicle either through a direct connection to the drive train, or by acting as a generator to deliver electricity to the electric motor.

Manufacturers must certify that PHEVs will meet the emission standards in CS mode, which is real-world worst-case since it represents a driver who never charges the vehicle and thus never uses the battery for propulsion. To the extent that a vehicle uses the battery for propulsion, the emissions during that period would be zero and thus would lower the overall emissions from the vehicle. In addition to CS mode, manufacturers must also certify that their vehicles will meet the emissions standards in the "worst-case" CD mode.

The method used to test "worst-case" CD mode is to drive the vehicle from a full charge over consecutive Urban Dynamometer Driving Schedules (UDDS)13 until the engine starts and then run one additional UDDS. Emissions are measured during the UDDS when the engine starts and over the next UDDS. This can lead to a situation where a vehicle has two cold starts (one at the very end of the first UDDS and another during the second UDDS) and appears to not meet the emission standard regardless of the zero emission miles traveled prior to the first cold-start. This does not represent any real-world condition. In fact, PHEVs will have far lower emissions than non-PHEVs certified to the exact same standard.

For example, GM provides data for the Chevrolet Volt on the total number of miles driven compared to the total number of all-electric miles (see http://www.chevrolet.com/volt-electric-car.html). As of May 27, 2013, Volts have driven a total of 310 million miles, of which 192 million miles were all-electric. Thus, more than 60 percent of the miles driven on the Volt produce zero emissions. If the Volt is certified to a Bin 30, this would translate into real world emissions of about 12 mg/mile (= 30 * 0.4). We recognize that this will vary depending on the vehicle design, all electric range, etc. However, it is indisputable that a PHEV will emit less than a conventional vehicle certified to the exact same emission standards. Yet manufacturers spend two to three times as much effort to certify a PHEV compared to a conventional vehicle. This is especially significant given that PHEV test groups are relatively low volume compared to conventional vehicle test groups and manufacturers face greater challenges in trying to make PHEVs profitable.

The driving cycles used for decades – Federal Test Procedure (FTP), UDDS, US06, etc. – were developed by monitoring driving behavior and choosing what would be an average driving cycle. No one drives a vehicle exactly according to an FTP cycle. However, on average, the FTP cycle is a good approximation. Likewise, the SAE J1711 and Part 600 procedures include a UF that approximates the amount of driving on the battery and the amount of driving with the engine. Again, perhaps no single vehicle mirrors the exact UF split in electric versus gasoline propulsion, but on average the UF is a good approximation of the average. In fact, EPA uses the UF for GHG emissions, but does not allow its use for criteria emissions.

Because the UF effectively mirrors total real-world emissions (SAE J2841) from a PHEV, EPA has expressed concern that manufacturers could use this to increase the air-to-fuel ratio, improve fuel economy and reduce GHG emissions at the expense of increased NOx emissions when compared to a CS test. This is a legitimate concern that EPA could address with the current defeat device regulations. If EPA needs further assurance, it could specify that the vehicle emissions system must perform in a similar manner at the same auxiliary power unit (APU) speed and load point on both the CS and the CD mode.

Recommendation: The following three requirements should address EPA's concerns with the criteria emissions. These assure that a vehicle that is never charged meets the emission standards, and that vehicle emission controls operate in a similar manner whether in CD or CS operations:
1. Vehicle must meet the emission standards in CS operating mode.
2. Vehicle must meet the emission standards in CD operating mode when the UF is applied. The manufacturer may attest to meeting this requirement.
3. The vehicle emission system must operate in a similar manner when operating at the same APU speed and load point in either CS or CD mode.

Net Energy Change (NEC) Tolerance and Use of Appendix C: CS tests are intended to determine emissions when the gasoline engine is providing all of the propulsion power. However, PHEV systems are complex, and the gasoline engine is designed to operate at maximum efficiency. This means that all of the power of the gasoline engine may go to providing propulsion at some times, while at other times it may be used to charge the propulsion battery; at other times, the propulsion battery may discharge further to provide peak or transient power. Consequently, while the vehicle is operating in CS mode, the battery state of charge may slightly change. To verify that the gasoline engine is providing all of the power over the CS test, SAE J1711, ARB, and EPA procedures require that the vehicle operate within a NEC tolerance of 1 percent of the total fuel energy.

As propulsion batteries become larger and the control systems more sophisticated, maintaining NEC within 1 percent becomes more difficult. The SAE J1711 committee recognized this difficulty and developed a method to correct an NEC of greater than 1 percent but less than 5 percent back to an equivalent of NEC = 0. This NEC correction of up to 5 percent is contained in Appendix C of SAE J1711.

The CS test is difficult, time consuming, and resource intensive, and if the vehicle misses the NEC tolerance, a complete retest over that cycle is required. Allowing use of Appendix C to correct NECs of less than 5 percent would significantly reduce the amount of retests conducted. Moreover, it would allow manufacturers to develop vehicles with better performance.

We understand that both EPA and ARB are concerned that if a vehicle is certified over the CS test with a -5 percent NEC, then emissions would be under-reported, since 5 percent of the vehicle's propulsion came from the zero emission battery. However, SAE J1711, Appendix C, corrects the measured fuel consumption back to NEC=0. Moreover, manufacturers would be required to meet the emission standards provided at any NEC between ± 5 percent. Thus, the vehicle must meet the emission standard if the NEC is +5 percent as well.

We agree that manufacturers should declare the use of Appendix C at an early point in the certification process. Automakers would agree to provide this information in the pre-certification meetings.

Recommendation: We recommend that EPA allow the use of SAE J1711, Appendix C, correction for NEC tolerance greater than one percent, provided the manufacturer declares its intention to use this during the pre-certification meeting. Moreover, manufacturers support a requirement that the vehicle must meet the emission standards within the full range of the NEC ±5 percent (with fuel consumption corrected per SAE J1711, Appendix C).

Our Response:

With regard to the recommendations on how PHEV's should be assessed in charge depleting and charge sustaining modes; we have addressed these recommendations in a memo to the docket which summarizes our test procedure changes. In summary, we have not adopted these recommendations as part of Tier 3 as we did not have adequate information on which to base our decision. We will continue to work with manufacturers to address concerns with current PHEV test procedures.

With respect to the NEC tolerance, EPA has adopted the recommendation made by the Alliance and Global Automakers, however, manufacturers wanting to exercise the option of using NEC +/-5% will be required to apply for permission to use this procedure and receive prior approval from EPA.

What Commenters Said:

Organization: BMW of North America, LLC

In-Use Testing of PHEV`s:
The in-use requirements for Carbon Related Exhaust Emissions (CREE) of PHEV`s were changed in 2012. Prior to this modification, the CREE was calculated separately for depleting and sustaining operation modes. The new language requires combining depleting and sustaining modes by the utility factor. However, the utility factor is determined by the depleting range; hence the new language makes the depleting range the key influence on in-use performance. Over useful life the depleting range is reduced as a result of aging of the traction battery.

To date very little experience exists on battery deterioration in actual customer use.

BMW finds the new in-use requirement premature and recommends that the feasibility of this approach be evaluated on the variety of PHEV concepts manufacturers are introducing into the market to better assess the effects of long-term customer use. Further, BMW recommends re-introducing the PHEV in-use requirements from May 2010 wherein depleting and sustaining operations are treated separately in CREE calculations.

Once long-term behavior is better understood through sufficient field data and impact analysis, a combined CREE calculation (depleting and sustaining modes) based on the depleting range could be re-introduced, provided available battery technologies support the approach.

Our Response:

BMW commented that in the 2012 light-duty Greenhouse Gas (GHG) regulations the in-use requirements for measuring and calculating Carbon Related Exhaust Emissions (CREE) for plug-in hybrid vehicles (PHEV) was calculated separately for charge depleting and charge sustaining operation modes, but that in the 2017 GHG rule, EPA changed the requirements so that in-use CREE is calculated by combining the depleting and sustaining modes using a utility factor. Their concern is that the utility factor is determined by the depleting mode driving range thus making the depleting range the key influence on in-use performance. They argued that there is very little experience with battery deterioration in actual use and that it is premature to use this approach. They suggested that more information on battery deterioration was necessary and that in the future it may be more appropriate to determine in-use performance for PHEVs by using a utility factor and combining depleting and sustaining modes.

BMW's comments are related to the GHG regulations and are not directly related to the Tier 3 rule. While their comments do discuss in-use emissions and how they would be calculated for IUVP, they are not related to anything that was proposed or discussed for the Tier 3 rule. However, EPA will address some of their concerns. BMW is fundamentally wrong when they state that EPA originally specified separate in-use CREE standards for charge-depleting and charge-sustaining modes. The 2012-2016 GHG final rule specified, for dual fuel vehicles (including PHEVs), that there should be an in-use standard for each fuel, not for each mode. (See 75 FR 25687, May 7, 2010.) PHEVs were included with other dual fuel vehicles, where the CREE (or CAFE) value is based on test results on each fuel (e.g., gasoline and E85). Obviously, each in-use test for most such vehicles should be done on one fuel or the other, especially for dual fuel vehicles where the fuels can be mixed in the same tank (e.g., gas-E85 FFVs). Such an approach might have worked for the Volt (a series PHEV), which at the time was the only PHEV with which EPA had any experience. However, by the time of the 2017-2025 GHG rule (see 77 FR 63158, October 15, 2012), we realized that PHEVs did not generally fit the mold of other dual fuel vehicles. With blended PHEVs, for example, it is simply impossible to test either on gasoline or on electricity, or to specify standards separately for each fuel. It was in the 2017 GHG rule that we changed the language for PHEVs, requiring that PHEVs be tested as they are for certification, using a utility factor weighted composite of charge-depleting and charge-sustaining operation.

Contrary to BMW's assertions, we never considered separate charge-depleting and charge-sustaining standards. PHEVs are a unique technology. While the in-use performance of FFVs can be typically assessed by testing on either or both fuels, this is not the case for PHEVs, where the two fuels can be inextricably intertwined, and where the battery performance over time can have an impact on in-use GHG emissions. The GHG emission standards are full useful life standards, and the regulations require manufacturers to account for battery deterioration in their certification values (which are likewise required to represent full useful life values). While we agree with BMW that battery performance over time can affect in-use GHG emissions, it is precisely for this reason that in-use testing must assess the composite of charge-depleting and charge-sustaining operation. If manufacturers appropriately account for battery deterioration in their certification values, then they should have no concerns. BMW is in effect asking that the fundamental basis of in-use testing – to produce a fair comparison between certification and in-use emission levels – be set aside for PHEVs. In a fleet-averaging program in particular, EPA believes it is important to assess in-use performance against certification levels.

What Commenters Said:

Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

EPA proposes to confirmatory test vehicles on four wheel (4WD) dynos as soon as 90 days after the Final Rule, even if they were originally certified by the manufacturer on a two-wheel (2WD) dynos. Such a change in dyno requirements would be a change to the yardstick used to determine fuel economy, and would significantly impact the measurement of fuel economy. While EPA would be obligated to release a Test Procedure Adjustment (TPA) for CAFE, EPA would need to also change GHG rule targets and label procedures. Since the yardstick at the EPA lab would be changed, manufacturers would be effectively forced to install 4WD dynos at their facilities to ensure correlation with the new EPA yardstick, with a massive capital cost for new equipment and new facilities. But studies and test data have not yet laid to rest basic questions concerning the higher variation in results on 4WD dynos or their effects on fuel economy or even their representativeness of on road behavior. 4WD dynos, as they are proposed to be used in the NPRM, may turn out to not be a better representation of on-road behavior, but just another, different representation, with new and different measurement offsets and correlation issues. Given that basic questions have yet to be answered, and that these questions were not addressed at all in the NPRM or in the RIA, we disagree with EPA adopting 4WD confirmatory testing, as this change in test procedure would require appropriate application of the dyno factor and CAFÉ TPA, GHG standards adjustments, and would be coupled to significant lead time, dramatic cost impacts, loss of emissions testing capacity and increased variability.

EPA's Proposal for 4WD Dyno Confirmatory Tests is Premature and Should not be Adopted: Not discussed in the preamble part of the Tier 3 NPRM, but included only in the draft regulations section (78 Fed. Reg. 30163, § 1066.410 (g), Dynamometer Test Procedure) is a significant change to current test procedures. EPA proposes to confirmatory test vehicles on 4WD dynos even if they were originally certified by the manufacturer on a 2WD dyno. Such a change would impact the measured fuel economy of a vehicle and effectively forces manufacturers to install 4WD dynos in order to minimize the risk of not correlating with the results of the EPA lab. This EPA lab test procedure change measurably impacts fuel economy and thus is a change to test procedures which requires a TPA. [EPA-HQ-OAR-2011-0135-4461-A1, p. 100]

First, the Alliance and Global Automakers recommend that EPA not adopt the proposed change and that EPA instead continue to follow established policy of confirmatory testing vehicles as OEMs do on the same dyno type as used by the manufacturer. EPA should continue the current policy of only using 4WD dynos for non-confirmatory testing and for data collection purposes for the following reasons:

It is premature to require confirmatory testing on 4WD dynos because there has been insufficient analysis and research performed on 4WD dynos to fully understand their operation and minimize test result variability to acceptable levels. For the switch from the Clayton twin-roll dyno to the 48” single-roll electric dyno in the 1990’s, both EPA and industry cooperated in a large study to determine the necessary changes to calibration and setup procedures to ensure good correlation between EPA and industry’s dynos (92). Based on a preliminary EPA and Alliance/Global Automakers study, attached as Appendix 9, 4WD dyno correlation is not predictable or well understood for even simple, “passive” 2WD vehicles. For this reason, meaningful conclusions cannot be drawn from 4WD dyno test results at this time. This may be due to the great variations in designs (four motors, motor in the middle, location of load cells, location of speed acquisition, parasitic loss adjustments, roll speed synchronization, flexible versus rigid vehicle tie downs, etc.), or it may be due to setup and testing procedures not being defined and standardized. The Alliance and Global Automakers strongly recommend that much more testing and analysis must be performed before 4WD dynos can be adopted for confirmatory testing.

By instituting a test procedure change to confirmatory test vehicles on a 4WD dyno even if the manufacturer certified on a 2WD dyno, EPA is effectively requiring manufacturers to install 4WD dynos in order to minimize the risk of not correlating with the EPA lab. This would impose an extraordinary burden on industry in terms of cost and practicality for manufacturers to install 4WD dynos for fuel economy and certification testing. Since the requirement could be implemented by EPA 90 days after publication of the Tier 3 Final Rule, over a very short time, a large number of 4WD dynos would need to be purchased and installed because of the great volume and frequency of certification and fuel economy tests performed by manufacturers. In many instances this would not be practicable, since many facilities in current use cannot be modified to accept the increased space requirements for 4WD dyno testing with their requirements for large underground pits. New buildings and test cells would be required in many cases to accommodate a 4WD dyno at a test facility. 4WD dynos would be required to be installed in environmental chambers to be able to perform 20°F, SC03 and AC17 tests. Many existing environmental chamber test cells will not be able to accommodate the installation of a larger pit and extra roll for a 4WD dyno. Finally, the cost for each 4WD dyno is more than double the cost of two 2WD dynos, due to the necessary and more complex hardware/software to synchronize two rolls and to move one roll to accommodate varying wheelbase vehicles.

4WD dynos have a particular burden associated with them in terms of the greater floor area required for their installation. The footprint area requirement for a 4WD dyno is partly a result of the two rolls, with one of the rolls being a movable roll, but is more a result of the unique vehicle tie-down arrangements necessary on a 4WD dyno. Differently than on a 2WD dyno, a vehicle is required to be restrained in all directions to maintain its contact at the top of the two rolls. Such a vehicle restraint system, be it a rigid type or a flexible type, requires sufficient space around all the sides of the vehicles to be able to resist the substantial forces during a test. On average, 4WD dyno test cells require approximately 3 to 4 times more square feet of floor space than do 2WD dynos. Appendix 10 provides examples of predicted floor space requirements for manufacturers to implement the 4WD dyno confirmatory proposal. As can be seen graphically in the first example, the floor space that is currently able to accommodate five 2WD dynos would only be able to accommodate three 4WD dynos. A new facility would be required to be built to accommodate the other two 4WD dynos which are needed to maintain the same test production capacity.

For some manufacturers, expansion of an existing facility may be possible, and for some manufacturers entirely new facilities would be required. However, some manufacturers are so real estate constricted that to add 4WD dynos at an existing location would require them to build vertically rather than horizontally, and the cost of expansion for those manufacturers would be significantly higher.

In order to better quantify the potential burdens associated with this proposal, manufacturers developed an overall industry cost estimate based on a survey of cost estimates from individual manufacturers for the purchase and installation of 4WD dynos. The cost estimate includes estimated costs for 4WD dynos (including individual selections of 4WD dyno technologies, such as location and number of power absorbers, and power ratings) and estimated costs to prepare the test sites to accept the 4WD dyno. These costs include digging larger pits in existing test cells, reconfiguration of existing equipment to accommodate 4WD dynos, and, where necessary, construction of entirely new facilities to maintain production capacity during and after construction. Based on this industry cost estimate, attached as Appendix 11, the one-time cost burden to implement the EPA proposal would be in a range from $1.031 billion to $1.246 billion. The cost estimate is conservative and an actual cost would likely be much greater, since the number of dynos to be replaced is not actually proportional to vehicle sales.. The ongoing cost burden to operate and maintain 4WD dynos with their reduced throughput and higher maintenance needs would be significantly increased as well, but is not quantified in the cost estimate.

These high costs make it very clear that before a switch to 4WD dynos can be contemplated, a rigorous analysis of costs and benefits needs to be performed, including evaluations of potentially less costly alternatives. Since such an analysis was not included or even addressed by the NPRM or the RIA, it is unclear how procedurally such a costly requirement could even be proposed.

The Alliance and Global Automakers also have concerns with a reduced test throughput from a 4WD dyno confirmatory requirement. The vehicle setup burden would be increased, not reduced. Previously, EPA has not released any guidance on standardizing methods for vehicle tie down on 4WD dynos. There are increased concerns with safety because of the more complex vehicle tie down arrangements required. Wheel chocks cannot be used on 4WD dynos and most vehicles are not equipped with trailer hitches and front tow hooks, requiring ad-hoc welding/securing of tie-down fixtures to vehicle frame - often impractical for customer vehicles and inherently unsafe. Specific and detailed procedures are necessary for how to tie down a vehicle, align the vehicle to the dyno rolls to minimize skewing, and how to account for any potential interaction between the 4WD dyno and 4WD/AWD vehicle torque distribution control systems, which in some cases may result in on-dyno AWD system activation that is not representative of its “on-road” behavior. Such guidance is needed before EPA and Industry can successfully implement a 4WD dyno confirmatory testing requirement.

Organization: Ford Motor Company (Ford)

Four-Wheel Drive (4WD) Dynamometer Testing: In the NPRM, EPA proposes to change its policy regarding 4WD dynamometer testing. There are two components of the proposal:
(1) EPA proposes to perform confirmation testing of four-wheel drive vehicles using four-wheel drive dynamometers, even if a manufacturer tests such vehicles using a two-wheel drive dynamometer.
(2) EPA has also proposed that starting in 22MY, manufacturers may continue to test four-wheel drive vehicles using 2WD dynos, but only if there is no decrease in emissions or energy consumption relative to on-road operation.

Our concerns with these proposals are provided below:

Added Complexity – The core argument in support of 4WD dynamometer testing is that it should, in theory, better represent a vehicle's "on-road" performance. This is true in the sense that all four wheels are rotated when testing on a 4WD dyno, however, the benefits of including this additional vehicle component must be weighed against the added complexity that is necessary to accomplish this seemingly simple task.

This added complexity includes:
(1) a second 48" dynamometer roll electrically coupled to the primary roll that requires the dynamometer control system to continually distribute and rebalance the target road load between the two axles in response to both changing roll speed and changing vehicle torque distribution, while at the same time maintaining a high degree of speed synchronicity between the rolls;
(2) fundamentally more complex and error prone vehicle positioning and securing process due to the inability to secure the tires of a "non-drive" axle;
(3) varied and complex restraint systems (chains, cables, and rigid fixtures);
(4) non-existent or inconsistent attachment points for these restraints on the vehicle and/or vehicle frame;
(5) four tires rotating on rounded surfaces (vs. a "flat" road) resulting in less contact area and higher rolling resistance, which requires the dyno to "assist" the vehicle at low speeds;
(6) dyno simulation of "negative" inertia for vehicles with test weights that are less than the combined base inertia of two dyno rolls; This complexity adds variability, and also likely contributes to correlation differences between 4WD and 2WD testing that should not be attributed to a vehicle tested in 4WD dyno mode. With sufficient study the inherently greater complexity of 4WD dyno testing can be better managed than it is today, but it is not certain that 4WD testing will be able to achieve the same level of consistency as the existing 2WD procedures.

Test Procedure Capability – Manufacturers have had very little experience using 4WD dynamometers, and as a result, best practices needed to ensure repeatable 4WD testing results that correlate with existing 2WD procedures are non-existent or not well defined. These practices cannot simply be carried over from the 2WD testing paradigm since they must address issues unique to 4WD dyno testing (see sources of added complexity above). EPA and Industry have been working to develop such procedures, but this work is incomplete and should be continued.

Correlation to Current 2WD Procedure – EPA has expressed an interest in understanding whether the existing 2WD dyno method satisfactorily accounts for vehicle systems that must be "disabled" or modified in order to permit operation on a 2WD dynamometer (for example, AWD systems). Although 4WD dyno testing may provide a means to answer this question once reliable test procedures are in place, the effect of "enabling" such a system can only be isolated if 4WD dyno testing in general produces results equivalent to a 2WD dyno for vehicles that do not possess such systems. Otherwise, any general testing bias between the dyno modes could be falsely attributed to the vehicle system being studied.

Additionally, since the parasitic drag of a test vehicle's "second" axle is already included in the existing 2WD testing process via the on-road coastdown test, future 4WD dyno testing studies should be focused on vehicle technologies that provide some "active" attribute on this axle that cannot be characterized by coastdown parasitics.

To better understand these issues, EPA and Industry have been conducting a joint, 2WD-to-4WD correlation program. Ford commends EPA staff for its continued interest and participation in this program, which we believe will ultimately lead to more capable and robust 4WD dynamometer test procedures.

Cost/Facility Impact – 4WD dyno testing is a complex and expensive testing option. Beyond the substantial cost of the dynamometer equipment itself, the installation process requires extensive site construction and often building modifications, and the additional time needed to align and secure test vehicles also reduces the number of tests that can be performed per shift. These costs and facility impacts must be carefully weighed against any demonstrated enhancement of measurement capability associated with 4WD dyno testing.

Lead Time – Whenever any new test method is introduced that has the potential to influence test results, manufacturers need adequate lead time to prepare for, and transition to, the new method. This time is needed to study the impact, develop test procedures, and if necessary, install new equipment. It also prevents disruption of programs currently in development using the existing procedures.

Recommendation:
(1) EPA should continue its current policy of conducting confirmation testing in the same dynamometer test mode used by the manufacturer. Meanwhile, EPA should continue to work with Ford and Industry to:

• Develop and refine best practices for 4WD dynamometer test methods to ensure meaningful and repeatable results.
• Complete the ongoing effort between EPA and Industry to establish a robust correlation factor between 2WD and 4WD dyno mode to ensure that any future 4WD dyno test results are appropriately adjusted to account for overall (i.e., non-vehicle specific) differences between the two dyno test methods.
• Once best practices and repeatable correlation factor are in place, conduct testing to demonstrate which specific vehicle technologies, if any, would be significantly better represented by using 4WD dyno test methods.

• For the technologies that have been clearly demonstrated to benefit from 4WD dyno testing, explore more cost effective options for including this effect in the fuel economy label that would not require manufacturers to install and test on 4WD dynamometers.
(2) Additionally, EPA should continue to define the 2WD dynamometer as the default test mode for all vehicles, and refrain from adding any language that would require manufacturers to test 4WD vehicles on 4WD dynos.
In light of (1) and (2) above, we recommend that the language of proposed § 1066.410 (g) be either deleted in its entirety, or revised as follows:
(g) For vehicles which provide four-wheel drive or all-wheel drive operation, manufacturers may either utilize the vehicle's normal (default) mode of operation or test the vehicle on a single roll by deactivating the second set of drive wheels. Any confirmatory testing will be conducted in the testing mode used by the manufacturer.
(3) If EPA proceeds with using 4WD dynamometers for confirmation testing in the future:
• EPA should provide manufacturers with adequate lead time to prepare.
• All fuel economy and CO2 results (certification, FE label, CAFE, GHG) generated using a 4WD dynamometer should be adjusted using the dyno correlation factor currently under development by EPA and Industry.
• EPA should apply appropriate test procedure adjustments for CAFE and GHG/CO2 purposes to account for any impact the 4WD dyno test methods have on the stringency of these standards.

Organization: General Motors LLC (GM)

The proposed Tier 3 regulations would effectively require testing of multiple drive axle vehicles on 4WD dynamometers (dynos) (ref. Section 1066.410(g)). Additionally the agency has stated that it reserves the right to include other vehicle configurations like hybrid vehicles in this '4WD' population, and may, or will confirm manufacturers emissions and fuel economy data on 4WD dynos, even if the manufacturer did its testing on a 2WD dyno. This is different than past practices by the agency which were adopted to minimize sources of variability between manufacturers' testing and the agency's testing. For OEMs to eliminate any risk at confirmatory testing, 4WD dynos will have to be used for a significant percentage of the fleet.

4WD Dynamometer Test Procedure Adjustment: GM supports the Alliance/Global comments with respect to adverse fuel economy impacts associated with 4WD testing, which would require EPA to issue a test procedure adjustment (TPA). However, data indicate that test to test variability along with cycle to cycle variability may prohibit the establishment of a robust TPA value at this time. The source of this variability is not understood, and likely is a function of several equipment and setup parameters. 4WD dyno testing is more complex than 2WD testing, and to state it simply, more things can go wrong. This needs to be thoroughly researched before 4WD testing is used for confirmatory testing. To this end, GM believes that EPA should continue with today's practice of testing the same way the vehicle is certified by the manufacturer.

4WD Dynamometer Facility Impacts: Implementation of 4WD dyno testing is a major facility impact, conservatively estimated to cost over $1 billion industry-wide, as detailed in the Alliance/Global comments. In addition, installation of the new dynos will adversely affect test throughput at a time when manufacturers need all of their test sites available to develop, validate and certify vehicles meeting the GHG/FE and Tier 3/LEV III requirements. The following outlines the facility impacts.

4WD Facility Impacts to Conventional 75o F Test Sites: Implementation of 4WD dynos will have dramatic and adverse effects on emissions test facilities and OEM's certification and development testing. Additionally, there is insufficient time to convert existing test sites to 4WD capability for the following reasons:

4WD dynos are more than twice the size of current 2WD dynos. 4WD dynos require very large pits compared with current, much smaller 2WD pits to house and service the dyno. These 4WD large pits require four times the surface area of today's conventional 2WD pit, are twice as deep, require two egresses for safety, and require a huge inertial mass to mount the dyno to.

4WD dynos will require new building structures and utilities. Many OEM's facilities were built in the 1970's and were sized for much smaller twin roll water brake dynos. The much larger pit size required for 4WD dynos will easily exceed the available area on many of today's test sites, and will clearly require much larger test sites. To accomplish this, existing sites will need to be expanded into neighboring cells, thereby significantly reducing the number of test sites available for Tier 3 certification and development testing. Given the increased stringency of the Tier 3 regulations along with new GHG/FE standards, reducing the number of emissions test sites will definitely have an adverse impact on OEM's ability to meet these new requirements.

Additionally, besides encroaching on adjacent test sites, these larger pits will also dramatically protrude out into routine vehicle movement lanes with safety egress stairs/hatches. When these hatches are open for dyno service or monthly calibration, vehicle traffic to adjacent test sites or evaporative sheds will be blocked, thereby adversely affecting emissions and fuel economy testing. Evaporative sheds need to be in close proximity to the chassis dynos due to the 40 CFR 86.130-96 requirements that no more than 7 minutes time elapse from the end of chassis testing to the start of evaporative testing.

4WD Facility Impacts to Climatic Test Chambers: Cold 20o F testing, hot 95o F SC03 testing, and the new A/C 17 testing all require specialized test chambers, and will also have to be updated with 4WD dynos. This is very problematic because these facilities are limited in number, and modifying them for 4WD testing will have a significant and adverse impact on current climatic emissions testing. The SC03 test sites are even more limited in number and 4WD implementation is further complicated by the CFR required large road speed fan (wind tunnel), which is likely to cause additional structural issues and longer implementation time.

4WD Construction, Implementation and Testing Down Time: We believe from start of construction to test site commissioning will take 1.5 years per test site, and as mentioned above, will need to be done in pairs of sites or more likely multiple test sites at any one time. The test sites removed from service for this construction are active certification and development test facilities, some of which are designed for specific vehicles like diesels. This will have an adverse impact on emissions testing capability. Additionally, because of this long downtime, manufacturers will only be able to convert a few sites at any given time. For a full line manufacturer, with dozens of test sites, this 4WD conversion will take a decade or more to complete. In fact, it is likely that 4WD dynos will force green field annexes or require the construction of new buildings. Manufacturers simply cannot afford to have test sites unavailable during this time when so much testing is needed for the development and certification of vehicles to meet the GHG/FE and Tier 3/LEV III standards.

4WD Pits – Non Dynamometer Impacts: Installing these very large machines will undoubtedly have major effects on virtually all of the other equipment located in the test sites such as exhaust sampling systems (CVS/Tunnel/bulk stream and raw exhaust tubing), modal sample conditioning systems plus close coupled modal analyzers, overhead XY support systems to hang vehicle cooling fans, drivers aids, remote mixing tees, etc. It is likely that these will be replaced with the site construction or require modification. With such large scale changes, additional changes to computer programs to control these new devices will be needed and modifications (or likely replacement) of emissions benches will be needed as well.

4WD Technology Not Well Understood: Many technical challenges still need to be resolved with the use of 4WD dynos. The dyno controls, set up parameters, calibrations, diagnostics and vehicle restraints all need to be studied. When 48-inch single roll dynamometers were adopted as part of the SFTP rulemaking, an extensive industry/government research program was launched to look into best practices and resolve any implementation and usage issues. Before 4WD dynos can be used for certification testing, it is highly recommended that a similar program be initiated to understand 4WD dynos.

4WD Dyno Adverse Impact on Long Term Testing Throughput: In addition to the impact on test throughput during the installation of 4WD dynos, it also takes much longer time to properly set up a vehicle on a 4WD dyno, which increases testing burden and slows down emissions testing on an ongoing basis. Please see the Alliance/Global comments for more detail.

Recommendation: Given the magnitude of the impact on test facilities and test throughput, along with the adverse yet not fully understood impacts on fuel economy and GHG emissions that would require accurate test procedure adjustments, GM does not believe that it is appropriate make changes that would require 4WD dyno testing in the Tier 3 rulemaking, particularly since Tier 3 is an accelerated rulemaking focused on criteria emissions. Instead, GM recommends that the current practice of EPA performing confirmatory testing the same way the manufacturer did, whether 2WD or 4WDwd, continue, and that EPA work with industry to study 4WD dynos further as detailed in the Alliance/Global comments.

Organization: Mitsubishi Motors R&D America, Inc (MRDA)

As part of the Tier 3 NPRM, EPA has included language indicating they intend to begin Confirmatory Testing on 4WD dynos. If EPA conducts Confirmatory Testing on 4WD dynos, manufacturers will need to perform their certification and development tests on 4WD dynos to ensure proper correlation to EPA tests. Manufacturers will incur a massive cost burden to replace their 2WD dynos with 4WD dynos. Additional costs will be associated with the operation of the 4WD dynos, the reduced testing throughput due to the time needed to upgrade facilities for 4WD dyno installation, as well as the longer vehicle set up time associated with 4WD dynos. Neither

EPA nor Industry has completed analysis to verify that there is any air quality benefit to the overall cost of installing and using 4WD dynos as opposed to the 2WD dynos currently in use.

The language in the Tier 3 NPRM states that manufacturers may continue to test on a 2WD dyno, 'but only if this mode of operation does not decrease emissions or energy consumption relative to normal in-use operation'. (Page 30163 Federal Register / Vol. 78, No. 98 / Tuesday, May 21, 2013). This implies that manufacturers could be required to test on 4WD dynos. Mitsubishi Motors strongly recommends that an extensive test program be conducted to determine if there are both dyno and vehicle losses associated with testing on 4WD dynos. If 4WD dyno testing is deemed necessary, Mitsubishi Motors believes that 2WD dyno testing would still be appropriate if the resulting data is accurately adjusted with a TPA.

NPRM Comments: Based on the above information, we recommend that:
-EPA should continue to allow certification and fuel economy label testing to be conducted on 2WD dynos.
-EPA should continue confirmatory testing the same way manufacturers perform their certification and fuel economy label testing.
-A TPA should be established to correlate the 2WD and 4WD dyno data.
-The language in 1066-410, stating a manufacturer may test on a 2WD dynamometer, 'but only if this mode of operation does not decrease emissions or energy consumption relative to normal in-use operation' should be eliminated.

4WD Dyno Testing: EPA should continue to allow certification and fuel economy label testing to be conducted on 2WD dynos. EPA should continue confirmatory testing the same way manufacturers perform their certification and fuel economy label testing. Any inclusion of 4WD dyno testing into the Tier 3 program must be accompanied by a TPA to correlate the 2WD and 4WD dyno data.

Organization: Volkswagen Group of America, Inc.

VW understands the need for a level playing field and a real world testing scheme. However, without the proper factors, testing vehicles on a 4WD dynamometer will not relate to the 1975 testing methodology as required. VW requests that much more work be done before beginning any confirmatory testing on vehicles with a 4WD dyno. The requirement for FPA to test in the same manner as Manufacturers should be retained in Tier 3 final rules. Industry and EPA are testing vehicles to determine the proper methodology moving forward and VW supports this cooperative spirit. While we do hove 4WD dynos in our labs, the capacity may not be large enough to support testing a potential future W/ fleet. Pathways need to be available to continue to test vehicles on 2WD dynos.

New EPA testing protocols involving 4WD dynos and the apparent split from the agreement to perform testing in the manner of OEM test methods may lead VW to install more 4WD dynos. It is the unpredictable nature of these confirmatory tests that may lead to abandoning of 2WD dynos. As an estimate, it may cost $1.3 Million and approximately 1 year to convert a 2WD dyno cell. Typically only 1 cell at a time is completed to maintain throughput of testing. Should climatic elements or solar cells need to be installed, this price would increase. Thus, Industry would need more than 90 days post Tier 3 signature for this conversion. We echo the Industry's request to continue working with EPA on these issues. We also echo Industry's comments that this program would potentially provide for factors for future technology vehicles, and not apply retrospectively to prior vehicles. We would continue to encourage EPA to engage with dyno manufacturers to develop proper dyno inertia error simulation procedures.

Organization: Volvo Car Group

In addition, in order to enable future technology development it is critical that there be harmonization with CARB with respect to test criteria and design requirements.

If manufacturers are required to utilize several different test procedures and to test against several different fuels, the lack of harmonization will generate unreasonable and unnecessary burdens that will impede the overall goal of facilitating low emission technology.

During the workshops with EPA during 2012 and 2013, the Alliance has consistently and repeatedly shown that there is a FE decrease when the same 2WD-vehicle is run on 4WD- compared to 2WD dynamometer.

VCG supports the concerns of the Alliance regarding these phenomena. At the EPA industry meeting on May 20, 2013, EPA expressed very clearly that a crucial aspect and goal for EPA is to achieve real world fuel consumption reductions. Part of this strategy is that EPA now has the ability to test on 4WD due to major investments.

Through substantial investments, VCG has developed similar testing capability, but VCG would like to highlight several issues that have been identified with regard to this testing capability.

- 4WD testing is more complex then 2WD.

- The correlation between 2WD and real road performance has been thoroughly investigated over the past 20-30 years, yet more remains to be done. There are aspects of 4WD and actual road performance which now need to be investigated, understood and correlated. (Car fixation, tie down etc.)

- Possible interaction between vehicle and dyno not seen on road.

Due to these issues, it would be premature to say that 4WD testing automatically represents real world fuel economy. Therefore, the investigation of a correlation factor to address the 4WD dyno aspects vs 2WD is essential.

Dyno to road correlation may not be more accurate on 4WD dynos than on 2WD; it could just be different. The exact impact on FE for the all issues is not clearly known and this shows that further method development is needed for 4WD testing. VCG believes the EPA proposal is premature and that further analysis of 4WD dyno testing is necessary so all remaining issues are resolved. VCG would like to work with EPA to support this future work.

Our Response:

We proposed that EPA may test vehicles with the capability of all-wheel drive operation with dynamometers operating in either two-wheel drive or four-wheel drive mode, regardless of the type of dynamometer that the manufacturer used for certifying the vehicle. However, the final regulations specify that we will conduct our testing using the same drive mode as the manufacturer. Vehicle manufacturers commented that differences in test results between a vehicle tested on a two-wheel drive and a four-wheel drive dynamometer might be due to differences in dynamometer characteristics more than in vehicle operation. Results of a government-industry study that tested vehicles on both two-wheel and four-wheel drive dynamometers indicated fuel economy differences in the range of ±4%, although the study was inconclusive with respect to the cause of the differences. Based on the results of this study, we will continue to test vehicles during confirmatory tests using the manufacturer's dynamometer configuration for that vehicle, and that test will be the official certification result. We are, however, finalizing revisions to 40 CFR 1066.410(g) to clarify that we may also test the manufacturer's vehicle in a different dynamometer configuration than what was used for certification testing for information-gathering purposes. If we decide to perform this testing, we will depend on the manufacturer to cooperate in reconfiguring the test vehicle for our testing. We will continue to investigate the effects of four-wheel drive dynamometers on emission results and will not rule out possible future test procedure changes that might require certification of, or allow EPA to perform confirmatory testing on, any vehicle on a four-wheel drive dynamometer.

4.7.2. Reduced Test Burden

What Commenters Said:

Organization: Ford Motor Company (Ford)

Where alignment cannot be achieved, it is important that mechanisms be provided to mitigate any unnecessary complexity and testing burden. For example, we agree with the proposed reciprocity provisions that will be crucial in helping manufacturers to manage the complexity in multiple certification testing and test procedures.

Our Response:

EPA has worked closely with CARB and vehicle manufacturers to limit test complexity and burden in the Tier 3 Final Rule.

In addition, we are updating the regulatory provisions that allow manufacturers to omit testing for certification, in-use testing, and selective enforcement audits in certain circumstances. Sections IV.A.3, IV.B.6, and IV.G.3 of the Preamble describe how this applies for demonstrating that vehicles meet the Tier 3 PM standards. We are also allowing manufacturers to omit PM measurements for fuel economy and GHG emissions testing that goes beyond the testing needed for certifying vehicles to the Tier 3 standards. Requiring such measurement would add a significant burden with very limited additional assurance that vehicles adequately control PM.

We are also allowing manufacturers to ask us to omit PM and formaldehyde measurement for selective enforcement audits. If there is a concern that any type of vehicle would not meet the Tier 3 PM or formaldehyde standards, we will not approve a manufacturer's request to omit measurement of these emissions during a selective enforcement audit.

The existing regulations have allowed for waived formaldehyde testing for gasoline- and diesel-fueled vehicles. The Tier 3 NMOG+NOX emission standards are stringent enough that it is unlikely that vehicles will comply with the NMOG+NOX standards while exceeding the formaldehyde standards. We are therefore continuing this waiver practice, such that manufacturers of Tier 3 vehicles do not need to submit formaldehyde data for certification.

4.7.3. Miscellaneous Provisions

What Commenters Said:

Organization: General Motors LLC (GM)

GM is concerned with EPA's definition of non-conformity of in-use vehicles under Tier 3 when vehicles are tested in-use. The non-conformity definition is a critical component of the stringency of the regulation. GM supports the Tier 3 regulation based on the premise that Tier 3 and LEV III are of equal stringency as well as harmonized. The industry widely recognizes that emissions control systems must be engineered with a degree of compliance margin to assure in-use compliance. EPA conformity language differs significantly from the conformity language of CARB. CARB regulations for LEV III recognize the average emissions test results of each constituent as a method to evaluate conformity of a test group. Average emissions are a sound statistical criterion upon which GM and other manufacturers can base compliance margins. EPA's criteria are potentially subjective and statistically undefined, particularly given the relatively small sample sizes used for in-use test programs. Therefore, GM is concerned about both the stringency of Tier 3 and the ambiguity of the compliance definition, and would like to work with EPA to ensure an approach that is statistically sound and harmonized with LEV III.

Our Response:

With the exception of addressing in-use fuel sulfur implications to emissions discussed in Chapter 4.1.5.12 of this Summary and Analysis of Comments document, the IUVP requirements and determinations of conformity are outside of the Tier 3 rule. EPA is committed to working with industry to address Tier 3 related in-use concerns that may arise in the future.

4.8 Leak Standard Comments

4.8.1. Introduction of New Leak Standard

What Commenters Said:

Organization: Michigan Department of Environmental Quality (MDEQ)

The MDEQ, Air Quality Division supports the more stringent evaporative, leak and refueling emissions standards, as well as the new test procedures described in the proposed rule. Control of these significant sources of volatile organic compounds, particulate matter, and toxic air contaminants have been demonstrated to be cost effective and attainable. California appears to have already implemented a program with many similar requirements, showing that the limits can be met.

Organization: National Association of Clean Air Agencies (NACAA)

Evaporative Emission Standards — EPA proposes new evaporative emission standards to reduce total evaporative emissions from all gasoline-powered highway vehicles to near-zero levels. The program would require new evaporative emission control technology on new vehicles as well as system design improvements to achieve improved in-use system performance and extend useful life. The proposed approach also introduces a new canister leak emission standard and would apply California's onboard diagnostic requirements nationwide. NACAA endorses these proposed requirements.

Organization: California Air Resources Board (CARB)

CARB supports the proposed evaporative leak test and standard, and believes that the leak test program will be effective in reducing in-use evaporative emissions. Accordingly, CARB intends to propose alignment with this proposal once the Tier 3 program is finalized.

Our Response:

EPA acknowledges the support of State and local governments for the new leak standard as well as California's intent to propose the new standard for adoption into their requirements, thereby maintaining a harmonized vehicle program for 50 States.

4.8.2 Nature and Scope of the Requirement

What Commenters Said:

Organization: Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

EPA asked for comment on a third option that would require that a manufacturer meet the Tier 3 evaporative emissions standard on 20 percent of its fleet less than 6,000 pounds GVWR and also meet the leak check standard on those vehicles. We support this option and appreciate that EPA understands our concerns.

We agree that manufacturers could meet the leak check standard on 20 percent of their MY 2017 fleet; however, since these are independent requirements, there is no reason that manufacturers need to overlap the vehicles meeting Tier 3 evaporative emission standards with vehicles meeting the leak check standard.

Our Response:

EPA concurs and has incorporated this MY 2017 flexibility into the final Tier 3 rule.

4.8.3. Leak Test Procedure

What Commenters Said:

Organization: Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

The connection point for most IUVP vehicle leak testing will be located at or near the purge valve. This will test the complete fuel system. For leak testing conducted in this manner only one test should be required. No additional testing is required to test the fuel cap. Also, for dual tank vehicles that have the vapor space of both tanks connected, repeat testing should not be required.

Our Response:

EPA asked the Alliance for data to support this comment and did not receive a response[47]. Therefore we are relying on the laboratory data that was gathered by EPA[48] which was referenced in the NPRM Appendix to the RIA. This EPA report shows that location of test connection points does matter for leak detection depending on where the leak is located. The leak standard requires two or more test points depending on the fuel evaporative system configuration.

What Commenters Said:

Organization: Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

Assuming implementation of the OBD regulation changes proposed in Section IV.C.5.d, EPA is proposing an optional approach to a portion of the leak emission test procedure discussed in Section IV.C.5.c. This optional testing approach would be included in the proposed IUVP/IUCP testing program for the leak emission standard, but would not be used for certification testing for

[1] Passavant, G. (June 2013) EPA and Auto Industry Meeting Related to Tier 3 Evap and OBD NPRM. Memorandum to the docket

[48] Smith, P. and Passavant, G., "Recommended Test Procedure and Supporting Testing Data for the Evaporative Emissions Leak Test", December 2013.

the leak emission standard. It would be considered an approach which could be used by the manufacturers to assess compliance with the leak emission standard. EPA could also use this procedure for conducting assessments and asks for comment on using this procedure for compliance purposes with a 0.02 inch cumulative equivalent diameter orifice standard.

We support this optional approach that would allow manufacturers to use the OBD evaporative system leak detection hardware in lieu of running the stand alone in-use leak test. This option allows manufacturers to rely on the OBD system, which is designed for this purpose, as the primary compliance method, thereby reducing and simplifying testing requirements, as well as reducing test time and costs.

Our Response:

EPA concurs and this option is part of the final Tier 3 rule.

4.8.4. Certification and Compliance

What Commenters Said:

Organization: National Association of Clean Air Agencies (NACAA)

Also related to evaporative emissions, with respect to the In-Use Verification Program (IUVP) requirements for the leak emission standard, EPA notes in the proposal that fuel and evaporative control system leaks are influenced to a significant degree by age as well as design and other factors. The agency, therefore, seeks comment on whether to extend leak emission IUVP testing to vehicles beyond the four-year age point, perhaps to six or eight years. Because of the importance of in-use confirmatory testing for older vehicles, NACAA believes EPA should extend testing beyond the four-year point.

Organization: Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

EPA asks comment on the viability of extending leak emission IUVP testing beyond the nominal four year point.

We do not support this change at this time. As EPA recognizes in the preamble, "in the past, manufacturers have expressed concern about the implications of testing older vehicles and about finding vehicles still within their warranty and recall liability periods" [78 FR 29905]. These issues continue to be problematic. In fact, obtaining vehicles at the required high mileage point at four years under the current IUVP test can be difficult. Any changes to vehicle age should be considered as a broader and separate IUVP regulatory action that would include reductions in test burden along with consideration of procurement of older vehicles still within warranty.

Industry is opposed to evap leak testing of customer vehicles at 6 to 8 years of age. Requiring evap testing beyond the current 4 year IUVP point would require a second evap only leak test fleet of vehicles. This would be costly and represent a new burden to industry.

Organization: California Air Resources Board (CARB)

The NPRM proposes additional measures to identify evaporative leaks on in-use vehicles based on studies performed by the Coordinating Research Council and Colorado Department of Public Health and Environment. Specifically, the NPRM proposes adding a test procedure to the IUVP focused on testing a broader sample of, fuel/evaporative systems leaks in in-use vehicles. Moreover, the NPRM proposes the addition of an IUVP evaporative leak check requirement beginning with 2018 model year vehicles. This requirement would be included in the IUVP's low and high mileage tests for any volatile fuel powered vehicle (except diesel and natural gas) with a requirement that there be at least one representative vehicle for each evaporative/refueling/leak family evaluated at each year point. EPA is proposing this approach in lieu of creating a new set of requirements which would require a separate set of vehicles to be procured for testing. In addition, the NPRM is considering extending the age point for leak emission testing for IUVP beyond the current four year test point (e.g., testing vehicles six to eight years old) to better assess aged vehicles for evaporative leaks.

U.S. EPA is also proposing to conduct an evaporative leak test on vehicles that are 6 to 8 years old. Although this is doable for IUVP, the challenge will occur if enough vehicles fail the leak check for a given test group and the manufacturer must then conduct an In-Use Confirmatory Program. Under an In-Use Confirmatory Program, the manufacturer must procure ten properly maintained and used vehicles which creates a challenge because many of these vehicles will be out of warranty, sold to a second owner and/or operated beyond 75 percent of the certified useful life and may not be properly maintained. Accordingly, CARB recommends that U.S. EPA include language to require testing on vehicles no more than 6 years after the certified model year and within 75 percent of the useful life mileage. For example, a manufacturer would be required to conduct evaporative leak testing on 2015 MY vehicles within 75 percent of the useful life mileage and before the end of the 2021 calendar year.

Our Response:

EPA has taken the conflicting comments into consideration and will not be including an extension of the IUVP age in this rule. Given the benefits which can be achieved through extending of the IUVP testing age to 6-8 years or more, our intention is to look at this more closely in the future. At that time EPA will be able to consider the issues raised above. EPA notes that with the useful life for emissions certification levels extended to 15 years and 150,000 miles, 75% is now over 110,000 miles and 11 years which is far beyond the 6-8 years identified in the solicitation for comment, we would expect manufacturers to be able to find vehicles in these age ranges suitable for IUVP testing.

5 Tier 3 Fuel Sulfur Program

What We Proposed:

The comments in this chapter correspond to Section V of the preamble to the proposed rule and address the economic impacts of the program. A summary of the comments received and our response to those comments are located below.

5.1. Proposed Tier 3 Gasoline Sulfur Standards

What Commenters Said:

Commenter: Chevron Products Company

If EPA does proceed with reducing gasoline sulfur content, we generally agree with the mechanism of the program outlined in the proposal. We agree with maintaining the structure of the current Tier 2 gasoline sulfur program and extending that structure to the new Tier 3 program. The use of an annual average standard per refinery, accompanied by separate maximum per gallon cap standards at the refinery gate and downstream of the refinery, is the appropriate way to implement the new program. This structure has worked well under Tier 2 and provides consistency for regulated parties as they transition to Tier 3.

Commenter: Manufacturers of Emission Controls Association (MECA)

MECA believes that a 10 ppm average gasoline sulfur standard with a gasoline sulfur cap of no higher than 50 ppm provides the refining industry with an adequate, cost-effective compliance pathway.

Our Response:

The final Tier 3 fuel program consists of a 10 ppm refiner annual average sulfur standard (which allows a refiner to average over all of its refineries), with an 80 ppm refinery per-gallon cap and a 95 ppm downstream cap. Please see Chapter 5.1.1 for more discussion on the 10 ppm annual average sulfur standard, and Chapter 5.1.2 for more discussion on the per-gallon sulfur caps.

5.1.1. Annual Average Sulfur Standard

5.1.1.1. General (incl. General Support & Opposition for 10 ppm Sulfur Standard)

What Commenters Said:

<u>Support</u>

Commenter: American Coalition for Ethanol (ACE)

We support EPA's proposal to ensure that gasoline and ethanol-blended gasoline contain no more than 10 parts per million (ppm) sulfur on an annual average basis by January 1, 2017.

Commenter: American Thoracic Society

We are particularly supportive of the proposal to reduce the fuel sulfur content from 30 parts per million to 10 parts per million.

The policy will also have the double benefit of allowing auto manufacturers to use improved technology in catalytic converters and other pollution control technology to make future vehicles emit even less pollution.

Commenter: Chrysler Group LLC

In the April 2013 Tier 3 hearings in Philadelphia and Chicago, Chrysler testified in support of the Environmental Protection Agency's (EPA's) lowering the sulfur content of market fuel gasoline.

Recommendation: Chrysler recommends that EPA adopt the 10 ppm sulfur market fuel standard.

Commenter: Clean Air Council

More specifically, the proposed rules would reduce the refinery annual average sulfur limit in gasoline from 30 parts per million to 10 parts per million, which is a 66 percent reduction.

The Council applauds EPA's proposed reduction of the annual average sulfur limits from 38 to 10 parts per million.

Commenter: Ford Motor Company (Ford)

The proposed Tier 3 emissions standards program are cited by the EPA as a "systems approach to reducing vehicle-related exhaust and evaporative emissions by addressing the vehicle and fuel as a system." We agree with the EPA's identification of the need to reduce sulfur levels in market fuel to 10 parts per million (ppm).

Commenter: Michigan Department of Environmental Quality (MDEQ)

The MDEQ, Air Quality Division is very supportive of the proposal to reduce sulfur concentrations in gasoline to 10 parts per million (ppm) on an annual average basis by January 1, 2017.

Commenter: Truck and Engine Manufacturers Association (EMA)

In addition, EMA and its members have also been long-time proponents of high quality fuels, and, as such, we are advocates for the removal of sulfur from both gasoline and diesel fuel.

Commenter: Union of Concerned Scientists (UCS)

The oil industry, which stands alone in its opposition to the Tier 3 program, would have you believe that these standards are unnecessarily burdensome – that the challenge is too great, and the costs are too high. This is simply not true. We have the technical capacity to meet these standards. Scientists and engineers in the U.S. and around the world are already achieving the goals of these standards, and doing so in a cost-effective way. And that is why the standards are supported by health groups, labor organizations, the environmental and faith communities, the auto industry, and state and local officials, among others. Don't let the oil industry's misleading analysis stand in the way of improving public health for everyone.

Our Response:

We appreciate the comments and, as previously stated, are finalizing an annual average sulfur standard of 10 ppm. For more information on the level of the standard, please see Chapter 5.1.1.2, below.

5.1.1.2. Level of the Standard

What Commenters Said:

Commenter: Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

As EPA has noted, sulfur is a catalyst poison and precludes the full functioning of catalytic exhaust after-treatment systems. Indeed, EPA assumed the existence of 10 ppm average sulfur gasoline when it determined the feasibility of the Tier 3 emission standards EPA's new study of the effects of sulfur on vehicle emissions found that there are strong benefits when reducing sulfur from 28 ppm to 5 ppm, confirming earlier studies. The agency noted in the Regulatory Impact Analysis that lower levels of sulfur can lead to "significant reductions" of emissions in the in-use fleet.

The specific catalyst damage caused by sulfur and the concurrent reduction in the functioning and efficiency of emission control equipment has been assessed in a number of studies, most recently in the EPA study noted above. EPA noted that the relative effectiveness of NMOG and NOx control are constrained by the sulfur level of the fuel, and found that there is clear damage to the catalysts from sulfur exposure, and further found that catalysts never fully desulfurize, even after a clean out procedure, as long as there is sulfur in the fuel.

Prior sulfur studies have also assessed the effects of sulfur on vehicle/fuel systems. The Ball study found that 3 ppm sulfur fuel would reduce NOx emissions by 40% compared to the 33 ppm fuel, and/or allow savings because lower levels of precious metals would be required in the catalyst. In addition, the Association for Emissions Control by Catalyst (AECC) study found "The promising NOx adsorber technology that diesel and lean burn engines need requires sulfur levels significantly below 10 ppm. This will avoid compromising the lower fuel consumption and CO2 emissions by requiring frequent regeneration to remove the sulfur that is clogging the NOx adsorption capacity".

The 10 ppm refinery average and a reduced retail cap are necessary to optimize and maintain the function of engine and exhaust after-treatment technologies. During the combustion process, sulfur, in both elemental and in compound forms, is present in the exhaust stream and is readily deposited on the surface of exhaust after-treatment devices, including oxidation and reduction catalysts as well as NOx adsorption components. It is on these surfaces precious metals are placed by design to provide the conversion sites for the chemical reaction which converts pollutants to harmless gases. Surface contamination with sulfur inhibits the conversion efficiency of exhaust after treatment components. In fact, even low levels of sulfur impede the function of these devices especially if they were previously subject to higher sulfur fuels.

While it is possible to dislodge the embedded sulfur through various mechanisms which raise the exhaust gas temperature sufficiently to "burn off" such deposits, in practice, it is far more difficult to accomplish this removal. This is especially true given the nature of emerging, higher-efficiency combustion technologies required under the new CAFE/GHG standards, which extract more energy from the fuel. Reduced sulfur is necessary not only to help catalysts function better, but also to prolong their life and to achieve a 25% increase in catalytic converter durability (120K-150K miles useful vehicle life).

Commenter: National Association of Clean Air Agencies (NACAA)

Tier 3 Vehicle Technologies and Gasoline Are Already Available: Not only is Tier 3 tremendously effective from an air quality perspective — low in cost, high in cost effectiveness and good for the economy — it is feasible today. EPA's proposed Tier 3 vehicle tailpipe standards are modeled on California's LEV III program. The potential technologies for this program are consistent with, and almost entirely the same as, those on today's California's vehicles, including precious metal catalyst loading, optimized close-coupled catalysts, secondary air injection pumps and evaporative control systems.

Further, California's gasoline already achieves 10-ppm sulfur on average. Finally, gasoline in other nations, including those in the European Union and Japan, is subject to a 10-ppm cap. China has also adopted requirements for 10-ppm sulfur, to take effect in 2017.

Commenter: Natural Resources Defense Council (NRDC)

To achieve the maximum cost-effective pollution reductions, the agency must consider the interaction between gasoline sulfur levels and vehicle pollution control equipment because sulfur buildup can limit exhaust catalysts effectiveness and shorten its useful life.

Commenter: Union of Concerned Scientists (UCS)

This will be particularly important over time as new vehicle greenhouse gas standards begin to reduce exhaust temperatures, which can degrade catalytic converter performance. Reducing gasoline sulfur can help offset this problem. UCS worked hard to secure the greenhouse gas standards, and we are again committed to achieving the lower sulfur standards needed to protect public health, and ensure the efficiency of the greenhouse gas standards as well.

Commenter: Flint Hills Resources, LP (FHR)

As a member of the American Fuel and Petrochemical Manufacturers (AFPM) trade association, FHR for the most part supports the comments submitted by AFPM, including opposition to a more stringent average gasoline sulfur standard, due to inadequate technical justification and negligible environmental benefits. Additionally, FHR is submitting the attached comments to emphasize, or perhaps clarify, our position related to certain detailed aspects of the proposal.

Commenter: Irving Oil Terminals Inc.

Assuming that EPA plans to adopt a reduced sulfur standard for motor gasoline, that standard should be no more stringent than an annual average of 10 ppm sulfur. EPA has already determined that such a standard is sufficient to enable vehicles to reach the proposed Tier 3 standards. Moreover, a standard below 10 ppm would be too difficult and costly to meet. For example, EPA estimated that the cost of sulfur control compliance with a standard of 5 ppm sulfur would be at least 50 percent higher than compliance with the proposed 10 ppm standard — an unnecessary substantial financial burden. In addition, industry studies have estimated that a standard below 10 ppm would result in substantial refinery shutdowns and supply disruptions.

Commenter: Countrymark; Small Business Refiners (SBRs)

As we examined the proposed rule, we found no technical support for the recommended limit of 10 ppm. The rule suggests that 10 ppm is a good break point where sulfur removal is cost effective, but no data was provided to support this position. In addition, no commercial data could be found by searching literature to support this position. CountryMark requests why the limit is not 15 ppm to match diesel sulfur content, if the limit has to be changed.

We believe that the present sulfur levels are even lower than the above data because 1) it includes small refiner gasoline which had a higher standard until 2011 and was estimated by DOE to be approximately 11.9% of the gasoline supply in 2010 and 2) the above data represents summer gasoline which would overstate the annual sulfur level as low sulfur butane is added to winter gasoline in levels of 3-4 volume percent.

Pennsylvania Department of Environmental Protection (DEP)

The EPA should fully explain the justification for choosing a fuel sulfur limit of 10 ppm.

The EPA should better explain why 10 ppm was chosen. The EPA explained why a lower level was not chosen, but did not fully explain why a higher level was not chosen.

Commenter: Sierra Club

EPA has provided robust evidence that regulating fuel quality, and specifically, reducing the sulfur content of fuels from 30 ppm to 10 ppm pursuant to its Section 211 authority, will obtain significant pollution reductions that could not otherwise be achieved by setting direct pollution control standards for tailpipe exhaust and evaporative emissions alone. For example, in the context of NOx reductions under the proposed rule, EPA's studies conclude that "the impact of gasoline sulfur poisoning on exhaust catalyst performance and the relative stringency of the Tier 3 standards, particularly for larger vehicles and trucks, when considered together make a compelling argument for the virtual elimination of sulfur from gasoline ... a gasoline sulfur standard of 10 ppm ... represents the highest level of gasoline fuel sulfur that will allow compliance with a national fleet average of 30 mg/mi NMOG + NOx." As such, EPA has appropriately proposed direct pollutant emission limitations and fuel quality standards to set a standard that is "achievable" and that meaningfully addresses the problems posed by motor vehicle pollution. (42)

Moreover, EPA's studies also demonstrate gasoline sulfur content controls are a necessary component to ensuring NOx reduction feasibility under the proposed rule. EPA's studies conclude that "1) reversible sulfur loading is occurring in the existing Tier 2 vehicle fleet and has a measurable effect on emissions of NOx, hydrocarbons, and other pollutants; 2) the effectiveness of high speed/load procedures in restoring catalyst efficiency is a function of fuel sulfur content; and 3) reducing fuel sulfur levels from 28 ppm to 5 ppm is likely to achieve significant reductions of emissions of NOx, hydrocarbons, and other pollutants of interest in the in-use fleet." EPA also provides that: [T]he impact of gasoline sulfur on NOx emission control of catalysts in the fully-warmed-up condition is particularly of concern for larger vehicles. Manufacturers face the most significant challenges in reducing cold-start NMOG emissions for these vehicles. Because of the need to reach near-zero NOx levels, any significant degradation in NOx emissions control over the useful life of the vehicle would likely prevent some, if not most, largest vehicles from reaching a combined NMOG + NOx low enough to comply with the 30 mg/mi fleet-average standard ... [a]ny degradation in catalyst performance due to gasoline sulfur would reduce or eliminate the margin necessary to ensure in-use compliance with the proposed Tier 3 emissions standards.

Based on studies, EPA concludes 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 + NOx."

EPA adequately demonstrates that the 10 ppm gasoline sulfur content standard is feasible. EPA makes the case that currently available technologies, some of which are employed in U.S. refineries are achieving significant reductions in gasoline sulfur/

42 It is important to note that EPA is proposing an average sulfur standard of 10 ppm. However, the actual sulfur content of fuel can vary substantially, based on variations in refinery operations and contamination from gasoline being transported through pipelines to its final destination. Automakers must then design vehicles to function with higher-sulfur gasoline. In order to give certainty to automakers designing vehicles and to ensure emissions reductions, setting caps on per-gallon sulfur content is critical. Currently, sulfur is capped at 80 ppm per gallon at the refinery gate and 95 ppm per-gallon downstream.

In this proposal, EPA is proposing two options: keep the per-gallon caps the same, or lower them to 50 ppm at the refinery gate and 65 ppm downstream in 2020, to allow small refinery provisions to take effect. We urge EPA, as it lowers the average sulfur standard from 30 ppm to 10 ppm, to also lower the per-gallon sulfur caps to at least 50 ppm at the refinery gate and 65 ppm downstream. Lowering the per-gallon caps will allow automakers to employ additional advanced vehicle technologies that can increase vehicle efficiency and lower emissions, while still allowing compliance flexibility for refiners.

Commenter: Emissions Control Technology Association (ECTA)

We agree with EPA's conclusion that the average sulfur content of gasoline must be reduced from 30ppm to 10ppm to ensure the effectiveness of catalysts necessary to reduce emissions.

EPA concludes that: "...the impact of gasoline sulfur poisoning on exhaust catalyst performance provides a compelling argument, particularly for larger vehicles and trucks, that these vehicle standards would be achievable only with a reduction of gasoline sulfur content from the current 30-ppm average down to a 10-ppm average'.

Section III of the FR Proposed Rule is an excellent review of the state-of-the-art understanding of sulfur impacts on gasoline vehicle emissions. Further, achieving the Tier 3 levels of emissions in all vehicle classes will require this level of sulfur. The description in Section IV of immediate reductions in fleet criteria pollutants when pump fuel sulfur is reduced to <10 ppm is new, relevant, and well conducted. We cannot add to these thorough analyses, but strongly endorse them.

Let me get technical. The fundamental catalyst problem we are talking about here is that sulfur is extremely surface active. It's unique to these types of chemicals. It absorbs readily on active catalyst sites, blocking the amazing action we need and want to clean up toxins. Surface active species are essentially -- are especially critical in low concentration ranges where most of the valuable active sites are sulfur poisoned in the sub 20 ppm sulfur range, depending on catalyst design. Dropping from 30 to 10 ppm sulfur can have a huge impact on catalyst performance and durability because of this fundamental physical chemistry behavior.

Commenter: Robert Bosch GmbH, Gasoline Systems, Germany

The limits for sulfur compounds needs to be fixed at least at the lowest level for sulfur in the respective liquid fuel (diesel/gasoline) due to the same requirements for the exhaust gas treatment systems, no matter what fuel is used.

Our Response:

As explained in Sections II and V.M of the preamble to the final rule, we are lowering the existing gasoline sulfur standards under section 211(c)(1), because emission products of gasoline with current levels of sulfur cause or contribute to air pollution which may reasonably be anticipated to endanger public health or welfare, and because emission products of gasoline with current levels of sulfur will impair to a significant degree the emissions control device or systems on the vehicles subject to the final Tier 3 standards. As discussed in Section II.B of the preamble to the final rule, control of gasoline sulfur to 10 ppm will lead to significant reductions in emissions of these pollutants, with the benefits to public health and welfare significantly outweighing the costs. As also discussed in Chapter 4 of this Summary and Analysis of Comments document (and further in Section IV.A.6 of the preamble to the final rule and Chapter 5 of the RIA), we believe that a standard of 10 ppm is appropriate, and when combined with the advances in emissions control technologies, will be sufficient to meet the Tier 3 emissions standards. We also believe that the 10 ppm annual average standard will bring significant immediate benefits by reducing emissions of the existing fleet. This sulfur standard is also feasible and is the level which appropriately balances costs with the emission reductions that it provides and enables.

With regard to the comment on why a higher sulfur level was not chosen, we note that the feasibility of the 30 mg/mi NMOG+NOx fleet average depends on exhaust catalyst systems that require gasoline with average sulfur levels of 10 ppm or less. Further, annual average sulfur levels greater than 10 ppm would significantly impair the emission control technology that we expect will be used to meet the Tier 3 standards and to ensure in-use compliance over a vehicle's useful life. This is particularly a concern for some larger vehicles that will need to reduce NOx to near-zero levels, due to greater difficulty in reducing cold-start NMOG, in order to meet a combined NMOG+NOx standard. As discussed in Section IV.A.6 of the preamble, increasing gasoline sulfur to 20 or 30 ppm would make it impossible for vehicle manufacturers to meet the Tier 3 standards. Achieving Tier 3 standards would require offsetting the resultant higher emissions but EPA is not aware of existing technology or developing technology that could address these higher emissions when taking into consideration the entire vehicle fleet. A higher average sulfur standard would also forego the very large immediate reductions from the existing fleet.

We also disagree with the comment that we did not provide data to support our position that a sulfur standard below 10 ppm is not cost-effective. As discussed in Section V.B of the preamble to the Tier 3 final rule, we also do not believe a sulfur standard lower than 10 ppm is necessary to enable vehicles to meet the Tier 3 standards. While reducing sulfur below 10 ppm would further reduce vehicle emissions and allow the Tier 3 vehicle standards to be achieved more easily, we believe that a 10 ppm average standard is sufficient to allow vehicles to meet the Tier 3 standards given the significant challenges associated with reducing sulfur below 10 ppm. Our analysis shows that a 10 ppm annual average is sufficient to enable vehicles to reach the Tier 3 standards. Consequently, while reducing sulfur levels further would continue to yield reductions from the in-use fleet, they would not be necessary to enable the new Tier 3 vehicle standards to be met. Further, as explained in Section V.L of the preamble, while sulfur levels would continue to reduce emissions from the existing fleet, reducing sulfur further below 10 ppm becomes increasingly difficult and costly. FCC naphtha is very rich in high-octane olefins. As the severity of desulfurization increases, more olefins are saturated, further sacrificing the octane value of this stream and further increasing hydrogen consumption. Making up for this lost octane represents a significant portion of the sulfur control costs. Furthermore, as desulfurization severity increases, there is an increase in the amount of sulfur removed (in the form of hydrogen sulfide) which recombines with the olefins in the FCC naphtha, thus offsetting the principal desulfurization reactions. There are means to deal with the recombination reactions, but they result in even greater capital investments. In addition, while FCC gasoline contributes the majority of sulfur to the finished gasoline, as the sulfur level drops below 10 ppm, the sulfur level of the various other gasoline streams within the refinery also become important. Any necessary treatment of these additional streams increases both capital and operating costs.

U.S. refineries are currently in different positions technically and financially, and vary greatly in size. It can be less costly per gallon for some to get down to 10 ppm, so a 10 ppm average standard plus the flexibility afforded by the averaging, banking, and trading (ABT) program helps those refineries with very high costs. However, if the gasoline sulfur standard were lower, this would essentially end the ability of refiners to average sulfur reductions across their refineries, because there would not be enough opportunity to generate credits at levels much below 10 ppm. Further, as discussed in detail in Chapter 5 of the RIA, our analysis shows that sulfur control costs for refineries to meet a standard below 10 ppm could be on the order of two times more costly per ppm-gallon of gasoline sulfur reduced. A standard below 10 ppm could also be cost-prohibitive for more challenged refineries. Lastly, such a standard would also introduce additional costs to address the contribution to gasoline sulfur from gasoline additives, transmix, ethanol denaturants, and contamination in the distribution system.

Therefore, we believe that the 10 ppm annual average standard will help reduce current levels of sulfur that contribute to ambient levels of air pollution that endanger public health and welfare. It will also help prevent significant impairment of the emission control systems expected to be used in Tier 3 technology, significantly improve the efficiency of emissions control systems currently in use, and continue prevention of the substantial adverse effects of sulfur on the performance of vehicle emissions control systems.

5.1.1.3. Vehicle Need/In-Use Benefits/GHG & CAFE

What Commenters Said:

Commenter: Advanced Engine Systems Institute (AESI)

As MECA has pointed out, compliance with the proposed standards is both technically feasible and cost-effective. However, as automakers deploy new and increasingly more efficient engines that produce less waste heat, the catalysts and other emissions control devices that now depend on using that excess heat to burn off damaging deposits will be significantly more vulnerable to sulfur poisoning and degradation, unless the amount of sulfur in fuel is simultaneously reduced to 10 parts per million or lower, as has been proposed.

Commenter: Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

EPA acknowledges that reducing the sulfur content of gasoline to a 10-ppm annual refinery average is a vital component of the proposed rule. We agree. In fact, our ability to effectively meet the Tier 3 requirements depends on EPA reducing the sulfur in market fuel. Sulfur inhibits the catalytic converter's ability to reduce vehicle emissions, so lower sulfur at the pump means fewer exhaust emissions in the air. And because lower sulfur reduces emissions from all vehicles, the proposed sulfur reductions would achieve Day One benefits, immediately reducing emissions from every gasoline-powered vehicle on our roads, no matter how old.

Support for Reductions in Tier 3 Market Fuel Gasoline Sulfur Standards: There are a number of issues related to market gasoline which are appropriately within the scope of the Tier 3 final rule, or a supplemental Tier 3 rulemaking. Such issues are integral to product design, planning, and implementation for all OEMs because vehicles and fuels are a system and clean, efficient operation of vehicles is limited by the fuels on which they depend. EPA itself echoed this concept in the NPRM Preamble noting that its proposal promotes a “systems approach to addressing the impacts of motor vehicles and fuels on air quality and public health’ (33).

We agree with changing the first of three prongs of the Tier 2 market sulfur standards, the annual refinery average, from 30 ppm to 10 ppm. As EPA notes, there is ample evidence that sulfur is a catalyst poison, and there is a “compelling case” that significant reductions of sulfur are needed to meet increasingly stringent criteria pollutant requirements in the Tier 3 standards. The Agency noted that “because any amount of sulfur in fuel can [damage catalysts] the lower sulfur the better.” Sulfur reduction also supports increased vehicle efficiency to meet CAFE/GHG requirements.

To be clear, automakers support EPA reducing the annual refinery average for gasoline sulfur from 30 to 10 ppm.

OEMs require further reductions of the content of sulfur in gasoline, to continue to innovate and meet important environmental goals included in Tier 3 and CAFE/GHG requirements. Based on recent projections, the internal combustion engine (ICE) will continue to be the predominant technology through the next several phases of vehicle emission standards, at least until 2025. Thus, it is increasingly important to determine the best way for the internal combustion engine to meet more stringent emission and fuel efficiency requirements.

Automakers support EPA in its efforts to reduce the sulfur content of fuel, and the 10 ppm annual average in the proposed rule is a step in the right direction.

We support the 10 parts per million average and a low cap for sulfur and gasoline.

In addition to needing ultra-low sulfur fuel to achieve the proposed emission standards, ultra-low sulfur fuel is also critical to auto manufacturers’ effort to meet the combined 54.5 miles per gallon fuel economy and greenhouse gas emission standards by 2025. And, most importantly, the ultra-low sulfur fuel will provide immediate and substantial public health benefits from the existing fleet of nearly 250 billion vehicles on the road today.

According to the National Association of Clean Air Agencies, the impact on the fleet is equivalent to taking over 30 million vehicles off the road. And today vehicles are lasting longer, and the average age of all vehicles on the road is 11 years. While the proposed standards will be another great step in reducing the fleet’s emissions, it will take time for fleet turnover to fully realize the benefits. In the meantime, the ability to immediately and directly reduce emissions from the vehicles on the road today by reducing sulfur and gasoline cannot be matched.

EPA acknowledges that reducing the sulfur content of gasoline to 10 part per million average is a hugely important component of the proposed rule. We agree. We know that sulfur inhibits the catalytic converter's ability to reduce emissions. Lower sulfur fuels at the pump mean fewer exhaust emissions in the air. It's that simple.

Further, sulfur reductions in the market fuels produce day one benefits. So while it will take a couple of decades for the current fleet to be replaced by Tier 3 compliant vehicles, reducing sulfur at the pump immediately will reduce emissions from every gasoline powered vehicle on our road, no matter how old.

Gasoline sulfur reduction is also a critical element needed to enable benefits of future alternative vehicle technologies, for example, Direct Injection Lean Burn engines which have greater energy efficiency, as well as HCCI (homogenous charge compression ignition), pHCCI (premixed HCCI), RCCI (reactivity controlled compression ignition), and lean cruise/idle technology. Without this change, fuels and vehicles CANNOT operate as an integrated system and synergistically achieve emissions and energy efficiency goals. It is appropriate for regulators to put some burden on fuel suppliers to do their part to invest and reduce sulfur to optimize the emissions reductions of the system. The projected cost of the Tier 3 system is far higher for automakers than for the refinery industry (See April 24, 2013 Alliance Tier 3 Testimony, and EPA RIA at ES-8 ff.)

But these standards cannot be met with vehicle changes alone, and the Tier 3 proposal recognizes another critical component in reducing vehicle emissions, and that is fuel quality, or, more specifically, the sulfur content in gasoline. We believe the proposed fuel standards for a nationwide supply of clean, ultra-low sulfur gasoline is critical for auto makers to meet the new and highly stringent vehicle emission standards.

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33 - 78 Fed. Reg. 29908 at 29816 (May 21, 2013).
34 - As noted in Alliance testimony for this rulemaking, according to EPA, automakers will spend about $15 billion in just ten years to meet the requirements of this proposed rule, and effectively remove tailpipe emissions from the environmental equation. As EPA further states, combined with the fuel economy and greenhouse gas program, this rule would bring auto investment in the vehicle emission reduction programs through 2025 to more than $216 billion –about 100 times the investment that the oil industry is being asked to make under the NPRM.
47 - 78 Fed. Reg. 29908, 29858 (May 21, 2013).

Commenter: American Honda Motor Co., Inc.

As the agency is aware, through the use of sophisticated emissions control technology, the automotive industry has been able to achieve extraordinarily low exhaust levels throughout a vehicle's life. The anticipated Tier 3 standards – and the LEV III standards of California – will push those emissions to near-zero levels. But doing so requires the use of vehicle technology and fuels that complement one another. Sulfur in gasoline has long been known to adversely affect catalyst performance and, as a result, achieving the Tier 3 and LEV III stringencies is highly dependent on the vehicles' use of low-sulfur fuel.

Lowering sulfur will enable new vehicles to better meet the cleaner proposed emissions standards for the duration of their useful life, improving air quality as those vehicles work their way into the vehicle population. It's also worth mentioning that lowering the sulfur content of gasoline has another, less gradual benefit. As the agency notes in the proposed rule, cleaner fuel "facilitates immediate emissions reduction from all vehicles on the road at the time the sulfur controls are implemented." Failing to bring cleaner fuel to market in a timely manner would miss a fundamental opportunity presented by this systemic approach to regulating both vehicles and fuels.

Setting fuel sulfur levels comparable to those currently set in California would ensure that the Tier 3, LEV III, fuel economy, and vehicle greenhouse gas policies are working not at odds with one another, but rather in a complementary manner, opening doors to future designs that are both cleaner and more efficient.

Commenter: American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM)

Further reducing sulfur is not necessary for meeting new stringent vehicle emission standards, and auto makers are unlikely to introduce the vehicle emission technologies that are enabled by the lower sulfur fuel. And I'm talking about lean burn GDI.

Auto makers insist they need 10 ppm gasoline to enable lean burn GDI engines, and yet in Europe and Japan where 10 ppm fuel is available, lean burn GDI engine penetration peaked at about two percent and then tailed off. Research shows it maxing out at about three percent of the U.S. fleet. Diesel sulfur was kept at 15 ppm to enable an emissions control technology that never took off in the marketplace. Don't make the same mistake with gasoline. Auto makers can meet the emission standards without further reductions to gasoline sulfur.

Commenter: Appalachian Mountain Club (AMC)

The adjustment in sulfur fuel content is needed as sulfur fouls the efficiency of vehicle catalytic converters, a key system component that reduces smog forming emissions and toxic air pollution.

As stated above, AMC is very supportive of the provision that will reduce the sulfur content of gasoline from 30 parts per million (ppm) to 10 ppm . This will result in immediate emission reductions when implemented in 2017.

Commenter: BMW of North America, LLC

To assist automakers in their efforts to comply with these stringent Tier 3 emission standards as well as with the upcoming MY 2017-2025 GHG/CAFE requirements, BMW strongly supports EPA's proposal that Federal gasoline, including any ethanol-gasoline blend, contain no more than 10 parts per million (ppm) of sulfur on an annual average basis by January 1, 2017. Uniformly low gasoline sulfur levels throughout the U S marketplace will enable automakers to effectively optimize vehicle emission control technology to meet these rigorous standards in the required timeframe.

Commenter: Chrysler Group LLC

Sulfur is the single most important gasoline parameter to enable manufacturers to broadly introduce gasoline direct injection ("GDI") technologies to meet EPA's air quality and greenhouse gas (GHG) requirements. The cause and effects are well known: Sulfur inhibits exhaust after-treatment conversion efficiency, so lower sulfur means lower emissions.

In fact, EPA considered these very issues in the heavy-duty diesel context, so the discussion has already taken place. Specifically, in the 2007 Heavy-Duty Highway Rule, EPA recognized the necessity of adopting low sulfur diesel fuel to support diesel direct injection technology with advanced exhaust aftertreatment systems, the very same technology (but as applied to gasoline engines) that EPA seeks to foster in the current proposed rule, which, again, necessitates the adoption of low sulfur gasoline.

Additionally, EPA's creation of new fuel economy and GHG standards anticipated the nationwide availability of low sulfur gasoline. Consistent with that basis, Chrysler supported the concept of One National Program to improve fuel economy and reduce GHG emissions with the understanding that low sulfur gasoline would be called for in this next round of establishing tailpipe emissions standards, and which would ensure availability to enable advanced lean-burn GDI technologies.

Advanced lean-burn GDI systems are an enabling technology to meet EPA and the National Highway Traffic Safety Administration's (NHTSA's) 2025 model year (MY) GHG and fuel economy requirements. As such, low sulfur gasoline, at 10-ppm or lower, is a prerequisite for lean-burn GDI systems achieving EPA/NHTSA's GHG and fuel economy benefits. Conversely, without low sulfur gasoline, lean-burn GDI systems incur a significant fuel economy (and corresponding GHG) penalty due to more frequent sulfur regeneration events.

The auto industry has already invested hundreds of millions of dollars to design, develop, tool and in some cases manufacture and produce lean-burn GDI systems. Without absolute assurance of low sulfur gasoline in the marketplace, the performance and GHG benefits of this promising technology will be significantly compromised.

As in previous rulemakings, Tier 3 continues to treat vehicles and fuels as a system, recognizing that fuels are critically important to achieve the full potential of advanced emission control technologies, especially during these historic time when regulations are driving near zero emissions and doubling fuel economy. Sulfur is the single most important gasoline parameter to enable vehicle technologies to meet these new requirements. The cause and effects are well known. Sulfur inhibits exhaust after treatment conversion efficiency, so lower sulfur means lower emissions.

Commenter: Clean Air Council

The Alliance of Automobile Manufacturers, which includes BMW Group, Ford Motor Company, and others, has publicly stated that it supports 'the lowest possible sulfur content at retail for uniformity at the pump for planning future technologies, and also to get the immediate benefit of existing vehicles as well as future ones, reducing sulfur poisoning of the catalyst and, therefore, minimizing exhaust emissions of the vehicle.'

Commenter: Delaware Department of Natural Resources (DNRC)

Sulfur in fuel inhibits the performance of catalysts that control vehicle exhaust, resulting in increased vehicle emissions. Reducing sulfur in fuel will reduce mobile source emissions of nitrogen oxides, carbon monoxide, fine particulate matter, and volatile organic compounds and continue the effective, proven approach of treating vehicles and fuels as an integrated system. Importantly, these reductions will begin immediately with the existing fleet so long as the vehicles are equipped with a functioning catalytic converter. Lower sulfur gasoline will also facilitate the deployment of advanced technologies that will improve fuel economy, reduce gasoline consumption and save consumers money. The effectiveness of EPA's proposed Tier 3 standards will continue to grow over the years as newer vehicles replace older ones.

Commenter: Emissions Control Technology Association (ECTA)

The EPA neglects other benefits from low-sulfur gasoline. To meet the 2025 GHG regulations, automakers will leverage all their engine tools. Lean-burn direct-injection gasoline (lean GDI) is one not mentioned by the EPA. In the 2020-25 timeframe, CO_2 reductions will cost about \$50-75 per percent (Corning Review, SAE 2013-01-0538). Lean-burn GDI (gasoline, direct injection) engines will deliver >10% CO_2 reductions (Daimler SAE 2013-01-1299; Mercedes Kemmler Vienna Motorsymposium 2013) versus stoichiometric GDI engines, and it is our estimate that incremental costs will be less than \$500. Most of the engine costs are in calibration, and the incremental exhaust costs reside in replacing a TWC with two LNT (lean NOx traps). This technology is not being considered for the United States due to high-sulfur gasoline (Mercedes, Kemmler, Vienna Motorsymposium, 2013).

Commenter: Environmental Defense Fund (EDF)

Cleaner fuel will also enable the technologies needed to meet the Tier 3 exhaust standards and enable the vehicles to meet the standards in-use for the duration of their useful life. Finally, lower sulfur gasoline facilitates the development of lower cost technologies to improve fuel economy.

The preamble to the proposal and the RIA clearly outline the technical need for additional sulfur requirements. As EPA states in the preamble, "[R]obust data from many sources shows that gasoline sulfur at current levels (i.e., around 30 ppm on average) continues to degrade vehicle catalytic converter performance during normal operation. The most significant problem is for NOx. Today's proposed NMOG+NOx vehicle emission standards, an 80 percent reduction from current Tier 2 standards, would not be possible without the gasoline sulfur controls we are proposing today." This determination has been echoed by the Manufacturers of Emission

Controls Association in their recent report describing the adverse impact of fuel sulfur on emission control technology (97).

In addition to protecting catalysts on existing vehicles and Tier 3 vehicles, automakers and emissions control manufacturers support cleaner fuel because it will allow for additional cost-effective technologies to meet the later-year fuel economy and GHG standards. For example, the lean burn gasoline direct inject (GDI) engine, which offers a 5-15 percent fuel economy advantage over the stoichiometric GDI, is currently being used in Europe where 10 ppm fuel is available. The advanced NOx catalysts needed to maintain low NOx emissions in a lean GDI engine are especially sensitive to sulfur. The lean burn GDI could be deployed by automakers to meet the 2025 fuel economy and GHG emissions standards in the US if the 10 ppm fuel standard is finalized. Indeed, many manufacturers in the U.S. are developing the lean GDI technology in anticipation of Tier 3 fuel standards (98).

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97 - MECA, The Impact of Gasoline Fuel Sulfur on Catalytic Emission Control Systems (June 2013).
98 - *Id.*;.MECA, *LEV III and Tier 3 Exhaust Emission Control Technologies for Light-duty Gasoline Vehicles* (Apr. 2013).

Commenter: Ford Motor Company (Ford)

Sulfur, which occurs naturally in crude oil, is known for its notorious ability to poison catalysts and dramatically reduce the functionality of advanced emissions systems. Laboratory research has also shown sulfur to increase light-off temperature and decrease conversion efficiency, in addition to slowing the rich to lean air/fuel (A/F) transition. Sulfur in gasoline is also known to cause corrosion of metallic components of the engine and fuels system. A reduction in market gasoline sulfur levels can immediately reduce the emissions from all vehicles on the road.

Improved fuel economy and reduced CO2 emissions are made possible in vehicles through engine operation at lean air-fuel ratios. While lean A/F ratios result in decreased hydrocarbon (HC) and carbon monoxide (CO) emissions, they increase oxides of nitrogen (NOx) emissions as three-way catalysts (TWC) have their highest efficiency for NOx reduction during stoichiometric or fuel rich conditions. Catalysts undergo sulfur poisoning when the sulfates formed during combustion (from the sulfur in the fuel) compete with NOx for the catalytic active sites on the TWC; this in turn reduces the lean NOx trapping functionality of the catalyst. Laboratory tests have shown a greater than 40% reduction in NOx emissions when decreasing sulfur from 30 ppm to 5 ppm.(5)

In order to meet the increased CAFE requirements of tomorrow, manufacturers are developing lean-burn engines that will reduce fuel consumption, but this requires sophisticated sulfur-sensitive NOx control technologies. Thus, the lowering of market sulfur levels in fuels to 10 ppm maximum has been proposed in countries with advanced fuel economy and emissions requirements that utilize such technologies.

In addition to worldwide efforts in mobile source emissions reductions, ambient air quality continues to be a global issue of interest. Air quality improvement efforts are often made possible through maintaining ozone and smog levels to acceptable ranges. Smog consists of fine particulate matter such as sulfate and nitrate aerosols. As stated above, fuel sulfur has a significant impact on NOx emissions that contribute to the formation of such aerosols, which furthers the importance for lowering fuel sulfur levels. Sulfur in the fuel has also been linked to the formation of sulfates in the exhaust stream. The lowering of sulfur levels in gasoline (and also diesel fuel) has been linked to lower smog-forming particulate matter emissions and improved air quality.

Recommendation: As communicated at the EPA and NHTSA public hearing on April 29, 2013 on the Tier 3 NPRM, Ford strongly supports a reduction of sulfur levels to 10 ppm maximum for market fuels in order to meet the strict emissions standards and maintain the integrity of the engine and emissions system throughout the vehicle's useful life and fully supports the detailed Alliance comments on sulfur.

5 SAE 2011-01-0300, D. Ball, et al., Effects of Fuel Sulfur on FTP NOx Emissions from a PZEV 4 Cylinder Applications.

Commenter: General Motors LLC (GM)

There are a number of issues related to the market gasoline which are appropriately within the scope of the Tier 3 final rule, or a supplemental Tier 3 rulemaking. Such issues are integral to product design, planning and implementation for all OEMs because vehicles and fuels are a system and clean, efficient operation of vehicles is limited by the fuels on which they depend. EPA itself echoed this concept in the NPRM Preamble noting that its proposal promotes a "systems approach to addressing the impacts of motor vehicles and fuels on air quality and public health."

While OEMs discussed the interconnection of fuels and vehicle issues with EPA during the negotiations leading to the MY 2017-2025 GHG/FE requirements, EPA declined to include fuel issues in that rulemaking. However, at that time EPA gave the industry assurance that these issues would be addressed promptly within the Tier 3 rulemaking in order to facilitate the needed product changes to support the GHG/FE standards, as well as Tier 3 requirements. OEMs are spending billions of dollars on compliance with the GHG/FE rules and require the cleanest fuels possible to meet these obligations. (13) We urge EPA to support the progress toward cleaner vehicles by ensuring that the proper fuels are widely available.

GM supports EPA in its efforts to reduce the sulfur content of fuel, and the 10 ppm annual average in the proposed rule is a step in the right direction.

Another key aspect of the proposal is the cleaner fuels that are included. Auto makers will need these cleaner fuels to meet the stringent Tier 3 emission standards EPA and California envision. We must have clean fuels because the vehicles and fuel function as a single system in determining the emission performance of the vehicle.

As EPA moves ahead to finalize the Tier 3 requirements, GM believes the provision for low sulfur fuel levels and other clean fuel properties is essential, as is outlined in the Alliance's comments. And while clean fuels are needed to meet the Tier 3 standards on new vehicles, they also provide the added benefit of reducing emissions immediately across the entire on road fleet.

13 According to EPA, automakers will spend about $15 billion in just ten years to meet the requirements of this proposed rule, and effectively remove tailpipe emissions from the environmental equation. As EPA further states, combined with the fuel economy and greenhouse gas program, this rule would bring auto investment in the vehicle emission reduction programs through 2025 to more than $216 billion –about 100 times the investment that the oil industry is being asked to make under the NPRM.

Commenter: Private Citizen

Vehicles and fuels are a system. Setting a strict gasoline sulfur standard of 10 ppm will cleanup every car on the road and enable the next generation of cleaner vehicle technologies. The result would be like taking 33 million cars off the road, and these benefits can be achieved for a penny or less per gallon of gasoline.

Commenter: Hyundai Motor Group

The Hyundai Motor Group supports EPA's proposal to lower the annual average sulfur retail gasoline levels to 10 ppm. We believe a systems approach is necessary to reduce emissions to the stringent levels called for in the proposal. There is a large body of evidence that shows that with reduced sulfur levels, we will see an immediate benefit from all vehicles in the existing fleet, not just on vehicles with the latest technology.

Sulfur inhibits the ability of after-treatment technology to reduce emission levels of NOx, VOCs, PM, carbon monoxide, and air toxics, by depositing on the precious metal catalysts.

As we work to meet all of the low emission levels proposed in the Tier 3 rule, particularly the ppm standards. We need the catalyst to be working as efficiently as possible to meet both certification and in use requirements. Also as sulfur degrades the catalyst, it reduces useful life. Auto makers are required to meet useful life standards of 150,000 miles for emission-related equipment as part of this regulation, so it is important that the technology works as intended.

Additionally, as auto makers introduced lean burn technologies that we see as necessary to meet stringent future GHG regulations, low sulfur levels must be implemented to minimize detrimental impact to NOx after treatment.

Commenter: Johnson Matthey

One of the important aspects of the Tier 3 proposal is to reduce the sulfur level in the gasoline fuel. Sulfur compounds cannot be transformed into something harmless in the way that a NOx molecule is, turning to NOx catalysts. Therefore, all sulfur emissions from the engine are bad for the environment, and the only way they can be prevented from entering the environment is by removal from the fuel itself.

The catalyst technology Tier 3 proposal is across the whole vehicle fleet. That's gasoline and diesel vehicles. It exists today, and it's already in the marketplace. New generations of catalysts are continually being developed, and they have further enhancements and performances. Implementation of these catalyst technologies to meet Tier 3 proposals is what our industry thrives on. We have a long track record of achieving these tighter emissions limits successfully, and this proposal would be no different.

Sulfur also poisons the efficiency of the catalyst for criteria emission control. To ensure that the full range of light duty vehicles comply with Tier 3 proposals, both at time of certification and during their use in the real world, the proposed lower gasoline sulfur levels, 10 ppm average, are needed. The EPA has recently completed an excellent and extensive evaluation of sulfur effects on the current Tier 2 vehicle fleet that clearly shows significant emission benefits from reducing gasoline sulfur levels on those existing vehicles.

And as we move to the future, vehicle manufacturers are working hard to meet greenhouse gas requirements. Exhaust temperatures are expected to get cooler, exacerbating these sulfur poisoning effects on the catalyst. This remaining clean fuel is increasingly important as we move forward.

Having low sulfur fuel may also enable new technologies to be introduced, such as NOx absorber catalysts, which are leading catalyst technology for highly fuel efficient clean burning gasoline engines, and need these ultra-low sulfur fuel levels to function at peak effectiveness, and allow these engines to meet their fuel economy potential. Sulfur in diesel fuel is already limited to a maximum of 10 ppm for these reasons, and sulfur and gasoline should also be limited to the proposed 10 ppm average.

Commenter: ECTA

To be sure, we have cars today that are meeting the Tier 3 average fleet requirements with 30 ppm sulfur fuel. However, all these cars are small and compact. It is a very different story in trying to get a large vehicle to Tier 3 average emission levels. Not only are the catalysts compromised, but the sensors are affected, causing complexities in on board diagnostics, which are so critical to proper fleet emissions monitoring. We demand 150,000 durability in our cars. High sulfur fuel makes this very difficult.

We also have catalyst formulations that are not as sensitive to sulfur as others. This is partly the result of unique formulations derived from -- through catalyst R&D. These formulations are usually intellectual property of the developers. They do not have 100 percent of the market share.

Further, for many reasons, the catalyst might be designed differently to meet the the market or technical requirements, or be placed in different conditions. We all drive different vehicles with different engines and different designs. The field is very complex. This is why we need the low sulfur fuel because the technologies and engines are becoming so complex.

I just attended the SAE International Annual Congress in Detroit. Fantastic. Developments are coming very quickly, but -- very important -- most researchers are using clean fuels in their development of engines and catalysts. We will see commercialized gasoline engines by 2020 that consume 20 to 30 percent less fuel. These new engines are complex, and many are lean, like diesel. Lean NOx mitigation for gasoline requires less than 10 ppm sulfur fuel. It doesn't make sense to tie one arm behind the back of the auto engineers by requiring them to use relatively dirty fuel.

Commenter: Manufacturers of Emission Controls Association (MECA)

A critically important element to ensuring that future gasoline vehicles will be able to comply with EPA's proposed Tier 3 emission limits is EPA's proposed reduction of gasoline fuel sulfur levels to a 10 ppm national average starting in 2017.

MECA has consistently supported the introduction of the lowest possible fuel sulfur limits used with mobile sources to enable the use of best available exhaust emission controls and minimize the impacts of fuel sulfur on catalyst performance and durability.

Commenter: Mercedes-Benz USA, LLC on behalf of Daimler AG

The impact of a 10 ppm retail average sulfur limit in the Tier 3 proposal is immediate and enduring for both new vehicles as well as legacy fleets.

Mercedes-Benz strongly supports the 10 ppm annual average for gasoline in the Tier 3 proposal and requests that this element be incorporated in the final EPA Tier 3 rulemaking. This advancement in fuel quality will immediately benefit the existing vehicles on the road by improving the function of exhaust aftertreatment components and by decreasing the formation of smog-producing pollutants.

In 2006, Mercedes-Benz first capitalized on the value of low sulfur gasoline and the reduction to fuel consumption it enables when it introduced in the EU the 350CGI CLS luxury sedan, which is equipped with stratified lean burn combustion. Depending on the driving mode, engine speed, and load, gains in the fuel efficiency can range between five and 15 percent as compared to conventional stoichiometric combustion. Incorporation of this technology in the EU is enabled by a 10 ppm refinery limit in comparison to the 10 ppm annual average as proposed in the Tier 3 rulemaking.

But sulfur reduction is not a lean burn discussion. Even existing power train architectures, including downsized turbocharged gasoline direct injected engines would also benefit from reduced sulfur and fuel, so no longer would a portion of the fuel savings realized need to be expended by periodically burning off sulfur to maintain optimum effectiveness in exhaust after treatment systems.

Additionally, prior testimony highlights the fact that power train technologies which increase efficiency result in core exhaust gas temperatures, which promote sulfur deposition and inhibit burn off. Thus, the effect of low sulfur on the current fleet is immediate and enduring. No other single step can provide retroactive and future benefits in criteria emissions and greenhouse gas reduction.

Commenter: Motor & Equipment Manufacturers Association (MEMA)

The steady phase-in of lower sulfur fuel will provide greater opportunities for deploying new technologies, such as lean-burn engines, and for improving emissions and fuel economy performance.

Commenter: National Automobile Dealers Association (NADA)

Vehicle emissions control is a direct function of the interaction of motor vehicle components and systems and motor vehicle fuels. The time-honored tug-of-war between 'auto' and 'oil' is a function of the basic laws of chemistry and physics. To the extent fuels can be controlled to make them cleaner or easier to clean, less need be done by vehicle components and systems. The reverse is also true.

Commenter: New York State Department of Environmental Conservation

Maximizing the benefit to the environment from this investment in catalytic exhaust aftertreatment requires appropriate reductions in fuel sulfur content. The Department urges EPA to implement the annual average gasoline sulfur standard as proposed, with most gasoline being subject to a 10 ppm sulfur standard in 2017.

However, the proposed gasoline sulfur standard is a significant component of the emission control system. The reduction is gasoline sulfur provides substantial benefits, particularly in the early years of the program, due to emission reductions from the existing vehicle fleet. Lower gasoline sulfur content will also minimize the in-use emissions of Tier 3 and LEV III vehicles throughout their lives.

The engine exhaust after treatment fuel needs to be treated as a system, as EPA has recognized and done with the Tier 3 and now the Tier 3 standards and heavy duty standards as well. And we fully support the proposal here to regulate the system again. Reduction in the sulfur content of gasoline facilitates improvements in engine and exhaust after treatment signs that can further reduce emissions of ozone precursors, as well as reductions in greenhouse gas emissions improvements in fuel economy as other technology is enabled.

Sulfur is well-known poison catalysts that are vital for meeting existing and proposed standards. There's been concern expressed about this for many years now, and Tier 3 made a lot of progress in reducing standards that – sulfur standards, and now it's time to go the next step and bring it down even further.

Commenter: Pennsylvania Department of Environmental Protection (DEP)

EPA's proposal would establish more stringent vehicle emissions standards and reduce the sulfur content of gasoline beginning in 2017. According to EPA, the proposed gasoline sulfur standard of 10 parts per million (ppm) average, down from the current 30 ppm average, would make vehicle emission control systems more effective for both existing and new vehicles, and would enable more stringent vehicle emissions standards.

DEP realizes the potential for significant emission reductions from the proposal as soon as the Tier 3 gasoline standards take effect. A 10 ppm average sulfur level in gasoline would allow Tier 3 vehicles' three-way catalysts to perform at an optimum level and potentially allow the use of more cost-effective emission controls on vehicles. In addition, a 10 ppm average sulfur level in gasoline will immediately lower emissions from vehicles that comply with Tier 2 standards. These reductions would occur because the lower sulfur levels in Tier 3 gasoline will reduce sulfur 'blinding' of the catalysts that has occurred from the use of current gasolines. Catalyst 'blinding' inhibits the performance of the catalysts and consequently Tier 3 gasoline will provide for almost immediate additional NOx emissions reductions from the existing fleet.

Commenter: Union of Concerned Scientists (UCS)

One of the unique benefits of Tier 3 is that, by lowering sulfur in the gasoline that goes into vehicles already on the road, the program will have an immediate positive impact. Reducing the sulfur content of gasoline helps existing catalytic converters work more efficiently, reducing the emissions from the legacy fleet even while we wait for the vehicle fleet to turn over. By setting standards for the fuel and the vehicle together (what is referred to as the "system based approach"), the Tier 3 standards are able to achieve the greatest emission reductions at the lowest cost to society.

Commenter: Utah Air Quality Board

The Board recognizes that the proposed Tier 3 Program addresses the vehicle and its fuel as an integrated system. The proposed low-sulfur gasoline component (Tier 3 Gasoline) — which would reduce sulfur content to an average of 10 ppm – is required to enable the advanced emissions reduction technologies that will be installed on new vehicles by automobile manufacturers beginning in 2017. In addition to enabling these advanced pollution cutting technologies, the Board recognizes that the Tier 3 Gasoline with 10 ppm sulfur content will also yield immediate and significant emissions reductions in our existing fleet of vehicles beginning on the day the fuel becomes available at the pump. We support the penetration of Tier 3 Gasoline into the market in Utah as soon as possible.

Commenter: Sierra Club Southeastern Pennsylvania Group

According to the Delaware Valley Regional Planning Agency, the area MPO, conformity with the State implementation plan is only being achieved through the continuing improvements in vehicle-related pollution controls. Now we can assist the manufacturers of the nation's vehicles and advance clean air efforts by adopting these standards and clean up fuel at the refinery.

Commenter: State of Utah

The proposed Tier 3 Program addresses the vehicle and its fuel as an integrated system. The proposed Tier 3 gasoline—with a reduced average sulfur content of 10 ppm—would enable the advanced catalytic converters to function more effectively. Therefore, Tier 3 gasoline should be made available at the pump as soon as possible.

Commenter: United Automobile Workers

A national standard for ultra-low sulfur gasoline is an especially cost-effective way to achieve substantial emission-reductions from vehicles. Low-sulfur gasoline allows a vehicle's catalytic converter to operate at higher efficiency, in turn leading to lower tailpipe emissions and decreasing the formation of smog-producing pollutants from cars and trucks. Looking forward, a reduction in sulfur will also enable the introduction of new fuel-saving technologies in the next generation of vehicles. Since manufacturers know that all vehicles will be using the same standardized low-sulfur gasoline across the country, they can include technologies in new vehicles that will capitalize on this fuel development.

Our Response:

As explained in Sections II and V.M of the preamble to the final Tier 3 rule, we are lowering the existing gasoline sulfur standards under section 211(c)(1), because emission products of gasoline with current levels of sulfur cause or contribute to air pollution which may reasonably be anticipated to endanger public health or welfare, and because emission products of gasoline with current levels of sulfur will impair to a significant degree the emissions control device or systems on the vehicles subject to the final Tier 3 standards. As discussed in Section II.B of the preamble to the final rule, control of gasoline sulfur to 10 ppm will lead to significant reductions in emissions of these pollutants, with the benefits to public health and welfare significantly outweighing the costs. As also discussed in Chapter 4 of this Summary and Analysis of Comments document (and further in Section IV.A.6 of the preamble to the final rule and Chapters 4 and 5 of the RIA), a reduction in gasoline sulfur from the Tier 2 30 ppm average to the Tier 3 level of a 10 ppm average is necessary to enable the new vehicle fleet to meet the Tier 3 standards, as well as achieve immediate emission reductions from the existing fleet. Lower sulfur gasoline will enable the needed reductions in vehicle emissions and the 10 ppm average sulfur standard is a feasible standard for refiners to meet taking into consideration costs and other factors. Further, the 10 ppm average sulfur standard will also help prevent the significant impairment of the emission control systems expected to be used in Tier 3 technology, significantly improve the efficiency of emissions control systems currently in use, and continue prevention of the substantial adverse effects of sulfur levels on the performance of vehicle emissions control systems.

As discussed in Chapter 5.1.1.2 of this Summary and Analysis of Comments document (and in Sections III.A and III.B of the preamble to the final rule), a 10 ppm annual average standard will help reduce current levels of sulfur that contribute to ambient levels of air pollution that endanger public health and welfare. Lowering gasoline sulfur will not only provide emissions benefits when combined with Tier 3 vehicle technologies, but it will also help to reduce emissions of pollutants from vehicles currently on the road today. As also discussed in Section IV.A of the preamble to the final rule, we have tested a wide range of vehicles to better understand the impact that even lower gasoline sulfur could have on emissions. Our test data showed significant NO_X and VOC reductions when vehicles were tested on low sulfur gasoline. Further, Section III.B of the preamble, shows that lowering average gasoline sulfur from 30 to 10 ppm will result in approximately 260,000 less tons of NO_X and 50,000 less tons of VOC almost immediately when the Tier 3 gasoline sulfur standards take effect.

Comments on GHG, CAFE, and CO_2 emissions are beyond of the scope of the Tier 3 rulemaking.

5.1.1.4. Impacts on Cost, Supply, and RFS Program

What Commenters Said:

Commenter: American Fuel & Petrochemical Manufacturers (AFPM)

EPA proposes that refiners further lower the amount of sulfur from gasoline despite the fact that our industry already removed 90 percent since 2004. The remaining incremental reduction of trace amounts of sulfur will cost refiners almost as much as the Tier 2 reduction 10 years ago, which removed 15 times more sulfur than the proposed Tier 3 regulation would require.

Commenter: Medical Advocates for Healthy Air

Other arguments mention the need for heavy investment in the newer technologies to achieve the standards of Tier 3. Yet oil refineries supplying gasoline to California are already reducing the sulfur content to 10 ppm. The technology already exists, is working, and can be installed at the national level with minimal increase—if any—to the cost of gasoline. As mentioned above, the new standards will increase employment and contribute positively to the nation's GDP.

Commenter: Small Business Refiners (SBR)

EPA Enforcement continues to pursue its National Petroleum Refinery Initiative that focuses on NSR/PSD, NSPS, LDAR, and benzene. The refining industry has spent over $6 billion to install additional control technologies, $80 million in civil penalties, and $75 million in supplemental environmental projects. Through investments, the refining industry has reduced sulfur emissions in gasoline from 300 ppm to less than 30 ppm and sulfur emissions in diesel from 500 ppm to less than 15 ppm. Tier 3 Fuels reduction in gasoline sulfur will be significantly more expensive per pound of sulfur removal, than previous regulations. Tier 2 sulfur reduction cost[s] approximately $100,000 per ppm of sulfur, where Tier 3 fuels is expected to cost $900,000 to $1,000,000 per ppm of sulfur reduction.

Commenter: Sutherland Asbill & Brennan LLP (Sutherland)

Instead, the Proposed Rule may hasten the impending blend wall under the Renewable Fuel Standard ('RFS') by exacerbating the increase in exports to foreign markets and decrease in supply to the U.S. markets brought on by the RFS and lack of consumer demand.

Our Response:

As discussed in Chapter 7.2 of this Summary and Analysis of Comments document (and in Section VII.B of the preamble to the final rule), our cost analysis shows that refiners will make about $2.025 billion in capital investments to achieve sulfur reductions to meet the Tier 3 gasoline standards. These capital investments are expected to be made over the 6 years that the Tier 3 program is expected to be phased in, which would spread out the capital costs to average about $330 million per year. When fully phased-in, we estimate that the national average refinery cost of compliance with the Tier 3 sulfur control program, with a nationwide credit trading program, will be 0.65 cents per gallon averaged over all gasoline.

We disagree with the comment that the costs associated with complying with Tier 3 may indirectly "hasten the "impending blend wall" under the RFS program. As highlighted in the 2014 RFS Annual Rule proposal ("2014 Standards for the Renewable Fuel Standard Program; Proposed Rule", 78 FR 71732, November 29, 2013), the Agency believes that the E10 blendwall was reached in 2013. Therefore, the Tier 3 program can do nothing to hasten its arrival. Even if this were not the case, there would be virtually no impact. The commenter highlights the potential for the costs of complying with Tier 3 to increase exports as a reason why Tier 3 may hasten the arrival of the blend wall. However, even if Tier 3 were to encourage some US refiners to export more of their gasoline, the supply would then be made up with reductions in exports by other refiners or increases in imports from abroad. This volume would also be subject to the same RFS standards, resulting in no impact on the RFS program as a whole. To the extent that Tier 3 does increase overall compliance costs for gasoline, and prices to consumers rise along with it, this could have an impact on consumer demand for gasoline. Given the very small projected increase in cost for Tier 3 (0.65 cents/gallon on average) the impact on consumer demand would be very small. However, even then it would have no meaningful impact on the RFS program as a whole, since the RFS standards are percentage standards that are adjusted on an annual basis to reflect whatever happens to gasoline and diesel fuel demand for whatever reason. The impact of Tier 3 would be imperceptible in comparison to other changes in the marketplace (e.g., changes in crude oil prices).

While we recognize that there are other regulations that are imposing compliance costs on the refining industry, including other EPA regulations, these costs do not preclude implementation of the Tier 3 standards, and such comments are otherwise beyond the scope of this rulemaking.

5.1.1.5. Harmonization with California & Other Countries

What Commenters Said:

Commenter: Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

Ultra-low sulfur gasoline has been available in California for years, and the ability to comply with emissions standards in California is premised on the use of such fuel, recognizing the need to treat the vehicle and the fuel as a system.

One final point on sulfur. You've already heard it this morning, and that is that we have fallen behind other countries. The proposed rule would help Americans to get gasoline with sulfur limits approaching 10 parts per million cap, which is like the retail sulfur – the retail levels of sulfur already available in Europe and Asia.

Commenter: American Honda Motor Co., Inc.

California has recognized this in its LEV III standards, requiring an average of 15 parts per million, and a cap of 20 parts per million. It is critical that EPA set a national gasoline sulfur average and cap levels equivalent to those specified in California regulations.

Commenter: Boulder County Board of Commissioners and Boulder County Board of Health

These are cost-effective, proven technologies that are almost entirely the same as those already in place on California vehicles. Further, California's gasoline already achieves 10-ppm sulfur on average, as do other nations, including the European Union, Japan, and – by 2017 – China.

Commenter: California Air Resources Board (CARB)

CARB staff strongly supports the proposed Tier 3 gasoline sulfur standards and applauds the efforts of U.S. EPA staff for bringing our fuel programs in alignment.

U.S. EPA is proposing to lower the sulfur standard in gasoline and ethanol-gasoline blends to a 10 parts per million (ppm) annual average. California's gasoline already meets the proposed 10 ppm sulfur standard. For many years California has led the nation in gasoline quality, including a low-sulfur standard. On December 31, 2003, California lowered the sulfur cap on gasoline from 80 ppm to 60 ppm. Then on December 31, 2005, the sulfur cap was lowered from 60 ppm to 30 ppm. And finally, on December 31, 2011, the sulfur cap was lowered to 20 ppm. The 20 ppm sulfur cap brought the in-use fuel's sulfur average in California to about 9 ppm (2).

(2) http://www.arb.ca.qov/reqact/2012/leviiiqhq2012/levisorpdf

Commenter: Chrysler Group LLC

California recognizes the environmental benefits of low sulfur gasoline and requires 10 ppm sulfur in its LEV III regulation as an enabler to meet the Air Resources Board's super ultra-low emission vehicle (SULEV) fleet average requirements. Requiring low sulfur gasoline in these Tier 3 rules will further harmonize Tier 3 and California LEV III to realize the emission benefits and to maximize new vehicle development and manufacturing efficiency.

We will continue to work with EPA to bring California LEV III and Tier 3 as close as possible, with the goal of a completely harmonized California and Federal, one national criteria pollutant program. Low sulfur gasoline is a vitally important and critical element in achieving this goal.

Commenter: City of Philadelphia Department of Public Health Management Services (AMS)

So in summary, I would like to have the rule be adopted as quickly as possible because the standards are consistent with California and other European countries already have.

Commenter: Delaware Department of Natural Resources (DNRC)

The Tier 3 standards support our efforts by reducing the average gasoline sulfur concentration from 30 ppm to 10 ppm, which is consistent with the international trend to reduce sulfur in gasoline.

Commenter: Emissions Control Technology Association (ECTA)

From a general global perspective, Japan, Europe, and even China are moving to 10 ppm sulfur gasoline. By not doing this, the United States will be a significant major outlier and cause vehicle options and costs to be higher than in other major markets.

Commenter: Environmental Defense Fund (EDF)

Reducing the sulfur content in gasoline from 30 parts per million (ppm) to 10 ppm will align the federal standard with those of California, the European Union, and Japan. Timely implementation of a national, unified sulfur standard will drive investment and development of emissions control technology, while allowing manufacturers to efficiently align technology upgrades with fuel efficiency and GHG emissions standards.

Finalizing the tighter fuel standard would bring the U.S. in line with the cleaner fuel already required in California, Europe, and Japan. Canada is also proposing 10 ppm sulfur fuel.

Commenter: Environmental Law and Policy Center (ELPC)

In reducing the sulfur content from 30 parts per million to 10 parts per million, that is a critical step to improving air quality. And we know that that standard is achievable because it is being met in California, Europe, and Japan.

Commenter: Ford Motor Company (Ford)

As mentioned earlier today, other markets with advanced emissions requirements, such as those found in Asia and Europe, are particularly concerned with high quality market fuels containing ultra-low sulfur fuels of 10 ppm to ensure catalysts maintain their high efficiencies throughout the expected useful life of the vehicle. Improved fuel economy and reduced CO2 emissions are made possible in vehicles through engine operations at lean air fuel rations, as Frank just mentioned.

Additionally, the proposed rule enables Americans to enjoy immediate air quality benefits through operating on gasoline with sulfur limits approaching the 10 ppm cap similar to those already in place around the world.

Commenter: Hyundai Motor Group

While we understand some refineries may face challenges in meeting the level proposed in this rule, we want to point out that by setting a 10 ppm average annual standard, EPA will be bringing the U.S. gasoline specifications in line with California, Japan, Korea, and the European Union.

In particular, South Korea has an average 10 ppm standard in place – has had an average 10 ppm standard in place since 2009. Also California has a cap of 20 ppm, and the average sulfur level in the fuel in the State is 10 ppm. Lastly, Japan and the EU have set a cap of 10 ppm, which is much more stringent than an average annual level proposed by EPA. All of these jurisdictions have recognized the importance of ensuring low sulfur levels in fuel. It is a reasonable and necessary standard for the U.S. as well.

Commenter: International Council on Clean Transportation (ICCT)

The ICCT also commends the EPA for proposing to reduce gasoline sulfur to 10 ppm. Japan and South Korea have required 10 ppm sulfur in gasoline since 2007 and Europe since 2009. Even Chile has required 15 ppm sulfur in gasoline since 2010. Given the leadership shown by the US in most environmental areas, it is important for the US to catch up on gasoline sulfur.

Commenter: ECTA

It's essential the U.S. refinery industry enter the 21st century by providing an average of 10 ppm fuel. Europe and Japan have had it for years. China is doing so now, and will have it throughout the country in 2017. And India and Brazil are considering moving in this direction.

It would be shameful if the U.S. still had 30 ppm sulfur and these countries have clean fuel. They all realize less than 10 ppm sulfur fuel is critical to clean vehicles. It all ties together.

Commenter: Manufacturers of Emission Controls Association (MECA)

Adoption of a 10 ppm average gasoline sulfur limit by EPA will bring the U.S. in line with other major vehicle markets in Europe, Japan, South Korea, and China where 10 ppm gasoline and diesel fuel sulfur caps are already in place or will be in place by 2018.

Commenter: Union of Concerned Scientists (comment campaign)

I support Tier 3 standards that will keep the United States on pace with global trends to reduce the sulfur concentration of gasoline from 30 parts per million (ppm) to 10 ppm.

Commenter: Michigan Department of Environmental Quality (MDEQ)

Once again, given California's regulations, we know this concentration is achievable.

Commenter: National Association of Clean Air Agencies (NACAA)

Further, California's gasoline already achieves 10-ppm sulfur on average. Finally, gasoline in other nations, including those in the European Union and Japan, is subject to a 10-ppm cap. China has also adopted requirements for 10-ppm sulfur, to take effect in 2017.

Commenter: New York State Department of Environmental Conservation

The gasoline sulfur standards are clearly feasible.

Many jurisdictions (European Union, Japan, South Korea, Beijing, China and California) are meeting comparable sulfur standards now. The processing technology necessary to produce gasoline meeting a 10 ppm sulfur standard is well established and commercially proven. Hydrodesulfurization has been used in oil refining since at least the early 1950s. Processes tailored to a wide variety of refinery streams, including those that contribute significant amounts of sulfur to the gasoline pool, have been developed and are in commercial use.

We also fully support adoption of the proposed standards regulating the sulfur content of gasoline. When we adopted the California motor vehicle emissions standards in 1990, the Clean Air Act pretty much hinders New York and other States from adopting the California fuel standards. I won't say it's impossible, but it is a high hurdle.

The proposed gasoline sulfur limited of 10 parts per million is widely accepted, developed around the developed world. It's currently the standard in the EU, Japan, South Korea, and in California, and China is even moving forward with the 10-part per million sulfur standard.

Commenter: Philadelphia Physicians for Social Responsibility

Now 13 years after the Tier 2 final rules on sulfur were published, it's time to update these regulations. We know that we have the technical ability to do this because we already require these standards in California, Japan, South Korea, and most of Western Europe. Because you will hear from many others on the Tier 3 rules, I will limit my few minutes to the harmful effects of sulfur.

Commenter: Sierra Club

Refiners in other countries, such as Japan and 30 European nations, already are meeting a 10 ppm gasoline sulfur cap standard. In addition, California refiners are already producing gasoline that averages 10 ppm sulfur content. Indeed, even without the proposed averaging, banking and trading (ABT) improvements, EPA demonstrates that a 10 ppm gasoline sulfur standard is feasible.

Commenter: Southern California Association of Governments (SCAG)

There appears to be some differences between the proposed Tier 3 standards and California's LEV III Regulations and California gasoline sulfur content standards. While acknowledging the complexities and nuances of these programs, harmonization of the proposed Tier 3 with the California program is important from a business and manufacturer continuity perspective. We believe that such harmonization may yield savings to California residents through the efficiencies of scale in the production of vehicles that meet one national standard.

Commenter: Sutherland Asbill & Brennan LLP (Sutherland)

Annual Average Sulfur Standard. The Proposed Rule would lower the annual average sulfur standard for gasoline refined, blended or imported from 30 ppm sulfur to 10 ppm sulfur on January 1, 2017. EPA states that Europe, Japan and other countries have moved to 10 ppm sulfur, so it is clear that U.S. refineries can also adapt. The make-up of refineries in the United States and Europe differs dramatically, with certain European markets having very little or no refining capacity and are thereby dependent on other markets for their refined products. These markets may have been able to purchase certain grades from refineries in other countries without the refineries having to undergo any dramatic changes to meet these markets' needs. Furthermore, European markets use diesel fuel rather than gasoline for their transportation needs at a much higher rate than the United States. Simply because other countries have lowered their sulfur standard in gasoline does not necessarily mean that the U.S. refinery complex will be able to supply lower sulfur gasoline in the quantities required by the U.S. markets without considerable expense and cost to U.S. gasoline prices and the U.S. economy.

Commenter: Union of Concerned Scientists (UCS)

Tier 3 is also consistent with the global trend to reduce sulfur in gasoline. Refiners are already producing ultra-low sulfur fuel in California and much of the developed world – demonstrating that the technology to meet these standards has already been deployed. In 2012, the Hart Energy International Fuel Quality Center ranked the top 100 countries based on sulfur limits in gasoline (12). The United States, at the current level of 30 ppm, is ranked 47th, with higher sulfur than Japan, South Korea, Turkey, Taiwan, Thailand, Chile and all of Europe.

12 - International Fuel Quality Center. 2013. International Gasoline Rankings – Top 100 Sulfur. Online at http://www.ifqc.org/NM_Top5.aspx accessed on July 1, 2013.

Commenter: United Automobile Workers

We applaud the EPA for taking the right approach, one that recognizes the connection between a vehicle's emissions and its fuel, and treats them as a connected system. This approach will also create a nationwide harmonization of our fuel standards and will bring us in line with low-sulfur fuel requirements already available in California, Europe, and Japan. Our nation's automakers will then be able to use a broader range of technologies to meet the significant environmental challenges facing our industry.

Commenter: United Steelworkers Union (USW)

Once the proposed regulations to lower overall sulfur emissions in gasoline to 10ppm are finalized, the European Union and China will either implement in tandem or have in place standards of ultra-low sulfur gasoline equivalent to the EPA Tier 3 Motor Vehicle Emission and Fuel Standards. By aligning emission standards with such large economic regions, U.S. refiners will be able to compete both domestically and globally in providing superior refined products to consumers.

Commenter: State of Utah

Experience in other countries and in California demonstrates that the lower-sulfur Tier 3 gasoline will yield immediate and significant emissions reductions in our existing vehicle fleet. Therefore, Tier 3 gasoline should be made available at the pump as soon as possible.

Our Response:

The commenters are correct that gasoline desulfurization technologies are well known, readily available, and have been further demonstrated by current fuel programs in California, Asia, and Europe. Under California's Phase 3 Reformulated Gasoline program (CaRFG3) and the Predictive Model that California refiners use to demonstrate compliance, California gasoline currently contains approximately 10 ppm sulfur on average. Europe has a 10 ppm sulfur cap that has been adopted by the 30 Member States that comprise the European Union (EU) and the European Free Trade Association (EFTA) as well as Albania and Bosnia-Herzegovina. Japan also has a 10 ppm gasoline sulfur cap, and a 10 ppm sulfur limit for gasoline was recently introduced in Beijing, China. As these are all 10 ppm sulfur *cap* standards, they are considerably more stringent than the 10 ppm annual average standard being finalized today because each batch of gasoline produced at every refinery must meet the 10 ppm cap. Therefore, every refinery must be designed to meet this cap regardless of changes in crude oil supply, operation conditions, or product mix.

While we acknowledge that the fact that other countries have a similar sulfur standard is not a reason for the U.S. to adopt it, this is not the reason we are lowering the sulfur content. As discussed in Chapters 2 and 3 of the Summary and Analysis of Comments document, we are controlling sulfur because emission products of gasoline with current levels of sulfur cause or contribute to air pollution which may reasonably be anticipated to endanger public health or welfare, and because emission products of gasoline with current levels of sulfur will impair to a significant degree the emissions control device or systems on the vehicles subject to today's final Tier 3 standards.

In response to the comment that the gasoline desulfurization technologies are not appropriate for the U.S. gasoline market, we note that many of these technologies were demonstrated under the current Tier 2 program. However, we agree that many oil refineries outside of the United States operate differently from their U.S. counterparts. U.S. refiners have invested more heavily in fluidized catalytic cracker (FCC) units than the rest of the world to maximize gasoline production. Because the FCC unit is responsible for nearly all the sulfur that ends up in gasoline, U.S. refineries can face a bigger challenge in achieving 10 ppm gasoline sulfur levels, however that is changing. The 2013 Annual Energy Outlook produced by the

Energy Information Administration supports the view that the U.S. demand for diesel fuel is increasing while the demand for gasoline is decreasing, starting the process that will make the U.S. more like Europe. Thus, U.S. refiners seem to be beginning to move away from relying on the FCC unit as the most important refinery unit. Further, as discussed in more detail in Section V.L of the preamble to the final rule, the challenge of complying with more stringent gasoline sulfur control will decrease over time. The review of gasoline sulfur control in California and elsewhere, and the future trend for gasoline demand, show that achieving 10 ppm is feasible. The Tier 3 requirements are less demanding than those of Europe or Japan, for a number of reasons. First, the Tier 3 10 ppm standard is a refiner annual average standard, rather than sulfur cap. Second, the Tier 3 program has an 80 ppm refinery gate cap, which allows individual gasoline batches to vary in sulfur level (as long as they meet the 10 ppm annual average). Lastly, the Tier 3 ABT program allows refiners to generate credits for overcompliance with the standard and to bank or sell those credits to other refiners with more challenged refineries that need to purchase credits to assist with compliance.

5.1.1.6. In-Use Gasoline

What Commenters Said:

Commenter: National Automobile Dealers Association (NADA)

Importantly, dealerships and their customers deserve to know that state-of-the-art emissions-related components and systems will not be undermined by substandard or 'bad' fuels. Thus, it is incumbent upon EPA to set appropriate limits on motor fuel characteristics in order to enable effective vehicle emissions control and to protect in-use vehicle performance against substandard or inappropriate real-world fuels.

Our Response:

With regard to concerns about in-use sulfur levels, we believe that vehicles will see sulfur levels closer to the 10 ppm average rather than the 80 ppm cap due to the fact that the 10 ppm average will drive reductions in gasoline sulfur levels. As discussed further in Chapter 5.1.2 below, we believe most refineries will still average less than 20 or 30 ppm in their physical gasoline production. Further, our cost analysis (in Section VII.B of the preamble to the final rule) projects that nearly 40% of the gasoline pool will be at 5 ppm, about 45% at 10 ppm, and the remaining 15% at levels higher than 10 ppm. Thus, the majority of in-use sulfur levels are expected to be at or below 10 ppm sulfur. And as discussed in Section V.C.1.b of the preamble, we are committing to monitor and further evaluate in-use sulfur levels and their impact on vehicle emissions. If it is warranted, we will reassess the sulfur cap level and the need for potential future regulatory action.

Further, while we are taking action to require lower sulfur content in in-use gasoline (which emissions test fuel should reflect) under authority given in Clean Air Act sections 211(c)(1) and (2), any action related to other in-use fuel standards is outside the scope of this rulemaking."

5.1.2. Per-Gallon and Downstream Sulfur Caps

We received comments on both of the proposed per-gallon cap options of 80/95 ppm and 50/65 ppm, as well as comments on finalizing lower caps of 20/25 ppm and a 20 ppm overall cap. Comments supporting lower caps noted potential environmental benefits. Comments in support of maintaining the current Tier 2 caps cited concerns on cost, flexibility for turnarounds/unplanned shut downs (due to refinery fire, natural disaster, etc.), and potential impacts on gasoline supply and pricing.

What Commenters Said:

Commenter: Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

We also support reducing the refinery gate and retail pump per gallon caps to 20 and 25 ppm respectively for an interim time period, rather than leaving them at Tier 2 levels (80 and 95 ppm respectively), or partially reducing them to 50 and 65 ppm, respectively.

In the final rule, EPA should also reduce the per-gallon refinery gate and retail pump cap to 20 and 25 ppm, respectively.

Commenter: American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM)

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.

Commenter: ExxonMobil

If the Agency decides to proceed with this rulemaking, we recommend that EPA retains the sulfur caps at the current levels of 80 ppm at the refinery gate and 95 ppm downstream.

Commenter: Kinder Morgan Transmix Company, LLC

Yes, we support EPA's proposed downstream cap implementation date of 2020. We concur that based upon a 2017 refinery gate cap of 50-ppm, transmix processors would have sufficient time to evaluate the impact of the regulation on our operations prior to 2020.

Commenter: General Motors LLC (GM)

In the final rule, EPA should also reduce the per-gallon refinery gate and retail pump cap to 20 and 25 ppm, respectively.

Commenter: Manufacturers of Emission Controls Association (MECA)

MECA is supportive of a 20 ppm gasoline sulfur cap for Tier 3 that would be aligned with California's current gasoline sulfur cap.

Commenter: Mercedes-Benz USA, LLC on behalf of Daimler AG

Mercedes-Benz further requests that a 20 ppm refinery gate and 25 ppm retail cap be enacted to ensure that a dependable, uniform fuel quality is available nationwide.

Commenter: Natural Resources Defense Council (NRDC)

EPA should evaluate even lower the caps to add more certainty to pollution reductions from low sulfur gasoline. EPA requests comment on caps of 20 ppm at the refinery gate and 25 ppm downstream. EPA's analysis, as discussed in the proposed rule, indicates that the 20 ppm and 25 ppm levels will render the flexibilities of the ABT program unusable because all refineries will have to produce gasoline at 10 ppm, thus increasing the compliance cost of the Tier 3 program. There may be, however, cap levels below 50 ppm at the gate and 65 ppm downstream that would maintain sufficient compliance flexibility through the ABT program but also enhance downstream fuel quality certainty. EPA should provide an evaluation of additional cap levels and finalize caps tighter than 50 ppm and 65 ppm if feasible and cost-effective.

Commenter: New York State Department of Environmental Conservation

We also believe that the per-gallon sulfur caps for gasoline can, and should, be reduced from the current levels of 80 ppm sulfur at the refinery gate, and 95 ppm sulfur at downstream locations.

The per-gallon refinery gate and downstream sulfur standards should be reduced from 80 and 95 ppm respectively to at most 50 and 65 ppm.

In addition to an annual average of 30 ppm sulfur, the current Tier 2 standards set a per-batch cap of 80 ppm, and a downstream cap of 95 ppm. While proposing to reduce the annual average standard to 10 ppm sulfur, EPA proposes to leave the 'per-gallon' sulfur limits unchanged, while requesting comment on more stringent per-gallon limits.

The EPA should allow the current 80 ppm fuel sulfur level refinery gate cap and the 95 ppm downstream per gallon cap.

It is evident that many refiners need the 80 ppm fuel sulfur cap to be able to purchase credits while they transition to the 10 ppm average. It is also evident that the full emission reduction potential for Tier 3 vehicles claimed in the proposed rule cannot be realized if the caps are kept indefinitely at the 80 ppm level. EPA should consult with the refining industry to develop a phase-in schedule to lower the caps to the 20 ppm to 30 ppm level by the year 2025, when Tier 3 vehicles will comprise most of the in-use fleet.

Our Response:

The final Tier 3 program retains the 80 ppm per-gallon refinery gate and 95 ppm per-gallon downstream caps that are currently in place under the Tier 2 program. As discussed in more detail in Chapters 5.1.2.1 through 5.1.2.3 below, and in Section V.C of the preamble to the final rule, we believe this is the most prudent approach for lowering in-use sulfur while maintaining refinery flexibility, considering cost and other factors (such as refinery turnarounds, unplanned upsets, etc.). The per-gallon caps provide an upper limit on the sulfur concentration that vehicles must be designed to tolerate, and they also limit downstream sulfur contamination and enable the enforcement of the gasoline sulfur standard in-use.

With regard to concerns about in-use sulfur levels, we believe that vehicles will see sulfur levels closer to the 10 ppm average rather than the 80 ppm cap due to the fact that the 10 ppm average will drive reductions in gasoline sulfur levels. As discussed further in Chapter 5.1.2 below, we believe most refineries will still average less than 20 or 30 ppm in their physical gasoline production. Further, our cost analysis (in Section VII.B of the preamble to the final rule) projects that nearly 40% of the gasoline pool will be at 5 ppm, about 45% at 10 ppm, and the remaining 15% at levels higher than 10 ppm. Thus, the majority of in-use sulfur levels are expected to be at or below 10 ppm sulfur. And as discussed in Section V.C.1.b of the preamble, we are committing to monitor and further evaluate in-use sulfur levels and their impact on vehicle emissions. If it is warranted, we will reassess the sulfur cap level and the need for potential future regulatory action.

5.1.2.1. Sulfur Cap Impacts on Vehicle Emissions and Enabling New Vehicle Technology (GHG, GDI, etc.)

We received comments on both of the proposed per-gallon cap options of 80/95 ppm and 50/65 ppm, as well as comments on finalizing lower caps of 20/25 ppm and a 20 ppm overall cap. Comments supporting lower caps noted greater certainty that vehicles would see lower and more uniform gasoline sulfur levels, and enabling new vehicle technologies that require very low sulfur levels. Comments against lower caps disagreed with the effect of sulfur levels on vehicle technologies and asserted that sulfur effects on such technologies were largely reversible.

What Commenters Said:

Commenter: Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

Furthermore, automakers support EPA reducing the retail per gallon cap to at least 25 ppm, which is close to the 20 ppm cap in California and should be feasible to achieve nationwide in the foreseeable future.

The auto industry supports EPA's proposed reduction of the annual refinery average sulfur limit for gasoline in the proposed Tier 3 rule, but we also support further reduction in the other two prongs of the federal market gasoline sulfur standard, the per gallon cap at the refinery gate, and the per gallon cap downstream at the retail pump.

However, while we commend EPA for proposing reduction of annual average sulfur content in gasoline, the proposed rule does not go far enough in reducing the absolute cap on downstream levels of this harmful component. As proposed, the rule does little to assure that there is uniform gasoline sulfur content at the gas pump. Automakers need a clear, harmonized standard, with consistently low sulfur levels at the pump to optimize vehicle technology to meet the emissions reductions and GHG/fuel economy goals set by the Agency, and thus request that EPA take further action on sulfur to facilitate compliance with such requirements.

In the proposed rule, EPA has focused on reducing the annual refinery average for sulfur from 30 ppm to 10 ppm (38). While reducing this annual average is important, without a concurrent reduction in the other two prongs of the standard the rule does not achieve a predictable capped amount of sulfur in each gallon of gasoline.

EPA is considering leaving in place the Tier 2 refinery gate per-gallon cap at 80 ppm and the per-gallon downstream cap at 95 ppm, and indeed has written the proposed C.F.R. regulatory language based on this approach (39). However, the Agency is also taking comment on reducing the refinery gate per-gallon cap to 50 ppm [or 20 ppm], and the downstream per-gallon cap to 65 ppm [or 25 ppm] (40). As EPA's own data show, the lower the sulfur the better, and we support the lowest possible levels for these latter two standards.

Predictable, low, downstream levels of sulfur are necessary for vehicles to run on the most advanced engine/emissions control systems, and OEMs need assurance of such levels to facilitate long-term product planning.

The highest sulfur level recorded among gasoline in the contiguous U.S. in the July 2012 Alliance fuels survey was 43 ppm, (41) and in the January 2013 survey was 72 ppm. Only 1 of the 394 retail samples in January 2013 exceeded 65 ppm, suggesting that EPA would be able to transition the refinery gate and retail pump cap limits without imposing significant costs. A retail sulfur cap of 25 ppm should be workable within the time period covered in the rule. As discussed below, this change would also come closer to harmonization with California's 20 ppm sulfur retail cap (42).

It will not be possible for emissions control equipment to work at the required levels found within Tier 3 while operating with sulfur as high as 95 ppm. Therefore a predictable national sulfur standard at the point of sale to the consumer, the retail pump, is crucial for ensuring that vehicles will have the fuel they need to meet the required fuel economy increases and emissions reductions.

EPA's own new study data show clear benefits from reducing gasoline sulfur from 28 ppm to 5 ppm (43). The remaining issues are technical and economic feasibility for establishing a more stringent sulfur cap at retail. EPA's own data shows catalyst sulfur poisoning reversibility is limited, and reduced sulfur in the fuel provides better emissions reductions (44). EPA must take action to reduce the per-gallon retail cap of sulfur to 25 ppm to support the OEMs' emissions reduction requirements, and also to plan for adjustments to achieve a 10 ppm retail sulfur cap as soon as possible, as noted above.

38 - 78 Fed. Reg.29908 at 29921 (May 21, 2013).
39 - 78 Fed. Reg. 29908 at 30023-30024 (May 21, 2013).
40 - 78 Fed. Reg. 29908 at 29920 (May 21, 2013).
41 - Annual Alliance of Automobile Manufacturers North American Fuels Survey, July 2012.
42 - California Reformulated Gasoline Regulations, 13 C.C.R. §2262.
43 - See EPA study, "The Effects of Gasoline Sulfur Level on Emissions from Tier 2 Vehicles in the In-Use Fleet," April 2013.
44 - Id.

Commenter: American Fuel & Petrochemical Manufacturers (AFPM)

The AFPM recommends that the current refinery gate cap for gasoline remain at 80 ppm sulfur. This would not interfere with an engine technology. Even the Agency has proposed that 80 ppm is prudent for 2017 to 2019.

Commenter: American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM)

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.

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 [of EPA-HQ-OAR-2011-0135-4276-A2] 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, NOx, 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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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.
34 - SGS Environmental Testing Corp., Reversibility of Gasoline Sulfur Effects on Exhaust Emissions From Late Model Vehicles, prepared for American Petroleum Institute, June 2013

Commenter: Appalachian Mountain Club (AMC)

Related to this provision, AMC supports EPA's proposed option to lower the per-gallon sulfur caps to 50 ppm at the refinery gate and 65 ppm downstream in 2020. This provision allows flexibility for some refiners but will also provide opportunities for advancements in the automobile technologies that result in lower emissions.

Commenter: BMW of North America, LLC

We also recommend that EPA promulgate a final rule that reduces the refinery gate and downstream sulfur caps to 20 and 25 ppm, respectively, to ensure low levels of sulfur at the retail pump.

Commenter: Chrysler Group LLC

In addition to EPA's 10 ppm sulfur national average gasoline, Chrysler urges EPA to adopt 20 ppm refinery sulfur and 25 ppm retail sulfur caps. Having a predictable national standard at the retail pump is crucial for vehicle design and development to achieve intended GHG and fuel economy benefits from lean-burn GDI systems. Again, without low sulfur (both national refinery average and at retail), lean-burn GDI systems will be subject to more frequent regeneration events leading to significant fuel economy (and corresponding GHG) penalties.

Recommendation: Chrysler recommends that EPA adopt a 20 ppm refinery sulfur cap coupled with a 25 ppm downstream (retail) sulfur cap.

Commenter: Emissions Control Technology Association (ECTA)

Given EPA's two options regarding per-gallon sulfur caps, we agree with EPA's recommendation for lowering the caps from 80 ppm at the refinery gate (and 95 ppm downstream) to 50 ppm at the refinery gate (and 65 ppm downstream) (3). EPA's other option of maintaining the current caps is not acceptable for two reasons: First, it will have a negative impact on the performance and durability of emissions and catalyst systems, as explained above. Secondly, reducing the caps in EPA's proposal from 80 ppm at the refinery gate (and 95 ppm downstream) to 50 ppm at the refinery gate (and 65 ppm downstream) would not materially increase the cost of compliance to refineries. Under the EPA's cost model that assumes intra-company trading only, just eight refineries consume credits rather than reduce their sulfur levels down to 10 ppm. To the extent that the current level of sulfur for each of these refineries is less than 50 ppm—a highly likely outcome given the nationwide average of 21 ppm according to MOVES 2010 data—then requiring these refineries to reduce the sulfur content to 50 ppm is a non-binding constraint that would impose no incremental costs.

Because EPA's cost model did not permit refineries to choose sulfur levels between their current levels and 10 ppm, one can infer that for these eight refineries that choose to consume credits and maintain their current sulfur levels, the associated compliance cost would be less than the cost of achieving 10 ppm. It is possible, however, that for those refineries, the cost of reducing sulfur slightly, to say 20 or 25 ppm, and consuming fewer credits would be an even better option. If so, then compelling these refineries to achieve at most 50 ppm would not impose any additional compliance costs.

Fortunately, it is possible to estimate an upper bound on the incremental compliance costs associated with imposing a cap of 50 ppm. Assuming conservatively that all eight of these refineries currently generate sulfur in excess of 50 ppm, one can estimate the upper bound by comparing EPA's no-ABT scenario with its limited ABT scenario: $2.527 billion (or 0.97 cents per gallon) versus $2.203 billion (0.89 cents per gallon), a difference of just $324 million. In other words, forcing these eight refineries to achieve 10 ppm generates an added cost of $324 million relative to a system with limited credit trading. Because EPA's proposed caps would require these eight refineries to achieve a more modest 50 ppm, the expected incremental compliance cost would range from $0 (assuming either they are already below 50 ppm, or they are above 50 ppm but prefer reducing sulfur slightly and consuming fewer credits) to $324 million (assuming they are above 50 ppm and prefer to stay above 50 ppm and consume more credits).

Indeed, the same comparison provides the upper bound of incremental compliance costs for any cap up to 10 ppm, including EPA's alternative 20 ppm cap. Accordingly, so long as the social benefits of imposing a cap of either 20 ppm or 50 ppm exceed $324 million, then the EPA should impose a more stringent cap than 80 ppm. EPA notes that a higher cap means that vehicles still have to be designed to operate on high-sulfur fuel, which would undermine emission performance and likely increase the cost of compliance for automobile manufacturers.4 Because the benefits of greater emission compliance increase with the cap stringency—a more stringent cap generates less variability in sulfur levels—it is conceivable that a 20 ppm cap (which would allow little variability in sulfur levels) would generate greater net surplus than a 50 ppm cap (which would allow substantial variability).

3 - Id. at 29927.
4 - Id. at 29927.

Commenter: Marathon Petroleum Company LP (MPC)

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 API 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. (21)

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 11 (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, NOx, CO, Soot and PN 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.

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

Commenter: Mercedes-Benz USA, LLC on behalf of Daimler AG

The impact of a 10 ppm retail average limit in the Tier 3 proposal…and can be strengthened by reducing the current refinery gate and retail sulfur caps to 20 and 25 ppm, respectively.

Commenter: Michigan Department of Environmental Quality (MDEQ)

Because poisoning of the catalyst can occur when larger amounts of sulfur are in the fuel and these poisonings may, in some instances, be irreversible, the MDEQ, Air Quality Division advocates the modification of the current refinery gate and downstream caps of 80 ppm and 95 ppm, respectively. The MDEQ, Air Quality Division would prefer the USEPA chose to lower the refinery gate and downstream caps to 50 ppm and 65 ppm, respectively. The downstream sources of sulfur should be able to take steps to decrease sulfur contamination, and have no incentive if the caps remain where they currently are.

Commenter: New York State Department of Environmental Conservation

While catalyst sulfur poisoning is to a degree reversible, restoration of catalyst activity is not instantaneous. High sulfur gasoline batches may have a negative impact on in-use emissions beyond the fraction of the gasoline pool they represent. Given that the total amount of sulfur in the gasoline pool will be reduced, the per-gallon maximum levels should also be reduced. These levels should be set no higher than 50 ppm sulfur at the refinery and 65 ppm sulfur downstream. Lower levels should be considered.

We concur with EPA that this change should take effect in 2020.

Commenter: Sierra Club, Clean Air Watch, Respiratory Health Association

It is important to note that EPA is proposing an average sulfur standard of 10 ppm. However, the actual sulfur content of fuel can vary substantially, based on variations in refinery operations and contamination from gasoline being transported through pipelines to its final destination. Automakers must then design vehicles to function with higher-sulfur gasoline. In order to give certainty to automakers designing vehicles and to ensure emissions reductions, setting caps on per-gallon sulfur content is critical.

We urge EPA, as it lowers the average sulfur standard from 30 ppm to 10 ppm, to also lower the per-gallon sulfur caps to at least 50 ppm at the refinery gate and 65 ppm downstream.

Lowering the per-gallon caps will allow automakers to employ additional advanced vehicle technologies that can increase vehicle efficiency and lower emissions, while still allowing compliance flexibility for refiners.

Commenter: Union of Concerned Scientists (UCS)

Lowering the per-gallon caps from 80 ppm at the refinery gate (and 95 ppm downstream) to 50 ppm at the refinery gate (and 65 ppm downstream) would not materially increase the cost of compliance to refineries. Under the EPA's cost model, no refineries would be producing product over 50 ppm per-gallon due to the 10 ppm average target, and only one refinery would likely be over 40 ppm (6). Therefore, requiring these refineries to meet a 50 ppm per-gallon cap would impose no incremental costs under normal operations, and would further ensure public health protections by minimizing the impacts of the sulfur on the performance and durability of the catalytic converter.

Commenter: Volkswagen Group of America, Inc.

As automakers, we must constantly balance market fuel availability and vehicle durability when deciding on which concepts to bring to the US market. Having caps on things such as sulfur set low enough would allow a range of vehicle technologies to be offered in a wide variety of products. A 10 ppm cap is appropriate, but we support 20 ppm & 25 ppm caps at the refinery gate and downstream, respectively.

Tier 3 vehicle emission standards are arguably the most stringent on earth; OEMs must have the most state-of-the-art fuels to support the state-of-the-art vehicles. Therefore, VW supports reductions in market fuel sulfur measured at the pump to a maximum 10 ppm. Other areas of the world with less-strict regulations already have very low sulfur market gasoline.

Our Response:

As explained in Section V.C.b of the preamble to the final rule, we are retaining the current Tier 2 80 ppm refinery gate cap. The refinery gate cap provides flexibility for batch-to-batch variability that naturally occurs at a refinery due to the varying types of crude that refineries process, variations in unit operations, and variations in product mix. It further provides for flexibility during unit turnarounds, and unplanned upsets (e.g., refinery fires, natural disasters, etc.), to avoid a complete refinery shutdown. A lower cap could create situations where refiners would need to store more off-spec gasoline for future processing. However, if a refinery does not have adequate tankage for storing this product, and/or if its processing units are not large enough to "catch up" in refining off-spec product, it could result in significant impacts to fuel pricing or supply. For a refiner that produces multiple products, any potential supply impacts could also impact other fuel markets (e.g., diesel, jet fuel, etc.). Additionally, the refinery gate cap is a "hard" limit—a refinery's actual production has to be well below this limit to account for in-use testing tolerances, safety margins, and any additives that a refiner may need to add prior to the fuel leaving the refinery. An 80 ppm refinery gate cap will provide refiners needed flexibility, and more certainty that they will be able to continue producing and distributing at least some gasoline during turnarounds/upsets to avoid a total shutdown. It will further provide more certainty for transmix processors, additive manufacturers and other downstream parties.

As also described below in Section VII of the preamble to the final rule, we believe that most refineries will be able to meet the 10 ppm average sulfur standard largely through revamps and operational changes at their facilities, rather than installing grassroots units. Lowering to a cap of 50 ppm would directionally increase the costs of the Tier 3 program. They provided a detailed study quantifying the additional costs associated with successively more stringent per-gallon caps. While we do not agree with the study's overall cost analysis, we do agree that with a refinery gate cap of 50 ppm, a number of refiners would incur higher capital costs due to the decreased ability to handle off-spec product with a lower refinery gate cap. As refiners must ensure that they can continue to produce saleable product and meet demand in the event of an upset or an off-spec batch of fuel, the need for installation of additional tankage and/or increased refinery processing capability would be greater with a 50 ppm refinery gate cap. While at the time of the proposal we believed that a cap of 50 ppm would have little cost impact, our more recent analysis shows that a 50 ppm cap would increase the cost of the Tier 3 gasoline sulfur standards by approximately 10 percent (see RIA Chapter 5.2.2.4).At the same time, the more stringent cap with its associated increase in cost would be unlikely to provide significant additional emission benefits nationwide. As discussed previously in Sections III and IV of the preamble, the emissions benefits associated with the Tier 3 program are mainly driven by the reduction in the average sulfur content of gasoline from 30 to 10 ppm, since vehicle emissions are proportional to the sulfur content of the fuel. Changes in the cap would not affect this. In the context of the final ABT provisions, a higher cap does allow for increases in emissions on a temporal basis as one batch of fuel is allowed to have higher sulfur levels. However, this is then offset by reductions in emissions from batches of fuel that are then required to be below the 10 ppm average standard. Similarly, the final ABT provisions allow for the possibility that the fuel from different refineries will cause varying emission reductions as one refinery's higher average sulfur levels would lead to less emission reductions in-use. However, this is then offset by greater reductions in emissions due to the fuel produced by refineries with sulfur levels below the average standard. In sum, we continue to believe that vehicles will see sulfur levels closer to the 10 ppm average rather than the 80 ppm cap due to the fact that the 10 ppm average will drive reductions in gasoline sulfur levels.

Thus, we believe it is prudent at this time to retain an 80 ppm refinery gate cap. However, we are committing to monitor and further evaluate in-use sulfur levels and their impact on vehicle emissions. If it is warranted, we will reassess the sulfur cap level and the need for potential future regulatory action. Such ongoing evaluation will include analyses of in-use fuel surveys, batch data that refineries are required to submit, and the sulfur credit market. It will also include an evaluation of any issues or concerns that might arise during implementation of the program. Finally, we will also carry out an ongoing evaluation of data submitted by the vehicle manufacturers on the performance of their Tier 3 vehicles in-use.

As also discussed in Section IV.A.6 of the preamble to today's final rule, we believe the 80 ppm sulfur cap is sufficient to allay concerns over irreversibility or sulfur poisoning.

5.1.2.2. Impacts of Lower Caps on Fuel Supply/Cost

We received comments on both of the proposed per-gallon cap options of 80/95 ppm and 50/65 ppm, as well as comments on finalizing lower caps of 20/25 ppm and a 20 ppm overall cap. Comments in support of maintaining the current Tier 2 caps cited concerns on cost, flexibility for turnarounds/unplanned shut downs (due to refinery fire, natural disaster, etc.), and potential impacts on gasoline supply and pricing.

What Commenters Said:

Commenter: Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

The highest sulfur level recorded among gasoline in the contiguous U.S. in the July 2012 Alliance fuels survey was 43 ppm, (41) and in the January 2013 survey was 72 ppm. Only 1 of the 394 retail samples in January 2013 exceeded 65 ppm, suggesting that EPA would be able to transition the refinery gate and retail pump cap limits without imposing significant costs. A retail sulfur cap of 25 ppm should be workable within the time period covered in the rule. As discussed below, this change would also come closer to harmonization with California's 20 ppm sulfur retail cap (42).

41 - Annual Alliance of Automobile Manufacturers North American Fuels Survey, July 2012.
42 - California Reformulated Gasoline Regulations, 13 C.C.R. §2262.

Commenter: American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM)

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.

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. 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.

Maintaining the current sulfur cap is a reasonable approach, but won't lower costs very much.

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

Commenter: BP Products North America Inc.

Maintain Current Sulfur Cap -BP recommends that EPA maintain the current 80 ppm refinery gate per gallon cap and 95 ppm downstream per gallon cap as proposed. Reducing the sulfur cap is unnecessary and adds to potential supply issues during turnarounds and upsets.

Commenter: Chevron Products Company

If EPA proceeds with the gasoline sulfur reduction, we do support several of the proposed elements including: per gallon sulfur cap.

We agree that the most appropriate per-gallon cap would be Cap Option 1, to maintain the existing 80 ppm refinery gate cap and the existing 95 ppm downstream cap. Under a 10 ppm annual average, the sulfur cap will be largely self-limiting, as refiners will not be able to produce individual batches near the sulfur cap and still meet the annual average. An arbitrarily low sulfur cap like 20 or 25 ppm will result in a significant increase in capital requirements in the refinery and will likely decrease refinery utilization and impact the supply of gasoline to the market.

Regarding Cap Option 2, while we do not feel that it would be necessary to reduce the refinery gate sulfur cap to 50 ppm with a 65 ppm downstream cap in 2020, we do not strongly oppose this option. A 50 ppm refinery gate cap still provides some flexibility to manage variability in the sulfur content of the gasoline pool without imposing too stringent of a cap. Because the maximum per-gallon sulfur is self-limiting due to the 10 ppm average, a 50 ppm cap would be reasonable. The EPA should not consider any refinery gate sulfur caps below 50 ppm regardless of timing. Reducing the sulfur caps to 50 ppm will add significant cost to the refinery and downstream systems. However, going below this level is prohibitively expensive and not warranted by the Tier 3 vehicle technology requirements (2). A Turner Mason & Co. study commissioned by API indicates a significant increase in implementation cost for a sulfur cap below 50 ppm.

2 - Turner Mason & Co., ‘Economic and Supply Impacts of a Reduced Cap on Gasoline Sulfur’, 2012

Commenter: CHS, Inc.

CHS is providing the following comments regarding the Tier 3 proposed gasoline refiner gate per-gallon sulfur cap and downstream per-gallon sulfur cap. Although CHS prefers Cap Option 1, we can support the lower sulfur levels in Cap Option 2. CHS does not support lowering the refinery gate per-gallon cap to 20 ppm sulfur and lowering the downstream per-gallon cap to 25 ppm sulfur. These lower limits do not allow enough room for refinery unit disruptions where gasoline could still be produced at the higher sulfur per-gallon levels. The unintended consequences of the proposed lower levels will affect the consumer’s ability to buy gasoline and cause regional gasoline price spikes that will put unnecessary economic burden on the consumer.

Commenter: Countrymark; Small Business Refiners (SBR)

EPA has proposed to keep the 80 ppm sulfur refinery cap in the draft regulatory text of the proposed rule but asked for comment on reducing this cap to 50 ppm in 2020, and potentially even further to 20 ppm in 2020. The SBRs are opposed to any reduction of the present cap and believe EPA should keep this successful flexibility provision. This flexibility will particularly benefit inland refiners that have limited ability to sell or ship blend stocks, should they have an unplanned outage of the FCC post-treater.

EPA acknowledges in the proposed rule preamble that the unique US fuel distribution system needs some level of cap room to allow for:
- Refinery flexibility to produce gasoline during temporary upsets and turnarounds
- Contamination challenges posed by pipelines and terminals that must also handle jet fuel with a 3,000 ppm sulfur specification
- Transmix processors that need ability to inject processed material back into the system.

With the existing 80 ppm cap, the Tier 2 sulfur rule has successfully reduced the average gasoline sulfur to below 30 ppm as shown in the graph provided by EPA, included in the draft Regulatory Impact Analysis (RIA):

Clearly EPA's own analysis shows very little incentive for lowering the 80 ppm cap. Keeping this cap will allow refiners maximum flexibility in responding to unplanned events and outages. This is especially true for inland refiners that lack the ability to sell/ship blend stocks should they have an unplanned outage of the FCC post-treater. Lowering the cap could put the areas served by inland refiners at increased risk for supply disruptions with no corresponding relief in average gasoline sulfur level.

Commenter: Independent Fuel Terminal Operators Association (IFTOA)

Per Gallon Caps – Retain 80/95-ppm Standards: EPA has requested comments on two options for the per-gallon sulfur caps. Under the first option, the Agency would retain the current 80 ppm refinery/import gate sulfur standard and the 95 ppm downstream (terminal) sulfur cap. Under the second option, the refinery/import gate cap would be reduced to 50 ppm and the downstream (terminal) cap would be set at 65 ppm.

As EPA is aware, to ensure the continuous flow of product, refineries and importers need maximum flexibility. EPA recognizes that the U.S. has the longest and most complex gasoline distribution system in the world, making it harder to control sulfur contamination than in other countries. The 80/95 ppm sulfur caps provide such flexibility, allowing facilities to address unanticipated problems such as a malfunctioning unit or a terminal hit by a superstorm, such as Hurricane Sandy, or an anticipated shutting down of a unit due to a scheduled turnaround. Lowering the per-gallon caps to 50/65 ppm sulfur reduces that flexibility and makes it harder to meet supply obligations – often at times when supply is desperately needed.

Finally, IFTOA agrees with EPA that a per-gallon standard of 20/25 ppm would be impossible for the industry to meet without almost all refinery facilities making substantial modifications to their units. Significant changes to the nation's gasoline pipeline and terminal distribution system would also be required. Such modifications would certainly compound the problems, burdens and costs discussed above. Implementation of the annual average 10 ppm sulfur standard would be delayed for many years.

Retention of the current 80/95 ppm per-gallon standards to provide maximum flexibility to the industry. It is unlikely that industry would produce/import, ship or distribute gasoline meeting those standards; however, it is important to have the ability to do so when unexpected events occur and strain the distribution system.

Retain the current per-gallon sulfur caps of 80/95 ppm to provide the maximum degree of flexibility to address unanticipated events.

Commenter: Irving Oil Terminals Inc.

EPA is proposing either to maintain the current 80 ppm refinery gate per gallon sulfur limitation and the 95 ppm downstream per gallon cap or to lower them to 50 ppm and 65 ppm, respectively. Irving Oil recommends that EPA retain the current per gallon caps of 80/95 ppm sulfur. These limitations provide the most flexibility, allowing refiners to address operational problems such as unexpected unit shutdowns and importers to address severe weather-related disruptions to the downstream supply chain. For example, in a ‘gasoline-short’ supply scenario, an importer could increase supply options beyond its typical resources. Considering the alternative options proposed, the 50/65 per gallon limit is achievable but will reduce supply flexibility; and the 20/25 per gallon cap could result in a significant step-change in the level of capital investment required by refiners. For this reason, Irving Oil strongly opposes the proposed 20/25 per gallon cap. Retention of the 80/95 per gallon limits would provide as much compliance flexibility as is possible while achieving the new Tier 3 goals of an annual average 10 ppm sulfur content.

Commenter: Magellan Midstream Partners, L.P.

Downstream Sulfur Cap - Under the Tier 3 gasoline sulfur program, EPA is proposing to (1) maintain the current 80-ppm refinery gate and 95-ppm downstream per-gallon caps or (2) reduce the cap to 50 and 65 ppm, respectively or (3) reduce the per-gallon caps to as low as 20 and 25 ppm.

Magellan Comment — We support EPA’s proposal to maintain the current per gallon sulfur caps, which are 80ppm at the refinery and 95ppm downstream, for the following reasons:

The potential for downstream contamination is as prevalent today as it was at the time the Tier 2 rules were promulgated to regulate sulfur. In the proposed rule, EPA provides an extension to small refiners for compliance with the reduced sulfur standards. Allowing small refiners to continue production of gasoline with elevated sulfur levels provides further justification for maintaining the existing downstream cap. We believe there will be a significant volume of gasoline with elevated sulfur levels regardless of the cap for other refiners.

Lowering the downstream cap increases the chances of product outages at storage and distribution terminals. If there is a sulfur excursion at a refinery, the flexibility associated with a higher downstream cap will potentially reduce supply disruptions that could result from having to reprocess gasoline.

Sulfur levels in jet fuel remain high. Major American airports rely almost entirely on pipelines, and have dedicated pipelines to deliver jet fuel directly to the airport.

Maintaining the current per gallon cap allows current transmix operations to continue in certain markets.

Commenter: Marathon Petroleum Company LP (MPC)

As to other specifics of the proposal, MPC agrees with EPA on the proposed cap of 80 ppm sulfur and notes that any cap below this level has the potential to both limit gasoline supply and/or increase the refinery investments required.

MPC supports 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. 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. The complete TM&C report titled "Economic and Supply Impacts of a Reduced Cap on Gasoline Sulfur" has been submitted to the docket 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.

Commenter: Monroe Energy, LLC

Lastly, EPA should not lower the 80ppm per gallon cap. Lowering the per gallon cap is not necessary to accommodate any engine technology, but would force some refiners, including Monroe, to install additional controls that otherwise could be avoided via reliance on the credit market for compliance.

Commenter: National Association of Convenience Stores (NACS) and Society of Independent Gasoline Marketers of America (SIGMA)

NACS and SIGMA support the proposed option for maintaining the current per gallon sulfur caps of 80 parts-per-million ("ppm") at the refinery gate and 95-ppm downstream.

NACS and SIGMA support EPA's proposed option for maintaining the current per gallon sulfur caps of 80-ppm at the refinery gate and 95-ppm downstream. As EPA notes, pipeline transport inevitably introduces the potential for sulfur contamination of the gasoline being shipped through multiproduct pipelines. In addition, various gasoline additives also contain varying levels of sulfur which contribute to the overall sulfur content of gasoline. If the final rule requires further reductions below the current sulfur cap standards, it could result in higher capital costs for refineries, which inevitably are passed down to retailers and consumers through higher prices. The final rule should take every step possible to mitigate the adverse effect it may have on fuel prices. Therefore, NACS and SIGMA support maintaining the current per gallon sulfur caps.

Commenter: PBF Energy Inc.

PBF supports the EPA option one proposal to keep per gallon sulfur cap at 80 ppm at the refinery gate and 95 ppm downstream. PBF facilities have been able to comply with this standard during any unplanned equipment outages.

PBF is opposed to the second option on the gasoline sulfur cap of lowering the per gallon cap to 50 ppm sulfur at the refinery gate or 65 ppm sulfur downstream or any lower per gallon sulfur standard. PBF will make significant investments to comply with the proposed 10 ppm annual sulfur standard and is not currently planning to invest further to ensure reliability at that level. In the event of an unplanned outage on the new equipment installed, the refineries will likely fall back to current gasoline product sulfur distribution levels. The EPA is aware of the sulfur content distribution of PBF gasoline products through our required batch reporting. In the event of an unplanned outage in the Northeast system there is a risk that the event could trigger a significant supply disruption at the 50 ppm sulfur cap level and could possibly result in product price increases to consumers as a result of the potential supply disruption.

Commenter: Phillips 66 Company

We support maintaining the 80 ppm refinery gate cap.

Phillips 66 supports maintaining the existing 80 ppm refinery gate cap as proposed. Providing an 80 ppm cap is beneficial in several ways. A lower cap with an effective date prior to the small refiner/refinery compliance date would be problematic. The result would be a different sulfur cap for small refiners/refineries causing complications in the distribution system. Also, reductions in the sulfur cap could be constraining in certain operating situations. The result would be reduction in supply until the operating problem was resolved.

On behalf of API, Turner, Mason & Company recently completed an evaluation entitled "Economic and Supply Impacts of a Reduced Cap on Gasoline Sulfur". Phillips 66 participated in this study by providing TM&C with data from our refineries. The study concludes that additional capital costs would be required to meet a more stringent cap (in addition to capital requirements to meet the 10 ppm sulfur average) and that the potential for loss of supply increases with a reduction in the sulfur cap. API has provided a copy of this study with their comments for inclusion in the docket.

Commenter: Shell Oil Products for Shell and Motiva

EPA proposes to leave the refinery per-gallon gasoline sulfur specification at 80 ppm, but is also considering lowering the per-gallon specification to 50 ppm effective in 2020. EPA should not change the refinery per-gallon sulfur specification from the existing 80 ppm.

A tighter per gallon sulfur cap will result in less flexibility and could lead to supply reductions. Maintaining the per-gallon cap would provide important flexibility in the event of planned or unplanned upsets, unit turnarounds or unit shutdowns, which can result in elevated sulfur levels. If the per-gallon cap is too low, it could result in lost volumes of gasoline during such events.

Another advantage of maintaining the current per gallon sulfur cap standard is that it allows current transmix operations to continue. 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 30-ppm refinery sulfur average. This indicates that sulfur content in transmix is relatively small, even in the context of current refinery annual average sulfur standard.

Commenter: Sunoco Logistics Partners L.P.

In particular, we support maintaining the current 95 ppm downstream per gallon gasoline sulfur cap to enable the current practices of pipeline interface handling. Pipeline and terminals will continue to be constrained by interfaces of gasoline with jet fuel or home heating oil. Interfaces with 3,000 ppm sulfur product are unavoidable, thus increasing the sulfur of the gasoline. Even small volume interfaces with 3,000 ppm sulfur jet fuel can significantly increase the gasoline sulfur. The northeast states are legislating the reduction of sulfur in home heating oil, which will help alleviate the heating oil sulfur contribution, although no action has been taken or is being contemplated to reduce the sulfur in jet fuel. Therefore we would not be supportive of lowering the downstream sulfur cap as low as 25 ppm. Downstream facilities with the inability to change their operations will not be able to handle interfaces of gasoline with jet fuel.

Commenter: Sutherland Asbill & Brennan LLP (Sutherland)

Per Gallon Sulfur Standards. EPA also proposes lowering the refinery gate per-gallon cap to 50 ppm sulfur and the downstream per-gallon cap to 65 ppm sulfur. Such reductions and any further reductions may limit the availability and use of components used to blend gasoline. These reductions could also limit imports of gasoline. It is important that EPA preserve the current refinery gate and downstream caps to provide refiners, and perhaps especially gasoline component blenders, the necessary flexibility to meet gasoline demand.

Commenter: Union of Concerned Scientists (UCS)

For these reasons, it is imperative that strict sulfur content limits be set on gasoline. This standard will protect human health and enable the next generation of vehicle technologies be implemented. We strongly support the EPA's proposal to limit the annual average sulfur content of gasoline to 10 ppm and also urge EPA to lower the refinery gate and downstream per-gallon sulfur caps to 50 and 65 ppm, respectively from the current levels of 80 ppm at the refinery gate and 95 ppm downstream.

6 - Environmental Protection Agency (EPA). 2013. Draft Regulatory Impact Analysis Tier 3 Motor Vehicle Emission and Fuel Standards. Online at http://www.epa.gov/otaq/documents/tier3/420d13002.pdf p. 4-22, accessed on June 28, 2013.

Our Response:

As explained in Section V.C.b of the preamble to the final rule, we are retaining the current 80 ppm refinery gate and 95 ppm downstream sulfur caps in effect under the Tier 2 program. The refinery gate cap provides flexibility for batch-to-batch variability that naturally occurs at a refinery due to the varying types of crude that refineries process, variations in unit operations, and variations in product mix. It further provides for flexibility during unit turnarounds and unplanned upsets (e.g., refinery fires, natural disasters, etc.), as noted by some commenters, to avoid a complete refinery shutdown or supply issues. A lower cap could create situations where refiners would need to store more off-spec gasoline for future processing. However, if a refinery does not have adequate tankage for storing this product, and/or if its processing units are not large enough to "catch up" in refining off-spec product, it could result in significant impacts to fuel pricing or supply. For a refiner that produces multiple products, any potential supply impacts could also impact other fuel markets (e.g., diesel, jet fuel, etc.). Additionally, the refinery gate cap is a "hard" limit—a refinery's actual production has to be well below this limit to account for in-use testing tolerances, safety margins, and any additives that a refiner may need to add prior to the fuel leaving the refinery. Thus, we believe that retaining the 80 ppm refinery gate cap will provide refiners helpful flexibility, and more certainty that they will be able to continue producing and distributing at least some gasoline during turnarounds/upsets to avoid a total shutdown. Further, it will further provide more certainty for transmix processors, additive manufacturers and other downstream parties.

As discussed more in Section VII.B of the preamble to the final rule, lowering to a cap of 50 ppm would directionally increase the costs of the Tier 3 program. The Turner Mason & Co. study cited in API and AFPM's comment quantified the additional costs associated with successively more stringent per-gallon caps. Although we do not agree with the study's overall cost analysis, we do agree that with a refinery gate cap of 50 ppm, a number of refiners would incur higher capital costs due to the decreased ability to handle off-spec product with a lower refinery gate cap. As refiners must ensure that they can continue to produce saleable product and meet demand in the event of an upset or an off-spec batch of fuel, the need for installation of additional tankage and/or increased refinery processing capability would be greater with a 50 ppm refinery gate cap. While at the time of the proposal we believed that a cap of 50 ppm would have little cost impact, our more recent analysis shows that a 50 ppm cap could increase the cost of the Tier 3 gasoline sulfur standards (see RIA Chapter 5.2.2.4). At the same time, the more stringent cap (with its associated increase in cost) would be unlikely to provide significant additional emission benefits nationwide.

5.1.2.3. Air Quality and Local Impacts of Sulfur Cap Levels

We also received comments arguing that lower caps of 20/25 ppm and a 20 ppm overall cap would address "hot spots" that tend to have higher than average sulfur levels.

What Commenters Said:

Commenter: Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

The Alliance fuel surveys also demonstrate that the absence of a low downstream sulfur cap facilitates the creation of "hot spots" with higher than average sulfur content. However, these hot spots appear to be geographically transient over time, as confirmed by the differences just between July 2012 and January 2013 sampling, suggesting that there are not predictable locations that consistently struggle to meet sulfur limits. Nonetheless higher sulfur locations do occur regularly. This underscores the uncertainties for OEMs building vehicles for a nationwide market.

Commenter: American Lung Association

Lower the sulfur caps. The American Lung Association supports lowering the per-gallon sulfur caps to 20 ppm at the refinery gate and 25 ppm downstream from the current 80 ppm per gallon refinery gate and 95 ppm per-gallon downstream caps in 2020. Although EPA is setting an average sulfur gasoline standard of 10 ppm, there will be refinery-by-refinery differences in the sulfur content of fuel due to operational differences. Additionally, fuel can be contaminated during transportation through pipelines to its final destination. As a result, the fuel quality available may differ by location exposing some populations to higher tailpipe emissions than others. EPA should set the refinery gate cap and downstream cap to 20 ppm per gallon and 25 ppm per gallon respectively to limit the exposure of vehicles in-use to sulfur levels that significantly degrade pollution control performance and to ensure all communities enjoy the benefits of cleaner air.

Commenter: Consumers Union

EPA's modeling indicates that regardless of the downstream sulfur cap selected between the two options being considered (95 ppm or 65 ppm), nearly all gasoline that ends up at the pump would be close to the 10 ppm average required of refineries. Automakers will provide insight into any burdens that a higher downstream cap may place on them to design vehicles that can tolerate the higher upper limit. Although sulfur-induced corrosion of catalytic converters is largely reversible if lower sulfur gasoline is used with regularity (justifying the averaging approach), if there are retail hot spots or regional high-sulfur clusters that consistently sell gasoline towards the upper limit, car owners in these areas may find their catalytic converters fail at a higher rate, and emissions may be significantly higher in such locales.

Commenter: CountryMark Cooperative, Small Business Refiners (SBR)

EPA's own analysis in the RIA of the proposed nation-wide credit trading program predicts that only 17% of the gasoline volume, mostly from smaller than average refineries, would exceed the 10 ppm standard and the vast majority would be below 30 ppm as shown in EPA's graph.

EPA also stated in this analysis: Under this scenario, most refineries with average sulfur levels higher than 10 ppm supply areas that are also supplied by refineries with sulfur levels at 10 ppm or below. We expect dilution of higher sulfur with lower sulfur in such areas to result in average sulfur levels no higher than about 20 ppm. Of those refineries projected to have average sulfur levels higher than 10 ppm under this scenario and which are the primary or only suppliers of gasoline to a particular area, none of the affected areas have historically been in nonattainment for ozone.

We agree with the above and believe this is a worst case scenario as it assumes perfect trading of sulfur credits, which is not realistic. Some of these higher sulfur refineries will not be able to rely on a supply of credits and therefore will take steps to reduce gasoline sulfur below the levels discussed above.

Commenter: Environmental Defense Fund (EDF)

EDF requests that EPA finalize a refinery gate sulfur cap of 20 ppm and a downstream sulfur cap of 25 ppm – standards that the Agency is officially requesting comment on. More lenient standards, as proposed by EPA, will not provide as robust health protections and "vehicles still have to be designed to operate on high sulfur fuel, and there will be less attention paid to limiting contamination downstream of the refinery gate."

EDF believes that the 20 ppm and 25 ppm standards will better protect human health. EPA has also stated that the tighter per gallon caps will benefit automakers by "limit[ing] the temporary exposure of vehicles in-use to sulfur levels that would significantly degrade their emission performance." EPA also notes that the more protective caps would "serve to provide added assurance that all parts of the country would receive the full emission benefits of gasoline sulfur control."

EDF believes that the proposal gives refiners and affected downstream parties ample additional time and flexibilities to meet the more protective per-gallon caps and we urge the Agency to finalize the most protective refinery gate and downstream caps.

In the event that EPA rejects the most protective 20 ppm refinery gate and 25 ppm downstream caps in favor of one of the two proposed alternatives, then EDF believes that EPA must opt for a 50 ppm refinery gate cap and a 65 ppm downstream cap. In issuing the proposed Tier 3 rule, the Administrator found pursuant to Clean Air Act section 211(c)(1) that the emission products of higher-sulfur gasoline both: (1) cause or contribute to air pollution which may reasonably be anticipated to endanger public health or welfare; and (2) will impair to a significant degree the performance of any emissions control device or system which is either in general use or which the Administrator finds has been developed to a point where in a reasonable time it will be in general use were the fuel control to be adopted. In light of these findings and in order to "limit the temporary exposure of vehicles in-use to sulfur levels that would significantly degrade their emission performance" and assure that "all parts of the country would receive the full emission benefits of gasoline sulfur control," it would be arbitrary and capricious for EPA to set refinery gate and downstream caps that do not strengthen current standards.

Commenter: Environmental Justice Leadership Forum on Climate Change

I caution that the credit trading provision designed to offer flexibility during the transition to more efficient vehicles and cleaner fuels seems counterintuitive to uniform national standards, thereby uniform benefits. I propose that the success of the Tier 2 standards are well documented and are all the transition that we ever needed.

We casually speak of trading credits, but if we look at the transaction closely, someone is standing with a basket full of credits, and someone is standing with a basket full of disbenefits or pollution.

Because all communities deserve their share of greenhouse gas reductions, fuel savings, energy security, mitigation of disproportionate adverse health impacts, economic growth, and job creation, I ask that you consider the benefits that – or the impact that the trading provision has had on the Tier 2 standards as we move forward in Tier 3.

Commenter: Marathon Petroleum Company LP (MPC)

-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.

Commenter: Consumers Union (comment campaign)

EPA's modeling indicates that regardless of the downstream sulfur cap selected between the two options being considered (95 ppm or 65 ppm), nearly all gasoline that ends up at the pump would be close to the 10 ppm average required of refineries. Automakers will provide insight into any burdens that a higher downstream cap may place on them to design vehicles that can tolerate the higher upper limit. Although sulfur-induced corrosion of catalytic converters is largely reversible if lower sulfur gasoline is used with regularity (justifying the averaging approach), if there are retail hot spots or regional high-sulfur clusters that consistently sell gasoline towards the upper limit, car owners in these areas may find their catalytic converters fail at a higher rate, and emissions may be significantly higher in such locales.

Commenter: Natural Resources Defense Council (NRDC)

NRDC strongly supports the proposed requirement that refineries meet an annual average sulfur limit of 10 parts per million but EPA should tighten refinery gate and downstream sulfur caps.

EPA Should Tighten Refinery Gate and Downstream Sulfur Caps. To help ensure that the maximize the cost-effective pollution reductions are achieved by the lower sulfur gasoline coming from the refineries, EPA should lower the refinery gate cap to no more than 50 ppm by January 1, 2020 and the downstream cap to no more 65 ppm per gallon by March 1, 2020.

Tightening the caps from today's levels will help increase the certainty that gasoline's low sulfur qualities will be maintained throughout the production and delivery processes. Tighter caps will reduce the probability of large sulfur spikes due to production equipment outages and maintenance and the probability of severe sulfur contamination during transport from the refinery gate to the retail outlets. By enhancing the quality assurance of delivered gasoline, automakers can better optimize the design of vehicle engines and exhaust systems within a smaller range of fuel specifications and the probability that all regions of the country will see the maximum pollution reductions from lower sulfur gasoline will be enhanced.

Commenter: Northeast States for Coordinated Air Use Management (NESCAUM)

The current Tier 2 refinery gate and downstream caps of 80 and 95 ppm should be lowered to 50 and 65 ppm, respectively. Given the stringency of the 10 ppm average standard, these lower caps will provide sufficient flexibility for refiners, pipelines, terminals, transmix processors, and gasoline additive manufacturers as achieved under the Tier 2 program, while ensuring maximum reduction in downstream sulfur levels.

Long-term cap relief should not be made available in conjunction with lowering the sulfur caps below the current 80/95 ppm level. The other shorter term hardship relief options should be sufficient for all circumstances. Having noted that, it is important that refineries be given sufficient time so as not to be faced with the need to undergo two turnarounds (shutdowns and startups for major maintenance or equipment installation) in a relatively short time period. To the extent reasonable, the equipment installation for low sulfur fuel equipment should be accommodated during a normally scheduled maintenance turnaround. This avoids the excess emissions that occur during multiple shutdowns and startups of a refinery.

Commenter: Union of Concerned Scientists (UCS)

EPA should lower the refinery gate and downstream per-gallon sulfur caps to 50 and 65 parts per million (ppm), respectively from the current levels of 80 ppm at the refinery gate and 95 ppm downstream.

Reducing the sulfur content of gasoline is critical to achieving the public health and air quality benefits promised by the Tier 3 program. Combustion of sulfur in gasoline produces exhaust containing sulfur dioxide (SO2), which can cause respiratory ailments, particularly in sensitive populations like children, the elderly and people with asthma. Additionally, SO2 is a precursor to particulate matter formation; the detrimental effects of particulate matter on human health are discussed in the next section. Unlike other compounds, most notably NOx, sulfur compounds in vehicle exhaust cannot be converted into a less harmful molecule using emission control technologies like catalytic converters. Therefore, all tailpipe sulfur emissions are harmful and the only way to reduce sulfur emissions from the vehicle is to reduce its content in the fuel supply (5).

Sulfur in fuel also leads to sulfur oxides in the exhaust that poison the catalytic converter, reducing its effectiveness. Sulfur is adsorbed into the catalytic converter, greatly reducing the efficiency of the converter for cleaning up exhaust emissions such as NOx, carbon monoxide, and hydrocarbons. Therefore, reducing the sulfur content of gasoline will provide immediate public health benefits by increasing the performance of existing catalytic converters, reducing harmful emissions from the legacy fleet before complete fleet turnover has occurred. Moreover, as the nation's vehicle fleet becomes more efficient, lower sulfur fuel will enable technology advances that allow greater efficiency gains, as well as ensure that existing technology performs as anticipated. Additionally, some technologies that help deliver efficiency improvements in the vehicle fleet can also lead to cooler exhaust temperatures, which inhibit the regenerative abilities of the catalytic converter, reducing its effectiveness. Lowering the sulfur content of fuel will ensure that we are able to effectively capitalize on the full suite of technologies available to improve both vehicle emissions and efficiency.

5 - Testimony of Dr. Phil Blakeman of Johnson Matthey. Public hearing on Tier 3 Standards. Philadelphia, PA. April 24, 2013.

Our Response:

As discussed in Sections V.C.b and VII of the preamble to the final rule, our analysis for the Tier 3 final rule shows that a lower refinery gate cap would be unlikely to provide significant additional emission benefits. The emissions benefits associated with the Tier 3 program are mainly driven by the reduction in the average sulfur content of gasoline from 30 to 10 ppm, since vehicle emissions are proportional to the sulfur content of the fuel—changes in the cap would not affect this. In the context of the final ABT provisions, a higher cap does allow for increases in emissions on a temporal basis as one batch of fuel is allowed to have higher sulfur levels. However, this is then offset by reductions in emissions from batches of fuel that are then required to be below the 10 ppm average sulfur standard. Similarly, the ABT provisions allow for the possibility that the fuel from different refineries will cause varying emission reductions as one refinery's higher average sulfur levels would lead to less emission reductions in-use. However, this is then offset by greater reductions in emissions due to the fuel produced by refineries with sulfur levels below the 10 ppm average standard.

We anticipate that in most cases refineries will make operational changes and/or investments in order to reduce their credit burden and reduce their compliance costs. Further, the 10 ppm average standard by definition limits the amount of gasoline that can remain at higher sulfur levels (regardless of the cap). Thus, we anticipate that most refineries, including those using credits, will still average less than 20 or 30 ppm. Nevertheless, the final ABT program does allow for the possibility (regardless of the cap) that if higher sulfur fuel is concentrated in any certain geographical area, it would not receive the full emission reductions from the Tier 3 program. We have considered the potential for areas to consistently receive fuel that might be predominantly higher than the 10 ppm average. However, since refineries generating credits and those using credits are interspersed across the country—and because most areas receive a considerable portion of their fuel by pipeline, barge, rail, or truck from refineries in other areas—we expect the variation in average sulfur levels across the country to be too limited to warrant lowering the per-gallon cap to 50 ppm. Though, given the stringency of the 10 ppm average standard, we predict that in-use sulfur levels will generally be well below 50 ppm.

Thus, we believe it is best to retain the current Tier 2 80 ppm refinery gate cap, however we are committing to monitor and further evaluate in-use sulfur levels. As discussed above in Chapter 5.1.2.1, we will reassess the refinery gate sulfur cap level and the need for potential future regulatory action if it is warranted.

5.1.2.4. Downstream Cap Level Delta

What Commenters Said:

Commenter: Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

EPA's RIA points out refiners (particularly smaller ones) may experience intermittent spikes in sulfur in gasoline secondary to cleaning tanks and other equipment or during turnarounds (46). However, options to dilute or otherwise reduce resultant higher sulfur content in this gasoline and related costs are not discussed.

EPA also underscores that gasoline sulfur content can increase slightly from sulfur in additives, from contamination of the pipeline itself, and during pipeline transport transmix when the gasoline comes into contact with adjacent fuels such as jet fuel, that have very high sulfur content. Similar types of fuel supplier concerns raised in the Ultra-Low Sulfur Diesel rulemaking did not turn out to affect the ability to meet 15 ppm sulfur diesel requirements, despite use of the same domestic pipeline distribution systems.

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46 - RIA at 10-7.

Commenter: Independent Fuel Terminal Operators Association (IFTOA)

Recommendations: Accordingly, the Association recommends – Retention of the 15 ppm differential between the refinery/import gate and the downstream sulfur cap to address sulfur contamination as gasoline moves through the lengthy distribution system; and

Commenter: Kinder Morgan Transmix Company, LLC

We support EPA's proposal to maintain a 15-ppm differential between the proposed refinery gate sulfur cap of 50-ppm and the proposed 65-ppm downstream sulfur cap. Our support of the 15-ppm differential is based on gasoline sulfur data collected from our transmix processing facilities over a 3-year period of time. A reduction or elimination of the 15-ppm differential between the refinery gate cap and the downstream cap would have a significant impact on our operations which could result in facility shut-downs or limited operations.

We also support EPA's proposed downstream cap implementation date of 2020. We concur that based upon a 2017 refinery gate cap of 50-ppm, transmix processors would have sufficient time to evaluate the impact of the regulation on our operations prior to 2020. Transmix typically consist of varying quantities of refined petroleum products such as gasoline, diesel fuel, aviation kerosene and home heating fuel. Reducing gasoline sulfur levels as presented in the proposed regulation; combined with the existing 15-ppm sulfur limit on ultra low sulfur diesel; may result in increasing sulfur levels in aviation kerosene or home heating fuel. Aviation kerosene and home heating fuel (where not restricted by state regulations) may contain sulfur levels up to 3,000-ppm. The 2020 downstream implementation provides sufficient time to evaluate the impact of reducing gasoline sulfur levels on transmix and take corrective action if necessary.

In summary: Yes, we support EPA's proposal to maintain a 15-ppm differential between the proposed refinery gate sulfur cap of 50-ppm and the proposed 65-ppm downstream sulfur cap.

Commenter: New York State Department of Environmental Conservation

New York's fuel sampling program for 2011 and 212 shows no gasoline samples exceeding either of the existing per-gallon standards (over 8500 samples). The highest measured sulfur content was 79 ppm. There was no discernible difference between terminal samples and retail samples, suggesting that a 15 ppm downstream tolerance is larger than necessary.

Our Response:

With regard to the downstream sulfur cap, we believe that maintaining a 15 ppm differential between the refinery gate sulfur cap and the downstream sulfur cap will provide pipeline operators, transmix processors, and gasoline additive users the same flexibility as was provided under the Tier 2 program. As was the case under the Tier 2 program, allowing a 15 ppm differential is needed to ensure adequate flexibility in accommodating gasoline produced from transmix, instances of contamination during distribution, and for the use of necessary (sulfur-containing) additives. While we agree that sulfur levels of 95 ppm will not be the norm, in those rare circumstances when the sulfur contribution from all these sources are concurrently at their maximum levels, a very limited number of batches of gasoline at the 95 ppm downstream sulfur cap may be present in the distribution system. However, we do not expect that this will have a substantial impact on the average sulfur content of in-use gasoline.

Additionally, transmix processors must produce gasoline sufficiently below the 95 ppm downstream sulfur cap to accommodate any downstream sulfur increases from the use of gasoline additives and contamination from further distribution. The sulfur content of the gasoline produced by transmix processors is determined by the sulfur content of the transmix they receive, which is primarily a function of the sulfur content of gasoline and jet fuel components in the transmix. Transmix processors do not handle sufficient volumes to support the installation of desulfurization units, which would also increase the cost of the rulemaking with little to no additional emissions benefit.

Regarding comments that the 15 ppm delta is not needed because there were not contamination problems when the sulfur level in diesel fuel was reduced to 15 ppm, we note that the diesel program is quite different than the final gasoline sulfur program. During implementation of the diesel program, pipeline and downstream parties set "inlet specs" for the sulfur level of fuel that they would accept (some pipelines had inlet specs as low as 7 ppm).

Thus, the diesel fuel that refiners needed to produce had to be much lower than the 15 ppm cap to ensure that the fuel would still meet a 15 ppm sulfur standard after traveling through the distribution system. Also, the diesel sulfur program was a phased-in program that also allowed for two month transition periods for when each level of the fuel production and distribution system was required to comply (e.g., refiners were required to comply by June 1, terminal operators by August 1, etc.); the Tier 3 gasoline program does not have a transition period. Lastly, contamination of 15 ppm diesel fuel was reduced by specific batch sequencing in pipeline; however, gasoline remains susceptible to contamination by higher sulfur jet fuel and heating oil.

5.1.2.5. Other (Alternate Phase-Down, SO2, etc.)

What Commenters Said:

Commenter: Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

We also support reducing the refinery gate and retail pump per gallon caps to 20 and 25 ppm respectively for an interim time period, rather than leaving them at Tier 2 levels (80 and 95 ppm respectively), or partially reducing them to 50 and 65 ppm, respectively. In addition, we also advocate that as part of the Tier 3 rulemaking process, EPA should commit to a supplemental rulemaking to develop a pathway and timeline for reducing the retail cap for market gasoline sulfur to 10 ppm, consistent with other developed countries. This is important so that refineries can plan now for longer-term horizon of additional sulfur reduction, rather than seeing such changes as “moving the goal posts again.” It is also crucial to the product planning of Alliance and Global member companies that there is assurance that over time EPA is moving toward progressively lower sulfur standards at the retail pump toward a cap no greater than 10 ppm per gallon (45).

Tier 3 sulfur reductions are also important because, if reduced to the lowest levels suggested by EPA (25 ppm retail cap), the sulfur level will come closer to harmonizing the 20 ppm retail cap in California and will create a predictable low sulfur standard nationwide. The results in the January 2013 Alliance North American Fuel Survey show that the average sulfur content of the samples outside of California was 25 ppm,65 or approximately three times higher than the California samples average of 7 ppm, so it should be feasible to transition to a lower national retail sulfur cap.

In addition, it is important that the EPA include a pathway to continue to ratchet down the sulfur content of the per-gallon cap at the retail pump over time to reach a per-gallon retail pump level of 10 ppm, in order to optimize emission reductions.

45 - We note that EPA’s own data shows that 5 ppm is even better for reducing emissions, as evidenced in its new study cited in the Preamble and RIA.

65 - The (octane) grade weighted (pool average for US (excluding California) would be closer to 27 ppm. Survey can be purchased from the Alliance website www.autoalliance.org.

Commenter: Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

We urge EPA to reduce the refinery gate and downstream caps to 20 and 25 ppm, respectively, perhaps with a slightly longer phase in period than the refinery average, and at the same time to develop a pathway toward a retail cap of 10 ppm per gallon. Effective standards should be put in place for Tier 3, and the Agency can then provide ad hoc relief, with a notice and comment process, for refiners and downstream distributors that can show evidence or reasons they actually need it.

Because the country as a whole is already trending toward lower sulfur levels, EPA can and should finalize the means to transition to a retail cap of 25 ppm, and then plan a pathway to reach an ultimate goal of 10 ppm retail cap over the next 12-15 years. If it turns out that this goal cannot be accomplished, then EPA can modify the limit, or extend the deadline, but the policy to ultimately minimize retail gasoline sulfur to a 10 ppm cap per gallon (and reduce sulfur content of other pipeline products mingled or trans-mixed with gasoline accordingly) should be developed now, for implementation within the framework of Tier 3 authority.

Commenter: Consumers Union

EPA should consider issuing a prospective reporting or data collection requirement that could help it identify whether such hot spots emerge and whether they warrant a lower downstream sulfur cap in the future.

Commenter: General Motors LLC (GM)

In addition, is important that the EPA include a pathway to continue to ratchet down the sulfur content of the per-gallon cap at the retail pump over time to reach a per-gallon retail pump level of 10 ppm, in order to optimize emission reductions.

The Tier 3 rulemaking is the correct place to set the near-term standards for sulfur and also create a roadmap of how the agency will further reduce sulfur in the coming years.

Commenter: Consumers Union (comment campaign)

EPA should consider issuing a prospective reporting or data collection requirement that could help it identify whether such hot spots emerge and whether they warrant a lower downstream sulfur cap in the future.

Commenter: Ozone Transport Commission (OTC)

In addition to proposing an average gasoline sulfur concentration of 10 ppm, EPA proposed maintaining downstream and refinery caps of 95 ppm and 80 ppm, respectively. This was done to allow refineries to have the flexibility to economically meet the sulfur requirements through an allowance, banking, and trading (ABT) program. EPA also suggested the possibility of lower downstream and refinery caps and requested comment on these lower caps.

OTC suggests that EPA consider evaluating a gradual reduction in the sulfur caps from 2017-2025. The caps would begin at 95 and 80 ppm respectively for the downstream and refinery levels, then be reduced to 65 and 50 ppm by 2020, and finally, in 2025, be reduced to a level that harmonizes the sulfur cap nationally. This approach could still allow refineries to have the economic flexibility that they need to successfully meet the caps at a low cost, while, in the long term, limiting anomalies in the fuel market that could result in particular areas having fuels that do not reduce NOx to a level necessary to reduce ambient ozone concentrations to attainment status concentrations.

Commenter: Pennsylvania Department of Environmental Protection (DEP)

The EPA should allow the current 80 ppm fuel sulfur level refinery gate cap and the 95 ppm downstream per gallon cap. The agency should consult with the refinery industry, especially small refiners, and develop a phase-in schedule that will lower refinery gate and downstream caps to the 20 ppm to 30 ppm range by 2025.

Commenter: Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

EPA's RIA points out refiners (particularly smaller ones) may experience intermittent spikes in sulfur in gasoline secondary to cleaning tanks and other equipment or during turnarounds (46). However, options to dilute or otherwise reduce resultant higher sulfur content in this gasoline and related costs are not discussed.

EPA also underscores that gasoline sulfur content can increase slightly from sulfur in additives, from contamination of the pipeline itself, and during pipeline transport transmix when the gasoline comes into contact with adjacent fuels such as jet fuel, that have very high sulfur content. If, as the Tier 3 RIA indicates, the increase in the per gallon cap at retail from the per gallon refinery gate cap is due to the sulfur content of other current products moving through the pipeline, rather than older sulfur deposits within the pipeline itself, then one potential solution for gasoline sulfur retail cap limits is to reduce the sulfur content of these other products, which could have environmental benefits as well. If jet fuel can be as high as 2-3000 ppm sulfur, and low sulfur fuel oil can be as high as 500 ppm, then EPA should lead efforts to reduce that content and find substitute means for the lubricity loss from reduced sulfur.

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46 - RIA at 10-7.

Our Response:

As noted above in Chapter 5.1.2.1, we are committing to monitor and further evaluate in-use sulfur levels and their impact on vehicle emissions and, if it is warranted, we will reassess the sulfur cap level and the need for potential future regulatory action. This evaluation will include analyses of in-use fuel surveys, refinery batch data, and the sulfur credit market. We will also evaluate any issues or concerns that might arise during the implementing the program. Finally, we will also carry out an ongoing evaluation of data submitted by the vehicle manufacturers on the performance of their Tier 3 vehicles in-use.

5.1.3. Additives

What Commenters Said:

Commenter: Automotive Aftermarket Industry Association (AAIA)

The Automotive Aftermarket Industry Association (AAIA) appreciates this opportunity to provide comments on the proposed Tier 3 Emissions and Fuel Standards for motor vehicles. In particular, we would like to address the provision relating to sulfur content of automotive fuel additives.

AAIA supports the provision within the Tier 3 standards that proposes 'gasoline additives that are used downstream of the refinery at less than 1 volume percent must limit the sulfur contribution to the finished gasoline from the use of their additive to less than 3 ppm when the additive is used at the maximum recommended treatment rate.' At currently recommended use levels, aftermarket fuel additives contribute less than the proposed 3 ppm. Furthermore, additives are not applied every time a motor vehicle stops for a fill-up. Therefore, the sulfur contribution continues to decrease over time.

Commenter: Consumer Specialty Products Association (CSPA) & Automotive Specialty Products Alliance (ASPA)

Our organizations support the proposed rule as it pertains to the sulfur content of downstream additives used at less than 1.0 percent by volume of the resultant additive(s)/fuel mixture (Section A (3): Per-Gallon Sulfur Caps). When used at the maximum recommended treatment rate, aftermarket gasoline additives contribute less than the proposed limit of 3 parts per million sulfur to the finished gasoline. Considering most of these products are recommended for use every 3,000-10,000 miles, the overall net increase in sulfur levels is further diluted.

Manufacturers of aftermarket gasoline additives have taken many proactive steps to protect the environment, including adopting sustainable packaging initiatives – moving, where possible, to more concentrated packages, which require using less solvent, less packaging and therefore creating less freight. Additionally, aftermarket additives play an important role in the cleanup of intake valves, fuel injectors and combustion chambers, resulting in fuel economy savings and emissions reductions.

Commenter: Motor & Equipment Manufacturers Association (MEMA)

Control of fuel sulfur content is a critical aspect of Tier 3. Specifically for additives, MEMA agrees with the proposed treatment of sulfur content in downstream additives that are used at less than one percent (1.0%) by volume of the resultant additive/fuel mixture. When used at the maximum recommended treatment rate, aftermarket gasoline additives contribute less than the proposed limit of three (3) parts-per-million sulfur to the finished gasoline. Since many of these products are recommended for use every 3,000 to 10,000 miles, the overall net increase in sulfur levels is further diluted. For downstream additive manufacturers, the proposed recordkeeping requirements demonstrating compliance is reasonable and manageable.

Commenter: New York State Department of Environmental Conservation

Control of the sulfur content of gasoline additives is necessary. The proposed sulfur limits are low enough that the sulfur content of fuel additives can have a material impact on the finished gasoline sulfur content, and therefore the environmental performance. We support EPA's proposal to indirectly control the sulfur content of these additives by limiting the increase from an additive (at its maximum treat rate) to 3 ppm. We also encourage EPA to promulgate limits on the combined sulfur contribution for all additives blended into a batch of gasoline, not just for each individual additive.

We also support EPA's requirement that any blender blending an additive at a rate of 1.0 percent by volume or higher comply with the gasoline sulfur requirements applicable to refineries.

Our Response:

The Tier 3 FRM finalizes the requirement that manufacturers of gasoline additives used downstream of the refinery at less than 1 volume percent must limit the sulfur contribution to the finished gasoline from the use of their additive to no more than 3 ppm when the additive is used at the maximum recommended treatment rate. The additive manufacturer will be required to maintain records of its additive production quality control activities which demonstrate that the sulfur content of additive production batches is such that when the additive is used at its maximum recommended treatment rate it will add no more than 3 ppm to sulfur content of the finished gasoline.

These requirements are designed to prevent the potential dumping of high sulfur materials into gasoline under the guise of the addition of gasoline additives. We continue to believe that all current gasoline additives contribute less than 3 ppm to the sulfur content of the finished fuel when used at the maximum recommended treatment rate (with 3 ppm being the extreme). Normal additive production quality control practices already have had to consider the sulfur contribution of the additive to finished gasoline as a result of the Tier 2 gasoline sulfur requirements. The maximum recommended treatment rate is already stated on product transfer document or packaging for the additive. Therefore, the Tier 3 requirements for gasoline additives will not constrain the use of genuine gasoline additives or result in significant additional costs to gasoline additive manufacturers. Parties that introduce additives to gasoline at over 1.0 volume percent are required to satisfy all of the obligations of a refiner and fuel manufacturer including demonstration that the finished blend meets the applicable sulfur specification.

We believe that additional controls to limit the combined sulfur contribution for all additives blended into a batch of gasoline in addition to controlling the sulfur contribution from individual additives are not necessary at this time, would add an unwarranted additional compliance burden, and could interfere with the use of necessary downstream additives. Certain additives that provide critical fuel performance characteristics (e.g., corrosion control, demulsifiers) contain sulfur-containing compounds as an essential functional component. Such additives are used to remedy specific instances of gasoline quality problems, and their treatment rate is governed by the desire to limit the added cost from their use.

5.1.4. Leadtime

5.1.4.1. Environmental Benefit of 2017 Start Date

What Commenters Said:

Commenter: Advanced Engine Systems Institute (AESI)

Unfortunately, as occurred during the debate on EPA's Tier 2 regulations, the petroleum industry is again opposing new requirements to reduce sulfur in transportation fuels. This is happening despite the significant pollution reduction benefits that would be achieved immediately from the use of lower sulfur fuel by the existing Tier 2 fleet, and those benefits that would result from phasing in Tier 3 starting in model year 2017.

Commenter: Union of Concerned Scientists (UCS)

We concur with EPA's assessment that these lower levels are achievable and support the timelines that EPA has outlined.

Our Response:

As discussed in more detail in Section III of the preamble to the final rule, the Tier 3 program will significantly reduce emissions of VOC, NO_X (including NO_2), direct $PM_{2.5}$, CO, SO_2, and air toxics nationwide, with immediate benefits due to the reduction in gasoline sulfur content from 30 to 10 ppm starting in 2017. The 10 ppm sulfur standard will provide significant reductions in harmful emissions independent of the vehicle standards and these reductions are significant and contribute to the total monetized health benefits. The vehicle standards will also begin to reduce emissions as the cleaner cars and trucks begin to enter the fleet in model year 2017 and model year 2018, respectively. The magnitude of reduction will grow as more Tier 3 vehicles enter the fleet. These reductions will help state and local agencies in their effort to attain and maintain health-based NAAQS "as expeditiously as practicable." (Sections 172(a)(2) and 181 of the CAA). The Tier 3 emissions reductions and air quality improvements occur in a timeframe that is relevant for 2008 ozone nonattainment areas classified as moderate, serious, severe and extreme, and beginning the program in 2017 is specifically relevant for attainment of the NAAQS for moderate areas in 2018. Without the Tier 3 program, some areas would have to adopt other, less cost-effective measures to reduce emissions from other sources under their state or local authority. In the absence of additional controls, many areas would continue to have ambient ozone concentrations exceeding the NAAQS in the future. Further, by 2030, the Tier 3 gasoline sulfur and vehicle emission standards will result in emissions reductions of 21 percent for NOx and VOC emissions from on-highway vehicles, and 24 percent for CO emissions. National emissions of many air toxics from on-highway vehicles will also be reduced by 10 to nearly 30 percent.

5.1.4.2. Vehicle Need for 2017 Start Date

We received comments in support of and against our January 1, 2017 compliance date. Commenters that opposed this date argued that it was not needed in light of the implementation dates for vehicle standards. Commenters in support argued that it had to be synchronized with the 2017 compliance date for certain light duty vehicles.

What Commenters Said:

Commenter: American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM)

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.

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 NOx 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.

EPA asserts that lowering gasoline sulfur to 10 ppm is necessary to enable larger vehicles and trucks to reduce the NMOG+NOx 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.

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.

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.

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 + NOx 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.

Commenter: Johnson Matthey

Adoption of this part of the Tier 3 proposal would bring the U.S. in line with Europe and Japan, who already have these low sulfur gasoline limits, and places like China who have committed to bringing in low sulfur gasoline by the end of 2017.

Commenter: Marathon Petroleum Company LP (MPC)

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 NOx 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.

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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.

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 + NOx 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.

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.

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.

As explained above, January 1, 2017 implementation of the 10 ppm gasoline sulfur requirement is not necessary to enable vehicles to meet the NMOG + NOx 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.

Commenter: New York State Department of Environmental Conservation

The 2017 gasoline sulfur compliance date for most refineries must not be delayed.

Significant immediate benefits accrue when the gasoline sulfur content is reduced, as sulfur catalyst poisoning of existing catalytic converters is (at least partly) reversed. Although any large chemical process construction project is a substantial undertaking, the processes and equipment necessary to produce low sulfur gasoline are well known. Tier 3 has been under active discussion, with petroleum industry participation, for several years.

Commenter: Shell Oil Products for Shell and Motiva

Furthermore, as explained in more detail in the API/AFPM comments, a January 1, 2017 implementation date is not necessary to achieve EPA's stated objectives. EPA asserts that the lower sulfur levels are necessary to help heavy duty vehicles meet the vehicle emission standards over their useful life, yet those vehicle standards are not even effective until the 2018 model year, and various other provisions from the phase-in of the vehicle standards to the small refiner/refinery exemption demonstrate that the January 1, 2017 implementation date is not necessary.

Commenter: Sierra Club, Clean Air Watch, Respiratory Health Association

Tier 3 Standards complement existing vehicle standards: Finalizing the proposed Tier 3 standards by December 31, 2013 is critical to ensuring that existing vehicle standards are fully implemented. Automakers are innovating and employing advanced vehicle technologies needed to meet the historic light-duty vehicle efficiency standards that will increase fleet efficiency to an average of 54.5 miles per gallon by 2025. In order to fully utilize advanced vehicle technologies, automakers need lower-sulfur gasoline.

For lower-sulfur gasoline to reach the market in 2017, in time to synchronize with the 2017-2025 light-duty vehicle efficiency standards, the proposed Tier 3 standards must be finalized no later than December 31, 2013.

Our Response:

We disagree with the comments that the January 1, 2017 start date is not necessary given that the heavy duty emissions standards are effective with the 2018 model year. We also disagree with the commenters that argue that the phase-in schedule and flexibilities seem to suggest that there is no need for the gasoline sulfur standards to begin in 2017. As explained in Section IV of the preamble to the Tier 3 final rule, vehicle standards begin to phase in for vehicles less than 6000lbs GWVR with the 2017 model year. As also explained in Section IV of the preamble to the final rule, such vehicle manufacturers may comply with today's standards by using early credits but that does not mean they are not required to meet the standards in 2017. Thus, we expect that the vehicle standards will begin to reduce emissions as the cleaner cars the fleet in model year 2017. As also previously discussed, immediate benefits will result in 2017, as the average sulfur standard of 10 ppm will facilitate emission reductions from vehicles that are on the road today. Thus, as explained in Section III of the preamble, and as some of the commenters correctly noted, the Tier 3 sulfur standards will reduce emissions from the on-road fleet immediately upon implementation in calendar year 2017.

We also disagree with the comments that the January 1, 2017 implementation date is unnecessary given that sulfur impacts on catalyst is reversible. As discussed in more detail in Chapter 4.1.4.3 of this document and as explained in Section IV.A.6 of the preamble, operating a catalyst at a sufficiently high temperature under net reducing conditions (e.g., air-to-fuel equivalence that is net fuel-rich of stoichiometry) can effectively release the sulfur oxides from the catalyst components. Thus, regular operation at sufficiently high temperatures at rich air-to-fuel ratios can minimize the effects of fuel sulfur levels on catalyst active materials and catalyst efficiency. It cannot, however, completely eliminate the effects of sulfur poisoning. In current vehicles, desulfurization conditions occur typically at high loads when there is a degree of commanded enrichment (i.e., fuel enrichment commanded by the engine management system primarily for protection of engine and/or exhaust system components). A study of Tier 2 vehicles in the in-use fleet recently completed by EPA shows that emission levels immediately following high speed/load operation is still a function of fuel sulfur level, suggesting that lower gasoline sulfur levels will bring emission benefits unachievable by catalyst desulfurization procedures alone. For example, if a vehicle operates on gasoline with less than 10 ppm sulfur, exhaust emissions stabilize over repeat FTP tests at emissions near those of the first FTP that follows the high speed/load operation and catalyst desulfurization. Therefore, continued operation on gasoline with 10 ppm average sulfur content or lower is necessary after catalyst desulfurization in order to achieve emissions reductions with the current in-use fleet. We also explained that to the extent such conditions do not occur today as part of normal driving for vehicles in the in-use fleet, there is no practical way to modify such existing vehicles to do so. Thus, reducing fuel sulfur levels has been the primary regulatory mechanism to minimize sulfur contamination of the catalyst and ensure optimum emissions performance over the useful life of a vehicle and is the only effective means for the in-use fleet.

For Tier 3 vehicles, there are several reasons why regular operation at the high exhaust temperatures and rich air-to-fuel ratios necessary for catalyst desulfurization is not desirable and may not be possible. The temperatures necessary to release sulfur oxides are high enough to lead to thermal degradation of the catalyst over time through thermal sintering of active materials. Sintering reduces the surface area available to participate in reactions. Additionally, it is not always possible to maintain these catalyst temperatures (because of cold weather, idle conditions, light load operation). Also, the air-to-fuel ratios necessary for sulfur removal can result in increased PM, NMOG and CO emissions.

While the fuel ABT provisions and small refiner/small volume refinery provisions already allow this to some degree – in order to provide a smooth phase-in of the 10 ppm average sulfur standard – delaying the standard would exacerbate this further. Since, as discussed in Section V.L of the preamble to the final rule, we believe there is sufficient lead time provided to refiners, there seems to be no reason to delay implementation of the fuel standards further.

The Tier 3 light-duty vehicle emissions standards will phase in beginning with model year (MY) 2017. This will enable auto manufacturers to be able to design a 50-state fleet of vehicles as a 2017 start date will harmonize the Federal standards with the California LEV III program. Further, we also have designed the Tier 3 program to be implemented in the same timeframe as the GHG emissions and fuel economy standards for model years 2017-2025. The 2017 start date of the Tier 3 program addresses interactions with the 2017 LD GHG rule in a manner that aligns implementation of the two programs, to achieve significant criteria pollutant and GHG emissions reductions while providing regulatory certainty and compliance efficiency. Thus, vehicle manufacturers will be able to design new vehicle platforms for compliance with both the GHG and Tier 3 standards at the same time.

Delaying the program to 2018 would not only negate the benefits of harmonizing with LEV III and the LD GHG program, it would also delay important health benefits that come from the systems approach of beginning the Tier 3 vehicle and fuel standards in tandem. The vehicle and fuel ABT programs, small refiner/small refinery provisions, and vehicle phase-in allow for the Tier 3 program to begin in 2017, while offering manufacturers and refiners the ability to spread out their compliance costs in the manner that best works for their specific situations.

5.1.4.3. Refinery Lead Time

5.1.4.3.1. Overall Lead Time Required

What Commenters Said:

Commenter: American Fuel & Petrochemical Manufacturers (AFPM)
Organization Type: Fuels Industry

We believe that there should be at least five years between the promulgation of a Tier 3 rule that includes reduction in the sulfur content, gasoline, and its effective date. Refiners need this lead time to schedule equipment modifications or the installation of new equipment during a turnaround. Otherwise refiners may be temporarily shut down with the associated supply impacts.

Tier 3 is not required by law, and the selection of 2017 is arbitrary. If the EPA promulgates a reduction in the sulfur content of gasoline in late 2013, then the effective date should not be earlier than 2019.

Commenter: American Petroleum Institute (API) and the Association of Fuel & Petrochemical

Manufacturers (AFPM)

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.

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.

EPA's three-year lead time is grossly inadequate. Six years is workable. Five years is the absolute minimum. Three years is insufficient to ensure against market disruptions. Refiners are able to operate for about five years between turnarounds, which is the most efficient time to make major changes. A three-year lead time means that normal maintenance schedules are likely to be disrupted, potentially impacting gasoline supply and increasing the overall cost.

Commenter: BP Products North America Inc.

Achieving the proposed January 1, 2017 effective date raises major concerns across BP. The availability of sufficient sulfur credits under the proposed Averaging, Banking and Trading program also raises major concerns. Even the availability of credits from 2014 will not be known until early 2015, less than 2 years from EPA's proposed effective date. Completing the necessary engineering, permitting, procurement, construction and startup by January 1, 2017 is highly unlikely. Pursuing completion of the investments on a compressed schedule also leads to increased costs. In order to complete the necessary investments and minimize unnecessary costs, BP proposes that EPA provide five years of lead time from the date the final rule is published. BP also agrees with API and AFPM's conclusion that the 10 ppm annual average gasoline sulfur standard is not necessary on January 1, 2017 as asserted by EPA.

Commenter: Chevron Products Company

We are opposed to the implementation schedule proposed by the EPA. The 2017 compliance deadline does not provide sufficient time to make necessary refinery modifications and would significantly increase the cost of the required upgrades. If the agency proceeds with the gasoline sulfur reduction requirement, the program start date should be no sooner than five years after the date of the final regulation.

We do not agree with the program start date of January 1, 2017 as this date only provides 3 years for implementation, assuming the rule is finalized by the end of 2013. This is insufficient for a refinery that is required to invest and chooses to do so by the start of the program. By comparison, the Tier 2 program was finalized in 1999, with implementation phased in from 2004 to 2006. The Tier 3 program start date should be extended to allow a minimum of five years for implementation. We would propose a start date of January 1, 2019, assuming that the Tier 3 regulations are finalized by January 1, 2014.

We agree that the technology for sulfur reduction to the 10 ppm level is available and has been demonstrated at certain refineries in operation today. However, we believe that EPA has underestimated the cost and complexity of the changes which will be required in the refining industry to achieve this reduction.

The time required for permitting is becoming longer due to local regulations and GHG programs. We do not agree that the analysis of permit times should be limited to the estimates provided by OAQPS. We are seeing other government agencies placing additional requirements on refinery permits for a variety of GHG, safety, and environmental concerns, all of which increase the time required to obtain a permit. California refineries producing gasoline subject to the Tier 3 regulations may encounter even longer permitting times and increased scrutiny, taking them well beyond the proposed implementation period.

Commenter: ExxonMobil

If the Agency decides to proceed with this rulemaking, we recommend that EPA provide a five year lead time from the publication date of the final rule in the Federal Register before implementation of a new fuel standard;

Commenter: Independent Fuel Terminal Operators Association (IFTOA)

The Association recognizes that EPA is proposing to require a significant reduction in the sulfur content of gasoline, beginning in 2017, as part of a systems approach to addressing the impacts of motor vehicles and fuels on air quality and public health. However, Members have concerns that the proposed rule is very aggressive and far more burdensome and costly than the Agency envisions. Therefore, the Association's recommendations set out below would more properly balance the goal of better air quality and the costs and burdens associated with implementation. If a better balance is achieved, the benefits to the consuming public would be enhanced.

A primary concern of Association Members is the proposed January 1, 2017 implementation date for the Tier 3 annual average sulfur standard of 10 ppm. Assuming that the final Tier 3 rule is issued by EPA at the end of 2013, refiners and importers would have only three years in which to comply. Three years is simply insufficient to make such major modifications.

Fourth, approval for funding for such major changes is a time-consuming and often difficult process. The estimated schedule put forth by EPA does not appear to include the time needed to obtain or allocate such funding.

The EPA appears to assume that there would be ample early credits available to assist refiners (provide flexibility) in meeting the three-year implementation date by deferring investments. To date, there is insufficient information available to EPA and the market about the volume of early credits that would or could be generated before the implementation date. Therefore, industry could not, during the planning stages, rely on the fact that there would be an adequate supply of such credits.

Recommendation: Accordingly, the Association recommends that EPA amend its proposed rule and make the annual average sulfur standard of 10 ppm effective no earlier than January 1, 2019.

Delay implementation of the proposed Tier 3 standard until at least 2019 to give the regulated community sufficient time to make necessary refinery changes in an efficient and cost-effective manner;

Commenter: Irving Oil Terminals Inc.

Irving Oil commends EPA's efforts to improve air quality through the reduction of sulfur content in motor gasoline; however, as outlined in our attached comments, the proposed 2017 Effective Date causes great concern because the 10 ppm annual average sulfur content standard cannot be achieved as quickly as EPA desires. Typically, the modifications required to comply with the proposed standard would be conducted during a five-year turnaround cycle at a refinery during which all major renovations, new units and reconfigurations are implemented. A three-year implementation period will increase operational risk to refiners, create inefficiencies, increase expense for many entities and increase the risk of supply disruptions. Industry needs adequate time to plan, finance and implement the significant changes required to meet the proposed Tier 3 standards. A 2019 Effective Date will provide the minimal five-year timeframe for these complex and costly adjustments to be implemented.

Moreover, when the EPA initiated discussions on the Tier 3 rule with the regulated community in 2011, it anticipated that the final rule would be issued by 2012, and provided refiners with a five-year timeframe to make the necessary adjustments by creating a 2017 Effective Date. Delay in issuing the final rule —expected now to be by the end of 2013 — warrants an extension of the Effective Date to at least 2019 — thereby preserving the original five-year implementation schedule. This proposed timeline is consistent with the previous implementation of both the Tier 2 and Ultra Low Sulfur Diesel (ULSD) rules.

Even though the proposed rule has been highly anticipated by the regulated community, design approval for major capital investments can only proceed with 'regulatory clarity' which will not exist until the final rule is issued.

Accordingly, adoption of the 2019 Effective Date for the 10 ppm annual average sulfur standard, along with incentives encouraging the generation of early credits at the earliest possible date, will allow industry to achieve compliance in the most efficient and cost-effective manner while meeting EPA's objectives for cleaner air.

Irving Oil fully supports the Agency's desire to reduce sulfur in motor gasoline as a means of minimizing air pollution as soon as possible. However, as discussed below, the proposed effective date— 2017 — will not provide the regulated community with sufficient time to implement the changes required and could result in substantial supply chain challenges, supply disruptions and unnecessary additional costs. Ensuring compliance with the proposed change in sulfur content is a significant undertaking. Accordingly, the EPA should make the effective date, January 1, 2019. Assuming the final rule will be issued at the end of 2013, this revised effective date would reduce business risk to refiners, allowing time to make the necessary adjustments in an efficient and cost-effective manner while continuing to produce adequate supplies of motor gasoline to meet consumer demand.

In the Preamble that accompanied the Proposed Rule, EPA recognizes that gasoline refining is a complex operation, and refiners would have to take many steps to comply with the proposed Tier 3 sulfur standards. These steps include scoping studies, financing, process design for new or revamped refinery units or subunits, permitting, detailed engineering based on the process design, field construction of the sulfur reduction units, and start-up and shakedown of the newly-installed desulfurization equipment. The Agency states that it conducted a lead time analysis and spoke with refiners to determine the amount of time that a typical refiner would take to complete renovations and meet the 10 ppm sulfur standard. EPA has proposed that a lead time of three years is sufficient. The details of the Agency analysis are set out in Table V-3 — 'Anticipated Compliance Timelines.'

Irving Oil has reviewed EPA's information on 'lead times' and believes that it is overly optimistic. Also, some of the data on which the determination was made are now out of date due to major changes that are occurring in the petroleum industry. The following are several significant reasons why a three-year lead time is insufficient:

1. Those companies that license the technology to desulfurize motor gasoline have limited resources and likely would be unable to support many simultaneous scoping studies and process designs. Thus, some refiners would not be able to begin these activities as early as needed to support a three-year lead time.
2. Irving Oil agrees with EPA's assessment that most refiners would revamp existing FCC gasoline post-treaters rather than constructing grassroots units. However, Irving Oil has often found that revamping units, particularly during the early project phases (the scoping study and process design) is more complex and time consuming than building and installing an entirely new, grassroots unit. Therefore, EPA's assumption that refiners can revamp existing units more rapidly is not supported by Irving Oil's many years of experience.
3. EPA has indicated that some of the initial phases of the revamping project can overlap, thereby saving additional time. Again, this assumption is contrary to Irving Oil's experience and belief. Irving Oil has found that the process design phase cannot be started until after the scoping study is complete. Thus, it is more reasonable to assume that the time needed to make the appropriate changes to the refinery would be the same for both a revamping of units and the installation of new units.
4. The EPA believes that there would be sufficient resources (technology licensors, engineering and construction services, skilled laborers, and equipment) available to the refining industry. However, EPA must recognize that the U.S is undergoing a domestic petroleum renaissance, and demand for these resources in new areas of production such as North Dakota, Montana, and Texas is great. Those projects would compete for resources directly with refiners trying to meet the EPA three-year time schedule. Shortages of these resources would, therefore, likely inhibit the ability of refiners to comply in a timely manner.
5. While the early credit provision of the Tier 3 program may provide refiners with some flexibility to meet the proposed January 1 2017 compliance deadline, the number of such credits available on the market cannot be predicted with any certainty. Refiners would carefully balance the costs associated with the production of lower sulfur motor gasoline in 2014 to 2016 with the value derived from selling such early credits. Thus, EPA and the industry cannot assume that early credits would provide refiners with enough assistance to comply with the effective dates as proposed.

Recommendations: Change Effective Date to 2019. Irving Oil understands EPA's desire to reduce air pollution by requiring the use of lower sulfur fuels. However, it is essential for the EPA to promulgate this new standard in a manner and timeframe that does not disadvantage members of the regulated community and provides sufficient time for refiners to plan and execute capital investments efficiently.

Therefore, Irving Oil strongly recommends that EPA change the 'effective date' of the proposed Tier 3 rule to 2019 — thereby providing at least five years for implementation of this complex and costly program. In this way, EPA would achieve its clean air objectives and minimize potential supply disruptions and costs associated with compliance that would ultimately be borne by consumers. Adoption of 2019 as the effective date and extension of early credits from 2013 until three years following the effective date would properly balance these important objectives.

Commenter: Marathon Petroleum Company LP (MPC)

The Agency must extend the implementation date until January 1, 2019 or five years after the final rule is issued.

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.

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. We suggest that EPA provide 5 years of lead time. As discussed above, rushing implementation of the gasoline sulfur requirement is not necessary. Not only is it unnecessary, 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. 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 have not already been decided before the Agency even issued this notice of proposed rulemaking. 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 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.

Commenter: Michigan Department of Environmental Quality (MDEQ)

The deadline proposed should be more than enough time given that the technology and methods are already available.

Commenter: Mid-Atlantic Regional Air Management Association Inc. (MARAMA)

MARAMA states recognize that the proposed rules may increase costs for some refineries located in this region, and raise the cost of gasoline. MARAMA supports EPA's efforts to mitigate those costs by providing time to install needed equipment at refineries.

Commenter: Monroe Energy, LLC

In addition, the controls will take at least 2 years to design and engineer and will necessitate a shutdown of the refinery for tie-in. Like most refineries in the United States, Monroe operates on a 5 year turnaround cycle. Monroe's next turnaround is scheduled for 2018. Therefore, in order to comply in a timely manner with the Tier 3 gasoline sulfur standard, Monroe would be forced to take an out of sequence maintenance turnaround, shutting off its production and costing the refinery millions of dollars of lost operating revenues, or it will be forced to buy credits from other refiners in order to comply. EPA's rules should provide sufficient lead time so that refiners have time to install controls and are not required to rely on purchasing credits from other refiners in order to comply. Therefore, the rule should give refiners no less than six years to comply from the time the rule is issued to ensure that all refiners have adequate lead time to design, engineer, and install controls without taking unscheduled or out of sequence turnarounds or buying credits from other refiners.

Commenter: New York State Department of Environmental Conservation

EPA estimates (Chapter 4 of the RIA) that three years will be necessary for the design, permitting, construction and commissioning of grass roots Fluid Catalytic Cracking (FCC) gasoline hydrotreaters. Revamps are expected to require two years. The Tier 3 proposal provides more than three years lead time, six for smaller refineries. Even if there are cases where three years are insufficient, the Averaging, Banking, and Trading provisions of the proposed rule provide additional compliance flexibility.

While industry-wide compliance significantly earlier than 2017 may be difficult to achieve, the proposed compliance dates provide ample time for industry to make the changes needed to reduce gasoline sulfur content, and should be promulgated unchanged.

Commenter: PBF Energy Inc.

PBF conducted a preliminary facility review to evaluate the modifications needed to comply with the new proposed fuel standards. We found that all three PBF refineries will require significant investments to comply with the proposed new regulation to meet the 10 ppm annual average gasoline sulfur standard.

Additionally, PBF is concerned that the timing of this regulation when coupled with the impact of other fuels regulatory programs RFS2, Ozone NAAQs, and Northeast States switching to 15 ppm sulfur home heating oil places a significant regulatory related economic burden at the same time the EPA is proposing to enact the new Tier3 gasoline sulfur standards. The Northeast gasoline market is highly competitive and the imposition of the added regulatory compliance costs associated with each program will have a significant impact on business outlook, regional investment decisions, and PBF's competitiveness versus imported gasoline products.

PBF requests that the EPA review the timing of all regulatory impacts and defer the implementation of the Tier 3 gasoline sulfur standard until it is actually needed by the new Tier 3 motor vehicles being rolled out with the most stringent fuel requirements at the end of the vehicle early credit program.

Commenter: Phillips 66 Company

Implementation date - The January 1, 2017 implementation date does not provide sufficient lead time for refineries to complete needed capital projects.

The API and AFPM comments provide detailed analysis of EPA's justification of the proposed 10 ppm average sulfur standard. These comments address the areas of the technical need for a 10 ppm sulfur level, the environmental impact, and the cost-benefit analysis. Phillips 66 participated in the development of these comments, agrees with the content, and questions the justification for the revised sulfur standards. We are not specifically addressing these aspects of the rulemaking in our comments but are relying on the API/AFPM comments to convey our views on these issues.

Implementation Date – January 1, 2017 does not provide sufficient lead time for refineries to complete projects.

The proposed implementation date of January 1, 2017 does not provide adequate lead time for refineries to implement needed capital projects. EPA has proposed this aggressive timeline and uses two basic arguments to support their proposal. Firstly, EPA predicts that most projects will be of moderate scope and therefore refiners can complete needed capital projects within a 3-year time frame. Based on our initial analysis, we expect our company (and likely industry) will be faced with projects of significant scope requiring more than 3 years to complete.

Project Scope: EPA provided two project timeline estimates in the proposed rule – one for unit revamps (24 months) and one for new grass roots units (36 months). We believe EPA has underestimated the time requirement for every phase of a project – whether a revamp or a new unit.

In its investigations, EPA concludes that most refineries will require only projects of moderate revamp scope and that a relatively few will require grass roots desulfurization investments. The DRIA is quoted, "For companies that already have an FCC naphtha postreater we assumed that all that would be necessary to meet the proposed sulfur standards was to revamp their existing FCC postreating units." Also in its analysis, EPA uses a PADD average approach which may neglect individual refinery configurations.

To reduce sulfur in gasoline, it is common for refiners to separate the FCC naphtha stream into several streams with differing characteristics requiring different treatment technologies. Some of these separated streams, but not all, may currently be undergoing sulfur reduction. The likely approach to achieving Tier 3 will be to treat the remaining FCC streams plus additional light streams from other process units. Due to the differences in characterization, the in-place technology likely will not be appropriate to treat the remaining untreated stream(s) required for Tier 3 and therefore revamp(s) would not be chosen. For example, heavy FCC naphtha contains a significantly higher amount of sulfur and uses a technology that is not appropriate for light FCC naphtha. In cases where a refinery is currently only treating the heavy FCC naphtha, refiners will require new grass roots units to treat other portions of the FCC naphtha, tailored to the individual characteristics of the untreated streams.

These extensive projects and the fact that industry will be competing for many of the same engineering, procurement and field resources to complete them, requires significantly more time than EPA is providing in its proposal.

Project time requirements: Our experience with both grassroots projects and significant revamps of this magnitude is that they require well in excess of three years to complete. As such, EPA should extend the compliance date to coincide with 5 years from issuance of the final rule.

Below are two projects time lines, for a grassroots and revamp, provided by Phillips 66 internal project management staff. As shown the grass roots projects will need almost 5 years to complete. By comparison, the revamp project can be completed in only 6 months less time. As such, we believe that EPA has underestimated the time requirement and uncertainty for every phase of a project.

In particular, a critical phase of any project is in the initial scoping. It is imperative that refineries take the requisite time needed to fully evaluate various technology options and operating configurations. It may be necessary to incorporate other facets into the project, such as alleviating existing bottlenecks to allow full operational optimization and flexibility with any new or revamped units. Technology vendors continue to work on improvements especially in the area of catalyst technology. It is a very time consuming effort to work with multiple technology vendors to evaluate various feed streams with their technologies and then do economic evaluations on the different options. In order to meet a January 1, 2017 implementation date, a refinery would need to have already completed the project scoping phase, well in advance of the final rule. Since there is uncertainty in when the final rule will be issued, and in the provisions it will contain, refiners cannot set a final design basis. They therefore cannot complete scoping until the final rule is issued.

The industry is requesting a lead time of 5 years from final rule issue, should EPA proceed with a modification of the standard. This timing would provide sufficient lead time and would fit better with the 5-year refinery turnaround cycles.

The proposed changes in gasoline sulfur level represent a significant change and one that will require wide scale refinery investment. Although EPA did initially start talking about potential changes to the gasoline sulfur standards almost two years ago, it did not promulgate a notice of proposed rulemaking until May 21, 2013. EPA has proposed a very aggressive implementation date of January 1, 2017 for the proposed new standard to take effect. EPAs justification for this short implementation timing is a combination of estimated project timelines and ability to generate early credits to help forestall capital investment. Phillips 66 believes that the Agency has been overly optimistic in both their estimate of required time for various project phases as well as the refining industry’s ability to generate early credits. Refineries that require modifications be complete in order to meet the new standard need more time than what is proposed to complete their projects. Existing units are limited in their capability to further reduce sulfur content and the collective cost to generate early credits may be very high (lost octane, shortened run length that would necessitate additional shut down, etc.). Phillips 66, along with others in the industry, is requesting EPA provide a 5 year lead time to allow needed project completion.

Commenter: Shell Oil Products for Shell and Motiva

EPA is proposing to make the 10 ppm annual average gasoline sulfur standard effective on January 1, 2017. Assuming that EPA issues the final rule by the end of 2013, that leaves only three years of lead time. We urge EPA to provide additional lead time. Three years is simply not enough time to allow obligated parties to adequately plan and implement the changes that will be necessary to reduce sulfur from the current 30 ppm annual average standard to the 10 ppm standard. It also does not allow refiners to optimize their plans and to integrate the necessary changes into existing turn-around and maintenance plans. The result of such a rushed implementation is likely to be higher compliance costs, which could translate in to higher prices for consumers.

Our Response:

We received several requests for extension of time from 3years to 5years. These requests justified the additional time on grounds of compliance costs and state/federal permitting requirements resulting from new regulations such as the GHG rule. Several commenters also stated that we had underestimated the project time lines for revamps and installation of grassroots units.

We disagree with the comments that a 3 year lead time is insufficient for refiners to comply with today's sulfur standards. We acknowledge that an adequate amount of lead time is required for the implementation of any rulemaking. Depending on the level of effort required to comply, more or less lead time is also required. Section 211(c) of the Act is silent on the compliance date for standards promulgated there under. We are therefore exercising our discretion in setting an appropriate compliance period for today's standards. In doing so we have considered various factors such as the time needed to select the technology and the vendor that will provide the technology with which they will comply with the fuels standard; time needed to arrange an engineering and construction (E & C) contractor which will design and oversee the construction of the refinery unit and the time needed to obtain the necessary permits and procure the necessary hardware. Further, we have considered the time needed to construct the unit and the time needed to make the necessary unit tie-ins of the unit with the rest of the refinery and then startup the unit. In response to these time considerations, we have provided a generous ABT program as well as provisions allowing for the phase-in of sulfur standards beginning in 2017 and through 2019. As also previously explained, EPA is also adopting Tier 3 emissions standards for motor vehicles under section 202. These vehicle standards begin to phase-in for vehicles less than 6000lbs GWVR with the 2017 model year. As discussed in Section IV.A.6 of the preamble, for new vehicles, the use of 10 ppm average sulfur fuel is an essential part of achieving Tier 3 levels while applying an array of advancements in emissions control technology to the light-duty fleet.

The commenters supporting more lead time, focused solely on the January 1, 2017 start date and failed to take into account that the standard is actually phased-in through the flexibilities provided through 2019. Focusing solely on the January 1, 2017 start data for larger refineries does not reflect the significant flexibilities provided by the Tier 3 averaging, banking, and trading provisions, the delayed start for small refiners and small volume refineries, the ability to carry over credits from Tier 2, and the availability of hardship relief as a failsafe. Were the program to have been designed without these flexibilities, then their comments would have been more relevant. With these flexibilities, the final Tier 3 program provides ample lead time.

As discussed in Section V.D of the preamble to the final rule, we are finalizing an averaging, banking and trading (ABT) program that would significantly help refiners comply with the January 1, 2017 start date. There are three provisions of the ABT program which help with respect to leadtime and we have concluded that when these ABT provisions are taken into account, refiners will essentially have the equivalent of 6 years of leadtime. The ABT program allows for ongoing intra-company and inter-company trading nationwide. This will allow some refineries to over-comply with the 10 ppm gasoline sulfur standard (in our analysis, we modeled these refineries bringing their gasoline down to 5 ppm), allowing other refineries that would otherwise need to install grassroots units to not invest and purchase credits instead. This aspect of the ABT program is very important because our analysis estimates that only one refinery would need to install a grassroots hydrotreater whereas without the ABT provisions, there could be as many as 20 grassroots units. This one aspect has important implications for leadtime because as discussed in the above, revamps require two years or less whereas grassroots FCC postreater units require approximately three years to install. We are convinced that this aspect of the ABT program will be utilized to the maximum extent possible because refineries revamping their postreaters in lieu of installing grassroots postreaters results in the most cost-effective mechanism for meeting the 10 ppm annual average standard.

An important question is whether refiners will not invest in a grassroots unit trusting that the credits will be freely available. For the NPRM, we conservatively assumed that refiners would only rely on credits if they could generate them internal to the company. As discussed in Section V.L. of the preamble and Chapter 4.4 of the RIA, we assessed how the sulfur credits were being traded under Tier 2 and we found that over half the sulfur credits were freely traded between companies (as opposed to only being used within companies), and many single-refinery companies had sulfur levels above 30 ppm (single-refinery companies must purchase credits from other companies). Because we set up the Tier 3 credit trading program to work just like the Tier 2 credit trading program, we are confident that there will be widespread trading within and between refining companies which means that few grassroots units will be need to be built for Tier 3.

A second aspect of the ABT program that helps with leadtime is the provision for generating early sulfur credits and banking them for later use. This provision allows refineries to reduce their gasoline sulfur to less than 30 ppm prior to January 1, 2017 and bank the credits for later use. Based on comments that we received on the proposed rule, we are allowing Tier 2 credits which are generated during the years 2012 and 2013 to also be used to show compliance for Tier 3. This effectively extends the early credit generation period for Tier 3 to encompass the years 2012 to 2016, which is 5 years. Analyzing the 2012 gasoline quality data that refiners reported to EPA, we found that gasoline sulfur levels in the U.S. averaged 26.7 ppm. Thus, refiners have already begun overcomplying with Tier 2 by 3.3 ppm, and are therefore already generating early credits for Tier 3. If refiners do nothing more but continue to overcomply with Tier 2 by 3.3 ppm over the 5 years of early credit generation, refiners will have generated enough credits to delay the completion of their capital projects by more than one year. Furthermore since those credits generated in 2012 and 2013 will expire in 2017 and 2018 respectively, refiners will have an incentive to either use them themselves or trade them in 2017 and 2018. Thus refiners that may need to count on them to delay their capital investment are likely to be able to have access to them.

We believe that refiners will generate a lot more early credits with their existing gasoline sulfur control units than the 3.3 ppm we observed in 2012. As we discussed in our cost analysis, to produce more diesel fuel in response to a greater demand for diesel fuel relative to gasoline, refiners are undercutting the swingcut portion of FCC naphtha at their refineries.[1] This action to shift what historically was blended into the gasoline pool to the diesel fuel pool, also dramatically reduces the sulfur content of the gasoline pool. If the entire swingcut portion of FCC naphtha is undercut to the diesel fuel pool, the amount of sulfur in the gasoline pool is reduced by about 50 percent. Our cost analysis estimates that at almost one quarter of U.S. refineries, refiners are fully undercutting the FCC naphtha to diesel fuel today. At many other refineries, our cost analysis estimates that refiners are partially undercutting their FCC naphtha. These refineries will be able to reduce the sulfur of their gasoline well below their current levels and generate a large number of early credits for Tier 3. Even for the subset of refineries where FCC naphtha is not being undercut, refiners can assess how much activity or catalyst life is left in its FCC postreater catalyst and compare this time with the time to the next turnaround when the FCC postreater catalyst is scheduled to be replaced. If there is spare catalyst life, the refiner

[1] The term swingcut means that this portion of the FCC product pool can be blended into gasoline or diesel fuel while still meeting the fuel quality specifications for either fuel regardless of where this swingcut is blended.

could elect to increase the severity of their postreaters to reduce their gasoline sulfur levels to under 30 ppm. With this strategy, the refiner would generate early sulfur credits. Also, when the refiner replaces the catalyst in its Tier 2 postreater, it can elect to do so with a more active catalyst which would allow the refinery to produce gasoline at sulfur levels below 30 ppm and generate more early credits for Tier 3.

Based on the early actions refiners are either already taking, or could take, to reduce their gasoline sulfur levels, we believe that refiners would be able to reduce their gasoline sulfur to as low as 20 ppm, on average, without making any capital investments. By averaging 20 ppm for 2.5 years prior to 2017, refiners would be able to delay completion of all capital investments for Tier 3 until mid 2019. If we add the 3.3 ppm of credits during 2012, 2013 and first part of 2014, refiners would be able to delay completion of all capital investments in Tier 3 until 2020. Thus, the early credit provisions in-effect can provide nearly 6 years of leadtime for full compliance with the fuels program. This will allow ample time for refiners to complete their investment and schedule their tie-ins during normal shutdown activities. It effectively provides even more lead time than 5 years that the refining industry requested in their comments. The delay in the program implementation will also help to distribute the demand on the E & C industry over more years ensuring that the E & C industry would not be overwhelmed. Thus, the Tier 3 program with a very flexible ABT program provides ample leadtime. In chapter 4 of the RIA we provide multiple examples of how the refining industry can comply with the January 1, 2017 start date which accounts for the types of projects that will need to be installed, a range of the credit market size that will exist and the timing associated with tying-in the revamp or grassroots unit with the rest of the refinery.

As discussed in more detail in Section V.E.1 of the preamble, the provisions for small refiners and small volume refineries is a third aspect of the Tier 3 ABT provisions that helps with leadtime. Small refiners and small volume refineries (i.e., refineries processing less than or equal to 75,000 net barrels per day of crude oil) are exempted from complying with the 10 ppm average sulfur standard until 2020. This provides an estimated 36 refineries, of the total 108 refineries, nearly 6 years of lead time; again more than the 5 years that the refining industry requested in their comments. As a group, we believe that these refiners and refineries are disproportionally impacted when it comes to their cost of compliance and ability to rationalize investment costs in today's gasoline market. Giving these refiners and refineries additional lead time provides more time to invest in desulfurization technology, take advantage of advancements in technology, develop confidence in a Tier 3 credit market as a means of compliance, and avoid competition for capital, engineering, and construction resources with the larger refineries. The small refiner and small volume refinery exemption until 2020 reduces the number of refineries which will need to make a significant capital investment to comply with Tier 3 prior to 2020 to a total of 49 non-small refineries (48 revamps and 1 grassroots unit), thus 15 refineries could wait to take action until 2020. Although the small refiners and small volume refineries are not required to comply with Tier 3 until 2020, they can still generate early credits (from January 1, 2017 through December 31, 2019) relative to 30 ppm for sale to other small refiners/small volume refineries, and relative to 10 ppm for sale to non-small refiners. Such credits generated relative to 10 ppm could provide another pool of early credits for Tier 3.

In summary, the ABT program provides ample flexibility for complying with Tier 3. The averaging provisions will allow refiners that only need to revamp their Tier 2 postreaters to overcomply and generate credits which will allow refineries that otherwise need to install grassroots units to comply solely through the purchasing of credits. The banking provisions, which allow refiners to generate early credits, effectively delays investments for compliance to potentially as late as the year 2020. Finally, the small refiner and small refinery provisions delay compliance for approximately 30 refiners until 2020. The provisions also allow them to generate and sell credits during this period if they so choose. All these ABT provisions effectively address the leadtime concerns. Furthermore, were we to shift the start date back another 2 years as the refinery industry suggests in their comments, it would provide nearly 8 years of leadtime for refinery changes that require just 2 or 3 years to complete. Refiners would not have to even begin taking action for Tier 3 for a couple of years. Given that the lead time and associated programmatic flexibility we are finalizing is sufficient to allow industry to readily comply, we do not expect that a delay in the start date of the fuel standards would change the cost of compliance discussed in Chapter 5. Any further delay in the program start date would simply delay the actions to comply. Furthermore, delaying the start of the program would forego significant emissions, air quality, and health benefits.

What Commenters Said:

Commenter: American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM)

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.

Our Response:

Our leadtime assessment is based on complying after the Tier 3 rulemaking is promulgated. The conversations we held with refining companies only figured into the means for compliance.

5.1.4.3.2. Impact of Turnaround Timing on Leadtime

What Commenters Said:

Commenter: Phillips 66 Company

Additionally, industry turnaround Intervals are typically every 4 to 5 years. An implementation date of January 1, 2017, about 3 1/2 years from publication of the proposed rule does not sync well with the refinery cycles. For example, if a refinery's normal turnaround date is 2014 and again in 2019, there is not enough time to design, plan and execute the needed modifications during the 2014 shutdown. In this case, refiners would be forced either to use credits in 2017, 2018 and part of 2019 until they could complete projects or to take a shut downs outside of normal turnaround intervals. We question the availability of adequate credits available to industry and believe that many refineries will require process unit shutdowns ahead of schedule.

Commenter: Chevron Products Company

The 2017 start date may have a negative impact on gasoline supply during the implementation phase of the program. Ideally, refiners would be able to schedule investment to correspond with their existing maintenance schedules, which often occur on 4 to 5 year intervals. Requiring investments and construction to occur in a limited three-year window may compel refineries to schedule additional off-cycle turnarounds which can reduce refinery utilization rates and also reduce the supply of products to the market.

Commenter: Irving Oil Terminals Inc.

Irving Oil commends EPA's efforts to improve air quality through the reduction of sulfur content in motor gasoline; however, as outlined in our attached comments, the proposed 2017 Effective Date causes great concern because the 10 ppm annual average sulfur content standard cannot be achieved as quickly as EPA desires. Typically, the modifications required to comply with the proposed standard would be conducted during a five-year turnaround cycle at a refinery during which all major renovations, new units and reconfigurations are implemented. A three-year implementation period will increase operational risk to refiners, create inefficiencies, increase expense for many entities and increase the risk of supply disruptions. Industry needs adequate time to plan, finance and implement the significant changes required to meet the proposed Tier 3 standards. A 2019 Effective Date will provide the minimal five-year timeframe for these complex and costly adjustments to be implemented.

Every year, refineries shut down select units in their facilities and perform regular inspections and maintenance. These planned 'turnarounds' last about four weeks and are time-consuming and disruptive, but they provide refiners the opportunity to make small adjustments to capacity, improve fuel quality to some degree, repair, clean and update units. Typically, most maior processing units undergo such turnarounds approximately every five years on a staggered schedule. It is also during these unit turnarounds that any required revamp upgrades are performed, which can extend turnaround durations beyond four weeks. These revamps can be minor or major in magnitude. Units can be modified or replaced, capacity may be increased, and there may be overall reconfiguration. The changes associated with this type of turnaround can be significant. They typically take years to plan, design, purchase equipment and install, and such changes can cost hundreds of millions of dollars. The refinery changes necessary to meet the proposed annual average sulfur standard of 10 ppm may fall within these latter types of modifications and would be most efficiently implemented as part of a comprehensive refinery turnaround.

Unfortunately, the proposed rule does not give consideration to these normal refinery turnaround cycles. It simply proposes an effective date that is approximately three years from the anticipated date when the final rule will be issued. Three years is not sufficient. Moreover, Irving Oil understands that when EPA first began work on the Tier 3 rule in 2010 and thought that a final rule would be issued in 2012, an effective date of 2017 was appropriate. It would have provided industry with five years to meet the proposed standard. However, because the proposed and final rules were delayed, the effective date for the 10 ppm sulfur standard should also be adjusted accordingly. An implementation date that provides five years would generally align with the turnaround cycle for most refiners. A shorter date would inadvertently place some at a significant financial and competitive disadvantage. Such refiners would either be forced to buy credits to meet the new standard or perform an additional turnaround — an inefficient and costly measure.

Commenter: American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM)

The increased reliability of refining equipment has extended refinery turn-around time to approximately 5 years.

Commenter: Marathon Petroleum Company LP (MPC)

The increased reliability of refining equipment has extended refinery turn-around time to approximately 5 years.

Our Response:

We also received comments indicating that the January 1, 2017 does not complement refinery turnaround schedules, which often occur in 4-5 year intervals.

We agree that the need to make tie-ins, which must occur during a refinery turnaround, must be considered when assessing the feasibility of leadtime, and even when we factor the time needed to do so, our analysis shows that refiners can comply with Tier 3 with the leadtime provided. This is true because the final rule effectively provides nearly 6 years of leadtime to complete capital projects, and also because the capital projects do not have to be completed prior to installing the necessary tie-ins for new Tier 3 units.

As explained in Section V.L of the preamble to today's final rule, when a refiner builds a grassroots unit or some sort of revamp that involves a new reactor or perhaps an added distillation column, the new vessels and associated equipment must be "tied-in" to the rest of the refinery. The tie-in usually involves connecting a pipe from the existing unit to the new unit installed. However, a pipe cannot simply be added while the refinery is operating. Instead, the refiner will add the necessary pipe for making the tie-in when the refinery, or at least that refinery unit, is shutdown for regular maintenance. The revamp or grassroots unit does not have to be started up at that time, thus, the tie-in piping can be added well before the revamp or grassroots unit is completed. Instead, the connection pipe just needs to be added and blocked off with a sealing-type valve and a blind flange (essentially a flat piece of steel) is bolted on as a precaution against a leaky valve. This is a very simple process that would take several pipefitters a half a day of work to complete including completing all the necessary safety protocols.[2] Once this piping has been added, the refiner can restart its refinery. Then when the refiner is ready to complete the tie-in to the completed revamp or grassroots unit, the refiner would remove the blind flange and connect a pipe that connects the existing part of the refinery to the newly installed grassroots postreater unit or revamp postreater subunit. This last step can either occur when the refinery is shutdown or still operating. At that point the refiner would only need to open the block valve to complete the tie-in of the grassroots unit or revamp to the existing refinery. One refiner who owns a number of refineries informed us that it installed the tie-ins for a possible Tier 3 rule when it installed its Tier 2 units.

Refiners commented that FCC turnarounds occur on a 4 to 5 year basis, or a 5 year basis. However, this amount of time between FCC turnarounds is contradicted based on information provided on the American Petroleum Institute's webpage, which reports that the average time between major FCC unit turnarounds is 4 years. Also, an Energy Information Administration (EIA) study makes a similar finding, which is that refiners target 3 – 5 years, or 4 years on average, between refinery turnarounds. The EIA study also reported the results of an Octane Week survey of about 20 refineries which found that refiners target 4 - 5 years between turnarounds of the FCC units, but over 25% of the time refiners need to conduct turnarounds earlier than targeted because a maintenance issue forces the earlier turnaround. However, the EIA study did not estimate how much earlier the turnaround occurred so it was not possible to estimate an actual average turnaround schedule, which may be less than 4 years. This means that on average, 25% of U.S. refineries shutdown to perform maintenance on its FCC units each year.

In Chapter 4 of the RIA, we presented our analysis of several different scenarios for credit availability versus demand for complying with the Tier 3 sulfur standard, assuming that credits will be traded nationwide as it has under Tier 2. In one scenario, if refiners reduce their gasoline sulfur to 20 ppm immediately after the Tier 3 rule is finalized, as we anticipate they are capable of, then the substantial number of early credits generated would allow refiners to delay their unit start-ups sufficiently for refiners to not only make the tie-ins, but even complete their capital projects as necessary. However, we also conducted a more conservative analysis which assesses the ability of refiners to comply with Tier 3 if they generate no or few early credits. Using the estimate that turnarounds are scheduled at refineries every 4 years, we also found that refiners would be able to comply with the Tier 3 program start date.

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[2] Since most refiners have already completed their scoping studies with the vendor companies which license the desulfurization technologies, they likely already understand what steps would need to be taken to tie-in their revamps and grassroots units with their existing refinery. Installation of tie-ins is relatively simple refinery change that can be engineered and installed in a short period of time. For this reason, we believe that refiners can begin making their tie-ins as soon as the spring of 2014

[3] 40 CFR 80.385(e).

5.1.4.3.3. Amount of Time Required to Install Grassroots Units and Revamp Existing Units

What Commenters Said:

Commenter: Phillips 66 Company

The proposed implementation date of January 1, 2017 does not provide adequate lead time for refineries to implement needed capital projects. EPA has proposed this aggressive timeline and uses two basic arguments to support their proposal. Firstly, EPA predicts that most projects will be of moderate scope and therefore refiners can complete needed capital projects within a 3-year time frame. Based on our initial analysis, we expect our company (and likely industry) will be faced with projects of significant scope requiring more than 3 years to complete.

Project Scope: EPA provided two project timeline estimates in the proposed rule – one for unit revamps (24 months) and one for new grass roots units (36 months). We believe EPA has underestimated the time requirement for every phase of a project – whether a revamp or a new unit.

In its investigations, EPA concludes that most refineries will require only projects of moderate revamp scope and that a relatively few will require grass roots desulfurization investments. The DRIA is quoted, “For companies that already have an FCC naphtha postreater we assumed that all that would be necessary to meet the proposed sulfur standards was to revamp their existing FCC postreating units.” Also in its analysis, EPA uses a PADD-average approach which may neglect individual refinery configurations.

To reduce sulfur in gasoline, it is common for refiners to separate the FCC naphtha stream into several streams with differing characteristics requiring different treatment technologies. Some of these separated streams, but not all, may currently be undergoing sulfur reduction. The likely approach to achieving Tier 3 will be to treat the remaining FCC streams plus additional light streams from other process units. Due to the differences in characterization, the in-place technology likely will not be appropriate to treat the remaining untreated stream(s) required for Tier 3 and therefore revamp(s) would not be chosen. For example, heavy FCC naphtha contains a significantly higher amount of sulfur and uses a technology that is not appropriate for light FCC naphtha. In cases where a refinery is currently only treating the heavy FCC naphtha, refiners will require new grass roots units to treat other portions of the FCC naphtha, tailored to the individual characteristics of the untreated streams.

These extensive projects and the fact that industry will be competing for many of the same engineering, procurement and field resources to complete them, requires significantly more time than EPA is providing in its proposal.

Project time requirements: Our experience with both grassroots projects and significant revamps of this magnitude is that they require well in excess of three years to complete. As such, EPA should extend the compliance date to coincide with 5 years from issuance of the final rule.

Below are two projects time lines [EPA-HQ-OAR-2011-0135-4463-A1], for a grassroots and revamp, provided by Phillips 66 internal project management staff. As shown the grass roots projects will need almost 5 years to complete. By comparison, the revamp project can be completed in only 6 months less time. As such, we believe that EPA has underestimated the time requirement and uncertainty for every phase of a project.

In particular, a critical phase of any project is in the initial scoping. It is imperative that refineries take the requisite time needed to fully evaluate various technology options and operating configurations. It may be necessary to incorporate other facets into the project, such as alleviating existing bottlenecks to allow full operational optimization and flexibility with any new or revamped units. Technology vendors continue to work on improvements especially in the area of catalyst technology. It is a very time consuming effort to work with multiple technology vendors to evaluate various feed streams with their technologies and then do economic evaluations on the different options. In order to meet a January 1, 2017 implementation date, a refinery would need to have already completed the project scoping phase, well in advance of the final rule. Since there is uncertainty in when the final rule will be issued, and in the provisions it will contain, refiners cannot set a final design basis. They therefore cannot complete scoping until the final rule is issued.

Commenter: Monroe Energy, LLC

The controls will take at least 2 years to design and engineer.

Commenter: Chevron Products Company

We are opposed to the implementation schedule proposed by the EPA. The 2017 compliance deadline does not provide sufficient time to make necessary refinery modifications and would significantly increase the cost of the required upgrades. If the agency proceeds with the gasoline sulfur reduction requirement, the program start date should be no sooner than five years after the date of the final regulation.

We agree that the technology for sulfur reduction to the 10 ppm level is available and has been demonstrated at certain refineries in operation today. However, we believe that EPA has underestimated the cost and complexity of the changes which will be required in the refining industry to achieve this reduction.

The time required for permitting is becoming longer due to local regulations and GHG programs. We do not agree that the analysis of permit times should be limited to the estimates provided by OAQPS. We are seeing other government agencies placing additional requirements on refinery permits for a variety of GHG, safety, and environmental concerns, all of which increase the time required to obtain a permit. California refineries producing gasoline subject to the Tier 3 regulations may encounter even longer permitting times and increased scrutiny, taking them well beyond the proposed implementation period.

We are also concerned about EPA's statement that many refineries have already started scoping work on investments in advance of the Tier 3 rulemaking. While it is true that refineries have been aware of EPA's intention to conduct a Tier 3 rulemaking for over two years, the NPRM was only published in the Federal Register on May 21, 2013, and will not be finalized until late 2013. It is unlikely that refineries have conducted significant planning or engineering based on speculation about Tier 3 when there has been no certainty about the timing or the specific requirements of the rule until very recently. The timeline for program implementation should be based on realistic estimates of the time required for planning, investment, permitting, construction, and operation, and refineries should be able to conduct these activities to fully comply on day one of the new program. To suggest that the timeline could be shortened based on actions that refiners may have taken prior to even a proposed rulemaking is inappropriate.

Chevron is concerned about the global availability of long lead time equipment, like reactors and compressors, which will be required for many of the industry projects. Refinery investments require specialized labor for both design and construction. These industries are experiencing a great demand for services due to other domestic energy investment projects currently underway. EPA's analysis of the capability of the labor force does not fully consider the competition for these resources and the impact this may have on the timelines required for Tier 3 investments.

Commenter: Irving Oil Terminals Inc.

Even though the proposed rule has been highly anticipated by the regulated community, design approval for major capital investments can only proceed with 'regulatory clarity' which will not exist until the final rule is issued.

Every year, refineries shut down select units in their facilities and perform regular inspections and maintenance. These planned 'turnarounds' last about four weeks and are time-consuming and disruptive, but they provide refiners the opportunity to make small adjustments to capacity, improve fuel quality to some degree, repair, clean and update units. Typically, most maior processing units undergo such turnarounds approximately every five years on a staggered schedule. It is also during these unit turnarounds that any required revamp upgrades are performed, which can extend turnaround durations beyond four weeks. These revamps can be minor or major in magnitude. Units can be modified or replaced, capacity may be increased, and there may be overall reconfiguration. The changes associated with this type of turnaround can be significant. They typically take years to plan, design, purchase equipment and install, and such changes can cost hundreds of millions of dollars. The refinery changes necessary to meet the proposed annual average sulfur standard of 10 ppm may fall within these latter types of modifications and would be most efficiently implemented as part of a comprehensive refinery turnaround.

In the Preamble that accompanied the Proposed Rule, EPA recognizes that gasoline refining is a complex operation, and refiners would have to take many steps to comply with the proposed Tier 3 sulfur standards. These steps include scoping studies, financing, process design for new or revamped refinery units or subunits, permitting, detailed engineering based on the process design, field construction of the sulfur reduction units, and start-up and shakedown of the newly-installed desulfurization equipment. The Agency states that it conducted a lead time analysis and spoke with refiners to determine the amount of time that a typical refiner would take to complete renovations and meet the 10 ppm sulfur standard. EPA has proposed that a lead time of three years is sufficient. The details of the Agency analysis are set out in Table V-3 — 'Anticipated Compliance Timelines.'

Irving Oil has reviewed EPA's information on 'lead times' and believes that it is overly optimistic. Also, some of the data on which the determination was made are now out of date due to major changes that are occurring in the petroleum industry. The following are several significant reasons why a three-year lead time is insufficient:
1. Those companies that license the technology to desulfurize motor gasoline have limited resources and likely would be unable to support many simultaneous scoping studies and process designs. Thus, some refiners would not be able to begin these activities as early as needed to support a three-year lead time.
2. Irving Oil agrees with EPA's assessment that most refiners would revamp existing FCC gasoline post-treaters rather than constructing grassroots units. However, Irving Oil has often found that revamping units, particularly during the early project phases (the scoping study and process design) is more complex and time consuming than building and installing an entirely new, grassroots unit. Therefore, EPA's assumption that refiners can revamp existing units more rapidly is not supported by Irving Oil's many years of experience.
3. EPA has indicated that some of the initial phases of the revamping project can overlap, thereby saving additional time. Again, this assumption is contrary to Irving Oil's experience and belief. Irving Oil has found that the process design phase cannot be started until after the scoping study is complete. Thus, it is more reasonable to assume that the time needed to make the appropriate changes to the refinery would be the same for both a revamping of units and the installation of new units.
4. The EPA believes that there would be sufficient resources (technology licensors, engineering and construction services, skilled laborers, and equipment) available to the refining industry. However, EPA must recognize that the U.S is undergoing a domestic petroleum renaissance, and demand for these resources in new areas of production such as North Dakota, Montana, and Texas is great. Those projects would compete for resources directly with refiners trying to meet the EPA three-year time schedule. Shortages of these resources would, therefore, likely inhibit the ability of refiners to comply in a timely manner.

Commenter: Independent Fuel Terminal Operators Association (IFTOA)

In the Preamble that accompanied the proposed rule, EPA includes a discussion on the "Adequacy of Proposed Refinery Lead Time." It provides that the Agency has sequenced the estimated time to complete scoping studies (6 to 9 months), process design (6 to 9 months), permitting (9 months), detailed engineering (6 to 9 months), field construction (6 to 12 months), and start-up and shakedown in advance of production (6 to 9 months). In addition, EPA believes that there would be substantial overlap among many of these steps. Therefore, the Agency states that three years is adequate to implement the required refinery changes, and early credits would add some flexibility. This estimate is far too optimistic. It fails to understand the process and timing refineries (both domestic and foreign) employ when they make decisions about refinery modifications, how financial planning for major modifications is handled, and that longer lead times are needed when the regulated community is directed to meet a new standard – not a single refiner/importer.

First, refiners generally would not undertake to make major modifications until the final regulation is issued by EPA. It would not be prudent to begin modifications down one path under a proposed rule and subsequently have to alter those modifications if the Agency finalizes a rule taking another approach.

Second, once the rule is adopted, there would be a great demand for consulting and engineering firms to assist the refining industry in its efforts to meet this new standard. As EPA is aware, there is already a great demand for the services of such firms due to increased production of crude oil in PADDs II and III. Thus, some refiners would have to wait for assistance.

Third, EPA envisions overlapping of some of the enumerated steps such as moving forward with design processing while the scoping study is underway. Based on the experience and expertise of a number of our Members, we have been told that it is unwise to move forward with design processing until the scoping study is complete. Again, substantial man-power, time and money could be wasted if design processing anticipates what would emerge from the scoping process.

Fourth, approval for funding for such major changes is a time-consuming and often difficult process. The estimated schedule put forth by EPA does not appear to include the time needed to obtain or allocate such funding.

Commenter: American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM)

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.

Commenter: Marathon Petroleum Company LP (MPC)

The Agency must extend the implementation date until January 1, 2019 or five years after the final rule is issued.

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. 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.

Our Response:

Several commenters also stated that we had underestimated the project time lines for revamps and installation of grassroots units. Some commenters compared the time required for installing units for Tier 3 with previous rulemakings such as the Tier 2 or highway diesel fuel rules.

We disagree with comments that we underestimated project time lines for revamps and installation of grass root units. As explained in Section V.E. of the preamble to today's final rule, we believe that the situation for Tier 3 is different than previous rulemakings. The technologies for complying with Tier 3, which are the same as those used for complying with Tier 2, are well known and well proven. Refiners that complied with Tier 2 using FCC naphtha desulfurization technologies installed the following units, all of which were grassroot installations: Axens Prime G+, CDTech's CDHydro and CDHDS, UOP's ISAL, Phillip's (Sinopec's) S-Zorb and Exxon's Scanfining. Prior to choosing a technology, refiners needed to evaluate each these different technologies and choose among them, all of which were largely untested at the time, which required us to provide more lead time for Tier 2. Since it has been 10 years since the Tier 2 sulfur standard began to be phased in, refiners now have direct experience with the installation and operation of these technologies, and the vendor companies that license them continue to support their installations onsite. This fact will allow refiners to reach a decision very quickly when complying with Tier 3, particularly, because in most cases the refiners will solely be revamping the units installed for Tier 2 when complying with Tier 3.

Based on our discussions with refiners, construction companies, vendor companies and from published literature, we estimated the time it takes to revamp existing postreaters and install grassroots postreaters. Revamping an existing postreater is expected to require up to two years. Installing a grassroots postreater is estimated to require three years.

We believe that the revamping of postreaters could take even less time than 2 years because many of the Tier 3 revamps are expected to be very modest (e.g., change out a reboiler or heat exchanger). The availability of a more active catalyst and the expanding practice of undercutting the FCC naphtha to the distillate pool (which reduces the FCC volume by 15% and sulfur content by 50%) permit the existing FCC postreaters to achieve much further sulfur control.

Furthermore, we noted at proposal that since EPA held discussions with many refiners in 2011 about EPA's plan to pursue additional sulfur control post-Tier 2 (Tier 3), refiners began the process of assessing how they would comply. The Tier 3 proposal was delayed for about a year and it is our understanding from recent discussions with vendor companies and some refiners that many refiners have already completed their scoping studies. By completing their scoping studies, refiners have chosen their technologies, and in the case of grassroots units, vendor selection as well (refiners with a particular postreater technology in most cases are expected to simply revamp the same vendor's technology, so there is no need to select a vendor). If refiners have already completed their scoping studies, we estimate that installation of the revamps or grassroots units would be about 3 months shorter than the 2 and 3 years, respectively, than our estimated timelines.

These project timelines are reasonable in light of past industry experiences that show FCC postreaters being installed in refineries in less time than what we estimate. At the Motiva refinery in Port Arthur, TX, a grassroots CDTech postreater was designed, constructed and started up in less than 2 years. At two refineries in Germany, two Prime G+ units were designed, constructed and started up – one of them in two years, and the other in 18 months. As an extreme example, the $3.6 billion dollar, 180 kbbl/day crude oil volume expansion at Marathon's Garyville, LA refinery was designed, constructed and started up in less than 4 years. This single project involved the construction of 10 major refinery units. Since these may be best case examples, we continue to believe that our construction projections are reasonable.

One commenter stated that our FCC installation timeline did not include the time required to obtain funding for the postreater installation. First, most all FCC postreater projects are revamps which are relatively inexpensive installations and thus, funding should be relatively easy to obtain. Second, funding for design and construction of the FCC postreater installation can be obtained when the scoping study is being completed. As discussed in more detail in Section V.E.2.b, if a refiner is experiencing financial hardship and is having trouble obtaining the necessary funding which leads to a delay in complying with Tier 3, the refiner may apply for an extreme circumstances hardship waiver, which is a hardship waiver based on severe economic or physical lead time limitations of the refinery to comply with the Tier 3 standards at the start of the program. A refiner seeking such hardship relief under this provision must demonstrate criteria, and we expect that a refiner would apply for such hardship prior to the start of the Tier 3 program (as a refiner should know during the planning stages if there will be extreme financial hardship).

In response to one commenter's concern about permitting and its impact on completing projects, as we discuss in Chapter 5.2, we expect that only a few permits are expected to be needed. Because of that, the few refineries needing to file a permit are expected to experience construction times about as long as we estimated, and the rest of the refineries, which are not expected to file a permit, could experience shorter construction timelines than what we estimated.

One commenter noted that we show overlapping time between important elements that comprise the planning, design and construction schedule, and commented that the overlap is not possible. The commenter stated that one element must be completed before the next one can commence. We show overlap between the different elements because some aspects of each element can begin before the next element begins. For example, before the scoping study is completed, the refiner will initiate the process to set up a contract to begin the process design. Also, before the detailed design is completed, the refiner is expected to begin site preparation aspect of the construction which may include demolition of nonused equipment and soil testing. Finally, the refiner is likely to test the individual pieces of equipment (such as pumps and activated valves) before trying to start up the entire unit which is why startup can begin before construction is complete. If refiners overlap the different design, construction and plant start up elements as depicted, the refinery would be able to meet the grassroots and revamp timelines we laid out. As cited above, the very fast FCC postreater installations (CDTech at Port Arthur and two German refineries) and very fast Garyville refinery expansion were likely made possible because there was overlap between several of the design and construction elements.

While we acknowledge that some refineries may require more time than we have assumed to complete their refinery modifications, others would be able to do so with less time. If the Tier 3 program were designed in a way that had a firm fixed date for compliance with no flexibility, then perhaps the much more conservative assumptions by the commenters would be more appropriate, as the worst case refinery situation would be important in determining the appropriate lead-time and start date. However, this is not the case here. As described above, the program is designed with considerable flexibility. Thus, it is more appropriate to consider more typical project timelines when evaluating lead time. Furthermore, the program, with its flexibilities, allows nearly 6 years of lead time for the industry to complete their projects, long enough for even the worst case project timelines highlighted by the commenters.

5.2. Refinery GHG Emissions and Air Permitting Interactions (NSR/NSPS/NESHAP)

5.2.1. GHG Emissions and Refineries

What Commenters Said:

Commenter: Association of Fuel & Petrochemical Manufacturers (AFPM)

One oil industry commenter said that the new regulations will create conflicts with existing regulations and could jeopardize a refiner's ability to comply with federal formulation regulations since modifications to operations may be necessary to make cleaner fuels which could trigger greenhouse gas emissions regulations, putting these projects in jeopardy.

Specifically, this commenter noted that mandating lower sulfur fuels under the Clean Air Act will require facilities to install advanced technologies that increase energy use for the formulation of increasingly complex motor fuels and this additional energy consumption will result in greenhouse gases and other emissions. Therefore, the proposed gasoline sulfur reduction standard will increase the carbon footprint at refineries.

Our Response:

EPA acknowledges that reducing sulfur from gasoline will result in a small increase in CO_2 emissions associated with higher energy use required in the process of removing sulfur within the refinery. As an extension of our refinery-by-refinery cost modeling described in the Preamble, Section VII.B., we calculated the CO_2 emission impacts of Tier 3 gasoline sulfur control. We estimated refinery-specific changes in process energy and then applied emission factors that correspond to those changes, on a refinery-by-refinery basis. As described in Chapter 4.5 of the RIA, the results showed an increase of up to 1.9 $MMTCO_2e$ in 2018 and 1.6 $MMTCO_2e$ in 2030 for all U.S. refineries complying with the lower sulfur standards assuming that the sulfur standards are fully phased-in. In 2018, the combined impact of CH_4 and N_2O emission reductions from the vehicles and CO_2 emission increases from the refineries shows a slight net decrease on a CO_2 equivalent basis. While still small, this net decrease grows to a range between 2.5 to 2.7 $MMTCO_2e$ by 2030.

In our updated analysis for the final rule, we adjusted our refinery-by refinery analysis to reflect the existence of a nationwide average, banking, and trading (ABT) program and refined our estimates regarding the physical and operational changes that will be required at each refinery (as described in the final RIA). The modifications at a given refinery could include revamps to existing FCC pre- or post-treatment unit(s) or the installation of a new grassroots post-treatment unit for sulfur reduction. Based on the updated projections of refinery-specific changes, we re-estimated the increased demand for energy (i.e., fuel to generate process heat, steam, and electricity), hydrogen, and sulfur recovery associated with meeting the final Tier 3 standards. Having received no comments suggesting that they should be changed, we re-applied the representative industry emission factors for NAAQS pollutants, their precursors, and GHGs for each emitting process and combined them with estimates of incremental activity to estimate the emissions changes at each equipment unit (or group of similar units) at each refinery.

We found that under the high case (worst case scenario), nine refineries appeared likely to have significant emissions increases for one or more pollutants and thus would trigger major NSR. This estimate equates to approximately eight percent of the 108 refineries projected to sell gasoline that will be subject to the Tier 3 standards. Of these nine refineries, we predicted that three refineries would need major source permits for NAAQS-related pollutants and their precursors (PSD and/or Nonattainment NSR) and for GHGs, while six refineries would need PSD permits to address GHG emissions. This number could be lower if those refineries apply pollution controls, such as SCR for NO_X, to sufficiently reduce the emissions increases to levels that are below the applicable pollutant significance level, or if the refineries can achieve emissions reductions elsewhere at the facility to "net out" of major NSR.

5.2.2. Issuing Permits

What Commenters Said:

Commenters: American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM); Concerned Citizens Around Murphy; Marathon Petroleum Company LP (MPC)

Several oil industry commenters stated that EPA needed to issue permits expeditiously and that EPA should adopt the recommendations offered by the Clean Air Act Advisory Committee (CAAAC) in the September 2012 report from the Committee's GHG Permit Streamlining Workgroup.

One citizens' organization commented that clean fuels are an essential part of the Ozone and particulate matter solutions. However, many of our fenceline communities do not have appropriate monitoring for the 2010 sulfur dioxide ambient air standards. Extra air monitoring could ensure the air permit limits are maintained, and air monitoring may even help the refineries become more efficient.

Our Response:

EPA is continuing to assess possible approaches to streamlining GHG permitting, including those offered in the referenced CAAAC report. As discussed below in Chapter 5.2.2, EPA believes that the permits that may be required as a result of the Tier 3 fuel sulfur standards will be issued in a timely manner.

EPA is planning to propose a rule soon that will describe requirements for air agencies to characterize sulfur dioxide concentrations through ambient monitoring or air quality modeling techniques in targeted areas around the country in which the largest sources of emissions are located. The air quality information collected by the air agencies will then be used to inform future rounds of area designations under the Clean Air Act. The rule will reference appropriate guidance on monitoring and modeling techniques, and it will include timelines for air agencies to conduct the required analyses. Comments regarding which sources should be subject to this requirement will be welcome as part of that rulemaking.

5.2.3 GHG Permitting

What Commenters Said:

Commenters: American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM); Marathon Petroleum Company LP (MPC)

Several oil industry commenters cited recent EPA-provided information on how many GHG permits have been issued by EPA and other permitting authorities since the GHG permitting requirement became effective in January 2011. These commenters stated that the small number of permits issued brings into question whether EPA's forecast of how quickly GHG permits will be issued when needed in connection with the Tier 3 fuel program is realistic.

Several oil industry commenters also noted that if the emissions thresholds that trigger permitting for GHG are lowered from the values assumed in EPA's preliminary assessment of permitting implications, the number of refineries that would need GHG permits could be higher than estimated in that assessment.

Our Response:

The commenters have cited EPA statements about the number of permits issued, without the context of when they were found to be complete. While some permits may have taken longer than 12 months to be issued once they were complete during this start-up period of the GHG permitting program, EPA continues to believe that in the future time frame in which a small number of refineries will be seeking GHG permits, those permits can be issued in a timely manner that will assure compliance with the requirements of the final Tier 3 fuel program. The experience gained by permitting agencies and the processing approaches developed during the start-up period should allow more expeditious processing in the future. Many of the permit applications cited by the commenters as not having reached the point of the final permit having been issued (as of the May 2012 date of the EPA-provided information) were for sources in Texas, where EPA has been the permitting authority for GHG. EPA has recently proposed to approve Texas' plan for assuming the role of that authority (79 FR 9123, February 18, 2014), with a final action expected around the middle of 2014. For permits to refineries in Texas issued by Texas during the implementation of the Tier 3 program, a number of requirements in federal laws that are applicable to EPA permitting actions will no longer apply, for example the federal Endangered Species Act. It should be possible both for sources to prepare complete applications more expeditiously since they will not need to include all the information needed to ensure compliance with these federal laws, and for the Texas permitting authority to review permit applications in less time than has been the case for EPA. Since May 2012, EPA has also proposed or taken final action to transfer GHG permitting authority to Arkansas, Florida, Idaho, Kentucky, Clark County in Nevada and Wyoming. In addition to those states for which we approved GHG PSD authority, EPA has approved PSD authority (including GHG) to the following air pollution districts in California: Eastern Kern, Imperial County, Placer County, San Joaquin Valley Unified, and Yolo-Solano. EPA has also approved the South Coast Air Quality Management District's ability to issue GHG PSD Permits.

Regarding the comments that the number of refiners needing GHG permits could be higher than estimated if the thresholds are lowered, EPA finalized GHG thresholds for Step 3 of the GHG permitting program that are the same as in Steps 1 and 2 on July 12, 2012. These are the thresholds assumed in the updated assessment of permitting implications of the final Tier 3 fuel program. EPA will complete a further rulemaking by April 2016 to establish permanent thresholds (the Step 4 rulemaking). In the Step 4 rulemaking, EPA may consider the possible need for the permanent thresholds to be phased in over some period after that final rule.

5.2.4. New Source Review

What Commenters Said:

Commenters: Countrymark; Environmental Defense Fund (EDF); Northeast States for Coordinated Air Use Management (NESCAUM); Sierra Club; Small Business Refiners

A number of refiners requested that the final rule explicitly affirm that any investment required for compliance with Tier 3 requirements not be subject to NSR permitting review, provided that capacity is not increased by more than 10 percent of prior capacity.

Two environmental groups commented that they supported EPA's not allowing vehicle emission reductions to be used as part of "netting out" under the NSR program, while one state air board supported the use of vehicle emission reductions for purposes of "netting out" under the NSR program.

An environmental group recommended that, to the extent that EPA moves forward with developing streamlining options for NSR, EPA must reach out to all stakeholders to identify methods that are wholly consistent with the CAA and the goals of the PSD program. Any committee of EPA employees with refinery expertise that oversees streamlining for permits related to the Tier 3 fuels program must be shielded against industry lobby interests and any conflicts of interest in implementing NSR regulations.

Our Response:

EPA believes such a blanket exemption based on a percentage increase in refinery capacity would not be consistent with CAA requirements. Under the Clean Air Act as interpreted by the courts, new source review applies to any physical modification that causes more than a *de minimis* net emissions increase. (See *New York v. EPA*, 413 F.3d 3 (D.C. Cir. 2005.) The final Tier 3 rule does not include such an exemption.

The final rule does not include any provision to allow the use of vehicle emission reductions for purposes of "netting out" of the NSR program. EPA believes that the use of vehicle emissions reductions for netting purposes is not permitted by the NSR regulations, since the creditable emissions reductions used for netting purposes must result from reductions occurring at the modified source. For example, the definition of net emissions increase in 40 CFR 52.21(b)(3)(i) includes only increases and decreases occurring "at the source". We believe this provision in the NSR rules is consistent with the CAA. With regard to the commenter supporting the use of "netting out," the commenter did not provide any grounds for concluding that allowing the use of vehicle emission reductions for netting out purposes would be consistent with the CAA.

Regarding the comment on streamlining, EPA has concluded that only a small number of refineries appear to have the potential of triggering major source permitting as a result of modifications needed to meet the Tier 3 fuel program. Furthermore, given the flexibilities provided by the final program in terms of when modifications must be in place in order to achieve compliance, even the limited number of permits will likely be spread out over a period of time. There were no industry comments that demonstrated a specific reason for concern about permitting implications on a broad scale. Therefore, EPA intends to address any permitting complications that do arise on a case-by-case basis with the appropriate EPA Regional Office in the lead, rather than convene an agency-wide committee of experts.

5.2.5. GHG Emissions and Offsets

What Commenters Said:

Commenters: American Petroleum Institute (API); Association of Fuel & Petrochemical Manufacturers (AFPM)

One commenter stated that 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 for any permitting purposes by the amount that the Tier 3 final regulations will increase its GHG emissions.

Our Response:

EPA interprets this comment to be a recommendation that refineries making GHG-increasing modifications in order to comply with new sulfur limits should, for PSD permitting purposes, be considered not to be increasing their GHG emissions since Tier 3 standards will result in GHG-reducing emissions of N_2O and CH_4 from light-duty vehicles and trucks. EPA disagrees with this suggested approach and the final rule does not include changes in the definition of baseline GHG emissions for refineries. The definition of baseline emissions for PSD purposes is contained in the PSD regulations, which EPA did not propose to amend, or take comment on, in this action. Nor did EPA propose any changes to the definition of stationary source that would allow a stationary source to take credit for reductions occurring at offsite mobile sources. Moreover, EPA's analysis of the possible permitting implications of the final rule requirements for sulfur content indicated that the need for GHG permits will be limited to relatively few refineries, and that these refineries and the relevant permitting authorities will be able to issue the necessary permits in a timely manner. Also, we expect that GHG Best Available Control Technology (BACT) requirements determined for this permitting of GHG emissions will generally be the use of energy efficiency measures that refineries will naturally include in their modifications anyway for economic reasons.

5.2.6. Flexibilities

What Commenter Said:

Commenters: Natural Resources Defense Council (NRDC)

An environmental group commented that due to the absence in the proposed Tier 3 rulemaking of any changes to EPA's permitting regulations, it would be unwarranted for the final action to create new flexibilities. The same commenter indicated its support for EPA efforts to help ensure that air permits meeting current permitting requirements are issued in a timely manner. Another environmental group also commented in opposition to any scheme to side-step any NSR requirements. This commenter expressed particular concern about streamlining options that might allow refineries to avoid the applicability of major NSR entirely and about any reliance on presumptive BACT limits or general permits.

Our Response:

The final rule does not establish any new flexibilities or exceptions to current permitting regulations. On an ongoing basis, EPA continues to consider ways to streamline the permitting process consistent with CAA requirements and goals.

5.3. Standards for Denatured Fuel Ethanol and Other Oxygenates

5.3.1. Sulfur Standard

What Commenters Said:

Commenter: American Coalition for Ethanol (ACE)

ACE supports 10 ppm sulfur for denatured fuel ethanol as developed by ASTM with input from oil companies and automakers.

Commenter: American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM)

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.

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.

Commenter: Chevron Products Company

Standards for Denatured Fuel Ethanol and Other Oxygenates: We support the Agency's proposal that manufacturers of Denatured Fuel Ethanol (DFE) for use by oxygenate blenders would be required to meet a 10-ppm sulfur cap. We note the Agency's comments that the California regulations (Title 13, Section 2262.9) already require this maximum level of sulfur (among other specifications) and that manufacturers of DFE have already been producing to the California specification because of logistical difficulties in segregating ethanol destined for California from other destinations. We, therefore, concur with the Agency's view that implementation of a 10-ppm sulfur cap would not result in an additional burden on the ethanol industry.

Commenter: Growth Energy

EPA should change the proposed DFE 10 ppm sulfur cap to a 10 ppm sulfur <u>average</u> to put DFE on a level playing field with unleaded**.**

In the past, EPA has regulated DFE with a sulfur limit that "reflects that 30-ppm refinery average." EPA says that "consistent with" its new 10-ppm refinery sulfur standard, EPA proposes "that manufacturers of DFE for use by oxygenate blenders would be required to meet a 10-ppm sulfur cap."

If DFE will have the same batch testing and registration requirements as gasoline, requiring a 10 ppm sulfur cap versus an average could disadvantage DFE versus gasoline, which can generate and profit from sulfur credits. DFE having the same sulfur limits as gasoline, along with a compliant petroleum blendstock, will result in ethanol blends having a sulfur limit that is identical to the proposed finished gasoline specifications.

Furthermore, if the burden of implementing batch testing and reporting is imposed on ethanol producers, they should be allowed to generate sulfur credits. EPA states that "While certain batches of ethanol could theoretically be low enough in sulfur to generate credits, it is our desire to limit credit generation to companies required to comply with the proposed Tier 3 sulfur standards, i.e., refiners and importers.'

Growth Energy believes that ethanol producers should not be required to undertake batch testing; however, if DFE producers are required to complete the batch testing, reporting, and record keeping on DFE similar to refiner requirements on gasoline, they should have the same ability to generate or use credits.

EPA mistakenly states that "since many refiners currently comply with our standards taking into consideration the fuel property changes expected as a result of downstream ethanol blending, providing ethanol blenders with sulfur credit would result in double counting the effects of ethanol." However, double counting would not result if refiners are assuming that DFE has a sulfur level of 10 ppm. Credits would only be generated at levels that are below this 10 ppm level.

EPA attempts to further reject ethanol generating sulfur credits by stating that "Over compliance with the per-gallon cap would not be a valid basis for credit generation, as you would expect that in all cases the DFE would be below the cap. To allow credit generation, we would need to propose an additional annual average sulfur standard for DFE at some level below 10 ppm, and allow credits to be generated for over compliance with that standard." Ethanol producers should have the same ability to generate credits if they have the same testing and reporting standards. In order to remain price-competitive with gasoline, ethanol should be allowed to generate credits in a similar manner as gasoline. Furthermore, such credit trading could allow ethanol producers to offset the cost of [new] DFE testing and reporting requirements.

Commenter: Independent Fuel Terminal Operators Association (IFTOA)

Current gasoline requirements include the prohibition on blending gasoline with denatured ethanol that has a sulfur content higher than 30 ppm. EPA is proposing to amend that standard and not allow blending with denatured ethanol that has sulfur content higher than 10 ppm. The Association supports this proposed change. If denatured ethanol contained 30 ppm sulfur, it could be difficult for refiners and importers to meet the annual average standard of 10 ppm.

Recommendation: The Association recommends that EPA adopt its proposal to lower the sulfur content of denatured ethanol. Reduce the sulfur content of denatured ethanol to 10 ppm to facilitate meeting the proposed Tier 3 standard.

Commenter: Irving Oil Terminals Inc.

Under current gasoline regulations, gasoline may not be blended with denatured fuel ethanol that has a sulfur content greater than 30 ppm. Under the Tier 3 proposal, the ethanol sulfur content would be reduced to 10 ppm consistent with the proposed standard for gasoline. Irving Oil supports this proposed amendment and believes that such a reduction would be essential if the 10 ppm sulfur annual average is adopted for gasoline. If the sulfur standard for denatured fuel ethanol were left at its current level of 30 ppm, refiners would have to further assess and determine if greater capital investments would have to be made to their FCC gasoline post-treater units or additional investments be made to adjust and lower the sulfur content of other gasoline blending streams to prevent violation of the ultimate 10 ppm annual average standard.

Commenter: Marathon Petroleum Company LP (MPC)

In the event that EPA finalizes a more stringent 10-ppm refinery average sulfur standard, MPC supports 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.

Commenter: National Corn Growers Association (NCGA)

EPA proposed that manufacturers of DFE for use by oxygenate blenders meet a 10 ppm sulfur cap, and that only natural gasoline, gasoline, and gasoline blendstocks for oxygenate blending (BOB) be used as ethanol denaturants. NCGA supports EPA's proposal for DFE standards. We believe it would be unnecessary and burdensome to adopt California's additional specifications for DFE.

Commenter: New York State Department of Environmental Conservation

The proposed limits on the sulfur content of blending streams such as denatured fuel ethanol are necessary to ensure that the program benefits are actually realized.

Commenter: POET, LLC

EPA should change the proposed DFE 10 ppm sulfur cap to a 10 ppm sulfur average to put DFE on a level playing field with unleaded.

EPA has in the past regulated DFE with a sulfur limit that 'reflects the current 30-ppm refinery average. (67) EPA says that 'consistent with' its new 10-ppm refinery sulfur standard, EPA proposes 'that manufacturers of DFE for use by oxygenate blenders would be required to meet a 10-ppm sulfur cap. (68) EPA also proposes that DFE manufacturers would be subject to batch testing (including batch volume, sulfur content, and denaturant concentration as applicable). (69) While the final ethanol blends (e.g., E30, E85, or some other blend ratio from E16 to E85) would not necessarily be subject to batch testing (under the Blender Option, below), EPA here proposes that the DFE would be tested.

If DFE will have the same batch testing and registration requirements as gasoline, requiring a 10 ppm sulfur cap versus an average could disadvantage DFE versus gasoline which can generate and profit from sulfur credits. DFE having the same sulfur limits as gasoline, along with a compliant petroleum blendstock, will result in ethanol blends (whether MLEBs or HLEBs) having a sulfur limit that is identical to the proposed finished gasoline specifications.

Furthermore, if the burden of implementing batch testing and reporting is imposed on DFE producers, they should be allowed to generate sulfur credits. EPA states that 'While certain batches of ethanol could theoretically be low enough in sulfur to generate credits, it is our desire to limit credit generation to companies required to comply with the proposed Tier 3 sulfur standards, i.e., refiners and importers.' (70) If DFE producers are required to complete the batch testing, reporting, and record keeping on DFE similar to refiner requirements on gasoline, they should have the same ability to generate or use credits.

EPA mistakenly states that 'since many refiners currently comply with our standards taking into consideration the fuel property changes expected as a result of downstream ethanol blending, providing ethanol blenders with sulfur credit would result in double counting the effects of ethanol.' (71) However, double counting would not result if refiners are assuming that DFE has a sulfur level of 10 ppm. Credits would only be generated at levels that are below this 10 ppm level.

EPA attempts to further reject ethanol generating sulfur credits by stating that 'Over compliance with the per-gallon cap would not be a valid basis for credit generation, as you would expect that in all cases the DFE would be below the cap. To allow credit generation, we would need to propose an additional annual average sulfur standard for DFE at some level below 10 ppm, and allow credits to be generated for over compliance with that standard.' (72) Ethanol producers should have the same ability as refiners to generate credits if they have the same testing and reporting standards. In order to remain price-competitive with gasoline, ethanol should be allowed to generate credits in a similar manner as gasoline. Furthermore, such credit trading could allow ethanol producers to offset the cost of new DFE testing and reporting requirements.

Commenter: Renewable Fuels Association (RFA)

This proposed rulemaking adds the regulatory burden of a 10 ppm sulfur maximum on a batch basis for Denatured Fuel Ethanol (DFE). However, DFE does not have a sulfur issue. The hydrocarbon denaturant is typically the sole source of sulfur in DFE.

Although current gasoline requirements include the prohibition on blending gasoline with DFE that has sulfur content higher than 30 ppm, the State of California has long required that DFE meet a maximum 10 ppm sulfur content standard. In 2002, RFA conducted an industry survey that demonstrated DFE manufacturers were meeting the new California requirement of 10 ppm sulfur content. Since then, RFA has recommended to the ethanol industry that all DFE meet this California requirement and all indications are that ethanol producers are adhering to this recommendation.

Because DFE already meets the proposed 10 ppm sulfur standard in nearly all cases, EPA believes that the implementation of a 10-ppm sulfur cap for DFE would not result in an increased regulatory or administrative burden for ethanol producers. We agree that there would be no new burden in terms of ensuring DFE complies with the 10 ppm maximum sulfur limit.

Commenter: Sutherland Asbill & Brennan LLP (Sutherland)

Producers of denatured fuel ethanol and other oxygenates also would be required to meet the annual average of 10 ppm sulfur.

Our Response:

The Tier 2 gasoline requirements include the prohibition on blending gasoline with DFE that has sulfur content higher than 30 ppm.[3] This requirement reflects the 30 ppm refinery gasoline average sulfur requirement under the Tier 2 program. Since the sulfur content of DFE was typically below 30 ppm, addition of DFE to gasoline would typically lower the sulfur content of the mixture relative to gasoline. Hence, additional regulatory requirements regarding the sulfur content of DFE were not necessary under the Tier 2 program to ensure DFE addition did not increase gasoline sulfur levels. With the introduction of the 10 ppm average sulfur standard for gasoline under the Tier 3 program, additional control of DFE sulfur content is needed to ensure that that the addition of DFE to gasoline does not result in an increased sulfur level for the mixture. Hence, consistent with the approach under the Tier 2 program and the 10 ppm refinery average sulfur standard for gasoline finalized under the Tier 3 program, the Tier 3 FRM requires that producers of DFE and other oxygenates for use by oxygenate blenders meet a 10 ppm sulfur cap beginning January 1, 2017.

[3] 40 CFR 80.385(e).

In demonstrating compliance with the Tier 3 program's 10 ppm average gasoline sulfur standard, gasoline refiners and importers may adjust the sulfur levels in the gasoline and BOBs that they produce/import to account for the downstream addition of ethanol.[4] Therefore, the sulfur level of DFE has direct effect on the extent of the desulfurization measures that a refiner/importer will have to undertake to comply with the gasoline sulfur standards finalized today.

EPA believes that requiring DFE to comply with a 10 ppm sulfur cap is the most appropriate means of ensuring that finished gasoline blends attain the sulfur control goals of the Tier 3 program. Controlling the sulfur content of DFE can be readily accomplished by limiting the sulfur content of the denaturant that is used. Neat ethanol produced with standard quality control practices should have negligible sulfur content. Denaturants with sufficiently low-sulfur content to facilitate compliance with the 10 ppm sulfur cap for DFE are widely available. Allowing DFE to exceed 10 ppm would result in the use of higher-sulfur denaturants, thereby increasing gasoline refiner capital costs to install desulfurization equipment. As discussed in Chapter 5.5.1 of this Summary and Analysis of Comments document, there are several reasons why we do not believe that it is appropriate to expand the ABT provisions to include ethanol producers and importers. Furthermore, as discussed in Section V.G.4. of the preamble to the Tier 3 FRM and Chapter 5.3.3 of this Summary and Analysis of Comments document, sulfur testing on each batch of DFE will not be required provided that the DFE producer or importer demonstrates compliance with the 10 ppm sulfur cap for DFE with volumetric blending records, whereas an average standard would require testing of every batch. We anticipate that DFE producers and importers will typically choose to demonstrate compliance with the 10 ppm sulfur cap using volumetric blending records rather than per-batch sulfur testing. Therefore, we do not anticipate that DFE producers and importers will need to install additional sulfur testing equipment as a result of the Tier 3 final rule. The registration, reporting, and recordkeeping requirements for DFE producers that we are finalizing will not necessitate substantial capital investments. Hence, there is no need to extend the flexibility of meeting an annual average sulfur standard and participation in the ABT program to ethanol producers and importers to help facilitate their compliance as exists for gasoline refiners.

5.3.2. Requirements to Address the Potential Emissions Effects of Fuel Parameters Other than Sulfur in DFE

5.3.2.1. Specifications on the Benzene, Olefins, and Aromatics Content of DFE and the Denaturants Used in the Manufacture of DFE

What Commenters Said:

Commenter: American Coalition for Ethanol (ACE)

[4] Accounting for the effect of oxygenate added downstream of the refinery or import facility in demonstrating compliance with the average gasoline sulfur standard is addressed in regulations finalized today at §80.1603(d). See Section V.C. in the preamble to the Tier 3 FRM regarding the sulfur level in DFE that must be used by refiners and importers in making this compliance determination.

Standards for Denatured Fuel Ethanol: Again, in keeping with EPA's desire to test vehicles on fuel available in the marketplace, we believe it is unnecessary to adopt California's specialized requirements.

Commenter: American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM)

We agree EPA should not set limits for benzene, olefins, and aromatics content of ethanol.

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.

Commenter: Chevron Products Company

The Agency also requests comment on whether it should adopt California's limits on benzene, olefins and aromatics for DFE. The Agency is not proposing any limits on these parameters. Our view is that the Agency should adopt California's requirements in their entirety. Since many ethanol producers are already manufacturing to a single national 'specification' to meet the California requirements, such action by the Agency would not impose any additional burden on them while offering the benefit of formalizing the 'de facto' application of a single DFE specification nationwide.

Many of the questions that the Agency seeks input on, can be simply resolved via the adoption of the California DFE specifications, including whether additional denaturants should be allowed (beyond, natural gasoline, gasoline, and gasoline blendstocks) and the range of allowable denaturant content.

Commenter: Growth Energy

It is unnecessary to establish benzene, aromatics and olefin limits on DFE**.**

The Proposed Rule states that limiting denaturants (e.g., to natural gasoline, gasoline, and BOBs "along with Internal Revenue Service ethanol denaturant requirements would limit benzene, olefins, and aromatics content of DFE to very low levels." Growth Energy agrees with EPA's "not proposing any limits on these parameters in DFE."

We further agree that the California DFE standards for benzene, aromatics, and olefins not be adopted. Not only would this impose a testing and record keeping burden on DFE producers, but it would not be meaningful given that there are no aromatics or olefin limitations for gasoline components (outside of base and certification fuel standards). (10)

10 The California regulations are also inappropriately stringent. California requires ethanol benzene levels to be 0.06 percent or lower and the denaturant to contain 1.1 percent benzene maximum. This benzene level in the DFE is 10 percent of the 0.62 percent benzene limit for unleaded gasoline. Ethanol should not bear a burden so strict compared to gasoline. Also, many natural gasoline streams do not meet this 1.1 percent benzene specification, as the benzene content is related to the natural gasoline source stream and processing. Many locations need to use denaturants with non-California-compliant benzene content. Using California benzene limits would increase costs as many companies would be forced to use far more expensive denaturants.

Commenter: Marathon Petroleum Company LP (MPC)

MPC agrees 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.

Commenter: National Corn Growers Association (NCGA)

Standards for Denatured Fuel Ethanol (DFE)

NCGA supports EPA's proposal for DFE standards. We believe it would be unnecessary and burdensome to adopt California's additional specifications for DFE.

Commenter: POET, LLC

POET agrees with EPA that it is unnecessary to establish benzene, aromatics and olefin limits on DFE.

The Proposed Rule states that limiting denaturants (e.g., to natural gasoline, gasoline, and BOBs) 'along with Internal Revenue Service ethanol denaturant requirements would limit benzene, olefins, and aromatics content of DFE to very low levels.' (73) POET agrees with EPA's 'not proposing any limits on these parameters in DFE.' (74)

POET further agrees with EPA's assessment that it should not adopt the California DFE standards for benzene, aromatics, and olefins. (75) Not only would this impose a testing and record keeping burden on DFE producers, but it would not be meaningful given that there are no aromatics or olefin limitations for gasoline components (outside of base and certification fuel standards). (76)

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76 - The California regulations are also inappropriately stringent. California requires ethanol benzene levels to be 0.06% or lower and the denaturant to contain 1.1% benzene maximum. This benzene level in the DFE is 10% of the 0.62% benzene limit for unleaded gasoline. Ethanol should not bear a burden so strict compared to gasoline. Also, many natural gasoline streams do not meet this 1.1% benzene specification, as the benzene content is related to the natural gasoline source stream and processing. Many locations need to use denaturants with non-California-compliant benzene content. Using California

benzene limits would increase costs as many companies would be forced to use far more expensive denaturants.

Commenter: Renewable Fuels Association (RFA)

We agree that parametric limits on benzene, olefins, and aromatics in DFE are unnecessary, as these substances are typically absent from DFE or are present at extremely low levels as a result of denaturing. RFA agrees no redundancy is needed in restricting the benzene, aromatics and olefins allowed in denatured fuel ethanol. Benzene, aromatics and olefins found in denatured fuel ethanol are strictly a product of the mandatory TTB denaturant addition.

Our Response:

We requested comment on adopting the additional fuel specifications currently in force for DFE in the State of California. The California requirements for DFE include maximum specifications for benzene, olefins, and aromatics as well as sulfur.[5] We believe that limitation on denaturant concentration and other requirements for DFE that we are finalizing as described in Section V.G. of the Tier 3 final rule preamble, and Chapters 5.3.2.2 and 5.3.2.3 of this Summary and Analysis of Comments document, are sufficient to limit the potential emissions effects of fuel parameters other than sulfur in DFE at this time. Therefore, we are not finalizing benzene, aromatics, and olefins specifications for DFE (or certified ethanol denaturant) at this time.

5.3.2.2. Limitations on the Types of Denaturants Used in the Manufacture of DFE

What Commenters Said:

Commenter: American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM)

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.

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

[5] California Code of Regulations 13 CCR section 2262.9.

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.

Commenter: Chevron Products Company

Many of the questions that the Agency seeks input on, can be simply resolved via the adoption of the California DFE specifications, including whether additional denaturants should be allowed (beyond, natural gasoline, gasoline, and gasoline blendstocks) and the range of allowable denaturant content. We believe there is sufficient flexibility in the slate of available potential denaturants that ethanol producers can utilize while adhering to ASTM D4806 requirements and do not see a benefit in broadening the list to include additional materials. The current list represents the material that would be most commonly available to ethanol producers and, thus, there is little (if any) incremental flexibility in allowing additional ones as potential denaturant 'options.' By the same token, maintaining the list as it currently exists would not present a new burden on DFE producers. Our recommendation to the Agency is to simply follow the requirements of ASTM in this regard since that is the right technical forum where any proposed addition of new denaturants to the specification should be entertained.

Commenter: Flint Hills Resources, LP (FHR)

In summary, should a more stringent standard be finalized as proposed by EPA, FHR believes that other gasoline blendstocks should be allowed to be used as denaturants for DFE.

Other Gasoline Blendstocks Should be Allowed for Use as Denaturants: FHR does not support EPA's proposal to restrict the number of available denaturants within new §80.1610(a)(3) to only gasoline, RBOB, CBOB or natural gas liquids. FHR recommends that if EPA must act, the latest version of ASTM Standard Specification D4806 for Denatured Fuel Ethanol (DFE) should be adopted, similar to the certification test fuels requirement proposed within §80.177(b)(i).

As EPA points-out in the preamble, ASTM D4806 provides for the use of natural gasoline, gasoline blendstocks or unleaded gasoline, as denaturants. In addition, the State of California also approves the use of gasoline components, as well as natural gasoline and unleaded gasoline. 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 to DFE producers, which must also meet U.S. Department of Treasury Alcohol and Tobacco Tax and Trade Bureau (TTB) denaturant requirements and State of California DFE requirements, when 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. FHR believes that with the combination of low denaturant concentrations (typically 2 volume percent) and ASTM D4806 specifications and TTB denaturant restrictions, any potential components of concern would be at very low levels and would unlikely impact vehicle emissions performance.

Commenter: Growth Energy

EPA should not limit denaturants to only certified BOBs, certified gasoline and natural gasoline.

EPA limiting denaturants to only certified BOBs, certified gasoline, and natural gasoline would unnecessarily reduce denaturant flexibility to prevent use of hydrotreated or refinery produced streams that are readily available for gasoline blending or may be available for future use. Several denaturants are in use today that do not meet the Alcohol Tobacco Tax and Trade Bureau (TTB) or EPA definition of natural gasoline.

Historically DFE producers have used refinery gasoline blendstocks such as "light straight run" and "light naphtha" as denaturants. Removal of this flexibility will increase costs for DFE producers. Especially if the sulfur limit for DFE is reduced (i.e., from 30 ppm to 10 ppm) and the industry is forced to look at hydrotreated streams not covered in the natural gasoline definitions.

Importantly, "gasoline blendstocks" and "gasoline blendstocks for oxygenate blending (BOB)" are very different and adopting the stricter BOB requirement will have negative economic effects on the ethanol industry.

Instead, EPA should allow a wide range of hydrocarbons for denaturant as long as they meet the TTB requirements and the final DFE meets the required benzene and sulfur specifications. The TTB requirements at 27 CFR § 19.747 allow for substantial flexibility in denaturant use.[28] EPA should follow similar provisions as the TTB, or incorporate them by cross-reference.

The proposed definition of NGLs in 40 CFR 80.2 is too restrictive. The definition should not include an unduly narrow listing of the types of facilities that produce NGLs and should include, for instance, NGLs that may be produced through refineries and hydro-treating. The definition should be revised as follows (with <u>additions underlined):</u> "(zzz) Natural Gas Liquids (NGL) means the components of natural gas (primarily propane, butane, pentane, hexane, and heptane) that are separated from the gas state in the form of liquids in <u>facilities such as</u> a natural gas liquids fractionation production facility, or <u>in</u> a natural gas processing plant, or <u>in</u> a natural gas pipeline, <u>or refinery or similar facility</u>. The higher temperature boiling components of NGL are sometimes also referred to as "natural gasoline"."

28 In particular, the TTB requirements at The TTB requirements at 27 CFR § 19.747 provide that "If a proprietor wishes to use a material to render spirits unfit for beverage use that is not authorized under § 19.746 or that is not on the published list of materials, the proprietor may submit an application for approval to the appropriate TTB officer. The application must include the name of the material and the quantity of material that the proprietor proposes to add to each 100 gallons of spirits. The appropriate TTB officer may require the proprietor to submit an 8-ounce sample of such material. The proprietor may not use any proposed material until the appropriate TTB officer approves its use. Any material that impairs the quality of the spirits for fuel use will not be approved. The proprietor must retain as part of the

records available for inspection by appropriate TTB officers any application approved by the appropriate TTB officer under this section."

Commenter: Marathon Petroleum Company LP (MPC)

MPC does 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. MPC believes 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, MPC recommends 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.

Commenter: National Corn Growers Association (NCGA)

EPA proposed that manufacturers of DFE for use by oxygenate blenders meet a 10 ppm sulfur cap, and that only natural gasoline, gasoline, and gasoline blendstocks for oxygenate blending (BOB) be used as ethanol denaturants. NCGA supports EPA's proposal for DFE standards.

Commenter: POET, LLC

EPA should change the proposed DFE 10 ppm sulfur cap to a 10 ppm sulfur average to put DFE on a level playing field with unleaded.

EPA has in the past regulated DFE with a sulfur limit that 'reflects the current 30-ppm refinery average. (67) EPA says that 'consistent with' its new 10-ppm refinery sulfur standard, EPA proposes 'that manufacturers of DFE for use by oxygenate blenders would be required to meet a 10-ppm sulfur cap. (68) EPA also proposes that DFE manufacturers would be subject to batch testing (including batch volume, sulfur content, and denaturant concentration as applicable). (69) While the final ethanol blends (e.g., E30, E85, or some other blend ratio from E16 to E85) would not necessarily be subject to batch testing (under the Blender Option, below), EPA here proposes that the DFE would be tested.

If DFE will have the same batch testing and registration requirements as gasoline, requiring a 10 ppm sulfur cap versus an average could disadvantage DFE versus gasoline which can generate and profit from sulfur credits. DFE having the same sulfur limits as gasoline, along with a compliant petroleum blendstock, will result in ethanol blends (whether MLEBs or HLEBs) having a sulfur limit that is identical to the proposed finished gasoline specifications.

Furthermore, if the burden of implementing batch testing and reporting is imposed on DFE producers, they should be allowed to generate sulfur credits. EPA states that ‘While certain batches of ethanol could theoretically be low enough in sulfur to generate credits, it is our desire to limit credit generation to companies required to comply with the proposed Tier 3 sulfur standards, i.e., refiners and importers.’ (70) If DFE producers are required to complete the batch testing, reporting, and record keeping on DFE similar to refiner requirements on gasoline, they should have the same ability to generate or use credits.

EPA mistakenly states that ‘since many refiners currently comply with our standards taking into consideration the fuel property changes expected as a result of downstream ethanol blending, providing ethanol blenders with sulfur credit would result in double counting the effects of ethanol.’ (71) However, double counting would not result if refiners are assuming that DFE has a sulfur level of 10 ppm. Credits would only be generated at levels that are below this 10 ppm level.

EPA attempts to further reject ethanol generating sulfur credits by stating that ‘Over compliance with the per-gallon cap would not be a valid basis for credit generation, as you would expect that in all cases the DFE would be below the cap. To allow credit generation, we would need to propose an additional annual average sulfur standard for DFE at some level below 10 ppm, and allow credits to be generated for over compliance with that standard.’ (72) Ethanol producers should have the same ability as refiners to generate credits if they have the same testing and reporting standards. In order to remain price-competitive with gasoline, ethanol should be allowed to generate credits in a similar manner as gasoline. Furthermore, such credit trading could allow ethanol producers to offset the cost of new DFE testing and reporting requirements.

POET agrees with EPA that it is unnecessary to establish benzene, aromatics and olefin limits on DFE.

The Proposed Rule states that limiting denaturants (e.g., to natural gasoline, gasoline, and BOBs) ‘along with Internal Revenue Service ethanol denaturant requirements would limit benzene, olefins, and aromatics content of DFE to very low levels.’ (73) POET agrees with EPA’s ‘not proposing any limits on these parameters in DFE.’ (74)

POET further agrees with EPA’s assessment that it should not adopt the California DFE standards for benzene, aromatics, and olefins. (75) Not only would this impose a testing and record keeping burden on DFE producers, but it would not be meaningful given that there are no aromatics or olefin limitations for gasoline components (outside of base and certification fuel standards). (76)

EPA should not limit denaturants to only certified BOBS, certified gasoline, and natural gasoline.

EPA limiting denaturants to only certified BOBs, certified gasoline, and natural gasoline would unnecessarily reduce denaturant flexibility to prevent use of hydrotreated or refinery produced streams that are readily available for gasoline blending or may be available for future use. Several denaturants are in use today that do not meet the Alcohol Tobacco Tax and Trade Bureau (TTB) or EPA definition of natural gasoline.

Historically DFE producers have used refinery gasoline blendstocks such as 'light straight run' and 'light naphtha' as denaturants. Removal of this flexibility will increase costs for DFE producers, especially if the sulfur limit for DFE is reduced (i.e., from 30 ppm to 10 ppm) and the industry is forced to look at hydrotreated streams not covered in the natural gasoline definitions.

Importantly, 'gasoline blendstocks' and 'gasoline blendstocks for oxygenate blending (BOB)' are very different and adopting the stricter BOB requirement will have negative economic effects on the ethanol industry.

Instead, EPA should allow a wide range of hydrocarbons for denaturant as long as they meet the TTB requirements and the final DFE meets the required benzene and sulfur specifications. The TTB requirements at 27 CFR § 19.747 allow for substantial flexibility in denaturant use. (94) EPA should follow similar provisions as the TTB, or incorporate them by cross-reference.

94 - In particular, the TTB requirements at The TTB requirements at 27 CFR § 19.747 provide that 'If a proprietor wishes to use a material to render spirits unfit for beverage use that is not authorized under § 19.746 or that is not on the published list of materials, the proprietor may submit an application for approval to the appropriate TTB officer. The application must include the name of the material and the quantity of material that the proprietor proposes to add to each 100 gallons of spirits. The appropriate TTB officer may require the proprietor to submit an 8-ounce sample of such material. The proprietor may not use any proposed material until the appropriate TTB officer approves its use. Any material that impairs the quality of the spirits for fuel use will not be approved. The proprietor must retain as part of the records available for inspection by appropriate TTB officers any application approved by the appropriate TTB officer under this section.'

We support the proposal to limit approved denaturants for denatured fuel ethanol to natural gasoline, gasoline, and gasoline blendstocks for oxygenate blending (BOBs), however we would like to see an option for proposing a new denaturant in the future.

Commenter: Renewable Fuels Association (RFA)

As for allowable denaturants for denatured fuel ethanol, RFA recommends that EPA recognize that the Alcohol and Tobacco Tax and Trade Bureau (TTB) and ASTM carefully restrict the allowable materials that can be used as denaturant. RFA also recommends that EPA recognize future options for denaturant and allow for the possibility of approving non-hydrocarbon origin denaturants. Regulatory schemes such as the California Low Carbon Fuels Standard promote the use of low carbon intensity fuels and thus nontraditional denaturants may be needed in the future. The ethanol industry should be granted as much flexibility as possible to meet the regulatory burden of the denaturing requirements of the TTB while continuously improving ethanol's performance in a spark ignition engine. EPA adding identical effectual denaturant requirements is not helpful for the industry or an improvement of air quality.

Commenter: Private Citizen

Approve denaturants that are non-petroleum based for Alcohol Fuel.

Our Response:

To limit the variability in DFE composition and the associated potential impact on vehicle emissions, we proposed to allow the use of only certified gasoline, gasoline blendstocks for oxygenate blending (BOBs), and natural gasoline as denaturants.

The ASTM specification for DFE requires that the only denaturants that can be used are gasoline, gasoline blendstocks, and natural gasoline. The State of California incorporated the ASTM limits on allowable denaturants into its regulations for DFE by reference.[6] Thus, both ASTM and the State of California allow the use of gasoline blendstocks other than BOBs as denaturants.

While industry standards are typically focused on performance concerns, EPA continues to believe that it is appropriate to implement additional controls to address the potential impact of fuel components in denaturants other than sulfur on vehicle emissions. In particular, EPA is concerned about the use of denaturants that might have a high concentration of benzene or other aromatics. We believe that limitation on denaturant concentration and other requirements for DFE that we are finalizing as described in Section V.G. of the Tier 3 final rule preamble, and Chapter 5.3.2.3 of this Summary and Analysis of Comments document, are sufficient to limit the potential emissions effects of fuel parameters other than sulfur in DFE at this time. Therefore, we are not finalizing additional controls on the types of denaturants that may be used beyond those currently adopted by ASTM and the State of California at this time. In response to comments, the Tier 3 FRM includes the requirement that only gasoline, gasoline blendstocks, and natural gasoline liquids may be used to denature DFE.[7] This requirement is essentially the same as the current ASTM and State of California specifications for the type of denaturants that may be used. In response to the comment that the proposed definition of natural gasoline liquids was too restrictive, we are finalizing the following definition: Natural gas liquids (NGL) means the components of natural gas (primarily propane, butane, pentane, hexane, and heptane) that are separated from the gas state in the form of liquids in facilities such as a natural gas production facility, a gas processing plant, a natural gas pipeline, or a refinery or similar facility. The higher temperature boiling components of NGL are sometimes referred to as "natural gasoline".

We will continue to monitor the need for additional denaturants, and when appropriate EPA may undertake a future rulemaking to evaluate the suitability of additional denaturants and consider allowing their use.

5.3.2.3. Limitation of Denaturant Concentration

[6] The California Code of Regulations references ASTM D 4806-99 which limits the allowed denaturants to gasoline, gasoline components, and natural gasoline.
[7] Finished gasoline used as denaturant must be compliant with the applicable EPA requirements.

What Commenters Said:

Commenter: American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM)

And, we contend that EPA should not limit the concentration of denaturant to 2%.

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,

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 contend that EPA does not need to limit the concentration of denaturant in DFE.

Commenter: Chevron Products Company

Adoption of the California DFE requirements would also address the issue of allowable denaturant content since the state's allowable range is 1.96 volume percent minimum to 4.76 volume percent maximum. The corresponding ASTM (D4806) range is 1.96-5 volume percent. We would like the Agency to reconsider its proposal to limit maximum ethanol denaturant content to 2 volume percent (even though we understand the Agency's recognizes that this 'limit' would actually entail allowing up to 2.5 volume percent denaturant content). We see no value in introducing yet a more restrictive requirement in the allowable denaturant range and dispute the Agency's assertion that this is in any way a facilitation vis-à-vis the RFS2 requirements. The minimum value is effectively set by the IRS' requirements at 1.96 volume percent and California mirrors that value. The Agency's setting the maximum at 2 volume percent unnecessarily results in nearly identical practical maximum and minimum values with only the rounding tolerance remaining for some operating flexibility.

There is no reason that we can see why denaturant content in excess of 2 volume percent cannot be 'backed out' of RFS2 RIN calculations and IRS calculations, nor do we consider the process of making those adjustments particularly onerous or burdensome. We disagree with the Agency's assertion that denaturant producer registration and demonstration of compliance with the sulfur, aromatics, benzene and olefin content requirements would be necessary if the maximum denaturant content is not set at 2 volume percent. In our view, adoption of the California DFE requirements in their entirety resolves this issue and obviates the need for such burdensome administrative requirements on denaturant producers.

Commenter: Flint Hills Resources, LP (FHR)

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. FHR believes that with the combination of low denaturant concentrations (typically 2 volume percent) and ASTM D4806 specifications and TTB denaturant restrictions, any potential components of concern would be at very low levels and would unlikely impact vehicle emissions performance.

Commenter: Growth Energy

EPA should not limit the denaturant content to 2 percent of DFE by volume. Denaturant limits exist in other regulations and should not be limited to 2 percent**.**

EPA notes regarding this issue that it is "proposing to limit the maximum concentration of denaturant that can be used in DFE to 2 volume percent."

Both ASTM and California allow for up to 5 percent denaturant, and EPA should not adopt a more stringent limit. Ethanol producers are strongly incentivized by the RFS to keep denaturant under 2 percent.[30] However, under certain conditions the flexibility to have a slightly higher denaturant content can be very important to ethanol producers. Accordingly, EPA should adopt no more stringent than a 5 percent denaturant limit.

30 The Proposed Rule notes that "Under the RFS2 regulations, if the denaturant level is 2 volume percent or less (effectively less than 2.5 volume percent considering rounding) the entire volume of denatured fuel ethanol can be used for determining compliance with the RFS2 renewable fuel volume requirements." Id.

Commenter: Marathon Petroleum Company LP (MPC)

MPC contends 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. MPC fully understands 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.

Commenter: POET, LLC

Denaturant limits exist in other regulations and EPA limiting denaturant content to 2% of DFE by volume is conflicting and unnecessary.

EPA notes regarding this issue that it is ‘proposing to limit the maximum concentration of denaturant that can be used in DFE to 2 volume percent.’ (95)

Both ASTM and California allow for up to 5% denaturant, and EPA should not adopt a more stringent limit. Ethanol producers are strongly incentivized by the RFS to keep denaturant under 2%. (96) However, under certain conditions the flexibility to have a slightly higher denaturant content can be very important to ethanol producers. Accordingly, EPA should adopt no more stringent than a 5% denaturant limit.

96 - The Proposed Rule notes that ‘Under the RFS2 regulations, if the denaturant level is 2 volume percent or less (effectively less than 2.5 volume percent considering rounding) the entire volume of denatured fuel ethanol can be used for determining compliance with the RFS2 renewable fuel volume requirements.’ Id.

Commenter: Renewable Fuels Association (RFA)

Several existing regulations and specifications already govern this 2.% volume of denaturant in our denatured fuel ethanol (e.g., ASTM, State of California, Alcohol Tax & Trade Bureau (TTB)) that confine ethanol producers on their choices of denaturant.

RFA does not support EPA limiting the amount of denaturant. RFA does not think the EPA should restrict the amount of denaturant content in DFE in this regulation. RFA thinks the current ASTM specifications for denaturant content are adequate. The DFE specification ASTM D4806 allows 5% denaturant content maximum. Further, the industry already has a regulatory restriction under the RFS2 for denaturant content; the RFS2 requires that DFE contain no more than 2. % denaturant for RIN generation. However, the option to use more denaturant when economical has proven effective and manageable by the marketplace.

Commenter: Sutherland Asbill & Brennan LLP (Sutherland)

The Proposed Rule would also limit the maximum concentration of denaturant that can be used in denatured fuel ethanol to 2 percent by volume. The Proposed Rule provides little tolerance in light of the 1.96 percent minimum level of denaturant required by Alcohol and Tobacco Tax and Trade Bureau regulations. A reasonable tolerance should be allowed so as to avoid inadvertent compliance issues.

Our Response:

To limit the potential impact on vehicle emissions of fuel parameters in ethanol denaturants other than sulfur, we proposed to limit denaturant concentration in DFE to a maximum of 2 volume percent, which translates to 2.5 volume percent considering rounding.

California allows a maximum denaturant content of 5 volume percent consistent with the industry consensus ASTM International (ASTM) specification for DFE. [8]

Since we did not finalize benzene, olefin, or aromatics specifications for ethanol denaturants similar to those in California as part of the Tier 3 FRM, we continue to believe that it is appropriate to implement a more stringent limit on maximum denaturant concentration to address concerns about the potential impact on vehicle emissions of fuel parameters in ethanol denaturants other than sulfur. Denaturants with high benzene content could have a substantial impact on the final benzene content of the finished ethanol-gasoline blend. Setting a more stringent limit on denaturant concentration will ensure that harmful components such as benzene potentially present in ethanol denaturants are adequately diluted in the finished fuel blend. We agree with comments that it is appropriate to provide additional flexibility for the allowable denaturant levels that may be used. Therefore, we are finalizing a 3.0 volume percent maximum on ethanol denaturant concentration. This approach provides sufficient flexibility to DFE producers while avoiding the need to impose additional testing burdens on denaturant and DFE producers (e.g. for benzene and aromatics). Given the comments that DFE typically contains approximately 2 volume percent denaturant, we expect that the 3.0 volume limit that we are finalizing will have a minimal impact on the operations of DFE producers and importers.

5.3.3. Compliance Demonstration Including Registration, Testing, Product Transfer Document, and Reporting Requirements

What Commenters Said:

Commenter: American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM)

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 believe that cumbersome individual batch reporting for all fuels has little value.

API and AFPM contend that EPA does not need to limit the concentration of denaturant in DFE 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.

[8] ASTM International D4806-13a, "Standard Specification for Denatured Fuel Ethanol for Blending with Gasolines for Use as Automotive Spark-Ignition Engine Fuel".

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.

Commenter: Chevron Products Company

We disagree with the Agency's assertion that denaturant producer registration and demonstration of compliance with the sulfur, aromatics, benzene and olefin content requirements would be necessary if the maximum denaturant content is not set at 2 volume percent. In our view, adoption of the California DFE requirements in their entirety resolves this issue and obviates the need for such burdensome administrative requirements on denaturant producers.

We concur with the Agency's proposal that producers of DFE be required to provide annual batch reports to the Agency to demonstrate that their product meets the proposed quality requirements. DFE manufacturers are required to register their product with the Agency prior to introducing DFE into commerce and they routinely test each batch of their product to provide the necessary documentation to their customers (i.e., fuel blenders). While we do not necessarily agree that the incorporation of DFE batch reporting would 'facilitate unfettered downstream ethanol blending,' we also do not see it as adding any significant burden to DFE producers. The single most important component in facilitating downstream blending is the adoption of uniform national specifications for ethanol and, thus, our recommendation of adoption of the California requirements.

Commenter: Flint Hills Resources, LP (FHR)

In addition, individual batch reporting of gasoline or other fuels should not be required.

Individual Batch Reporting of Gasoline and Other Fuels Should Not Be Required

FHR believes that reporting of each batch of gasoline under §80.1652 has little value, and EPA should not consider individual batch reporting for DFE producers. FHR agrees that batch records should continue to be part of the recordkeeping requirements within §80.1653, but only aggregated reports be submitted to EPA. Similar to how the diesel sulfur program is currently structured, fuel producers should be required to keep batch records that demonstrate compliance with standards and support annual reporting. Individual batch records would be made readily available to EPA upon request or during inspections.

Commenter: Growth Energy

Denaturant manufacturers should not be required to register with EPA.

EPA requests comment "on whether to require manufacturers of denaturants for use in DFE to register with EPA, and demonstrate compliance with the maximum sulfur, benzene, olefins, and aromatics specifications enforced in the State of California based on the anticipated dilution with ethanol."

EPA should not require denaturant manufacturers to register with the EPA. Doing so would limit supply and unfairly increase production costs on the ethanol industry. Gasoline component manufacturers are not required to register, e.g., manufacturers of pyrolysis gasoline, natural gasoline, and chemical byproducts. We believe a registration requirement would limit the number of denaturant suppliers willing to supply the ethanol industry, versus the gasoline or crude blending markets where they would not need to register. It is inappropriate that a natural gasoline producer would need to register in order to supply product for DFE, but not need to supply the same product to a gasoline blender. The requirements should be similar to keep the market competitive and provide a level playing field to both gasoline and ethanol.

EPA also proposes that DFE manufacturers would be subject to batch testing (including batch volume, sulfur content, and denaturant concentration as applicable). While the final ethanol *blends* (e.g., E30, E85, or some other blend ratio from E16 to E85) would not necessarily be subject to batching testing, EPA here proposes that the DFE would be tested.

Commenter: Marathon Petroleum Company LP (MPC)

In the event that EPA finalizes a more stringent 10-ppm refinery average sulfur standard, MPC supports 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.

MPC believes 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, MPC believes 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.

Commenter: POET, LLC

EPA should not require denaturant manufacturers to register with the EPA. Doing so would limit supply and unfairly increase production costs on the ethanol industry. Gasoline component manufacturers are not required to register, e.g., manufacturers of pyrolysis gasoline, natural gasoline, and chemical byproducts. POET believes a registration requirement would limit the number of denaturant suppliers willing to supply the ethanol industry, versus the gasoline or crude blending markets where they would not need to register. It is inappropriate that a natural gasoline producer would need to register in order to supply product for DFE, but not need to register to supply the same product to a gasoline blender. The requirements should be similar to keep the market competitive and provide a level playing field to both gasoline and ethanol.

Commenter: Renewable Fuels Association (RFA)

Because denaturants are the sole source of sulfur in denatured fuel ethanol (DFE), the EPA should not require sulfur content batch reporting by DFE producers. Current practices for monitoring the sulfur content of denaturant and DFE are adequate.

However, if EPA finalizes the currently proposed regulatory language pertaining to batch reporting, it would create a substantial and unnecessary cost burden for DFE producers.

The EPA may not know that ethanol production facilities do not have the laboratory capability to analyze for sulfur content. This proposed regulation as written would be an expensive endeavor for ethanol producers.

Since the California sulfur specifications were adopted, ethanol facilities have worked closely with their denaturant suppliers (mostly natural gasoline marketers) to supply a California-compliant denaturant that results in a finished DFE with less than 10 ppm sulfur. Ethanol producers require denaturant suppliers to provide a low sulfur product that also meets the other attributes of the California regulations pertaining to benzene, olefins and aromatics content. A certificate of analysis is received with each denaturant delivery. Ethanol production facilities reference the sulfur content on the certificate of analysis, which is typically a quarterly reported number recorded by third party commercial laboratories using the latest version of ASTM Test Method D5453.

What EPA is proposing via §80.1610 is that producers of DFE be required to meet the proposed fuel quality requirements for their product and sample and test each batch produced and provide batch reports to EPA. This is similar to the requirements for gasoline refiners. This would require all ethanol production facilities to purchase lab equipment to analyze for sulfur Using ASTM D5453; the most widely used and accepted method for DFE. Just the initial equipment investment for this test method is expected to be $60,000 at a minimum for each location, not to mention training and personnel time to perform this work. If finalized, this proposed regulation would require the ethanol industry to initially invest over $12 million dollars in lab equipment to analyze daily for sulfur content of less than 10 ppm that the industry has been in voluntary compliance since 2002.

Results from the ASTM Interlaboratory Crosscheck Program (ILCP) for DFE further underscore the superfluous nature of the proposed batch reporting. RFA participates in many areas within ASTM including the test methods committee and ILCP for DFE. The ILCP program for DFE has fifty laboratories that participate in the blind analytical testing of DFE using the ASTM D5453 test method for sulfur content. The collection of data has been statistically analyzed and shows DFE typically has sulfur content in the range of 1 – 5 ppm. In many cases, sulfur levels are so low that precision problems have arisen in attempting to analyze sulfur content.

For these reasons, RFA is requesting some relief from the batch reporting requirements proposed in § 80.1610. We believe EPA should allow continuation of current practices for denaturant blending/sulfur limit compliance instead of following the proposed §80.1630 sampling and testing requirements for refiners and importers. The sulfur content of the DFE can be monitored mathematically, based on the incoming certificate of analysis supplied by the denaturant manufacturer and confirmed via a third party commercial laboratory by sampling and testing DFE on a defined periodic basis utilizing standard test methods. Additional recordkeeping requirements for DFE producers (beyond what is specified in the proposal) could be part of this procedure. Producers would need to maintain the certificate of analysis showing denaturant sulfur content and the calculations used to determine DFE sulfur content as evidence that DFE meets the 10 ppm sulfur requirements. They would also have to perform standard quality assurance activities with the denaturant supplier by sampling incoming shipments of denaturant for sulfur content against the specified certificate of analysis on a frequent basis.

This would be similar to the way butane is treated in the proposed §80.82 pertaining to butane blending. The current regulations reduce the burden of compliance with EPA gasoline quality requirements for parties that blend butane into conventional gasoline, reformulated gasoline (RFG), or reformulated blendstock for oxygenate blending (RBOB) downstream of a refinery.

Parties that conduct such butane blending are considered refiners; however, they are not subject to sampling and testing requirements that would otherwise apply to a refiner provided they use butane of known quality and meet certain other requirements. Proposed language for butane blending states that any refinery that blends butane for which the refinery has documents from the butane supplier which demonstrate that the butane is commercial grade may demonstrate compliance with the standards based on the properties specified by the butane supplier. We are simply seeking the same treatment for blending of denaturant with ethanol.

EPA should adopt the current California regulatory practice of certifying the sulfur content of denatured fuel ethanol as this certification system has proven extremely effective. Recently, California has taken steps to preserve the sulfur content certification which confirms the ethanol industry’s standard practice as accurate.

The above suggested changes to the current proposed language regarding validation of sulfur content in DFE, which mimic the California regulations, will not compromise the intentions of the gasoline sulfur proposed limit of 10 ppm maximum.

§80.1651 Product transfer document requirements. The product transfer document from Subpart M § 80.1453 product transfer document requirements for the ethanol producers under the Renewable Fuels Standard contains the same information and should be allowed to suffice for §80.1651 with the additional statement as required by §80.1610(c)(1) “Meets EPA standards for denatured fuel ethanol for use in gasoline.” Under the RFS program’s EMTS platform, the ethanol industry already has a batch numbering system and PTD requirements. Requiring another unique batch number for the sulfur program by §80.1610(d) is redundant and not necessary for tracking batches of product.

§80.1652 Reporting requirements. Ethanol producers are required to annually report production volumes under fuels and fuel additives (FFARs) (40 CFR 79 Subparts A, B, C, D, and F). We suggest simply adding a check box to form 3520-13A Fuel Additive Manufacturer Report to include the §80.1652(c)(3) attestation.

In lieu of requiring sulfur content batch reporting for DFE producers, we recommend the following changes to 80.1653 to ensure that DFE producers can demonstrate, upon request, that the sulfur content of the denaturant used for DFE blending resulted in a final DFE blend with less than 10 ppm sulfur:

Denaturant manufacturers should be required to demonstrate compliance with the sulfur specifications enforced in the State of California. We feel compelled to point out again that the primary source of sulfur in DFE is the hydrocarbon denaturant itself. Very little sulfur is contained in the feedstocks and processing aids used for ethanol production. Thus, the primary concern for ethanol producers regarding proposed sulfur limits on ethanol is continued access to low sulfur hydrocarbon denaturants. As such, EPA could consider a sulfur maximum for denaturant, similar to California’s regulations.

Overall, RFA is not opposed to the DFE sulfur content standards, provided that sufficient supplies of low sulfur denaturant continue to be available.

Our Response:

To demonstrate compliance with the Tier 3 program 10 ppm sulfur cap for gasoline oxygenates, we proposed that producers and importers of oxygenates would be required to test the sulfur content of each batch of oxygenate they produce. We also requested comment on whether to require producers of denaturants for use in denatured fuel ethanol DFE to register with EPA and to demonstrate compliance with a maximum sulfur specification based on the anticipated dilution with ethanol. With DFE now comprising essentially 10 percent of the gasoline supply, it is important that EPA have effective means of enforcing gasoline quality standards, particularly given that the majority of DFE is blended into gasoline at a large number of diverse locations downstream of the refinery gate. We appreciate the desire of the industry to avoid regulation. However, important emissions and air quality improvements resulting from our fuel standards would be at risk without EPA’s ability to readily enforce gasoline quality standards.

DFE producers currently use certificates of sulfur analysis from denaturant producers and volumetric DFE blending records to assure themselves that when a sample of DFE is tested by the State of California that it will be found to be compliant with a 10 ppm sulfur cap.[9] Under this approach, DFE producers would maintain records regarding the denaturant sulfur content and the calculations used to determine the sulfur content of the finished DFE. Because the sulfur content of neat (un-denatured) ethanol manufactured using industry standard quality control practices should be negligible, the sulfur content of DFE is effectively determined by the sulfur content of denaturant used.[10]

EPA agrees that is appropriate to finalize requirements for the demonstration of compliance with the 10 ppm sulfur cap for DFE that are based on current industry practices rather than requiring sulfur testing on each batch of DFE.[11] We agree that that potential contribution to the sulfur content of DFE other than from the addition of denaturants can be adequately addressed by the retention of production quality control records by the ethanol manufacturer. We also agree that the denaturant typically contributes the majority of the sulfur to the finished DFE. Therefore, the Tier 3 FRM finalized streamlined provisions that DFE producers and importers may use in demonstrating compliance with the 10 ppm sulfur cap for DFE as an alternative to testing each batch of DFE for its sulfur content. These streamlined provisions are based on the use of denaturant batch sulfur testing conducted by denaturant producers who have registered with EPA. Denaturants from unregistered denaturant producers may be used by DFE producers provided that they test each batch of DFE to demonstrate compliance with the 10 ppm sulfur cap for DFE.[12]

DFE manufacturers that use denaturants that have been designated on the denaturant product transfer document (PTD) as a certified ethanol denaturant will be able use PTDs for the denaturants used and volumetric blending records which show that the denaturant was added at 3.0 volume percent or less in demonstrating compliance with the 10 ppm sulfur cap for DFE in lieu of per-batch sulfur testing of DFE. The sulfur content of "neat" (i.e. un-denatured) ethanol may be assumed to be negligible for the purposes of demonstration of compliance using volumetric blending records provide that the DFE manufacturer maintains quality control records that demonstrate this assumption is justified. The Tier 3 FRM rule also requires that DFE manufacturers conduct quality assurance to demonstrate affirmative defenses to presumptive liability.[13] Producers and importers of DFE must initiate a PTD to accompany each batch of DFE which states that it meets federal standards.

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[9] The State of California does not rely on industry testing and recordkeeping to help establish compliance with their sulfur requirements for DFE, instead choosing to focus on direct testing that they conduct. EPA relies on the review of industry records including those associated with tesing conducted by industry as well as direct testing conducted by EPA for compliance assurance.

[10] Ethanol manufacturers conduct periodic sulfate testing on neat ethanol to ensure that sulfur contamination from the manufacturing process is negligible.

[11] Per-batch sulfur testing for other potential oxygenates will be required to demonstrate compliance with the 10 ppm sulfur cap. EPA may consider amending the requirements for other potential oxygenates in a later rulemaking based on additional information that we might receive.

[12] The limitation on the types of denaturants that may be used and the maximum concentration at which a denaturant may be used (discussed in section V.G.2 and 3 of the Tier 3 FRM) applies regardless of whether a denaturant from a registered or non-registered denaturant manufacture are used.

[13] Such quality assurance practices include periodic calibration of the denaturant blending equipment to ensure that denaturants are not added in excess of 5 volume percent.

Denaturant manufacturers are accustomed to providing certificates of sulfur analysis to DFE manufacturers. Therefore, we believe that the requirements finalized today for denaturant manufacturers to conduct per-batch sulfur testing, initiate a product transfer document stating that denaturant is suitable for use in manufacturing DFE that meets federal requirements, retain records, and register with EPA will not represent a substantial new burden. To facilitate compliance with the requirement that DFE manufacturers who use the mathematical method to demonstrate compliance with DFE sulfur requirements must only use denaturants from registered denaturant manufacturers. Registering with EPA will be a one-time act, as will be the necessary modifications to denaturant product transfer documents. Thus, the requirement to register with EPA should not be a serious impediment for a manufacturer to enter the denaturant supply market. We believe that it is necessary to require denaturant manufacturers to register with EPA in order to facilitate compliance oversight. EPA needs to be able identify all manufacturers of denaturants in order to periodically audit their records, and to recognize potential denaturants in the system that are incorrectly designated as appropriate for use in manufacturing DFE that meets federal sulfur requirements. Denaturant manufacturers that supply their product to refiners for use in the manufacture of gasoline are not required to register with EPA because, unlike the DFE manufacturers, refiners are responsible for testing the final gasoline they produce.

As is current practice today, we anticipate that ethanol manufacturers will negotiate the specific sulfur level they require from denaturant manufacturers to facilitate compliance with the 10 ppm sulfur cap for DFE taking into consideration what level of compliance margin a given manufacturer feels is necessary. We believe that it is appropriate to allow this practice to continue. We understand that ethanol manufacturers currently require denaturant manufacturers to provide a product with a sulfur content of 120 ppm or less in order to ensure that DFE that contains 5 volume percent denaturant can comply with California’s 10 ppm sulfur cap for DFE. Thus, we expect that denaturant manufacturers will not need to change the sulfur content of the denaturant they manufacture in order to comply with the Tier 3 requirements. Manufacturers of denaturants used by DFE producers that employ the volumetric blending record method in demonstrating compliance with the sulfur requirements for DFE must retain per batch sulfur test data on the denaturants they produce to demonstrate that the sulfur content of the denaturant will not cause the sulfur content of DFE to exceed 10 ppm when added to neat ethanol at 3.0 volume percent. Any sample of denaturant which is designated as appropriate for use in manufacturing DFE that meets federal requirements, that is found by EPA to have sulfur content above 330 ppm will be deemed to be noncompliant, and the denaturant manufacturer may be liable for the associated penalties. A denaturant with a sulfur content of 330 ppm when used at 3.0 volume percent would result in a sulfur content of the finished DFE of slightly less than 10 ppm.

We continue to believe that annual reports from oxygenate producers (as well as gasoline refiners and importers) are important enforcement and compliance assurance tool. Therefore, we are finalizing the requirement that producers and importers of DFE and other oxygenates must submit annual reports to EPA that include the total volume of DFE/oxygenate produced and an attestation that all batches met the proposed fuel quality requirements. The flexibilities provided in the Tier 3 rule will allow DFE producers and importers to avoid testing DFE production batches, thereby avoiding substantial capital costs to comply with the Tier 3 requirements. We do not believe that it appropriate to provide additional regulatory relief to DFE producers and importers from registration, reporting, and recordkeeping requirements. As noted above, these requirements are essential to ensure the quality of a substantial fraction of the total volume of motor vehicle fuel.

In response to comments, EPA will work with stakeholders to evaluate the potential for use of EMTS and other existing EPA mechanisms to meet some of the reporting requirements for DFE producers and importers.

5.3.4. Other

What Commenters Said:

Commenter: American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM)

Ethanol has become a significant component within the gasoline fuel pool and should be subject to requirements similar to gasoline refiners.

Commenter: Growth Energy

We promote expanding the use of ethanol in gasoline, decreasing our dependence on foreign oil, improving our environment and creating American jobs. Ethanol is a home-grown, renewable fuel that provides significant benefits to our nation's air quality. We vigorously support the Renewable Fuel Standard (RFS) and the continued use of ethanol in our nation's fuel supply as it significantly reduces carbon monoxide, particulate matter and greenhouse gas emissions. As such, we are pleased to have this opportunity to comment on the Agency's proposed "Tier 3" Emission and Fuel Standards as there are several key issues that, when addressed, will continue to promote the expanded use of biofuels in our nation's transportation fuel system.

We also have several concerns about some of the specific standards for Denatured Fuel Ethanol (DFE).

EPA must not burden the ethanol industry with additional, unnecessary production restrictions: EPA must not burden the ethanol industry with additional, unnecessary production restrictions. These restrictions include both the specifications for DFE (denatured fuel ethanol) as well as the process of blending gasoline with DFE to create ethanol-blended fuels.

Commenter: Chevron Products Company

We concur with the Agency's opinion that the proposed fuel specifications for DFE also apply to other oxygenates used in gasoline. The January 1, 2017 effective date for oxygenate producers/importers to meet the new quality requirements seems reasonable in that it appears to provide sufficient lead time for any manufacturing process modifications that oxygenate producers may need to make to comply. However, should EPA decide to extend the overall program start date to a date that occurs after January 1, 2017, the effective dates for new DFE requirements should be extended to be consistent with the overall Tier 3 program.

Commenter: Marathon Petroleum Company LP (MPC)

DFE has become a significant component within the gasoline fuel pool and should be subject to requirements similar to gasoline refiners.

Commenter: Sutherland Asbill & Brennan LLP (Sutherland)

It appears that an importer of ethanol that is denatured upon entry or already denatured would qualify as a 'producer' of denatured ethanol. Sutherland believes that EPA should clarify this point.

Our Response:

We agree with the comment that additional requirements for denatured fuel ethanol (DFE) are necessary to ensure DFE quality. With DFE now comprising essentially 10 percent of the gasoline supply, it is important that EPA have effective means of enforcing gasoline quality standards, particularly given that the majority of DFE is blended into gasoline at a large number of diverse locations downstream of the refinery gate. We appreciate the desire of the ethanol industry to avoid regulation. However, important emissions and air quality improvements resulting from our fuel standards would be at risk without EPA's ability to readily enforce gasoline quality standards. As discussed in chapter 5.3., we have included flexibilities in the requirements for denatured fuel ethanol that will minimize the burden on DFE producers.

We have amended the regulatory text to further clarify that denatured fuel ethanol importers as well as producers are subject to DFE quality requirements.

We agree with the comment that the specifications for DFE should also apply to other gasoline oxygenates. This is reflected in the oxygenate requirement that we are finalizing.

We agree with the comment that the January 1, 2017 effective date for oxygenate producers/importers to meet the new quality requirements that we are finalizing in the Tier 3 final rule provides sufficient time for the industry to prepare to comply

5.4. Standards for Fuel Used in Flexible Fueled Vehicles (E51-83 and Mid-Level (E16-50) Blends)

What Commenters Said:

Commenter: Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

Recommendations for E51-83 and E16-50 Market Fuel Specifications – E51-E83: As EPA notes, (86) the standards for E51-83, "Ethanol Fuel Blends for Flexible-Fuel Automotive Spark Ignition Engines" have been changing rapidly in recent years. Indeed, a revised specification, ASTM D5798-13, issued in May, 2013. The most significant driver for the recent revisions to the E51-83 specification was the inability of terminals to blend E85 that met the requirements of the E85 specification using current gasoline and BOBs (blend stock for oxygenate blending). The low vapor pressures of modern gasoline made it difficult to meet the vapor pressure minima prescribed by the specification, even at the maximum rate of gasoline addition. After running a test program to determine that the fuel vapor pressure requirements could not be changed, the ASTM task group decreased the minimum allowable ethanol percentage to 51% as the best way to enable E51-83 blends with compliant RVPs. The higher allowed level of gasoline is required not just to meet cold weather vapor pressure requirements but also to meet summer requirements when using the low vapor pressure RBOBs (Reformulated Blend-stocks for Oxygenate Blending) used in many areas of the U.S.

We agree with EPA's proposal to subject E51-83 to the same sulfur, benzene and RVP requirements as gasoline. It is important that producers of E51-83, where they are merely oxygenate blenders, be exempt from the regulatory burden that falls on those EPA classifies as "refiners." The goal of this regulation is to ensure that blenders produce E51-83 blends that are compliant to the gasoline sulfur, RVP and benzene standards, while avoiding all the sampling, testing, and reporting obligations of refiners. To this end, requiring blenders to maintain records including the certificates of analysis, product transfer documents, and the ratios used to blend the fuel, would be sufficient to document that the resultant blends were compliant with EPA standards.

E16-50

We recommend that EPA treat E16-50 as an alternative fuel for use in FFVs or other vehicles specifically certified for use with these fuels (87). These fuels should be subject to the same sulfur, benzene and RVP requirements as gasoline. It is important that producers of E16-50, when they are merely oxygenate blenders, also be exempt from the regulatory burden that falls on those EPA classifies as "refiners" as noted in the preceding section.

86 - 78 Fed. Reg. 29908 at 29937 (May 21, 2013).
87 - 78 Fed. Reg. 29908 at 29937-29938 (May 21, 2013).

Commenter: American Coalition for Ethanol (ACE)

Standards for E51-E83 (new ASTM spec): In keeping with EPA intent to provide test fuels that approximate those actually used by vehicle operators, and in the interest of providing ethanol producers with similar flexibility given to refiners for decades, ACE supports specifications consistent with ASTM D5798-13 and would recommend allowing the use of blendstocks such as natural gasoline and butane in certification fuels.

Standards for Mid-level Ethanol Blends (E16-E50): As mentioned earlier, unless and until a definitive new ethanol blend is established by auto manufacturers, ACE believes other ethanol certification fuels should be created using E10 or E15 blendstocks along with Denatured Fuel Ethanol or ethanol flex fuel, since that is the way such fuels would likely be created in the marketplace

Commenter: American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM)

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.

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.

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) 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. 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."

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.

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.

Commenter: BP Products North America Inc.

Standards for E51–83- Meeting the ultimate goals of the Renewable Fuel Standard is highly dependent upon the expansion of E51–83 into the marketplace. BP, therefore, supports EPA's proposal to allow the use of butane and natural gas liquids to manufacture E51-83. BP also agrees that the final blend should meet the same sulfur, RVP, and benzene standards otherwise applicable to gasoline. BP does not support imposing tighter standards on E51-83, such as EPA's proposed 0.2 wt. % benzene.

EPA has proposed alternate conformance demonstrations with RVP requirements for E51- 83. Under option 2, the blender could use a blending model and measure the RVPs of the blending components. Alternatively the blender could use reduced frequency testing to verify vapor pressure conformance. BP is supportive of these options which will provide greater flexibility for E51-83 blending.

Standards for Butane and Natural Gas Liquids (NGLs)- BP supports the limits on butane composition that match those used now for butane blending of gasoline at the terminal. BP's experience has shown that only relatively low levels (one to few percent) of butane are needed to bring ethanol blends into vapor pressure conformance with ASTM D 5798 specification. In general, one volume percent butane raises vapor pressure of flex fuel about 1 psi. Hence an upper limit on butane is self-determined by the vapor pressure limits of D 5798 specification. Limits on other components in E51-83, including NGLs, should be restricted to their total contribution toward regulated properties on the final E51-83 blend. Imposing the same limits on individual blending components, would severely limit the blending of such components. BP also recommends that EPA not restrict the use of NGLs to natural gas processing plants. If NGLs are used in the blending of E51-83 and the final blend conforms to the necessary requirements, restricting the source of NGLs is unnecessary.

BP further recommends that EPA not impose upper limits on the concentration for butane and NGL's in E51-83 blending, however, does support adoption of reasonable standards to facilitate such blending.

For additional flexibility, BP also encourages EPA to allow blending of pentanes as a means of increasing flex fuel vapor pressure to allow conformance with ASTM D 5798 specification for flex fuel blends.

Establish Gasoline Deposit Control Requirements for E51-83– BP recommends that gasoline deposit control requirements be imposed upon E51-83 and mid-level ethanol blends. It is in consumers' best interest to establish a deposit control requirement for all spark-ignition fuels, in order to protect their engines.

Pump Dispenser Label for E51-83 -BP supports the use of the following pump dispenser label for E51-83 and a consumer education program on flexible fuel vehicles, E51-83, E16-50 and the terms 'flex fuel' and E85.

Commenter: California Air Resources Board (CARB)

CARB staff also supports the proposed requirements for midlevel ethanol blends, as well as promoting the power plant design advantages of an E30 blend.

Commenter: Chevron Products Company

Standards for Flexible-Fuel Vehicle Fuel and Mid-Level Ethanol Blends: Chevron actively participated in the development of the API/AFPM comments on these topics. We refer you to those comments as our detailed feedback on this section.

Commenter: Energy Future Coalition and Urban Air Initiative

EPA Should Enable a Market for Optimized, Dedicated, and Flex- Fuel Vehicle Production through Recognition of Ethanol's Life-Cycle GHG Benefits. As was the case in the transition from leaded to unleaded gasoline, a mid-level ethanol blend cannot be made available nationwide, and market forces will not prompt any greater availability, until vehicles designed to run on this fuel are in widespread use. Meanwhile, legacy vehicles designed for conventional gasoline (E0) will not perform adequately on a mid-level ethanol blend, while new optimized or dedicated vehicles will not perform adequately on much lower-octane, conventional E10 fuel. EPA, however, can break through this impasse by encouraging automobile manufacturers to equip new vehicles (beginning in model year 2017) with FFV capabilities that enable the vehicles to run on both conventional fuel and the new mid-level ethanol blend (as well as higher ethanol blends such as E85), thereby opening the door to a new generation of engines optimized for the new fuel as it becomes available (and eventually standard). (141)

FFV technology is both widely available and relatively inexpensive, and it can build a bridge to a cleaner fuel standard by solving the transitional problem of engine and fuel compatibility that must precede an aromatics phase-down. Manufacturers can equip any new vehicle with FFV technology that senses the alcohol content of the fuel being used and adjusts the engine's timing accordingly. With the right incentives, this technology could be installed in every new vehicle in the country. This would avoid potential legacy fleet issues when automobile manufacturers begin to optimize or dedicate all vehicles to run on cleaner fuel and when EPA begins to require aromatics reductions in standard market fuel. Legacy vehicles would, at that point, be mostly FFVs capable of running on the new fuel.

In order to begin to phase in a cleaner, higher-ethanol fuel that significantly reduces air toxics and other dangerous pollutants, while at the same time helping manufacturers design more efficient engines to reduce GHG pollution, EPA should allow all vehicles capable of running on a mid-level ethanol blend (dedicated, optimized, or FFV) to be certified for purposes of GHG emissions and fuel economy on the new high-octane, mid-level ethanol blend.

EPA Should Grant the New Mid-Level Ethanol Blend the Same One-Pound RVP Waiver Congress Granted to E10. As gasoline evaporates, VOCs enter the atmosphere, producing PM and contributing to pollution. (151) The Reid vapor pressure (RVP) of gasoline refers to the tendency of gasoline to evaporate and is measured in pounds per square inch (psi). In order to prevent VOCs from forming ozone and PM pollution in the presence of sunlight ("photochemical smog"), Congress required gasoline to be limited to a maximum RVP of 9.0 psi during the summer ozone season as part of the 1990 Clean Air Act Amendments. (152) In addition, Congress authorized EPA to set more stringent standards for certain non-attainment areas or former non-attainment areas. (153) EPA limits "high-volatility non-attainment" areas to a maximum RVP of 7.8 psi during the summer ozone season. (154) During the summer ozone season, about 75% of gasoline is 9.0 psi.

In its neat form (when not blended with gasoline), ethanol's RVP is much lower than that of conventional gasoline (pure ethanol's RVP is approximately 2.0 psi). However, due to an azeotropic effect when blended in small percentages with gasoline, ethanol can increase the overall blend's volatility. (155) As a result, ethanol splash-blended with gasoline at 10% has a tendency to raise vapor pressure by approximately one pound. (156) Because of this effect, Congress also stipulated in the Clean Air Act Amendments that gasoline containing 10% ethanol would be permitted to exceed the applicable maximum RVP by one psi (the "one-pound waiver"). (157) In its regulations implementing this section of the statute, EPA specified that the waiver only applies to blends containing "at least 9% and no more than 10%" ethanol (158)—a distinction that was not particularly relevant at that time. In the Proposed Rule, however, EPA asks whether it should "allow E16 to E50 blends to have higher RVP levels than otherwise required by our regulations for gasoline." (159) Our answer is 'yes.' It is important that EPA, consistent with the terms of the statute, treat the new mid-level ethanol blend the same as E10, granting it a one-pound waiver of the RVP limit, but requiring that the gasoline portion of the fuel meet the applicable RVP standard.

Because ethanol's effect on RVP is azeotropic, and not due to a higher RVP of ethanol itself, adding ethanol beyond 10% is likely to lower, rather than raise, RVP. (160) Nevertheless, allowing the one-pound waiver would remove uncertainty for distributors and also ensure compliance with the statutory mandate that "fuel blends containing gasoline and 10 percent denatured anhydrous ethanol" (which would include any mid-level ethanol blend) receive the one-pound waiver. (161) The tailpipe emissions reductions achieved by a mid-level ethanol blend will be greater than those achieved by E10, and will more than compensate for any slight increase (over E0) in evaporative emissions that may occur because of the higher RVP of the blended fuel. (162) As a result, a mid-level ethanol splash blend would be superior to both E0 and E10 on all counts: Its toxic, hydrocarbon, and NOx tailpipe emissions would be lower, and, due to the higher concentration of ethanol, its evaporative emissions would be lower as well. (163)

The Agency's requests for comment demonstrate its awareness of the benefits of a mid-level ethanol blend. However, approving a new certification fuel is not enough. We urge EPA to take the initiative to shepherd a nationwide transition to this cleaner, more efficient, renewable fuel in order to realize its benefits to air quality and public health, automotive performance, and consumer costs, while meeting the Agency's obligation to regulate air toxics in motor vehicle fuel. Although critically important, a new certification fuel should be only the first step in a comprehensive plan to make a mid-level ethanol blend available at pumps across the country and to enable the production of vehicles designed to maximize its benefits. We appreciate the opportunity to offer such a plan, and we look forward to providing any additional information or assistance that might be useful to EPA as it strives to protect air quality and public health for all Americans.

141 - Again, we reiterate that manufacturers themselves are powerless to make a fuel commercially available. EPA, in contrast, has wide authority to regulate toxic compounds in motor vehicle fuel, thereby ensuring that cleaner fuels are available, just as it did in the lead phase-out. In this case, EPA has authority—and indeed the responsibility—to mandate aromatics reductions under sections 202(l) and 211.
151 - See supra Parts III.B.1-B.2.
152 - 42 U.S.C. § 7545(h)(1).
153 - Id. § 7545(h)(1)-(2).
154 - 40 C.F.R. § 80.27(a)(2).
155 - See Proposed Tier 3 Rule, 78 Fed. Reg. at 29938 ("As the ethanol level increases, the volatility increase caused by blending ethanol with gasoline begins to decline, such that at E30 there is only about a 0.5-psi RVP increase.").
156 - See id.
157 - 42 U.S.C. § 7545(h)(4) ("Ethanol Waiver. For fuel blends containing gasoline and 10 percent denatured anhydrous ethanol, the Reid vapor pressure limitation under this subsection shall be one pound per square inch (psi) greater than the applicable Reid vapor pressure limitations established under paragraph (1).").
158 - 40 C.F.R. § 80.27(d)(2); see also id. § 80.28(g)(8) (providing as a defense for a noncompliant E10 blend that its blendstock met the RVP standard).
159 - Proposed Tier 3 Rule, 78 Fed. Reg. at 29938.
160 - See id.
161 - 42 U.S.C. § 7545 (h)(4).

162 - See Fann, supra note 58, at 176, fig. 4 (ranking PM and VOCs according to the dollar/ton benefit of their respective reductions).
163 - Proposed Tier 3 Rule, 78 Fed. Reg. at 29938 ("The evaporative emission increase caused by E30 would . . . be less than for E10.").

Commenter: Flint Hills Resources, LP (FHR)

Regarding E51-83 for use in flexible fuel vehicles (FFV), this fuel should be defined to meet ASTM 5798-13, including the, maximum RVP specifications, and be required to meet the same sulfur and benzene standards otherwise applicable to gasoline. Also, an effective date should be established for the E51-83 standards and regulations. Lastly, FHR believes that formal rules-should be developed for E16-50 use in FFVs.

Comments to the Jeff Herzog Memorandum dated April 8, 2013: Notwithstanding the APA and CAA requirements to publish proposed rules within the Federal Register, FHR provides the following comments to the Jeff Herzog Memorandum dated April 8, 2013 posted within the docket (ID: EPA—HQ—OAR-2011-0135-0529):

E51-83 Should be Defined to Meet ASTM D5798-13: FHR agrees that E51-83 for use in Flexible Fueled Vehicles (FFV) should be required to meet the same sulfur and benzene standards otherwise applicable to gasoline, as well as the Clean Air Act Section 211(f)(1) substantially similar provision. In addition to sulfur and benzene standards, FHR recommends that the definition within the draft regulatory text in §80.2(cccc) be revised to require E51-83 to meet the requirements of ASTM Standard Specification for Ethanol Blends for Flexible-Fuel Automotive Spark-Ignition Engines D5798-13.

FHR believes that the adoption of ASTM 05798-13 would be a key supporting element to achieve EPA's E51-83 objectives. ASTM D5798-13 presents performance requirements for ethanol fuel blends of DFE and hydrocarbon blendstock. Within ASTM D5798-13, DFE must meet the requirements of ASTM D4806, and the hydrocarbon blendstock may be composed of unleaded gasoline, gasoline blendstock for oxygenate blending (BOB), natural gasoline or other hydrocarbons in the gasoline boiling range. ASTM 05798-13 also sets further requirements for hydrocarbon blendstock properties, including maximum distillation end point, oxidation stability, copper strip corrosion, and silver strip corrosion.

Different Requirements Should be Provided for E51-83 Refiners and Blenders: FHR agrees that E51-83 refiners should be subject to the full responsibilities of a refiner (e.g. registration, batch sampling, testing, and reporting obligations), as described in Option 1 within the Herzog Memorandum. FHR also agrees that E51-83 blenders should be exempt from the sampling, testing, and reporting obligations of refiners, when using gasoline, gasoline blendstocks for oxygenate blending, DFE, natural gas liquids (NGL) and butane that meet certain specifications, as outlined in Option 2 within the Herzog Memorandum.

FHR agrees with this two-option approach, as a means to not restrict refiners or downstream blenders from choosing maximum blending flexibility by meeting the more stringent refiner requirements, as outlined in Option 1. FHR also believes that E51-83 blenders should be required to meet the 95 ppm downstream per-gallon cap sulfur standard included within §80.1604(b), instead of the 80 ppm per-gallon cap standard sulfur of §80.1603(a)(2), as incorporated within §80.1608(b)(1).

As means of further streamlining the requirements of Option 1, FHR recommends that EPA consider adopting batch sampling, testing, and reporting obligations for batches of E51-83 hydrocarbon blendstock, as defined within ASTM 05798-13, that include the test results obtained from testing a hand blend with DFE, similar to the RBOB/RFG requirements of §80.69(a). Under these circumstances, a refiner could manufacture, sample and test any batch quantity of E51-83 blendstock , blend with DFE into multiple tank trucks at a refinery loading rack, and avoid the requirement to sample, test and report each tank truck.

E51-83 Should Meet the Reid Vapor Pressure (RVP) Specifications within ASTM D5798-13: ASTM D5798-13 sets maximum RVP requirements for ethanol fuel blends for FFV that vary only slightly from EPA's maximum RVP requirements for gasoline within §80.27(a)(2). As such, FHR believes that EPA should adopt the maximum RVP requirements of ASTM D5798-13 within the draft regulatory text for Option 1 E51-83 refiners in §80.1608(c)(6) and Option 2 E51-83 blenders in §80.1608(b)(4).

In addition, FHR believes that EPA does not need to impose minimum volatility standards for E51-83. By defining E51-83 to meet the requirements of ASTMD5798-13, EPA would be adopting the minimum RVP specifications within ASTM D5798-13 by reference.

E51-83 Should Meet the Benzene Standards Otherwise Applicable to Gasoline: FHR has identified a concern with the suggested 0.20 volume percent benzene cap for E51-83 refiners and E51-83 blenders within the draft regulatory text in §80.1608(c)(3) and §80.1608(b)(2), respectively. To resolve this issue, FHR recommends that E51-83 refiners and E51-83 blenders be required to meet the same benzene standards otherwise applicable to gasoline within §80.1230.

Requiring E51-83 to meet a 0.20 volume percent benzene cap would effectively preclude the blending of gasoline blendstock 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 standards. Furthermore, natural gasoline, used as a DFE denaturant, 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 could 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 with gasoline blendstock meeting the requirements of §80.1230.

Furthermore, requiring natural gasoline for use by E51-83 blenders to meet a 0.03 volume percent benzene cap within §80.1612(a)(4), or the 0.20 volume percent stated within the memorandum, would effectively preclude the use of natural gasoline, as a hydrocarbon blendstock, to manufacture E51-83. As previously stated, natural gasoline typically contains 1 volume percent benzene, and as stated within the memorandum, could be as high as 2 volume percent benzene. FHR believes that it is reasonable for natural gasoline blended into E51-83 to be required to meet a maximum benzene standard of 1.1 volume percent within §80.1612(a)(4) and a maximum sulfur standard of 20 ppm within §80.1612(a)(3).

An Effective Date Should be Set for E51-83: Apart from the gasoline sulfur implementation dates via §80.1603(a), sections 80.1608 and 80.1611 do not specify an effective date for the standards and requirements for E51-83. FHR infers the effective date to be sometime in 2017, but requests this clarification be added into the regulation.

Formal Rules Should be Developed for E16-50 Use in Flexible Fuel Vehicles: FHR agrees that E16-50 ethanol blends for use only in FFV should meet the same sulfur, RVP, and benzene standards otherwise applicable to gasoline. FHR also agrees that EPA should treat E16-50 as gasoline under current regulations. However, in FHR's opinion, this action would require formal rulemaking, including a waiver from the substantially similar requirements, explicitly listing E16-50 in §80.1601(a), and providing a definition within §80.2.

1- 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.
2 - United States Code, Title 5, Chapter 5
3 - 5 USC 552(a)(1)

Commenter: Growth Energy

In particular, Growth Energy fully supports the treatment of midlevel ethanol blends (E16-50) as alternative fuels.

Higher Ethanol Blends Improve Air Quality and Warrant Consideration for Higher Reid Vapor Pressure Limits: In the proposal, EPA seeks comment on whether it is appropriate to allow higher RVP limits for midlevel in-use ethanol blends (E16-E50). Currently, EPA is required to limit gasoline to 9.0 pounds per square inch (psi) except in areas where further emission control is required, and E10 currently has a 1 psi waiver allowing it to rise to 10.0 psi. Any review of RVP and ethanol blends shows that RVP decreases as ethanol is added and that the highest RVP occurs with an E10 blend (estimated RVP curve below) [Figure can be found on p. 8 of Docket number EPA-HQ-OAR-2011-0135-4681-A3]. As ethanol increases, RVP decreases and better air quality is achieved. Therefore it is certainly appropriate and Growth Energy would fully support higher RVP limits for all ethanol blends above E10. It would be counter to the intent of this proposed rule to continue to provide a waiver for E10 while requiring blends above E10 which demonstrate better air quality not to enjoy the same treatment.

Specifically, EPA sought comment on the regulation of midlevel and highlevel ethanol blends (E16-E85) as an alternative fuel family as discussed in the Herzog memo to the docket (Jeff Herzog, "Possible Approach to Fuel Quality Standards for Fuel Used in Flexible-Fuel

Automotive Spark-Ignition Vehicles (FFVs)"). Growth Energy fully supports the treatment of ethanol blends above E15 as an alternative fuel family rather than as gasoline and feels as though EPA can use its authority under 211(C) to take ethanol blends' lower RVP relative to E10 gasoline to provide similar RVP leeway as that given to gasoline. Additionally, because evaporative emissions from the current vehicle fleet are already well controlled and will be further controlled through the Tier 3 evaporative emissions standards, Growth Energy believes that a similar 1 psi waiver should also be extended to gasoline blends above E10 as well as midlevel ethanol blends.

Benzene limits for ethanol blends must take into account the gasoline blended with ethanol. EPA believes "it may be possible to set the benzene standard for E51-83 at a 0.20 volume percent cap or even lower without imposing any burden rather than implementing an average annual benzene standard similar to that for gasoline." (Herzog, FQS for FFVs, p. 5) Gasoline has 0.62 volume percent average maximum benzene content.

A benzene cap of 0.20 percent on ethanol blends would create a tremendous burden on blenders and could render certain production impossible. For instance, an E51 blend composed of 51 percent DFE and 49 percent certified gasoline would likely have a benzene content of 0.31 percent as the gasoline would bring 0.62 percent benzene to the mixture. This mixture would not meet the regulatory requirements.

Under the proposed approach, E51-83 could only exist as E75-83 with DFE at a 0.06 percent benzene and gasoline at 0.62 percent benzene. Higher benzene levels in the gasoline due to averaging would further limit the hydrocarbon content of this fuel as well as the RVP and cold start capability in cold weather. It is imperative that EPA provide a higher benzene limit to account for the gasoline blended with ethanol. Growth Energy feels that EPA should set this benzene standard at 0.62 volume percent, identical to the gasoline limit.

We agree with EPA that addressing RVP in blends does not require batch testing. EPA states that "For blenders that use only gasoline, BOB's, and DFE to produce E51-83, demonstration of compliance with the maximum RVP standard under consideration could be accomplished by retention of Product Transfer Documents for the blendstocks."

Additionally, EPA raises the issue of whether the SAE "Model for Estimating Vapor Pressures of Commingled Ethanol Fuels" is adequate to avoid testing for NGLs and refinery naphthas for RVP.17 Growth Energy agrees that the SAE model referenced in the FQS for FFVs memo should be adequate to avoid testing for NGLs and refinery naphthas for RVP.18

EPA states that "Given the proposal in the Tier 3 NPRM to limit the denaturants that can be used to manufacture DFE to NGL, gasoline, and BOBs, and the narrow range in denaturant concentration, we believe that the RVP of different batches DFE would not vary substantially. Therefore, we currently do not believe that deliveries of new batches of DFE into the storage tank used to produce E51-83 would necessitate a return to per batch testing." We agree that the variability of the ethanol RVP would not vary substantially, and batch testing should not be required, with a 5 percent denaturant cap.20

EPA's streamlined "Blender Option" requirements should be the default regulations for E16-E85 production (as opposed to full refiner responsibilities). The Tier 3 rule appropriately recognizes that ethanol blending is of central importance to our nation's transportation fuel supply and accomplishing key environmental and energy security goals. To achieve these goals and maintain a robust domestic transportation fuel supply, it is critical that EPA design its regulations to facilitate the production and blending of ethanol.

EPA discusses its possible approaches to the regulation of ethanol (and vehicles that use ethanol) in the Proposed Rule, including the section "Standards for Fuel Used in Flexible Fueled Vehicles." This section then references a detailed memo to the docket, the FQS for FFVs Memo.

The FQS for FFVs memo outlines two options for regulating manufacturers of E51-E83. Growth Energy strongly supports "Option 2: Treatment as a Blender" (the "Blender Option") as the default option. Under this Blender Option, EPA states that E51-E83 producers can reduce their regulatory burden if they only use *blendstocks that meet certain specifications* that would ensure sulfur and benzene does not exceed appropriate amounts.[12]

More specifically, under this Blender Option, EPA proposes generally to limit blendstocks for ethanol blends to gasoline, BOBs, and DFE, as well as natural gas liquids (NGLs) and butane if they are produced to certain standards. Under this Blender Option, the finished E51-83 would be subject to the proposed downstream sulfur cap for gasoline of either 65 ppm or 95 ppm. A benzene limit would also apply to the finished blend (as discussed above).

Growth Energy agrees that testing of final blends would not be needed as the DFE and blendstocks are regulated individually for sulfur and benzene (and RVP issues can be handled in a streamlined fashion as well).

Growth Energy also believes that the Blender Option requirements could apply equally to E16-E50 as well as E51-E83. The FQS for FFVs memo also notes that "the draft regulations written to address E5183 might be modified to cover E16-50 blends." Growth Energy believes that this Blender Option can be applied across all ethanol blended fuels from E16-E85. If EPA considers it necessary to further delineate midlevel ethanol blending, we suggest that applicable ASTM standards *already* provide a suitable approach. In particular, ASTM Standard D7794 allows midlevel ethanol blends only to be created from a mixture of gasoline and DFE, or gasoline and E85.[15] Thus, the constituents of midlevel ethanol blends (gasoline, DFE, and E85) are already controlled. This is consistent with the streamlined "Blender Option" that avoids batch testing for blends when the constituents of those blends are already controlled.

Under the Blender Option, <u>gasoline blendstocks</u> should be allowed for blending (in addition to NGLs and butane) as long as they meet adequate specifications. Light straight run naphtha, hydrotreated naphthas, and hydrotreated natural gasoline are potential streams to consider. These gasoline blendstocks could be subject to the same sulfur and benzene specifications as NGLs and butane and should be allowed as blendstocks for ethanol blends.

Growth Energy supports facilitating the use of NGLs under the Blender Option in the production of ethanol blends. We do not believe that any EPA limits on the volume of NGL used as a blendstock are necessary for ethanol blends (E51-E83). For midlevel ethanol blends (E16-E50), if EPA considers that some NGL limits are necessary, we would suggest that applicable ASTM standards *already* effectively limit the NGL content in midlevel ethanol blends. In particular, as noted above, ASTM Standard D7794 allows midlevel ethanol blends only to be created from a mixture of gasoline and DFE, or gasoline and high level ethanol blends (E51-E83). The amount of NGLs allowed in these constituent products are already controlled. Therefore, the volume of NGL in midlevel ethanol blends can effectively be no greater than what is already contained in approved components of a midlevel ethanol blend.

Furthermore, we respond to the following statements by EPA regarding NGLs under the Blender Option:

- Production "using NGL blendstocks would require that the NGL blendstock, like butane, meet a 10-ppm per-gallon sulfur cap."
  - *We agree that NGL (or gasoline blendstocks such as hydrotreated refinery streams) used for blending E16-E83 should meet the proposed 10 ppm sulfur cap under the Blender Option* and therefore avoid burdensome batch testing requirements for blending.
- EPA notes that "Similar to the envisioned 0.20 volume percent benzene cap for butane, we would look to implement a 0.20 volume percent benzene cap standard for NGL rather than an average standard in order to simplify the regulatory requirements."
  - *A benzene cap of 0.20 percent for NGLs is too restrictive* and may be impractical to meet. The benzene standard for NGLs should be 0.62 percent benzene similar to unleaded gasoline. Therefore, this NGL stream or gasoline could be used in the blend with no detrimental effect to the finished fuel since the DFE in which it is blended will have little to no benzene.
- "Since NGL properties from different sources can vary widely ... we may also need to consider restricting the sources of NGL to natural gas liquids fractionation facilities and natural gas processing plants to ensure an appropriate level of quality control.

- *EPA should maintain a provision for an alternative NGL source to allow for hydrotreated streams or refinery streams that meet the same criteria [i.e., benzene and sulfur limits]*. Refineries (including where hydrotreating takes place) can provide the same or superior quality control as NGL fractionation facilities and natural gas processing plants.

"Stakeholders have stated that as additive concentration diminishes due to dilution with DFE, there is a point where the presence of a deposit control additive ceases to be beneficial and can actually contribute to deposit formation. In light of this, it may be appropriate to remove the requirement that the gasoline portion of E51-83 and perhaps E16-50 must contain a deposit control additive until the specific deposit control needs of these blends can be evaluated."

o We support removal of the requirement that the gasoline portion of E51-E83 must contain a deposit control additive until the specific deposit control needs of these blends can be evaluated. A similar approach may be warranted for E16-E50.

EPA should not unduly regulate E16-E83 blendstocks. EPA states that "Currently, only ... RBOBs ... and gasoline ... are used to manufacture E51-83." This is inaccurate. Gasoline blendstocks and natural gasoline can also be used in E51-E85 today.[26]

Some ethanol producers may wish to use non-standard blendstocks, which they should maintain the option to do as long as the end product meets appropriate specifications. Ethanol producers should have the option to do so, if they opt to undertake broader "refiner" responsibilities. These "refiner" responsibilities could require batch testing of the end product, and some ethanol producers may consider this extra cost and burden appropriate.[27]

EPA's proposed regulations unduly restrict using NGL as a denaturant or blendstock. A requirement to "Certify that the NGL was derived solely of from [sic] natural gas liquids fractionation facilities and natural gas processing plants" is too narrow. As noted above, EPA should include refineries (including hydrotreating) as potential hydrocarbon stream sources as long as blendstocks meet certain requirements (i.e., benzene and sulfur limits).

A requirement to demonstrate "that the benzene content of each production batch of NGL is not greater than 0.03 volume percent" is too restrictive. This specification is unrealistic, and it is unclear whether a product that meets this specification even exists in any significant commercial quantities. For instance, this specification is 20 times more stringent than gasoline and wouldn't apply to NGLs blended directly into unleaded gasoline. [Even California ethanol specifications allow benzene content up to 0.06 volume percent in DFE. Therefore, the resultant specification allows NGL with benzene levels up to 2.4 volume percent.]

A prohibition that "NGL and E51-83 made from NGL cannot be sold as gasoline or E16 or be commingled with gasoline or E16-50 and subsequently sold as gasoline or E16-50" is unduly restrictive. This prohibition on commingling E51-83 made with NGL with MLEBs would unduly limit the ability for retail stations to provide E16-E83 fuels, especially if they employ blender pumps. Alternatively, EPA should follow ASTM requirements as stated in standards D4814, D4806, D5798 and standard practice D7794.

12 Some ethanol producers may wish to use non-standard blendstocks, which they should maintain the option to do as long as the end product meets appropriate specifications. Ethanol producers should have the option to do so, if they opt to undertake broader "refiner" responsibilities. These "refiner" responsibilities could require batch testing of the end product, and some ethanol producers may consider this extra cost and burden appropriate.

15 See ASTM D7794-12 (D7794) "Standard Practice for Blending Mid-Level Ethanol Fuel Blends for Flexible-Fuel Vehicles with Automotive Spark-Ignition Engines." This standard incorporates by reference ASTM standards governing the permissible constituents of MLEBs including one for gasoline (D4814), as well as ASTM D4806-12 ("Standard Specification for Denatured Fuel Ethanol for Blending with Gasolines for Use as Automotive Spark-Ignition Fuel") (DFE) and ASTM D5798-12 ("Standard Specification for Ethanol Fuel Blends for Flexible-Fuel Automotive Spark-Ignition Engines") (HLEBs).

17 By way of background, EPA stated "If NGL and/or butane were used to manufacture E51-83, demonstration of compliance with a maximum RVP requirement could not be accomplished merely by retention of [product transfer documents (PTDs)] indicating that blendstocks were produced subject to applicable standards.... However, it may be possible to avoid sampling and testing for RVP as well. RVP models exist that could perhaps be developed further to avoid the need for sampling and testing for RVP when NGL or butane were used, but they are not yet applicable to these blends." Id.

18 See id. at 7 n. 22 (referencing SAE paper 2007-01-4006, "A Model for Estimating the Vapor Pressures of Commingled Ethanol Fuels.").
20 [By way of example, 5 percent denaturant would create a .75 psi difference between a 9 psi and 14.5 psi denaturant in DFE. Either blend would change the E85 RVP by 0.5 psi or less according to the model in SAE paper 2007-01-4006. This minor impact would not cause any concerns for E85 (which already have low volatility), and the impact on MLEBs from the RVP of denaturant would be even smaller due to the overall smaller proportional share of denaturant in the overall blend (i.e., 5 percent denaturant in an E30 blend would be only 1.5 percent of the total fuel mixture).]
26 See e.g., ASTM standard for HLEBs, ASTM D5798-12.
27 Under either the Blender Option or the more stringent refiner option (which would regulate ethanol producers similar to gasoline refiners), the resulting E16-E83 "produced would be required to meet the downstream sulfur, RVP, and a benzene per-gallon cap standard in order to ensure emission performance over the life of the vehicles that use it." FQS for FFVs Memo, supra, at 4.

Commenter: Independent Fuel Terminal Operators Association (IFTOA)

Currently, only RFG, conventional gasoline, and RBOB may be used to produce gasoline with high concentrations of ethanol – E51 to E83. EPA recognizes that there will be a greater need for outlets for ethanol as the Renewable Fuel Standard Mandates increase. Therefore, EPA is encouraging the use of E51 to E83 fuels. EPA would like to remove regulatory obstacles to its production while ensuring that the product meets the fuel quality requirements needed to maintain vehicle emission performance.

EPA has stated in the Preamble to the proposed regulations that the exclusive use of RFG, conventional gasoline, and RBOB in the production of such higher ethanol-concentrated blends may interfere with the expansion of the E51 to E83 market. EPA notes that with higher ethanol-concentration fuels, blenders cannot meet volatility specifications set by ASTM for cold start performance. Therefore, EPA is proposing to apply to E51 to E83 blends, the same sulfur, RVP, and benzene standards applicable to gasoline as well as the "substantially similar" rule requirements. Application of such regulations would allow the production of E51 to E83 using butane and natural gasoline liquids, which, in turn, would allow the blends to meet ASTM volatility specifications. In addition, because butane is a relatively inexpensive component, its use should reduce the cost of these higher ethanol-concentration blends, making the final product – E51 to E83 – more attractive to consumers.

While Members of the Association understand EPA's desire to expand the E51 to E83 blend market, it is essential that EPA ensure that whatever actions are taken, the authority for use of a one pound RVP waiver during the summer months be retained. As more and more ethanol is added to blends, the waiver becomes more important. If it were eliminated, refiners would have great difficulty meeting RVP standards, and would have to use more costly components with lower RVP (e.g., alkylates) in their gasoline production. Such actions could substantially increase the ultimate fuel price to consumers.

Recommendation: Accordingly, if EPA decides to amend the regulations to expand the E51 to E83 blend market, it should also ensure that the RVP waiver for summer months is preserved.

While encouraging the use of higher ethanol-concentration blends – E51 to E83 – preserve the one pound RVP waiver during the summer months;

Commenter: Magellan Midstream Partners, L.P.

Magellan Comment — we have developed an Ethanol Flex Fuel (EFF) program which exclusively utilizes gasoline as the hydrocarbon portion of the EFF mixture. All EFF distributed from Magellan's terminals meet ASTM-5798-11 everyday of the year. It is indeed feasible to utilize gasoline as the sole hydrocarbon component in producing EFF. Our EFF program meets the quality expectations of our customers, the automobile industry and others.

Generally, we applaud EPA for taking the step to regulate higher level ethanol blends such as EFF. This regulatory action is overdue. Magellan agrees that EFF should also be required to meet the same sulfur, Reid Vapor Pressure and benzene standards which are applicable to gasoline and the interpretive rule defining the phrase 'substantially similar' in CAA section 211(0(1) (i.e., contain only carbon, hydrogen, oxygen, nitrogen, and sulfur) that apply to any fuel used in an FFV requirement. While we appreciate EPA's proposals to expand the use of natural gas liquids (NGLs) as the hydrocarbon portion of the EFF blend, this increases the potential for the development of EFF which may not meet stakeholder expectations unless stringent standards are established. However, we do not believe the use of NGLs should be permitted in EFF until adequate testing is complete and appropriate standards are established.

Although NGLs have been used in gasoline, they have not been used for the production of EFF, or have not at least been tested under controlled conditions to assess performance and establish specifications. We do not believe EPA should proceed with rules which allow an untested fuel in the market place. The use of very light hydrocarbons should be fully tested and incorporated into specifications and regulations only after they have been demonstrated to provide satisfactory performance. In our view, the use of NGLs should not be allowed as the hydrocarbon piece of EFF solely to reduce the cost of the blend when compared to the utilization of gasoline.

We have reviewed EPA's options as explained in the April 8, 2013 memorandum to the docket. Option 1 requires the EFF producer (i.e. denatured fuel ethanol producers) to assume the full responsibilities of a refiner. While we believe the EFF producer should be required to register and report as a refiner, EFF producers who may be allowed to blend NGLs in the future and refiners currently blending NGLs into gasoline should be allowed to utilize the additional flexibility provided in Option 2 as long as the respective hydrocarbon components meet well established specifications.

Compliance burden when blending NGLs into Gasoline / Blendstock Representation: Magellan Comment — as stated above, we do not believe EPA should permit the use of NGLs as the hydrocarbon portion of EFF until adequate testing is complete. Once testing is complete and satisfactory standards have been established, we would support the use of NGLs in EFF. We applaud EPA's options raised in the EFF preamble regarding the compliance burden normally associated with refiner sampling and reporting. We believe this approach should promptly be made available to refiners producing gasoline using NGL blendstocks in gasoline.

To this end, we propose the following Blendstock Specifications for gasoline blenders: We believe adoption of these specifications will allow additional flexibility for blending which would lower the overall cost impact of the Tier 3 fuel requirements in general.

Lastly we agree that it is important to reduce the compliance burden for blending natural gasoline into ethanol as a denaturant, just as it is for gasoline blenders. As EPA considers regulatory compliance requirements for ethanol and flex fuels, as a matter of fairness, we encourage the agency to provide similar compliance requirements for all fuel production from gasoline range blend stocks.

Commenter: Manufacturers of Emission Controls Association (MECA)

MECA also supports defining fuel sulfur average limits or caps on any alternative transportation fuels (e.g., blends of alcohols with gasoline, natural gas) that are consistent with the proposed 10 ppm national average for gasoline or the existing 15 ppm national sulfur cap on diesel fuel.

Commenter: Marathon Petroleum Company LP (MPC)

Standards for Mid-Level Ethanol Blends (E16-50): MPC agrees that Mid-Level Ethanol Blends (E16-50) for use in FFV should meet the same sulfur, RVP, and benzene standards otherwise applicable to gasoline. MPC does not agree that EPA should treat E16-50 as gasoline under current regulations. In MPC's view, this action would require formal rulemaking with a waiver from the substantially similar requirements.

EPA is proposing that gasoline deposit control requirements be removed from the E16-50 and E51-83 fuels. MPC believes 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 and to reduce air emissions.

Standards for E51-83: EPA's preamble to the proposed Tier 3 regulations references a separate memorandum25 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 MPC 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).

The APA is clear that EPA's forum for informing the public of substantive rules, amendments, and revisions is through the Federal Register. 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."

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.

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, MPC 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):

MPC agrees 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. MPC does not support limits on specific components, but does support adoption of reasonable standards to facilitate blending.

However MPC has 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, E5183 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, MPC recommends that E51-83 be required to meet the same benzene standards applicable to gasoline.

MPC support s 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.

MPC agrees 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. MPC agrees 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. MPC also agrees that any resulting E51-83 should also be required to meet the downstream sulfur, RVP and benzene per-gallon cap standard.

MPC agrees 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.

MPC agrees 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 MPC does 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, MPC provides 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 to reflect the currently published version ASTM D5798-13 and should be updated further if a newer 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 E5183 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 made from NGL 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.

80.1662 Liability for violations under subpart 0: 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 *appeared at a facility* 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 E5183 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 "appeared at a facility", 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. State laws and the markets have changed. At present jobbers can do their own blending. Thus the rules dealing with presumptive liability no longer make little sense since refiners no longer control the actions of many jobbers.

25 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.

Commenter: Mid-Continental Energy (MCE)

EPA is proposing the definition of any fuel that has less than 50% ethanol content be classified as gasoline. MCE supports that definition. For clarification in this document, any ethanol fuel that contains more than 51% ethanol content will be referred to as a Flex Fuel.

In addition, EPA is proposing Flex Fuel have a sulfur content not to exceed the gasoline sulfur mandate. MCE agrees with EPA in their proposal.

MCE supports the EPA premise of using RVP models to calculate and certify the final RVP of Flex Fuel produced from butane, natural gasoline, and denatured fuel ethanol ("DFE") blendstocks which meet EPA specifications.

EPA is proposing allowing natural gasoline and butane as blendstocks used to produce E51 to E83 Flex Fuel. Our understanding is that natural gasoline specification standards will be defined by the EPA as butane was defined in Federal Register Title 40 Part §80.82. MCE requests that EPA specification standards for natural gasoline should: 1) be reasonably consistent with current industry specifications and standards, 2) not limit origin of the natural gasoline so long as specifications are met, 3) be mindful of final, blended Flex Fuel properties including vapor pressure, octane, benzene, and sulfur. MCE will comment on specific natural gasoline specifications within 90 days of this letter. MCE is conducting studies on natural gasoline quality and blending, and MCE can provide the study findings to the EPA on a confidential basis.

MCE requests that a blender of natural gasoline to produce Flex Fuel would be allowed to blend approved butane into the natural gasoline (blendstock) before the natural gasoline is blended with DFE to meet the seasonal RVP requirements as allowed in EPA specifications for Flex Fuel. The blender will use an RVP Model approved by EPA to calculate the finished RVP of the Flex Fuel instead of having to test each batch of Flex Fuel leaving the terminal facility. The terminal blender would not have to recertify the blendstock provided the two components met all specifications approved by EPA before blending the two components together.

MCE requests the EPA provide clarification on how Flex Fuel can be produced and blended. Can DFE producers blend Flex Fuel with existing ethanol and denaturant infrastructure? If a DFE producer blended approved blendstock with DFE to produce a Flex Fuel and then shipped the Flex Fuel to a petroleum terminal, would the terminal blender be allowed to blend butane into the Flex Fuel to increase the RVP to the maximum allowable RVP specifications per EPA seasonal specifications for Flex Fuel before the Flex Fuel is loaded into a transport truck? Could a petroleum terminal use Flex Fuel to blend E10-15 gasoline at the terminal in place of DFE?

MCE would favor allowing the terminal blender to use a process analyzer to determine the RVP of the Flex Fuel stream in the process of blending butane into the Flex Fuel to increase the RVP to the maximum allowable for the seasonal variations. This is the same process presently being used by terminal blenders to blend butane into gasoline under the guidance in the Federal Register Title 40 Part §80.82.

During the VOC period, MCE requests the EPA consider allowing blenders to blend butane and natural gasoline with DFE to produce Flex Fuel in RFG markets as long as the maximum RVP of the Flex Fuel does not exceed maximum RVP specifications as calculated by EPA approved RVP models. During the non-VOC season, the maximum RVP during would be under States rulemaking for Flex Fuel specifications.

Under the present definition of a ‘batch’ in Federal Register Title 40 Part §80.82, EPA looks at each transport truck load leaving a petroleum terminal with gasoline for a service station as a ‘batch’. EPA is proposing to allow a terminal blender to blend natural gasoline with DFE to produce Flex Fuel during the VOC period using an approved EPA model to calculate the finished blend RVP. This is a change to what is allowed under Part §80.82 for a butane blender. To make the rules like-minded, MCE is proposing EPA remove the language in §80.82(e)(1) which states ‘When butane is blended with conventional gasoline under this section during the period May 1 through September 15, the refiner shall demonstrate through sampling and testing, using the test method for Reid vapor pressure in § 80.46, that each batch of conventional gasoline blended with butane meets the volatility standards specified in § 80.27.'

The terminal blender can use the model provided by EPA to calculate the RVP of the blended gasoline, install a downstream process analyzer to use as an oversight reporting analyzer for determining the RVP of the blended gasoline. RVP process analyzers on the market today take five to six minutes to produce results and there are several manufacturers of process RVP analyzers making downstream RVP a demonstrable option. MCE is not requesting to make the allowance applicable to gasoline marketed in RFG areas.

MCE suggests the EPA consider new definitions for NGL, natural gasoline liquids, and/or pentanes. The proposed wording is potentially confusing and may not be consistent with industry standards. The proposed regulation defines NGL as: "the components of natural gas (primarily propane, butane, pentane, hexane, and heptane) that are separated from the gas state in the form of liquids in a natural gas production facility, in a gas processing plant, or in a natural gas pipeline. NGL is sometimes also referred to as "natural gasoline".

Natural gasoline is a product of the NGL fractionation process consisting primarily of pentane and heavier components. MCE believes the EPA's intends to allow Flex Fuel production using natural gasoline and not NGL as technically defined in the proposed regulations.

Commenter: National Corn Growers Association (NCGA)

EPA divided its proposal for in-use fuels for FFVs into two levels by ethanol concentration: E51-83 and E16-50 (or MLEBs).

For E51-83, EPA proposed that these blends meet the same sulfur, vapor pressure, and benzene standards otherwise applicable to gasoline as well as the Clean Air Act "substantially similar" requirements. EPA expressed the belief that establishing such requirements could allow the use of butane and natural gasoline liquids to manufacture E51-83 with sufficient volatility to meet the ASTM specifications. We support specifications that are consistent with ASTM D5798-13, and allowing the use of blendstocks such as NGL, butane and others that would permit compliance with ASTM D5798-13.

For E16-E50, EPA proposed that these blends meet the same standards that apply to gasoline. EPA also requested comments on "...whether it might be an appropriate reading of our regulatory and statutory authority to allow E16 to E50 blends to have higher RVP levels than otherwise required by our regulations for gasoline." EPA went on to say: "As the ethanol level increases the volatility increase caused by blending ethanol with gasoline begins to decline, such that at E30 there is only about a 0.5 psi vapor pressure increase. While still an increase compared to the standards that apply to gasoline other than E9-E10, it is considerably less than the full 1 psi vapor pressure increase that results at E10. The evaporative emission increase caused by E30 would be then be less than that for E10."

NCGA believes that EPA should use its regulatory and statutory authority to allow E16-50 blends to have higher vapor pressures, so that gasoline blendstocks used currently for E10 could also be used for E16-E50, and these MLEBs could be used in current FFVs. This is critical to the success of high octane MLEBs, since it would facilitate distribution of a high octane MLEB that could likely be requested by automakers to meet the 2017 and later GHG and CAFE standards.

At least two major automakers have reported research programs evaluating advanced technology gasoline direct engines with high octane MLEBs (18, 19).

18 - McCarthy, T "Fuel Octane and Ethanol Impacts on Petroleum Displacement, CO2, and the Consumer, Ford Motor Company, presentation at SAE High Octane Fuel Symposium, January 29, 2013.
19 - Woebkenberg, W, "Advanced Powertrain Technology Coupled with Octane and Ethanol, Benefits and Opportunities", SAE High Octane Fuels Symposium, January 29, 2103.

Commenter: New York State Department of Environmental Conservation

The proposed limits on the sulfur content of blending streams such as denatured fuel ethanol are necessary to ensure that the program benefits are actually realized.

Due to ethanol blending and an increase in trade of intermediate gasoline blending components over the last several decades, the blending of finished gasoline is no longer limited to crude oil refineries. In general these blenders have become refiners in the regulatory sense, with all the compliance documentation that entails. EPA has made efforts to allow some downstream blending activities, particularly ethanol blending, to be accomplished with a reduced level of documentation.

The Department supports this reduced level of documentation for downstream blending, provided that the environmental benefits promised by Tier 3 are not compromised. This requires that the materials blended be sufficiently controlled to ensure that the finished gasoline will comply with applicable regulations. These streams must, as EPA proposes, comply with a 10 ppm sulfur cap on their own. We believe that other properties, particularly benzene and olefins content, may also need to be capped to prevent backsliding.

...and only RFG compliant gasoline or blendstock for oxygenate blending (BOB) may be used to produce 'E51-83' for use in RFG areas. This latter requirement makes it difficult to produce fuel that has both high ethanol content and meets the minimum ASTM volatility requirements.

It is also necessary to regulate commercial E51-83 to ensure that emissions controls are effective in the field.

The EPA staff memo discusses two possible approaches. in one approach the blender of the fuel is treated as a refiner, with substantial compliance documentation requirements in exchange for production freedom. The other approach, closer to what is done today for ethanol blending into BOBs to produce finished gasoline, reduces the compliance burden but limits blenders to blendstocks with known and regulated composition.

Clearly the 'ethanol blender' approach has advantages for all concerned as long as environmental and fitness-for-use requirements can be reliably met. Properties such as sulfur content, benzene content, aromatics content, and olefins content can be controlled by ensuring that all allowable blendstocks meet standards that ensure the final product will meet its standards.

If high volatility blendstocks such as butane and natural gasoline are used as blendstocks it becomes possible to produce fuel that exceeds gasoline DVPE limits. EPA appears to be searching for a mechanism to allow this without any need to sample the resulting product and conduct laboratory tests. We believe that sampling and testing for DVPE can't be avoided, although it may not be necessary to obtain sample results prior to releasing each truck load of product. Assuming that blending occurs during delivery truck loading, it may be sufficient to prepare and test a hand blend of the components to be used, and periodically sample truck compartments as part of a documented quality control program to ensure that the planned blend is being achieved in practice (without holding the truck for the test results).

Commenter: Phillips 66 Company

- E51-83 – The memorandum included in the docket should not suffice as a proposed rule. We have reviewed the concept and have some comments.

EPA included a memorandum in the rulemaking docket entitled "Possible Approach to Fuel Quality Standard for Fuel Used in Flexible-Fuel Automotive Spark-Ignition Vehicles (FFVs)". We take this to be informational concerning work EPA has done to evaluate potential regulatory changes to provide specifications and guidance for these fuels. We do not believe this constitutes a proposed rule even though EPA has included draft regulatory language. In order for this to constitute a NPRM, the proposed language and preamble would need to be published in the Federal Register.

We offer the following comments on some of the concepts that EPA discusses in the memo:
- Fuel name should be consistent on product transfer documents and labels EPA has coined the term E51-83 to describe what historically has been referred to as E85. While we agree that E85 is now an outdated term given the recent changes in the ASTM specification, there may be other options for naming convention of this fuel. EPA included in its conceptual PTD language a requirement to put a statement identifying the fuel as E51-83. Any name or reference on the PTDs should align with potential label nomenclature. The industry is still wrestling with what to call this fuel now that ASTM has modified its specification. However, consumers could be confused by a label that calls the fuel E51-83. We would suggest there are other options such as Flex Fuel (typically what is now shown on new vehicles and their gas caps) or Ethanol Fuel or Ethanol Flex Fuel. We suggest EPA not rush to create a designation for this fuel and require it on a PTD that may not be in alignment with pump labels.
- Agree that Flex Fuel (E51-83) should be required to meet the same sulfur, benzene and maximum RVP standards as gasoline
- The suggested 0.20 benzene cap for E51-83 is problematic

Some hydrocarbon blendstocks that could be used to produce flex fuel (such as natural gasoline) could result in a benzene content greater than 0.20. We feel that the E51-83 should meet the same standards as gasoline.
- Providing two options for sampling, testing, and reporting is a good approach

Commenter: POET, LLC

Also, mid-level ethanol blends that contain 16-50% ethanol (MLEBs) are slated to be an important 'fuel of the future.' MLEBs have been assessed by auto manufacturers as providing a 'sweet spot' in terms of a cost-effective fuel that can provide octane benefits (enabling greater engine efficiency) and lower overall vehicle emissions.

Additionally, EPA must not burden the ethanol industry with additional, unnecessary production restrictions.

The Proposed Rule takes comment on 'whether it might be an appropriate reading of our regulatory and statutory authority to allow E16 to E50 blends to have higher RVP levels than otherwise required by our regulations for gasoline.' (42) POET suggests that doing so is not only appropriate, but essential (with this regulatory relief including blends of E11 and higher).

This RVP issue can be handled for ethanol blends of E16 and higher by, as described later in section 4 of these comments, by creating a separate 'Ethanol Fuel Family' for all blends of E16 and higher (e.g., E16-E85). The RVP provisions in CAA Section 211(h) by their terms only apply to 'gasoline,' and thus should not apply to a blend in the 'ethanol' fuel family. (43)

EPA must ensure that the various clean-burning attributes of ethanol are not prevented from entering into commerce by arbitrary RVP limits when in fact these MLEB and higher-level ethanol blends have a lower (environmentally-preferable) RVP. EPA states that it has an ability to broadly craft RVP standards for the ethanol fuel family per CAA Section 211(c). (44) If EPA can meet the statutory criteria under 211(c) for regulating RVP from higher-level ethanol blends (i.e., if such regulations are necessary, taking into account the inherently lower RVP of ethanol), this regulatory authority should be pursued to allow the equivalent of the 1 psi waiver for blends of E16 and above, including all MLEBs.

E16-E85 should be regulated as a single, alternative 'ethanol' fuel family that covers MLEBs and HLEBs. In the Proposed Rule, EPA requests comment on how to regulate and promote MLEBs and 'aspects of today's proposed standards that might need to be modified to provide an incentive for, or remove obstacles to, the development of highly efficient vehicles optimized for use on higher level ethanol blends.' (50)

EPA further asks 'should the Agency simply treat E16-50 as gasoline under our regulations' or 'Alternatively, should the Agency treat E16-50 as an alternative fuel'? (51) Similarly, the 'FQS for FFVs Memo' in the docket raises the possibility of regulating E16-E85 vehicles as a single alternative fuel family. (52) POET supports this approach. This 'fuel family' would include both MLEBs and HLEBs. Importantly, an ethanol fuel family provides a means to appropriately structure RVP limits for MLEBs.

Under EPA regulations, a 'fuel family' is defined as 'a set of fuels and fuel additives which share basic chemical and physical formulation characteristics and can be used in the same engine or vehicle.' (53) Given that ethanol blends from E16 through E85 today 'can be used in the same engine or vehicle' (i.e., an FFV), it is more appropriate that MLEBs be regulated within the existing ethanol fuel family (which includes HLEBs), as opposed to being considered gasoline. (54) By comparison, MLEBs cannot be used in an ordinary 'gasoline' vehicle.

An E16-E85 'Ethanol Fuel Family' can readily meet core fuel quality standards, including appropriate chemical composition, benzene, and sulfur; a separate fuel family also provides a means to appropriately structure RVP limits for MLEBs.

EPA believes that it is important that fuel quality requirements for chemical composition, sulfur and benzene 'apply to any fuel used in an FFV.' (55) Regarding chemical composition, EPA believes that it is appropriate to explicitly apply to ethanol blends 'substantially similar' requirements that 'E51-83 must be composed solely of carbon, hydrogen, nitrogen, oxygen, and sulfur.' (56) POET supports 'substantially similar' chemical composition requirements, and they can be readily applied across a single Ethanol Fuel Family comprised of E16-E85 blends. (57)

Similarly, sulfur and benzene limits must be properly structured, but should not be a problem for E16-E85 blends, given that ethanol contains no benzene and is nearly sulfur-free. (58)

Finally, as discussed above in Section 3 of these comments, it is absolutely imperative that EPA address unnecessary and environmentally counter-productive RVP limits that prohibit the use of MLEBs. An Ethanol Fuel Family provides a ready means to have MLEBs subject to an appropriately designed RVP limit that is different than that for 'gasoline' but nonetheless adequately protective. (59) HLEBs could be subject to this standard as well, although an alternative RVP standard is less critical for HLEBs because ethanol blends greater than 50% can already meet existing 'standard' RVP limits, due to the inherently environmentally-friendly RVP of unblended ethanol. (60)

Benzene limits for ethanol blends must take into account the gasoline blended with ethanol.

EPA believes 'it may be possible to set the benzene standard for E51-83 at a 0.20 volume percent cap or even lower without imposing any burden rather than implementing an average annual benzene standard similar to that for gasoline.' (77) Gasoline has a 0.62 volume % average maximum benzene content.

A benzene cap of 0.20% on ethanol blends would create a tremendous burden on blenders and could render certain production impossible. For instance, an E51 blend composed of 51% DFE and 49% certified gasoline would likely have a benzene content of 0.31% as the gasoline would bring 0.62% benzene to the mixture. This mixture would not meet the regulatory requirements.

Under the proposed approach, E51-83 could only exist as E75-83 with DFE at a 0.06% benzene and gasoline at 0.62% benzene. Higher benzene levels in the gasoline due to averaging would further limit the hydrocarbon content of this fuel as well as the RVP and cold start capability in cold weather. It is imperative that EPA provide a higher benzene limit to account for the gasoline blended with ethanol. POET believes EPA should set this benzene standard at 0.62 volume %, identical to the gasoline limit and the directly competitive fuel.

EPA's streamlined 'Blender Option' requirements should be the default regulations for E16-E85 production (as opposed to full refiner responsibilities).

The Tier 3 rulemaking appropriately recognizes that ethanol blending is of central importance to our nation's transportation fuel supply and accomplishing key environmental and energy security goals. To achieve these goals and maintain a robust domestic transportation fuel supply, it is critical that EPA design its regulations to facilitate the production and blending of ethanol.

EPA discusses its possible approaches to the regulation of ethanol (and vehicles that use ethanol) in the Proposed Rule, including the section 'Standards for Fuel Used in Flexible Fueled Vehicles.' (78) This section then references a detailed memo to the docket, the FQS for FFVs Memo.

The FQS for FFVs Memo outlines two options for regulating manufacturers of E51-E83. POET strongly supports 'Option 2: Treatment as a Blender' (the 'Blender Option') as the default option. Under this Blender Option, EPA states that E51-E83 producers can reduce their regulatory burden if they only use blendstocks that meet certain specifications that would ensure sulfur and benzene do not exceed appropriate amounts. (79)

More specifically, under this Blender Option, EPA proposes generally to limit blendstocks for ethanol blends to gasoline, BOBs, and DFE, as well as natural gas liquids (NGLs) and butane if they are produced to certain standards. Under this Blender Option, the finished E51-83 would be subject to the proposed downstream sulfur cap for gasoline of either 65 ppm or 95 ppm. (80) A benzene limit would also apply to the finished blend (discussed above).

POET agrees that testing of final blends would not be needed as the DFE and blendstocks are regulated individually for sulfur and benzene (and RVP issues can be handled in a streamlined fashion as well).

POET also believes that the less-stringent Blender Option requirements could apply equally to E16-E50 as well as E51-E83. The FQS for FFVs Memo also notes that 'the draft regulations written to address E51-83 might be modified to cover E16-50 blends.' (81) POET believes that this Blender Option can be applied across an Ethanol Fuel Family from E16-E85 (i.e., across both MLEBs and HLEBs). If EPA considers it necessary to further delineate MLEB blending, POET suggests that applicable ASTM standards already provide a suitable approach. In particular, ASTM Standard D7794 allows MLEBs only to be created from a mixture of gasoline and DFE, or gasoline and HLEBs. (82) Thus, the constituents of MLEBs (gasoline, DFE, and HLEBs) are already controlled. This is consistent with the streamlined 'Blender Option' that avoids batch testing for blends when the constituents of those blends are already controlled.

While POET supports EPA's Blender Option approach, blendstocks for ethanol blends (i.e., those substances blended with DFE to achieve a certain ethanol/'gasoline' blend) should not be regulated more than is necessary to accomplish EPA's emission-control goals, as further discussed immediately below.

Under the Blender Option, gasoline blendstocks should be allowed for blending (in addition to NGLs and butane) as long as they meet adequate specifications.

Light straight run naphtha, hydrotreated naphthas, and hydrotreated natural gasoline are potential streams to consider. These gasoline blendstocks could be subject to the same sulfur and benzene specifications as NGLs and butane and should be allowed as blendstocks for ethanol blends.

POET agrees with EPA that addressing RVP in blends does not require batch testing.

EPA states that 'For blenders that use only gasoline, BOB's, and DFE to produce E51-83, demonstration of compliance with the maximum RVP standard under consideration could be accomplished by retention of PTDs [Product Transfer Documents] for the blendstocks.' (83)

Additionally, EPA raises the issue of whether the SAE 'Model for Estimating Vapor Pressures of Commingled Ethanol Fuels' is adequate to avoid testing for NGLs and refinery naphthas for RVP. (84) POET agrees that the SAE model referenced in the FQS for FFVs memo should be adequate to avoid testing for NGLs and refinery naphthas for RVP. (85)

EPA states that 'Given the proposal in the Tier 3 NPRM to limit the denaturants that can be used to manufacture DFE to NGL, gasoline, and BOBs, and the narrow range in denaturant concentration, we believe that the RVP of different batches DFE would not vary substantially. Therefore, we currently do not believe that deliveries of new batches of DFE into the storage tank used to produce E51-83 would necessitate a return to per batch testing.' (86) POET agrees that the variability of the ethanol RVP would not vary substantially, and batch testing should not be required, with a 5% denaturant cap.

POET supports facilitating the use of NGLs under the Blender Option in the production of ethanol blends.

POET does not believe that any EPA limits on the volume of NGL used as a blendstock are necessary for HLEBs (E51-E83). For MLEBs (E16-E50), if EPA considers that some NGL limits are necessary, POET suggests that applicable ASTM standards already effectively limit the NGL content in MLEBs. In particular, as noted above, ASTM Standard D7794 allows MLEBs only to be created from a mixture of gasoline and DFE, or gasoline and HLEBs. The amount of NGLs allowed in these constituent products (gasoline, DFE, and HLEBs) is already controlled. Therefore, the volume of NGL in MLEBs can effectively be no greater than what is already contained in approved components of an MLEB.

Furthermore, POET responds to the following statements by EPA regarding NGLs under the Blender Option:
- Production 'using NGL blendstocks would require that the NGL blendstock, like butane, meet a 10-ppm per-gallon sulfur cap.' (87)
- POET agrees that NGL (or gasoline blendstocks such as hydrotreated refinery streams) used for blending E16-E83 should meet the proposed 10 ppm sulfur cap under the Blender Option and therefore avoid burdensome batch testing requirements for blending.

- EPA notes that 'Similar to the envisioned 0.20 volume percent benzene cap for butane, we would look to implement a 0.20 volume percent benzene cap standard for NGL rather than an average standard in order to simplify the regulatory requirements.' (88)
- A benzene cap of 0.20% for NGLs is too restrictive and may be impractical to meet. The benzene standard for NGLs should be 0.62% benzene similar to unleaded gasoline. Therefore, this NGL stream or gasoline could be used in the blend with no detrimental effect to the finished fuel since the DFE in which it is blended will have little to no benzene.
- 'Since NGL properties from different sources can vary widely ... we may also need to consider restricting the sources of NGL to natural gas liquids fractionation facilities and natural gas processing plants to ensure an appropriate level of quality control.' (89)
- EPA should maintain a provision for an alternative NGL source to allow for hydrotreated streams or refinery streams that meet the same criteria (i.e., benzene and sulfur limits). Refineries (including facilities where hydrotreating takes place) can provide the same or superior quality control as NGL fractionation facilities and natural gas processing plants.
- 'Stakeholders have stated that as additive concentration diminishes due to dilution with DFE, there is a point where the presence of a deposit control additive ceases to be beneficial and can actually contribute to deposit formation. In light of this, it may be appropriate to remove the requirement that the gasoline portion of E51-83 and perhaps E16-50 must contain a deposit control additive until the specific deposit control needs of these blends can be evaluated.' (90)
- POET supports removing the requirement that the gasoline portion of E51-E83 must contain a deposit control additive until the specific deposit control needs of these blends scan be evaluated. A similar approach may be warranted for E16-E50.

EPA should not unduly regulate E16-E83 blendstocks. EPA states that 'Currently, only ... RBOBs ... and gasoline ... are used to manufacture E51-83.' (91) This is inaccurate. Gasoline blendstocks and natural gasoline can also be used in E51-E85 today. (92)

Some ethanol producers may wish to use non-standard blendstocks, which they should maintain the option to do as long as the end product meets appropriate specifications. Ethanol producers should have the option to do so, if they opt to undertake broader 'refiner' responsibilities. These 'refiner' responsibilities could require batch testing of the end product, and some ethanol producers may consider this extra cost and burden appropriate. (93)

The proposed definition of NGLs in 40 CFR 80.2 is too restrictive. (97) The definition should not include an unduly narrow listing of the types of facilities that produce NGLs and should include, for instance, NGLs that may be produced through refineries and hydro-treating. The definition should be revised as follows (with <u>additions underlined</u>): '(zzz) Natural Gas Liquids (NGL) means the components of natural gas (primarily propane, butane, pentane, hexane, and heptane) that are separated from the gas state in the form of liquids in <u>facilities such as</u> a natural gas liquids fractionation production facility, or in a natural gas processing plant, ~~or in a~~ natural gas pipeline, <u>or refinery or similar facility</u>. The higher temperature boiling components of NGL are sometimes also referred to as 'natural gasoline'.'

A requirement to 'Certify that the NGL was derived solely of from [sic] natural gas liquids fractionation facilities and natural gas processing plants' is too narrow. (98) As noted above, EPA should include refineries (including hydrotreating) as potential hydrocarbon stream sources as long as blendstocks meet certain requirements (i.e., benzene and sulfur limits).

A requirement to demonstrate 'that the benzene content of each production batch of NGL is not greater than 0.03 volume percent' is too restrictive. (99) This specification is unrealistic, and it is unclear whether a product that meets this specification even exists in any significant commercial quantities. For instance, this specification is 20 times more stringent than gasoline and wouldn't apply to NGLs blended directly into unleaded gasoline.

A prohibition that 'NGL and E51-83 made from NGL cannot be sold as gasoline or E16 or be commingled with gasoline or E16-50 and subsequently sold as gasoline or E16-50' is unduly restrictive. (100) This prohibition on commingling E51-83 made with NGL with MLEBs would unduly limit the ability for retail stations to provide E16-E83 fuels, especially if they employ blender pumps. Alternatively, EPA should be guided by ASTM requirements as stated in standards D4814, D4806, D5798 and standard practice D7794.

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51. - Id. at 29,938.
52 - See FQS for FFV Memo, supra, at 10 (stating that, instead of regulating MLEBs as 'gasoline,' EPA 'could treat E16-50 as an alternative fuel used in FFVs.').
53 - See 40 CFR 79.50 (emphasis added). EPA has designated six fuel families per 40 CFR 79.56, including gasoline, diesel, methanol, ethanol, methane, and propane.
54 - In any possible re-categorization of MLEBs, EPA should ensure that no testing burdens are increased, and that all other applicable regulations are appropriate for ethanol blends.
55 - 78 Fed. Reg. at 29,937.
56 - FQS for FFVs Memo, at 6.
57 - However, these 'substantially similar' requirements for ethanol should also allow the presence of chlorine and sulfur, per the current provisions for the ethanol fuel family at 40 CFR 79.55(e).
58 - However, gasoline that is blended with ethanol does contain benzene; appropriate benzene and sulfur limits for blends in the Ethanol Fuel Family are discussed in the section 5 of these comments.
59 - The 'FQS for FFVs Memo' recognizes that categorizing MLEBs in an ethanol fuel family would allow RVP regulations different from those applicable to 'gasoline' to apply. Id. at 11.
60 - As noted above, it is only when ethanol is blended with significant concentrations of gasoline does the mixture of the two substances exceed current RVP limits in certain circumstances.
77 - FQS for FFVs Memo, at 5.
78 - 78 Fed. Reg. at 29,936-38.
79 - Some ethanol producers may wish to use non-standard blendstocks, which they should maintain the option to do as long as the end product meets appropriate specifications. Ethanol producers should have the option to do so, if they opt to undertake broader 'refiner' responsibilities. These 'refiner' responsibilities could require batch testing of the end product, and some ethanol producers may consider this extra cost and burden appropriate.
80 - FQS for FFVs Memo, supra, at 7.
81 - Id. at 11.
82 - See ASTM D7794-12 (D7794) 'Standard Practice for Blending Mid-Level Ethanol Fuel Blends for Flexible-Fuel Vehicles with Automotive Spark-Ignition Engines.' This standard incorporates by reference ASTM standards governing the permissible constituents of MLEBs including one for gasoline (D4814), as well as ASTM D4806-12 ('Standard Specification for Denatured Fuel Ethanol for Blending with Gasolines for Use as Automotive Spark-Ignition Fuel') (DFE), and ASTM D5798-12 ('Standard Specification for Ethanol Fuel Blends for Flexible-Fuel Automotive Spark-Ignition Engines') (HLEBs).
83 - FQS for FFVs Memo, at 7.

84 - By way of background, EPA stated 'If NGL and/or butane were used to manufacture E51-83, demonstration of compliance with a maximum RVP requirement could not be accomplished merely by retention of PTDs.... However, it may be possible to avoid sampling and testing for RVP as well. RVP models exist that could perhaps be developed further to avoid the need for sampling and testing for RVP when NGL or butane were used, but they are not yet applicable to these blends.' Id.
85 - See id. at 7 n. 22 (referencing SAE paper 2007-01-4006, 'A Model for Estimating the Vapor Pressures of Commingled Ethanol Fuels.').
86 - Id. at 8.
87 - Id. at 9.
88 - Id.
89 - Id. at 10.
90 - Id. at 11.
91 - 78 Fed. Reg. at 29,937.
92 - See, e.g., ASTM standard for H LEBs, ASTM D5798-12.
93 - Under either the Blender Option or the more stringent refiner option (which would regulate ethanol producers similar to gasoline refiners), the resulting E16-E83 'produced would be required to meet the downstream sulfur, RVP, and a benzene per-gallon cap standard in order to ensure emission performance over the life of the vehicles that use it.' FQS for FFVs Memo, supra, at 4.
97 - See FQS for FFVs Memo, supra, at 13; also, 78 Fed. Reg. at 30,003.
98 - See FQS for FFVs Memo, at 20. ' Id.
100 - Id.

Commenter: Renewable Fuels Association (RFA)

Existing standards and specifications for "flex fuels" (i.e., 51-83%vol. ethanol) are sufficient and EPA should not subject these fuels to the same sulfur, RVP, and benzene standards applicable to gasoline

RFA agrees with EPA that increased volumes of higher ethanol blends will be used in flexible-fuel vehicles (FFVs) with implementation of the expanded Renewable Fuels Standard (RFS2). RFA has dedicated resources to develop both the proliferation of the manufacture of FFVs and the retail fuel offering for "flex fuels," ethanol blended fuels containing 51 to 85% ethanol (volume.) There are effective fuel quality specifications already in existence for these flex fuels; ASTM International publishes the fuel specification D5798-13 "Standard Specification for Ethanol Fuel Blends for Flexible-Fuel Spark Ignition Engines." RFA supports the continued responsibility of ASTM International, of which EPA is a member of the D5798 Task Force, to further describe the characteristics needed for flex fuels. The ASTM D5798-13 specification includes regulatory restrictions and has a track record of timely and frequent content update. Recently, the D5798 specification has undergone significant improvements to better characterize and require appropriate blending components and blending practices. Where EPA regulations may have appeared silent on requirements for flex fuels, ASTM International has stepped in to address these issues with robust restrictions for flex fuels. The ASTM D5798-13 flex fuel specification does not allow inappropriate blending components. The ASTM standards process is designed for industry and government driven consensus standards with a thorough vetting process. RFA supports the use of NGLs, butane and other ASTM D5798-13 suitable hydrocarbons as the balance of the fuel blend with ethanol. EPA must avoid prescribing onerous and unprecedented requirements, such as a minimum and maximum vapor pressure, for flex fuels. RFA supports the continued reliance on ASTM D5798-13 to describe ethanol fuel blends containing 51-83% ethanol and to allow blending of flex fuels with ASTM D5798-13 allowed hydrocarbons in all markets including RFG areas.

E16-E50 blends should be treated as alternative fuels.

RFA supports EPA's continued treatment of E16-50 fuels as alternative fuels; this range of fuel blends is only legally allowed for use in FFVs. E16-50 fuel blends are not gasoline. In fact, a fuel blend being predominantly gasoline does not effectuate the use of that fuel blend in gasoline-certified vehicles.

RFA agrees with EPA that data gaps exist on the effectiveness of detergents in E16-83 ethanol fuel blends. Currently, there is insufficient data to render a decision of the effectiveness across the broad range of FFVs in the marketplace. RFA continues to investigate the most efficient and effective composition of these fuel blends and will continue to play a role in addressing data gaps.

RFA supports the EPA requirement for "substantially similar" for all fuels: gasoline and alternative, which restricts the composition to only carbon, hydrogen, oxygen, nitrogen and sulfur.

Commenter: Shell Oil Products for Shell and Motiva

In the preamble and in a separate document entered in to the docket (April 8, 2013 memorandum from Jeff Herzog, "Possible Approach to Fuel Quality Standards for Fuel Used in Flexible-Fuel Automotive Spark-Ignition Vehicles (FFVs)") EPA discusses potentially regulating - 83 and E15-50. In general, we agree that these fuels should be regulated similar to gasoline. As it is, these fuels are essentially exempt from the sulfur, benzene, and detergent additive requirements that apply to gasoline.

The following identifies numerous specific issues in the provisions included in the Herzog memo, and makes recommendations to address those issues.

Of the issues discussed below, one is particularly noteworthy. The suggested benzene level for E51-85 of 0.2 vol% is too low and is not consistent with the existing benzene specifications for gasoline. If EPA proceeds with this, it will essentially require specialized blendstocks with lower benzene levels to produce E51-85.

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 to reflect the currently published version ASTM D5798¬13 and should be updated further 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. Do the requirements of Subpart O apply to E51-83 and/or E16-50 sold in California? And if so, how do they apply?

80.1608 Standards and requirements for E51-83: Apart from the compliance dates for the new sulfur levels 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 ask that EPA specify the effective date in 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.

- As an example, per 80.1611, E51-83 can be made from compliant RFG and compliant denatured fuel ethanol. In this case with:

- the benzene content of E10 RFG being up to 1.30 vol% benzene and

- the amount of E10 RFG in the blend potentially being as much as ~53 vol% of the total fuel recipe (resulting in a final blend containing 51% pure ethanol),

- the final E51-83 made using RFG may contain up to ~0.69 vol% benzene. However, this would conflict with EPA's proposed 0.20 vol% benzene limit for E51-83. The benzene content of the E51-83 may be even higher when conventional gasoline is used in the E51-83 recipe instead of RFG (or RBOB). 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. The EPA intended language should be:

"The Reid vapor pressure of each batch of E51-83 must comply with the same standards applicable for gasoline in §80.~~16~~27(a)(2).

- EPA should clarify that section 80.1608(b)(4), which would require that "each batch" of E51-83 must comply with same standards applicable for gasoline in 80.27(a)(2), only applies to E51-83 blenders (and refiners, importers, distributors, resellers, and carriers). 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 at retail sites as well, then EPA has to recognize and address 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 *fuel at the time and place of bulk delivery to fuel-dispensing facilities for the end user.* 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:

- Similar to our comments regarding the 0.20 vol% benzene limit for E51-83 blenders in 80.1608(b)(2) being too low. 0.20 vol% benzene listed in 80.1608(c)(3) for E51-83 "refiners" is also too low and should be revised consistent with our recommendations for E51-83 blenders.

- 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 deals with test requirements. At this time no section 80.1632 appears proposed or intended by EPA.

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 request that EPA specify the effective date.
- 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 requirement 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 made from NGL 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.

80.1662 Liability for violations under Subpart 0:
- 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 *appeared at a facility* 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 expanded the sulfur cap requirements in 80.1660(b) to include E16-50 and E51-83 fuels sold at retail sites where the branded refinery has no control on the retailer who might independently make these product offerings from sources of his/her own choosing. Branded refiners should not be liable in these cases simply because their brand name "appeared at a

facility", 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.

The Herzog memo discusses detergent additives for E51-85. EPA is seeking comment on the amount (if any) of detergent additive needed.

The EPA proposed regulation for E85 (51% to 83% pure ethanol) and Mid-Level Ethanol blends (16% to 50% pure ethanol), for use only in Flex Fuel Vehicles states:

"Stakeholders have stated that as additive concentration diminishes due to dilution with DFE, there is a point where the presence of a deposit control additive ceases to be beneficial and can actually contribute to deposit formation. In light of this, it may be appropriate to remove the requirement that the gasoline portion of E51-83 and perhaps E16-50 must contain a deposit control additive until the specific deposit control needs of these blends can be evaluated".

There is evidence that unadditized E85 generates deposits on inlet valves. There is also evidence that the use of additives in E85 helps to remove inlet valve deposits. Therefore, we recommend that EPA maintain the approach taken in the current deposit control regulations which require that the gasoline portion of E51-83 and E16-50 must contain a certified deposit control additive at a concentration at least as great as that used during gasoline deposit control additive certification testing (referred to as the Lowest Additive Concentration or LAC). If EPA should decide to pursue changes to the current approach, we recommend that EPA initiate a stakeholder process to vet the issues.

Commenter: Sunoco Logistics Partners L.P.

As the owner/operator of approximately 40 refined product terminals, nearly all of which, inventory and blend ethanol, Sunoco Logistics supports expanding the use of blend stocks like butane and natural gasoline to manufacture E51-83, provided the finished E51-83 blend meets existing industry standard ASTM 5798. At the lower fuel ethanol ranges (i.e., E51), the use of butane and natural gasoline as blend stocks would likely require the addition of other lower volatility components to meet all volatility standards in ASTM 5798.

To meet the envisioned flex fuel quality standards and comply with the applicable sections of the CAA, we support providing maximum flexibility by allowing E51-83 producers to choose between option 1 (refiner) or option 2 (blender) as outlined in the 4/8/13 memorandum authored by Jeff Herzog. The option 2 approach requiring blend stock specifications, quality control testing and reporting should parallel the requirements under 40CFR80 for blending butane into conventional gasoline.

Our Response:

As explained in Section V.H. of the preamble to today's final rule, we are deferring final action not on these provisions at this time. We appreciate the valuable input provided by the commenters and will take this into consideration in our final actions on these standards. We will continue to work with stakeholders in developing in-use fuel quality standards for higher level ethanol blends. We may issue a supplementary proposal prior to issuing a final rule if the additional information we receive from stakeholders warrants such an action.

5.5. Flexibilities

5.5.1 General

What Commenters Said:

Commenter: Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

The main concern with the protracted compliance flexibility in the proposed rule is that it enables on-going unpredictable and unidentified “hot spot“ issues where chronically high sulfur fuels may be sold, forcing OEMs to manufacture vehicles that can perform at higher sulfur level to account for such variability. The flexibility also generally precludes uniformity at the retail pump and therefore makes it more difficult to achieve emissions reductions across the country. The Alliance and Global Automaker support a reasonable date for 100% compliance with sulfur standards, and urges EPA to further limit the period for early crediting and trading that will delay full compliance with the rule.

Commenter: American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM)

The so-called flexibilities proposed in the rule do little to offset the burden of compliance.

Commenter: Manufacturers of Emission Controls Association (MECA)

MECA also appreciates the importance of providing some compliance flexibilities to the oil and refining industries (as EPA has done in past fuel sulfur regulations) to facilitate cost-effective compliance with the standards.

Commenter: Michigan Department of Environmental Quality (MDEQ)

The USEPA is proposing to use phase-in flexibilities, credit and allowance programs, more lead time for small business and manufacturers, and hardship provisions as has been historically done. The MDEQ, Air Quality Division supports this flexibility. A reduced number of United States refineries in recent years has resulted in temporary fuel price spikes when events take them ‘off-line.’ However, pollutants emitted due to high sulfur content in fuel have a cost to the environment and the public’s health that can be much greater and longer duration. With the multitude of complex issues regarding cost to citizens, to refineries, to the environment and to health, these allowances for special cases seem prudent.

Commenter: Ozone Transport Commission (OTC)

We anticipate that EPA will ensure flexibility for automobile manufacturers and refiners of gasoline through averaging, banking, trading programs, or other mechanisms as appropriate without diminishing the environmental benefits of the rule.

Additionally, refineries should be extended flexibility to avoid 2 turnarounds (shutdowns and startups for major maintenance or equipment installation) in a relatively short time period. To the extent reasonable, the equipment installation for low sulfur fuel equipment should be accommodated during a normally scheduled maintenance turnaround. This avoids the excess emissions that occur during multiple shutdowns and startups of a refinery.

Commenter: Pennsylvania Department of Environmental Protection (DEP)

DEP supports flexibility for…refiners of gasoline through averaging, banking, trading programs, or other mechanisms and efforts to mitigate those costs by providing time to install needed equipment at refineries.

Commenter: State of Utah

Utah supports including mitigation provisions in the final rule to help refineries as they transition to Tier 3 gasoline, including providing an averaging, banking, and trading (ABT) program to allow refineries to spread out the cost of these investments among their facilities and hardship and flexibility provisions (e.g., delayed implementation) for small volume refineries such as those in Utah.

Commenter: Union of Concerned Scientists (UCS)

We also support the flexibilities in the Tier 3 standard that were also used in the Tier 2 program.

Commenter: Utah Air Quality Board

The Board further recognizes that the low-sulfur gasoline component of the proposed Tier 3 Program will require significant investments by Utah's petroleum refineries. The Board supports EPA's efforts to mitigate the economic impacts of the Tier 3 Gasoline on this industry, including, but not limited to, providing an averaging, banking, and trading (ABT) program to spread out the cost of these investments and proposing hardship provisions and flexibility provisions (e.g., delayed implementation) for small volume refineries such as those found in Utah.

Our Response:

As discussed more below in Chapters 5.5.2 through 5.5.4 (and in Section V of the preamble to the final rule), we are in fact finalizing a number of flexibilities in the Tier 3 gasoline sulfur program including: a nationwide ABT program, with the ability to use Tier 2 "banked" credits; a three-year delay for approved small refiners and small refineries; and hardship provisions. We believe that these flexibilities address concerns of the potential for having off-cycle turnarounds (which could in turn lead to supply and/or pricing issues) and will help to reduce the burden of compliance on regulated entities. In response to comments, we have also made changes to the final ABT program that we believe will allow for a smooth transition between the Tier 2 and Tier 3 ABT programs, and provide more certainty for refiners of the availability of credits—thus allowing refiners to spread out the cost of their investments among their facilities and in a manner that best works for them.

With regard to the concern that flexibilities preclude uniformity of the gasoline sulfur standards, we note that the January 1, 2020 compliance date for small refiners and small refineries is also the date that all refiners and importers can no longer use credits that were generated with respect to the 30 ppm sulfur standard. Therefore, all production and credit generation/use will be relative to the 10 ppm average sulfur standard at this point. As discussed above in Chapter 5.1.2, we do not anticipate any such "hot spot issues" that the commenter mentioned.

5.5.2. Averaging, Banking, and Trading (ABT) Program

5.5.2.1 General

What Commenters Said:

Commenter: American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM)

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.

Commenter: Chevron Products Company

If EPA proceeds with the gasoline sulfur reduction, we do support several of the proposed elements including: averaging, banking and trading program.

EPA's refinery modeling assumes very optimistic refinery conversion timing and also assumes that refineries would target a 10 ppm level when in fact refineries would have to target a lower level (e.g., 8 ppm or lower) to ensure that the annual average met the 10 ppm standard. Also, the proposed Averaging, Banking and Trading (ABT) program is required to be widely used by the participants in order that the costs be kept down and to meet the proposed implementation timeline — this represents the ideal situation. There is uncertainty about the number of credits that will be available in the market to allow parties to meet the 10 ppm annual average standard. We believe that use of the ABT should be a 'relief valve' for compliance and not a critical component.

While the ABT program does provide flexibility for refiners, the short three-year implementation time period removes a great portion of the benefit of this flexibility by requiring refiners to use the ABT program to manage their investment program and stay in compliance. Refiners who choose to invest for compliance on time for a 2017 start may be unable to do so due to the time required for capital investment, permitting, and construction. Reliance on the ABT program to obtain credits for compliance should be an option for refiners, not a requirement. A refiner should have a clear path to meet the new sulfur standards by investing early and being able to meet the start date without having to use the ABT program.

Commenter: Countrymark

CountryMark believes that the ABT program will provide an easier way for the refining industry to transition from Tier 2 fuels requirements to Tier 3 fuels requirements. This program provides opportunities for obligated parties to meet compliance through a sulfur credit program.

Commenter: Small Business Refiners (SBR)

Sulfur Average, Banking, and Trading (ABT) Program: The Small Business Refiners believe that the ABT program will provide way for the refining industry to transition from Tier 2 fuels requirements to Tier 3 fuels requirements. This program provides opportunities for obligated parties to meet compliance through a sulfur credit program.

Commenter: Environmental Defense Fund (EDF)

The averaging, banking, and trading (ABT) program will help achieve these low costs by allowing refiners to optimize their investments. And that low cost estimate assumes that less than a quarter of the 111 existing refiners will participate in the ABT program.

Commenter: ExxonMobil

If the Agency decides to proceed with this rulemaking, we recommend that EPA retains the flexibility of the Averaging, Trading, and Banking program with the additional modifications submitted by API and AFPM;

Commenter: Marathon Petroleum Company LP (MPC)

In general, MPC supports the sulfur Averaging, Banking, and Trading program concept but has some specific recommendations to improve the proposal.

MPC supports the inclusion of an ABT program as part of the Tier 3 regulations.

Commenter: Natural Resources Defense Council (NRDC)

EPA's proposal provides generous flexibilities for the meeting the sulfur requirements. The proposed averaging, banking and trading (ABT) program minimizes cost of compliance by allowing for investments in the most efficient locations and through early credit generation opportunities that allow refiners to spread out investments.

Commenter: Phillips 66 Company

Credit, Banking and Trading - We support an early credit generation provision.

Our Response:

Consistent with our proposal, we are finalizing a nationwide ABT program as part of the final Tier 3 program. We believe that the ABT program provides flexibility will help enable the January 1, 2017 start date for the gasoline sulfur standards. Details of the ABT program can be found in Section V.D of the preamble to the final rule, and specific elements of the ABT program that we received comments on are also discussed below in Chapters 5.5.2.2 through 5.5.2.5.

Regarding the commenter's concern that our modeling is optimistic, based on our analysis of the Tier 2 credit trading market (see RIA Chapter 4.3.2) and current refinery sulfur levels (RIA Chapter 4.4), we believe that there will be sufficient credits in the marketplace and that there will be both intra- and inter-company trading. As discussed in more detail below, the Tier 3 ABT program will flow seamlessly from the Tier 2 ABT program. Tier 2 "banked" credits will be able to receive their full credit life, and credits generated prior to January 1, 2017 will be relative to the current (Tier 2) 30 ppm sulfur standard. Further, these credits can be used for compliance with either the Tier 2 or Tier 3 programs. Current refinery sulfur levels indicate that there are refineries near, and even below, 10 ppm; thus, we anticipate that these refineries will all be able to generate credits for overcompliance with the 10 ppm sulfur standard beginning January 1, 2017. Considering all of these factors, we believe that there will be sufficient credits available for those needing (or choosing) to defer investment to better align with their existing turnaround schedules or financial needs.

We received comments both expressing concerns that the ABT program will hinder the efforts of the Tier 3 program, and expressing concern that the Agency should not rely on the ABT program – it should be an option available to refiners, not a requirement. We note that the success of the Tier 2 gasoline sulfur program occurred with a nationwide ABT program. The Tier 3 program will simply continue this ABT program, just relative to a 10 ppm standard instead of 30 ppm. We considered, but quickly rejected, other compliance options for the Tier 3 program that included for example, a fixed date for all refineries with no ABT or other flexibilities. Without this flexible ABT program, a January 1, 2017 start date of the program may not have been feasible and would have caused impacts to the fuel refining industry that could have negative supply or pricing impacts. However, this would have gone counter to our successful approaches in implementing prior fuel standards, and counter to refiner support for an ABT program. We could also have designed it with a declining sulfur standard each year beginning in 2014. However, that would have required a rigid phase-down of the sulfur levels between now and 2020. In contrast, the program as finalized allows the industry to determine the most cost-effective way to phase-down sulfur levels between now and 2020. Finally, we believe that it is entirely appropriate to consider the flexibilities when considering the start date for the fuel standards. The Agency has always taken into consideration the flexibility afforded by the ABT programs in setting the start date for its standards, and in fact has argued that it is legally required to in the context of some of vehicle and engine programs where we are obligated to set the most stringent standards feasible considering cost and other factors. Incorporating ABT provisions allows the Agency to set standards that are less costly and can achieve benefits sooner than might otherwise be possible.

5.5.2.2 Who Can Generate Credits

What Commenters Said:

Commenter: Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

EPA has also requested comment on its proposal that sulfur credits only be generated for gasoline that is subject to the proposed sulfur requirements as described at §80.1603. This approach would exclude gasoline designated for export and California, but would include gasoline produced by California refineries for use outside the state. California gasoline is not covered by EPA's proposed rule. The Agency has requested comment on whether to include California gasoline in the averaging, banking and trading program under Tier 3 (not the early credit program) (57).

We agree with EPA that sulfur credits may only be generated for gasoline that is subject to the proposed sulfur requirements as described at §80.1603. However, California gasoline should not be included in the ongoing ABT program under Tier 3. California gasoline has a 20 ppm per gallon cap at retail and market fuels have averaged 10 or less for several years (58). Allowing federal credits for improvements done long ago to meet CARB requirements serves only to dilute the federal program. In addition, refiners should only be granted credits if EPA also reduces the refinery gate and retail per gallon caps well below Tier 2 levels.

57 - 78 Fed. Reg. 29908 at 29873 (May 21, 2013). To be consistent, if EPA were to grant the oil industry sulfur credits for California gasoline sold, it should also grant OEMS federal NMOG credit for CA vehicles sold in CA and 177 states.
58 - 78 Fed. Reg. 29908 at 29820 (May 21, 2013).

Commenter: Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

Furthermore, we also agree with EPA that over-compliance with the DFE per-gallon cap is not a valid basis for credit generation (59). EPA should only allow credit generation were it to impose an additional annual average sulfur standard for DFE (denatured fuel alcohol) at some level below 10 ppm, and allow credits to be generated for over-compliance with that standard.

59 - 78 Fed. Reg. 29908 at 29820 (May 21, 2013).

Commenter: American Petroleum Institute (API) and the Association of Fuel & Petrochemical

Manufacturers (AFPM)

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.

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.

Commenter: Chevron Products Company

We agree that both U.S. refiners and 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, 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.

It is important to maintain the current rules for participation in the program. Entities who are not producers or importers of gasoline and who are not regulated under Tier 3 should not be allowed to participate in the ABT program.

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 already challenging California market. We do not believe that the additional Tier 3 flexibility justifies this additional burden for producers of California gasoline. Gasoline produced in California for sale outside the state should continue to be included in the program.

Commenter: Independent Fuel Terminal Operators Association (IFTOA)

In the Preamble that accompanied the proposed regulations, EPA explained that it is the Agency's plan to limit both credit generation and ability to hold title to generated credits to companies required to comply with the proposed Tier 3 sulfur standards – refiners and importers. These limitations are designed to prevent abuse and fraud. The Association agrees with EPA and believes that such an approach would promote the integrity of (i) credit generation and use, and (ii) the overall program.

EPA is proposing to encourage early gasoline desulfurization and to give members of the refining industry flexibility to stagger their investments. Therefore, under the proposed rule, EPA would allow refiners and importers to generate early credits for "over-complying" with the current 30 ppm gasoline sulfur standard on a volume-weighed annual average basis from January 1, 2014 through December 31, 2016. These early credits would have a limited credit life; they could be used to demonstrate compliance for three years – 2017, 2018, and 2019. EPA has asked for comments on whether importers should be eligible to generate early credits because they do not make investments in refinery modifications to meet the proposed Tier 3 standard.

Members of the Association strongly support EPA's proposal to allow importers, as well as refiners, to generate early credits for several reasons:

First, eligibility for such credits would encourage importers to maximize their efforts to bring lower sulfur gasoline into the United States. These efforts would result in greater volumes of lower sulfur gasoline on the market sooner and help EPA meet its objective of better air quality at the earliest possible date;

Second, the greater the number of early credits available, the greater the flexibility U.S. refiners would have in making the needed investments in their facilities; and

Third, EPA is correct that importers do not, themselves, make financial investments in desulfurization equipment. However, when importers purchase lower sulfur gasoline abroad, they pay a premium for this fuel, reflecting the financial investment made by the foreign refiner. Thus, importers are essentially making an investment, similar to domestic refiners, when they import lower sulfur fuel into U.S. commerce.

Commenter: Irving Oil Terminals Inc.

Irving Oil strongly supports the generation of early credits by both refiners and importers.

Commenter: Magellan Midstream Partners, L.P.

Early Sulfur Credits — EPA has proposed program flexibility through an average, banking and trading program.

Magellan Comment - EPA has limited its proposal to allow only crude oil refiners and importers to generate early credits. We believe 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 credits under the proposed rule. For example, importers are not required to produce gasoline from crude oil refining and could be producing it by blending, and yet they are allowed to generate early credits. In addition, the primary reason for allowing importers to generate early credits because there is no baseline required. This is also applicable to a domestic gasoline blender.

The preamble also mentions the inclusion of importers in the generation of early credits allows domestic refiners more time to make capital investments to reduce sulfur in gasoline. Allowing domestic blenders to generate early credits would have the same impact.

Commenter: Marathon Petroleum Company LP (MPC)

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.

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.

Commenter: Northeast States for Coordinated Air Use Management (NESCAUM)

It is not appropriate to allow ethanol producers or blenders to generate sulfur credits under the proposed gasoline sulfur program. This would require expansion of the program's sampling, testing, recordkeeping, and reporting requirements and require ethanol producers and blenders to be treated as refiners. This expansion of the program to include non-obligated parties would unnecessarily complicate the program with no corresponding benefit.

Commenter: Phillips 66 Company

We support refineries and importers being able to generate credits. This would include entities that meet the definition of a refinery through creation of finished gasoline via blendstock blending. These "refineries" have to meet the standards, sampling and testing, and reporting requirements. In order to generate credits, they would need to secure very low sulfur blendstocks and should be allowed to generate credits. We also agree that other entities (e.g., oxygenate blenders) should not be allowed to generate credits.

The proposed rule continues to exempt California gasoline from the federal gasoline sulfur regulation, however, EPA asked for comment on whether to include California gasoline in the ongoing ABT program under Tier 3. Phillips 66 agrees that the California gasoline volumes (CARB gasoline) should not be included under the Tier 3 provisions but we provide an alternative option for consideration. We ask EPA to consider an opt-in provision whereby a California refinery could chose to have its CARB gasoline volumes subject to the Tier 3 standards and requirements. If a refinery opted in, all of their CARB gasoline would be subject to the 10 ppm average sulfur standard and they would be able to generate credits against the 10 ppm standard.

Commenter: Renewable Fuels Association (RFA)

As detailed above, RFA believes DFE producers should be exempt from onerous sulfur content batch reporting requirements. However, if EPA's final rule requires ethanol producers to report sulfur content by batch (as proposed), they should be allowed to participate in sulfur credit averaging, banking, and trading (ABT) program. Ethanol has value for its sulfur reduction ability. As larger volumes of ethanol enter the marketplace, EPA should allow ethanol manufacturers the option to capture the value to the marketplace through the dilution of sulfur from ethanol that contains below 10ppm sulfur. The option to bank and trade sulfur credits would come with the regulatory reporting requirements of the Sulfur banking and trading program imposed on oil refiners.

Commenter: Shell Oil Products for Shell and Motiva

EPA should allow all "refiners," Including Gasoline Blenders, To Participate in the Credit Generation Program.

We generally support EPA's proposed averaging, banking and trading provisions. These provisions provide important flexibility that should help the industry reduce compliance costs. We do not agree, however, with one of the restrictions that EPA proposes – only refineries that process crude oil are eligible to generate credits. That is an unnecessary limitation that unfairly excludes gasoline blenders. If a gasoline blender – classified as a refiner under EPA's rules – is able to secure low sulfur blend stocks and supply lower sulfur gasoline to the market, EPA should encourage it. By not allowing gasoline blenders to generate credits, EPA is unnecessarily foregoing the emission reductions that could result from such parties supplying lower sulfur gasoline and it deprives the entire industry of credits that could help the entire industry meet EPA's aggressive compliance schedule.

Commenter: Sutherland Asbill & Brennan LLP (Sutherland)

EPA proposes that refiners and importers be able to generate credits through early compliance and over-compliance. Only 'Obligated Parties' (refiners, blenders and importers) may generate, use, transfer or own early or standard credits. Though we acknowledge that the same entities are implicated under the RFS, we encourage EPA to use a term other than 'Obligated Parties' to describe the parties capable of generating credits to avoid confusion. The use of such term is unnecessarily confusing as Obligated Parties cannot generate credits under the RFS, and have entirely different obligations under the RFS than they would under the Proposed Rule.

Commenter: Weaver and Tidwell LLP

Under this section [80.1615(a)], only refiners and importers may earn credits under Subpart O. Weaver believes that butane blenders and transmix processors should be included in this list.

Commenter: Countrymark

the rule. This is important to the CountryMark because we own and operate the refining and terminal assets.

Commenter: Small Business Refiners (SBR)

Credit generation should be permitted only for the obligated party as defined in the rule. This is important to the SBRs because we own and operate the refining and terminal assets.

Commenter: American Coalition for Ethanol (ACE)

On a related note, ACE also believes that ethanol producers should be eligible to generate credits under the gasoline sulfur program. EPA states that 'since many refiners currently comply with our standards taking into consideration the fuel property changes expected as a result of downstream ethanol blending, providing ethanol blenders with sulfur credit would result in double counting the effects of ethanol.' Actually, giving sulfur credit to ethanol producers would apply credit to the fuel supplier that is actually reducing sulfur, as opposed to forcing ethanol producers to give that benefit away to refiners, who will use it to delay reducing sulfur in gasoline. Regardless of the mechanism used, ACE does not believe EPA should provide refiners with pathways that allow delayed adoption of cleaner fuel standards, and we particularly object to the suggestion that the ethanol industry should enable that delay at our own expense.

Commenter: Growth Energy

If DFE will have the same batch testing and registration requirements as gasoline, requiring a10 ppm sulfur cap versus an average could disadvantage DFE versus gasoline, which can generate and profit from sulfur credits. DFE having the same sulfur limits as gasoline, along with a compliant petroleum blendstock, will result in ethanol blends having a sulfur limit that is identical to the proposed finished gasoline specifications.

Furthermore, if the burden of implementing batch testing and reporting is imposed on ethanol producers, they should be allowed to generate sulfur credits. EPA states that "While certain batches of ethanol could theoretically be low enough in sulfur to generate credits, it is our desire to limit credit generation to companies required to comply with the proposed Tier 3 sulfur standards, i.e., refiners and importers.'

If DFE producers are required to complete the batch testing, reporting, and record keeping on DFE similar to refiner requirements on gasoline, they should have the same ability to generate or use credits.

EPA mistakenly states that "since many refiners currently comply with our standards taking into consideration the fuel property changes expected as a result of downstream ethanol blending, providing ethanol blenders with sulfur credit would result in double counting the effects of ethanol." However, double counting would not result if refiners are assuming that DFE has a sulfur level of 10 ppm. Credits would only be generated at levels that are below this 10 ppm level.

EPA attempts to further reject ethanol generating sulfur credits by stating that "Over compliance with the per-gallon cap would not be a valid basis for credit generation, as you would expect that in all cases the DFE would be below the cap. To allow credit generation, we would need to propose an additional annual average sulfur standard for DFE at some level below 10 ppm, and allow credits to be generated for over compliance with that standard." Ethanol producers should have the same ability to generate credits if they have the same testing and reporting standards. In order to remain price-competitive with gasoline, ethanol should be allowed to generate credits in a similar manner as gasoline. Furthermore, such credit trading could allow ethanol producers to offset the cost of [new] DFE testing and reporting requirements.

Commenter: POET, LLC

If DFE will have the same batch testing and registration requirements as gasoline, requiring a 10 ppm sulfur cap versus an average could disadvantage DFE versus gasoline which can generate and profit from sulfur credits. DFE having the same sulfur limits as gasoline, along with a compliant petroleum blendstock, will result in ethanol blends (whether MLEBs or HLEBs) having a sulfur limit that is identical to the proposed finished gasoline specifications.

Furthermore, if the burden of implementing batch testing and reporting is imposed on DFE producers, they should be allowed to generate sulfur credits. EPA states that 'While certain batches of ethanol could theoretically be low enough in sulfur to generate credits, it is our desire to limit credit generation to companies required to comply with the proposed Tier 3 sulfur standards, i.e., refiners and importers.' (70) If DFE producers are required to complete the batch testing, reporting, and record keeping on DFE similar to refiner requirements on gasoline, they should have the same ability to generate or use credits.

EPA mistakenly states that 'since many refiners currently comply with our standards taking into consideration the fuel property changes expected as a result of downstream ethanol blending, providing ethanol blenders with sulfur credit would result in double counting the effects of ethanol.' (71) However, double counting would not result if refiners are assuming that DFE has a sulfur level of 10 ppm. Credits would only be generated at levels that are below this 10 ppm level.

EPA attempts to further reject ethanol generating sulfur credits by stating that 'Over compliance with the per-gallon cap would not be a valid basis for credit generation, as you would expect that in all cases the DFE would be below the cap. To allow credit generation, we would need to propose an additional annual average sulfur standard for DFE at some level below 10 ppm, and allow credits to be generated for over compliance with that standard.' (72) Ethanol producers should have the same ability as refiners to generate credits if they have the same testing and reporting standards. In order to remain price-competitive with gasoline, ethanol should be allowed to generate credits in a similar manner as gasoline. Furthermore, such credit trading could allow ethanol producers to offset the cost of new DFE testing and reporting requirements.

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70 - Id. at 29,938.
71 - Id.
72 - Id. at 29,938-39.

Our Response:

Use of the Term "Obligated Parties"

With respect to comments requesting that EPA not use the term "obligated party" in the Tier 3 regulations, we agree with these comments and are using the terms "refiner" and "importer" in the final Tier 3 regulations. The Tier 2 rule was finalized in 2000, and used this term as a general way to refer to regulated parties such as refiners and importers. However, this term now has a very specific meaning under the RFS program. The use of "obligated party" in the Tier 3 proposed regulations was to remain consistent with the Tier 2 regulations; however, we agree that this could cause confusion with the RFS program.

Participation in the ABT Program

Consistent with our proposal, gasoline sulfur credits may be generated by U.S. refiners, and importers of gasoline into the U.S., only for gasoline that is subject to the sulfur requirements as described in the regulations at §80.1603. This provision excludes gasoline produced or imported for use in California ("California gasoline") and gasoline designated for export, but includes gasoline produced by California refineries for use outside the state. Further, importers will also be able to participate fully in ABT program, so they will be able to generate credits for sending over-compliant gasoline to the U.S. This is unlike other previous and existing fuel programs that precluded their participation in the early credit portion of an ABT program.

In response to comments, we have revised the regulations by removing the terms “produce gasoline from crude” from §80.2(i). Under the final Tier 3 program, refiner-blenders who comply with the full suite of sampling, testing, and reporting requirements can participate in the Tier 3 ABT program. Additionally, we are extending these provisions to butane and pentane blenders (per Section V.I of the preamble to the final rule) if they likewise comply with the full suite of sampling, testing, and reporting requirements. However, any refiner-blender who uses the reduced sampling, testing, and reporting provisions for blending butane or pentane into gasoline will not be allowed to generate Tier 3 credits.

Consistent with our proposal, ethanol and oxygenate producers are not allowed to participate in the Tier 3 ABT program. As discussed in Section V.G.4 of the preamble to the final rule, and consistent with existing EPA fuel programs, we continue to believe that it is not appropriate expand the ABT provisions to cover ethanol producers and oxygenate blenders for several reasons. First, expanding the ABT program beyond refiners and importers could greatly increase the number of parties participating thereby potentially complicating EPA compliance assurance activities while having little overall impact on the sulfur credit pool. Second, the current ABT program under the Tier 2 gasoline sulfur program, which is limited to gasoline refiners and importers, has functioned effectively with few compliance irregularities. Third, experience with the unleaded gasoline program suggests widespread abuse and fraud when credits have been allowed to be generated or sold by parties other than refiners or importers subject to the regulations. Fourth, it would require a considerably more complicated compliance structure, including the application of all refiner responsibilities to ethanol producers and blenders. Fifth, there is no need for denatured fuel ethanol (DFE) producers to generate credits in order to recoup the value for any lower sulfur content of their product. The value of any lower sulfur content will be reflected in the market price of DFE, similar to the octane value to refiners. Sixth, the sulfur ABT provisions were included to ease the burden of compliance for refiners who have to make capital changes to their facilities to meet the more stringent Tier 3 sulfur standards. In addition to reducing the cost of the Tier 3 gasoline sulfur program, the ABT provisions allow for an earlier effective date of the sulfur standards than would otherwise be possible. Such considerations are not applicable to ethanol producers since capital expenditures for desulfurization equipment or other equipment will not be needed at their facilities to comply with the final Tier 3 sulfur standards.[14] Finally, overcompliance with the per-gallon sulfur cap for DFE is not a valid basis for credit generation. We expect that in all cases, the DFE sulfur level will be below 10 ppm. To allow credit generation for these parties, we would need to set an additional annual average sulfur standard for DFE at some level below 10 ppm and allow credits to be generated for overcompliance with that standard. Accordingly, we do not believe it is appropriate to allow ethanol producers or blenders to generate sulfur credits under the Tier 3 gasoline sulfur program, and as such, we did not finalize such a provision. The Tier 3 rule prohibits any person downstream of the refinery or importer that produced or imported gasoline, CBOB, or RBOB who adds oxygenate to such product from including the volume and sulfur content of the oxygenate in any compliance calculations for credit generation.

5.5.2.3 Design of Credit Program

What Commenters Said:

Commenter: American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM)

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.

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.

The benefits of averaging banking and trading of the Tier 2 rule are not comparable to Tier 2. The opportunity to generate credits is limited by a refinery's existing equipment and configuration. Tier 2 sulfur credits are still in circulation, and it would be beneficial, and we request that EPA publish aggregate data on the remaining Tier 2 sulfur credit balances in order to determine to what extent an ABT program would provide or could provide a benefit.

With such a short lead time, the opportunity to generate sufficient credits to cover both the Tier 2 requirements and bank credits for Tier 3 between now and January 2017 will be limited.

Commenter: Chevron Products Company

We agree with the format of the ABT program. 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.

We do agree with the inclusion of a credit averaging, banking, and trading (ABT) program, including a three-year phase-in period from 2014 through 2016 with the ability to generate early credits. However, we propose some changes to the details of the ABT program which are described below.

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.

We do not agree with the proposed structure of the early credit program during the 2014-2016 period 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 credits must be designated as Tier 2 or Tier 3, 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 Tier 2 sulfur standard.

Commenter: CHS, Inc.

Currently under the proposed Tier 3 regulation, sulfur credits generated under the Tier 2 regulation for the years 2012 and 2013 can only be used for compliance through the calendar year 2016. CHS requests that the EPA allow these Tier 2 sulfur credits to be used to demonstrate compliance for years 2017 and 2018. This will help ensure that refineries meet compliance and ultimately protect the consumer from any supply disruptions.

Commenter: Irving Oil Terminals Inc.

In addition, EPA has recognized that early credits generated by both refiners and importers will help industry comply with the new standard and ensure that lower sulfur gasoline is available as quickly as possible. Early credits also help to advance the associated environmental and health benefits to an earlier timeframe. With some companies already having the ability to meet the proposed lower standard, the EPA should begin the early credit program at a minimum of five years before the effective date.

Irving Oil does not think that the compliance timetable of three years is adequate to meet the Tier 3 sulfur content standard. The use of early credits would certainly provide some flexibility with refinery project execution in order to meet the requirements of the proposed standard. In addition, early credits would help bring greater volumes of lower sulfur gasoline to market earlier and address concerns from the auto manufacturers. Irving Oil strongly supports the generation of early credits by both refiners and importers. EPA should do everything it can to encourage the production and importation of qualified gasoline eligible for these credits.

It is well known that some refiners and importers need only to make modest adjustments to their facilities and/or locate foreign gasoline cargoes in order to incrementally lower their sulfur content downward from 30 ppm. The EPA should initiate the early credit program as early as possible with a retroactive effective date of January 1, 2013.

It should be noted that, even with this modification, it is not certain that enough early credits would be generated to allow the regulated community to meet the Tier 3 standard by the current proposed Effective Date of 2017. However, the more early credits are encouraged, the greater the chance more will be available to provide the degree of flexibility EPA has anticipated, thereby facilitating compliance with the 10 ppm annual average standard at the earliest possible date.

Commenter: Marathon Petroleum Company LP (MPC)

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.

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.

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.

Commenter: Phillips 66 Company

EPA is overly optimistic on early credit generation capability.

Secondly, EPA asserts that the Averaging, Banking and Trading program will provide refineries with early credits that can be used by refineries that fall outside of the small refinery category to postpone their project start-up date. Phillips 66 disagrees with this assessment. We believe EPA is being overly optimistic on the capability of refineries to generate and make available sufficient credits.

Phillips 66 supports the inclusion of an early credit generation provision in the regulation and we believe these flexibilities combined with a 5-year implementation lead time will enhance the chances of a successful implementation of any new standard. As a key implementation component, ABT provides both 1) incentives for limited early reductions in gasoline sulfur with existing units and 2) important flexibilities for continuing compliance after the final implementation date.

We offer some suggested modifications to the proposed ABT provisions that we believe will provide additional utility.
- Allow refiners to designate credits generated during the 2014-2016 time period as generic sulfur credits and put them into a “bank”.
- Allow refiners to use the generic credits for either Tier 2 compliance or leave them in the bank and use them for Tier 3 compliance.
- Allow any Tier 2 credits in the bank at the end of 2016 (e.g. generated in 2011, 2012, or 2013) to be converted into Tier 3 credits.

Commenter: PBF Energy Inc.

PBF supports the proposed ABT program and will examine our options to generate early credits. We ask that the EPA clarify the regulatory language to ensure that the final regulation allows refiners to decide on credit use as either Tier 2 or Tier 3 early credits at the time of use. It is extremely difficult to forecast future requirements, given the potential for unplanned equipment outages. Having to designate credit types prior to actual consumption increases the risk of “stranding” credits in a less usable type and is a drawback to the rules as currently proposed. The EPA through the current programs can still track the amount and year credits are generated and effectively define the credits as to their potential. We see little value in forcing a refiner to declare the credit type in advance of consumption.

Commenter: Weaver and Tidwell LLP

Additionally, the program allows for early credits to be earned. However, the Tier 2 sulfur credit inventory is not being addressed. What will happen to the current level of Tier 2 sulfur credits? To ignore the Tier 2 program sulfur reductions within the context of the Tier 3 program would leave the Tier 2 sulfur decrease (funded by refiners, both large and small) out of the program. Thus, the efforts of facilities to comply with Tier 2 are ignored. Weaver recommends that the agency allow for the conversion of Tier 2 credits to Tier 3, at some reasonable conversion rate.

Early credits are valid through February 29, 2020. We believe this date should be changed to March 31 (consistent with when the annual compliance reports are due, assuming the deadline is changed).

Commenter: Wyoming Refining Company (WRC)

Some subtle aspects of the proposed rule, however, have the potential of making pre-2020 Tier 2 compliance more difficult, if not impossible. First, the proposed Tier 3 rule allows refiners to generate early Tier 3 credits by lowering their gasoline sulfur below 30 ppm during 2014, 2015 and 2016. Considering the proposed compliance time frame, WRC expects there will be significant demand for Tier 3 early credits that will enable large refiners to delay 10 ppm production until 2020. The early credits will most likely be generated by increasing operating severity on existing Tier 2 equipment. Most Tier 3 early credits will, therefore, probably not be new credits but, instead, will be Tier 2 credits, most of which would have been generated in any event, converted into Tier 3 early credits.

This situation will create a shortage in the Tier 2 credit supply on which WRC must depend to maintain Tier 2 compliance through 2019.

It does appear that Tier 2 credits generated prior to 2014 (2013 and earlier), however, will become more abundant starting in 2017 as large refiners transition into Tier 3 production and no longer have a need for Tier 2 credits. These 'dumped' Tier 2 credits, however, will expire, at the latest, in 2018. WRC, therefore, may very well be exposed to a situation in 2019 where abundant 2013 and earlier Tier 2 credits have all expired and 2014 and later Tier 2 credits have been mostly converted into Tier 3 early credits. Non-compliance in 2019 is a very real possibility even though the proposed rule intends to extend flexibility to small refiners and small volume refineries until 2020.

Our Response:

As discussed in more detail in Section V.D of the preamble to the final rule, in response to comments, we are finalizing a more flexible approach to the ABT program than proposed. We believe this will provide for a more seamless transition from the Tier 2 to the Tier 3 credit programs, and will provide more certainty of credit availability.

Consistent with our proposal, refiners and importers may begin generating credits on an annual average basis January 1, 2014, and continue through December 31, 2016, for overcompliance with the current 30 ppm annual average sulfur standard. We believe this simple approach is possible because U.S. gasoline was averaging around 30 ppm as we started developing the Tier 3 program, based on compliance data. Since refiners and importers would need to continue to comply with the existing 30 ppm Tier 2 sulfur standards during this timeframe absent Tier 3, they would need to maintain this level of performance on an industry average basis. Accordingly, any additional gasoline sulfur reductions beyond 30 ppm will be attributed to the proposed Tier 3 program. In response to comments, we are not requiring that credits be designated as either Tier 2 or Tier 3 and only used for the program for which they were designated. Refiners and importers may use credits generated prior to January 1, 2017 either for ongoing compliance with the Tier 2 program, or bank them for future compliance with the Tier 3 program (within the limits of the credit life restrictions). Essentially, the Tier 2 credit generation provisions simply continue, and any credits generated from January 1, 2014 through December 31, 2016 that were not used for compliance with the Tier 2 standards would be carried over for use in complying with Tier 3. We believe that this will allow for more certainty of credit availability before refiners must make their Tier 3 investment decisions, thus reducing the cost of the program. It will also avoid any incentive for refiners to use up banked Tier 2 credits prior to 2017 causing increased in-use sulfur levels and emissions.

Based on our analysis of the Tier 2 credit market for 2012, we believe that there will be a balance of 2012 banked credits equivalent to approximately two months of compliance, and we anticipate a similar amount (perhaps more) for 2013. In response to several commenters that urged EPA to allow these credits to be able to be used for Tier 3 compliance as well to avoid the risk of them being stranded, we are finalizing a provision for these credits to retain their full five-year life. We are finalizing this provision for a number of reasons. First, the Tier 2 banked credits represent real reductions—refiners and importers are currently generating these credits for overcompliance with the Tier 2 gasoline sulfur standard. Second, allowing these banked credits to receive their full five-year credit life will provide more assurance of the credit availability for trading for those who need them to comply with Tier 3 without a large capital investment. As previously explained, this will allow for more certainty of credits available far before making Tier 3 investment decisions, thus reducing the cost of the program. A lack of certainty in the credit trading market could lead to refiners banking more credits than usual for their own use rather than allowing these credits to be available in the market for trading. As shown in our analysis in Chapter 4.3 of the RIA, refiners tend to hold credits as an insurance policy until they approach the end of their credit life. If credit-generating refiners continue with this approach, credits generated in 2012 and 2013 will likely be available for purchase in 2017 and 2018 for those refiners that may want to rely on them for compliance (along with additional credits generated from 2014 through 2016). Finally, as we anticipate that these credits will be equal to about four months of compliance, the allowance of 2012 and 2013 banked Tier 2 credits makes for a more flexible program by effectively allowing for a small amount of additional lead time without adversely affecting the overall benefits of the Tier 3 program. We believe these provisions will allow the Tier 3 program to begin on January 1, 2017, with more certainty regarding the availability of credits for those refiners needing (or choosing) to defer investment to better align with their existing turnaround/shutdown schedules.

However, one small refiner highlighted an opposite concern—that large refiners may hold sulfur credits for their own compliance with Tier 3, drying up the market that small refiners can rely on to continue to comply with the Tier 2 standards (through December 31, 2019). While we appreciate this concern, we believe it is overstated. Based on our analysis of current sulfur credit generation and use, we believe that the 5-year credit life will continue to provide an incentive for credits to be made available in the market through 2019 for Tier 2 compliance. In fact, since credits generated in 2015 and 2016 cannot be used in 2020 and beyond, there is now likely to be an increase in credit availability in the years prior to 2020.

Under the final Tier 3 ABT program, the credit generation provisions are nearly the same as those under the Tier 2 program – in essence, the Tier 2 program simply continues with a lower standard below which credits are generated. Refiners and importers are allowed to average within and across companies to meet the standard in the most cost-effective manner possible, including generating and using credits. Credit generation periods remain 12 months long and continue to be synchronized with annual compliance demonstration periods. As noted by one commenter, these annual reports (which will include a refiner or importer's credit generation and use information) will be due on March 31 of each year, not February 28.

Please see our response to Chapter 5.5.2.4, below, for a detailed discussion of the final credit life and credit trading provisions.

5.5.2.4 Credit Use – Credit Trading and Credit Life

What Commenters Said:

Commenter: Alliance of Automobile Manufacturers (Alliance) and Association of Global

Automakers (Global)

We concur with EPA providing a three-year life for sulfur credits (60). The proposed three-year early credit life provision would be consistent with the duration of the small volume refinery provisions. It is important that when Tier 3 is fully phased in for automakers it is likewise fully phased in for refiners, so that the public can fully benefit from its provisions.

60 - 78 Fed. Reg. 29908 at 29939 (May 21, 2013).

Commenter: American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM)

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.

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.

Commenter: Chevron Products Company

Credits should be allowed to be traded between companies who are participants in the Tier 3 program. Credits should not be limited to internal transfers between refineries from the same company.

Regarding credit trading, we do not believe the maximum two trade limitation on sulfur credits is warranted. 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 should be eliminated.

Commenter: CHS, Inc.

CHS is providing the following comments regarding the sulfur averaging, banking and trading (ABT) program. Currently under the proposed Tier 3 regulation, five year sulfur credits generated under the Tier 2 regulation for the years 2012 and 2013 can only be used for compliance through the calendar year 2016 thus cutting short the five year credit life. CHS requests that the EPA allow these Tier 2 sulfur credits to be used to demonstrate compliance for years 2017 and 2018.

Commenter: Independent Fuel Terminal Operators Association (IFTOA)

Early credits should be valid for more than the three years proposed. The 10 ppm annual average sulfur standard is an aggressive standard that will take substantial time and money to meet. Refiners need as much flexibility as possible, and EPA should do all that it can to maximize (a) the number of early credits available, and (b) the value (credit life) of such credits to facilitate compliance. Extension of the life of early credits would meet that objective.

Recommendation: The Association recommends that both refiners and importers have the right to generate early credits to help ensure that an adequate volume of such credits is available to help refiners stagger their investments to meet the proposed Tier 3 standard. In addition, the life of such credits should be 5 years from the date Tier 3 is implemented.

Permit both refiners and importers to generate early credits to facilitate delivery of lower sulfur gasoline into the market at the earliest possible date and to allow such credits to be used for a period of 5 years from the date that the Tier 3 regulations become effective;

Commenter: Irving Oil Terminals Inc.

Irving Oil endorses EPA's proposal to limit the number of parties who may hold title to Tier 3 credits. Such a limitation would enhance the ability of regulated parties to assess the validity of the credits generated and maintain the integrity of the credit program.

Moreover, early credits should be valid to demonstrate compliance into 2019, 2020 and 2021.

Commenter: Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

EPA has proposed that under the Tier 3 ABT program, sulfur credits must be transferred directly from the refiner or importer generating them to the party using them for compliance purposes (61). This would ensure that the parties purchasing them are better able to assess the likelihood that the credits are valid. EPA has allowed an exception so that if a credit generator transfers credits to a refiner or importer who inadvertently cannot use all the credits, the credits can be transferred a second time to another refiner or importer. After the second trade, the credits must be used or be terminated. We agree that allowing a maximum of two trades is consistent with other recent fuel programs and is sufficiently flexible while still preserving adequate means for enforcement. One need only look at recent activity in the Renewable Fuel Standard RFS (RIN) credit mechanism to know that fraud is a concern, and therefore minimizing the trading of these potentially valuable credits is the correct approach.

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61 - 78 Fed. Reg. 29908 at 29940 (May 21, 2013).

Commenter: Marathon Petroleum Company LP (MPC)

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.

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.

Commenter: Northeast States for Coordinated Air Use Management (NESCAUM)

Early credits generated under the averaging, banking, and trading (ABT) program should expire after three years. The three-year early credit life provision offers sufficient flexibility to refiners and still provides a date certain by when automobile manufacturers can be assured that introduction of their technology designs correspond with the availability of 10 ppm average sulfur gasoline.

Commenter: Phillips 66 Company

We strongly support limiting ownership of sulfur credits to refiners and importers. This has been instrumental in protecting the integrity of the current program.
- Provide a 5 year life to all credits

Our Response:

Credit Life

Under the final Tier 3 ABT program, in response to comments, all credits generated before January 1, 2017 will be valid for five years or until December 31, 2019, whichever is earlier—no early credits may be used for compliance beginning January 1, 2020. Thus, unlike our proposal, banked Tier 2 credits generated in 2012 and 2013 will receive their full five-year life and will not expire at the start of the Tier 3 program. However, credits generated in 2015 and 2016 that are unused as of December 31, 2019 will expire and become invalid. We believe that structuring the credit program this way will offer considerable flexibility to refiners phasing in Tier 3 gasoline sulfur controls, while still placing a date at which point the intended sulfur program will be fully implemented and enforceable—January 1, 2020 (the same date small refiners and small refineries must begin complying with the 10 ppm sulfur standard). This will also provide a date certain to give auto manufacturers greater confidence for the design of their vehicles that all vehicles in-use are running on 10 ppm average fuel. Otherwise, it is possible that the greater ease of generating early credits relative to 30 ppm sulfur (as opposed to 10 ppm in 2017 and beyond) would allow higher sulfur levels to continue well beyond 2019.

Consistent with our proposal, all credits generated beginning January 1, 2017 will be for overcompliance with the Tier 3 10 ppm annual average sulfur standard, and will have a five-year credit life. We believe five years will give refiners and importers sufficient time to use credits generated in previous years, while still placing limitations on credit life to help with enforcement. Five-year credit life is also consistent with the Tier 2 ABT program, as well as the current credit life and recordkeeping provisions for other 40 CFR part 80 fuels programs, and coincides with the applicable five-year statute of limitations for violations by parties who generate invalid credits. Credits must be used within five years from the year they were generated (regardless of when/if they are traded), otherwise they will expire and become invalid. For example, credits generated in 2017 can be applied towards 2018-2022 compliance, as well as 2017 compliance. After March 31, 2023 (when reports for the 2022 annual compliance period will be due), credits generated in 2017 will expire and become invalid. Similarly, credits generated in 2018 can be applied towards 2019-2023 compliance, as well as 2018 compliance. After March 31, 2024, credits generated in 2018 expire, and so on and so forth.

Credit Trading

We are finalizing credit trading provisions in the Tier 3 ABT program that are identical to those under the current Tier 2 program. As with Tier 2, it is possible that sulfur credits could be generated by one party, subsequently transferred or used in good faith by another, and later found to have been calculated or created improperly or otherwise determined to be invalid. Under the Tier 2 ABT program, as well as other 40 CFR part 80 fuel programs, if this occurs, we are requiring that both the seller and purchaser will have to adjust their sulfur calculations to reflect the proper credits and either party (or both) could be determined to be in violation of the standards and other requirements if the adjusted calculations demonstrate noncompliance with the 10 ppm standard. Sulfur credits must be transferred directly from the refiner or importer generating them to the party using them for compliance purposes, to ensure that the parties purchasing them are better able to assess the likelihood that the credits are valid. However, as with the Tier 2 ABT program, there are no prohibitions against brokers facilitating the transfer of credits from one party to another. Further, any person can act as a credit broker, regardless of whether such person is a refiner or importer, as long as the title to the credits is transferred directly from the generating refiner or importer to the using refiner or importer. We believe that maintaining a prohibition on outside parties taking ownership of credits will allow for maximum program enforceability and consistency with all of our other ABT programs for mobile sources and fuels.

We disagree with comments arguing against the two-trade maximum for inter-company trading that exists in the current Tier 2 ABT program. Under the final Tier 3 ABT program, after the second trade, credits must be used or they will expire. While some commenters stated that they believe the two-trade maximum is not necessary given the fact that credits are only being traded within a small part of industry, we believe that unlimited trading could result in an unenforceable program and potentially lead to problems with invalid credit trading. Further, allowing a maximum of two trades is consistent with other recent fuel programs and we believe it is sufficiently flexible while still preserving adequate means for enforcement. Also consistent with the Tier 2 program, the provision for unlimited trading for intra-company credits will continue. In response to comments, we have clarified this in both the preamble and the regulatory text.

5.5.2.5 Deficit Carryforward

What Commenters Said:

Commenter: American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM), Chevron Products Company, Marathon Petroleum Company

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.

Commenter: Phillips 66 Company

Provide a multi-year deficit carryover provision. Meeting the very stringent 10 ppm average will be challenging. An operational issue could persist causing a refinery to not be able to meet the standard. Securing sufficient credits or making up the deficit operationally the following year may also be very difficult. Allowing a multi-year deficit carryover will be beneficial. We suggest allowing a three year deficit carryover rather than just a single year.

Section 80.1616(a)(6) states that “a refiner possessing credits must use all credits prior to falling into a compliance deficit”. The use of “refiner” implies an aggregated company basis. We ask that this be changed to be on a refinery specific basis rather than a refiner basis.

Our Response:

As discussed in the preamble to the final rule, we are finalizing deficit carryforward provisions similar to the existing Tier 2 program. An individual refinery that does not meet the 10 ppm standard in a given year may carry a credit deficit forward for one year, and will have to make up the credit deficit and come into compliance with the Tier 3 sulfur standard the next calendar year.

Regarding comments requesting that the deficit carryforward allowance be extended to two or three years, we disagree with these comments primarily because of concerns with the enforceability of a allowing for a deficit beyond one year. Furthermore, an extended deficit carryforward could further delay Tier 3 sulfur reductions. However, in recognition of unanticipated circumstances, such as where credits are unavailable or are prohibitively expensive such that a refiner could not make up the deficit in one year, we are finalizing hardship provisions that provide EPA with the authority to allow for extended deficit carryforward if a refiner’s hardship petition demonstrates that it meets the required criteria. Thus, as described more in Section V.E.2 of the preamble to the final rule, a refiner could carry a deficit forward for up to three years only in cases of hardship situations.

We disagree with comments suggesting that the deficit carryforward provisions should be applied on a refinery (facility-specific) basis instead of a refiner (company) basis. There is little need for a company to carry a deficit for one refinery if it has excess credits from its other refineries. But allowing this could defeat the purpose of the one-year restriction, as a refiner could simply shift a deficit around from one refinery to another year after year.

5.5.3. Regulatory Flexibility Provisions (Small Refiners and Small Volume Refineries)

What Commenters Said:

Commenter: American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM)

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.

Commenter: American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM)

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.

Small refinery exceptions are of limited utility if pipelines set lower specifications, which is what happened in the Tier 2 rulemaking.

Commenter: Chevron Products Company

If EPA proceeds with the gasoline sulfur reduction, we do support several of the proposed elements including: small refinery exemption;

We agree with the inclusion of an extension of the compliance deadlines for small refiners and small refineries as proposed in the Tier 3 NPRM. However, the extension of the compliance deadline may not be sufficient to ensure the long term viability of these challenged refineries. The Tier 3 capital investment requirements for certain refineries may be economically prohibitive regardless of an extension of the start date. EPA should carefully consider the impact of the Tier 3 regulations on all refineries and whether additional flexibility measures are warranted.

If the EPA defers the 2017 start date to a later time, the extension for small refiners and small refinery owners should be maintained, such that the Tier 3 requirements should apply to small refiners and refineries at least three years after the revised start date.

Commenter: Chevron Products Company

The preamble suggests that small refiners would have to voluntarily opt in to the Tier 3 program and comply with the 10 ppm standard to be able to generate standard credits. 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.

Standard credit generation by small refiners and small volume refineries should be allowed during the 2017-2019 period.

Small refiners/refineries should be able to participate in the credit trading program. We suggest that the credit generation rules during the transition period, 2014 through 2019 for small refiners/refineries, should allow flexibility for parties to manage their credits for compliance and to generate value for their over-compliance. The requirement for small refiners/refineries to opt-in to Tier 3 to generate standard credits is not clear in the preamble and does not appear in the regulations. We do not understand what it would mean for a small refiner/refinery to opt-in to Tier 3. Could an opt-in party also opt back out? We suggest that small refiners/refineries be allowed to comply with the 30 ppm standard through the 2019 compliance year. Any credits generated during this period should be able to be used for compliance with the 30 ppm standard, and unused credits at the end of 2019 should be allowed to be used for Tier 3 compliance. Conversion of Tier 2 credits to Tier 3 credits preserves the value generated by the refinery by over-complying with the standard and creating a benefit for the environment.

Commenter: Countrymark, Small Business Refiners (SBR)

We recommend that the early credit generation period be available for the three years prior to compliance (2014-2020) for small refiners and small volume refineries just as the early credit generation is available for large refineries in the three years prior to compliance. We also recommend that early credits are available for use three years after the compliance deadline (through 2023), just as they are available for large refiners.

A small refiner that is unable to comply with the rule until 2020 will not be penalized for complying with the rule by the due date. Not having early credits available for use in the three years after equipment start-up would significantly impact a small refiner and the communities that they supply if issues occur (such as FCC post-treater shut down) and credits are not available to continue operations.

As part of the Tier 2 regulation, EPA permitted small refiners, as well as refiners in the Geographic Phase-in Area, to fully participate in the ABT program at the same time the program started for the industry at large. This decision provided early compliance incentives for all refineries and maximized the credits available system-wide. EPA has not provided any justification on why they have significantly scaled back small volume refinery participation in the ABT program compared to Tier 2.

Commenter: Countrymark

If an exemption cannot be granted, then we recommend that the ABT program be re-structured per our comments above to generate early credits in 2014 through 2020 and utilize early credits for compliance through 2023. Implementing these changes will provide appropriate relief to the SBRs as they implement their compliance projects.

We prefer that the Small Business Refiners and Small Volume Refineries be exempt from complying with Tier 3 fuels requirements. As stated above, DOE's estimate that small refiners only provide 11.9% of the gasoline supply. With this small contribution to overall emissions, we recommend that an exemption from the rule due to the high cost of implementation compared to the low impact of the required investment. EPA estimates that the 2030 sulfur reduction will be

14,264 tons per year; of which the estimated total contribution from fuels generated by SBR s will be 2,000 tons per year.

Commenter: Small Business Refiners (SBR)

Clearly, SBRs have important financial differences from large refiners. It is a well-settled fact that our size limits the options we have to comply economically with new regulations.

Small Business Refiners are important to the economy

- Small refiners foster competition in the petroleum industry.
- Small refiners are critical to easing the tight supply of petroleum products and often are the only sources of supply in their areas.
- Most small refiners serve as the major economic resource in the small, often rural, communities in which they operate.
- It is generally agreed that the economic 'multiplier effect' (jobs and other local and regional investment and businesses) resulting from refinery operations is eight-to-ten times the refinery's actual budget.
- Many small refiners provide a reliable and competitive supply of military jet fuel to our country's military bases and thus are important to national security.

Small Business Refiners Do Not Enjoy Economies of Scale

- Large refiners are able to spread compliance and operating costs over much greater product sales and over a much greater asset base.
- SBRs are not fully integrated like the large refiners. Many do not have upstream crude oil and gas production, midstream pipelines and terminals, or downstream retail marketing.
- SBRs already have been at a disadvantage with major refiners relative to higher production costs of ultra-low sulfur and reformulated fuels on a per barrel basis.
- SBRs as a group are most vulnerable to decreasing domestic demand for refined products and increased competition from renewable fuels.

Small Business Refiners Have Limited Resources and Compliance Flexibility

- Access to capital present much greater obstacles for SBRs than for larger refiners.
- Small refiners do not have large staffs to negotiate and implement permitting, regulatory, and compliance requirements.
- By contrast, large refiners have access to a larger qualified labor pool and can maintain large corporate staffs with a diverse range of specialties and in-house expertise.
- Qualified outside engineering consulting is limited even where financial resources to procure such help are available.
- Due to the smaller size of projects, SBRs are disadvantaged when competing with large refiners to garner outside engineering resources.
- The majority of SBRs do not have port access like the majority of large refiners and are therefore more reliant upon local domestic crude supplies; they therefore have little or limited ability to change crude slate when regulations and specifications change.
- The majority of SBRs are less complex than large refiners and thus have less operational flexibility and fewer outlets for intermediate products.
- Small refiners owning just one or two facilities have limited internal compliance flexibility relative to the industry at large with respect to Average, Banking, and Trading (ABT) programs.

ABT programs, which are a fundamental aspect of many EPA fuel regulations, inherently provide more flexibility to companies owning multiple refineries than SBRs owing a single or few facilities.

The Small Business Refiners would like to thank EPA for adding the definition of a Small Volume Refinery. This additional definition will assist many members of our Ad Hoc group that would not have qualified for certain benefits such as delayed implementation status under the small refinery definition. This change will benefit small refiners and the communities that we supply with transportation fuels.

While SBRs are able to achieve compliance, we will be disproportionately disadvantaged compared to larger facilities due to the economy of scale, scope, technical staff availability, and funding capabilities. Among these challenges, economy of scale to spread the capital cost over the barrels of produced product will be the hardest to overcome.

We prefer that the Small Business Refiners and Small Volume Refineries be exempt from complying with Tier 3 fuels requirements. As stated above, DOE's estimate that SBRs only provide 11.9% of the gasoline supply. With this small contribution to overall emissions, we recommend that an exemption from the rule due to the high cost of implementation compared to the low impact of the required investment. EPA estimates that the 2030 sulfur reduction will be 17,267 tons per year; of which the estimated total contribution from fuels generated by SBRs will be 2,000 tons per year.

If an exemption cannot be granted, then we recommend that the ABT program be re-structured per our comments above to generate early credits in 2017 through 2020 and utilize early credits for compliance through 2023. Implementing these changes will provide appropriate relief to the SBRs as they implement their compliance projects.

The SBRs will be balancing cash flow, personnel availability, and contractor availability to complete implementation by 2020. Some SRBs may complete their projects in 2020 because this is the fastest that they are able to complete all of the project work; independent of their desire for early compliance and credit generation.

Commenter: Marathon Petroleum Company LP (MPC)

Finally, since MPC believes that the average refinery size has increased since the Tier 2 rulemaking, EPA should increase the small refinery exemption size threshold from 75 MBPD to 90 MBPD.

EPA should change the size limit for the small refinery exemption from 75,000 MBPD to 90,000 MBPD

EPA should increase the "average aggregate daily crude oil throughput" amount in the "small volume refinery" definition from 75,000 MBPD to 90,000 MBPD to reflect changes that have occurred in the industry in the past several years. According to EIA, in 2000 there were 151 refineries in the US with an average crude capacity of 111.2 MPBD. In contrast, the figures for

2012 were 128 refineries with an average crude capacity of 133.5 MBPD or an increase of 20%. In response to economic pressures, the US refining industry has shifted to a smaller pool of larger facilities. The concerns that the "small volume refinery" definition is intended to address still occur—ability to raise capital and access to engineering services—but to larger facilities. In recognition of that fact, EPA should increase the "small volume refinery" throughput amount accordingly.

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.

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.

Commenter: Natural Resources Defense Council (NRDC)

Further, small refiners and small volume refineries have a longer period to raise needed capital and make investments.

Commenter: Shell Oil Products for Shell and Motiva

EPA Should Not Exempt Small Refiners/Refineries   EPA proposes to exempt both small refiners and small refineries until 2020. Shell disagrees and urges EPA to not pick winners and losers in the market place and allow all refiners and refineries to compete on a level playing field.

In any event, if EPA does provide a small refinery/small refiner exemption, it should not be limited solely to refiners that process crude oil. As explained above regarding credit generation, EPA should treat the obligated parties fairly and extend this same treatment to gasoline blenders, which are classified as refiners under EPA's rules, even though they do not process crude oil.

Commenter: Private Citizen

The one issue I have is with the EPA giving a 3 year extension to refineries using less than 75,000 barrels per day of oil to comply with the change. Many refineries of that size are usually owned by large oil companies that have the financial resources to implement the changes immediately. Giving them a 3 year extension only extends the poor health due to poor air quality that many residents of the USA have to contend with.

Commenter: United Steelworkers Union (USW)

USW supports the inclusion of methods to allow smaller refineries to seek compliance relief, and proposals to provide credit to refiners already producing 10ppm, which will allow for market trading or banking of the credits to manage compliance until 2019. Methods to ease the transition and allow for capital investment planning will give refiners and their workers time to adequately prepare facilities for the upgrades.

Commenter: Weaver and Tidwell LLP

§80.1622(a) - Applications for small refiner or small volume refinery status must be submitted by March 31, 2014. Weaver recommends that this date be extended to June 30, 2014. Given the Agency's aggressive time line for approval of this section, EPA will most likely not issue the final regulations until November 2013. Any slippage of this date would put unnecessary burden on the registrants.

Commenter: Wyoming Refining Company (WRC)

These comments are prompted by the fact that WRC has not yet installed its Tier 2 compliance equipment, but, instead, has been demonstrating compliance with Tier 2 sulfur credits generated under the small refiner provisions of the Tier 2 rule. Under the proposed Tier 3 rule, WRC would be allowed to purchase and use Tier 2 credits through 2019 rather than construct either a Tier 2 or Tier 3 project now and, therefore, forfeit the intended small entity benefits of the proposed Tier 3 rule.

WRC, therefore, respectfully suggests that the final rule contain two additional provisions. First, any Tier 2 or early Tier 3 sulfur credit may be used by a small refiner or small volume refinery for compliance with Tier 2 requirements through 2019. Second, the life of any 2013 and earlier Tier 2 credits shall be extended through 2019 so long as they are owned by a small refinery or small volume refinery. These provisions will broaden the supply of credits available for small refiner and small volume refinery Tier 2 compliance through 2019. There may be concerns about small volume refineries owned by multi-refinery companies and the ability to shift credits from one facility to another. WRC, however, feels these concerns are not valid since, beginning in 2017, the only demand for Tier 2 credits will be from small refiners and small volume refineries. Tier 2 credits will have no further value for larger refineries and will necessarily be obtained only for small facility compliance.

Our Response:

<u>Small Refiner/Small Refinery Delay</u>

As discussed in Section XII.C of the preamble to the final rule, refiners who are classified as small businesses ("small refiners") as a category generally lack the resources that are available to larger companies to raise capital for investing in a new regulatory program, such as shifting of internal funds, securing of financing, or selling of assets. As noted by comments above, and based on information available from small refiners and others, we believe that the category of entities classified as small generally face unique circumstances with regard to compliance with environmental programs, compared to larger entities. As such, the final Tier 3 gasoline sulfur program includes provisions that will provide assistance for small businesses in meeting the 10 ppm average sulfur standard. This approach will allow the overall program to begin as early as possible; achieving the air quality benefits of the program as soon as possible, while helping to ensure that small businesses have adequate time to raise capital for new fuel desulfurization equipment or to make any other needed changes. We also believe that small business regulatory flexibilities can provide these entities with additional help and/or time to accumulate capital internally or to secure capital financing from lenders, and could spread out the availability of any needed engineering and construction resources in a manner that they are available by the time they are needed.

As discussed in Sections V and XII.C of the preamble to the final rule, we are also aware that there are some refineries that may experience higher compliance costs on a per-gallon basis than other refineries, and in some cases considerably higher. In many cases, these are refineries owned by a refiner/company that would not meet the Small Business Administration definition of a small business (as those entities classified as "small refiners" do). In many cases, these small refineries compete directly in markets also supplied by small business refineries. In an oversupplied gasoline market, these refineries may have difficulty justifying capital investments to comply with new standards. Overall, we believe that these refineries are disproportionally impacted when it comes to their cost of compliance and ability to rationalize the investment costs in today's gasoline market. These small refineries also find it more difficult to obtain vendor, contractor, and engineering firm support, as these firms find it more profitable to first focus on the larger refinery projects. Giving these refineries additional lead time will allow more time to invest in desulfurization technology, take advantage of advancements in technology, develop confidence in a Tier 3 credit market as a means of compliance, and avoid competition for capital, engineering, and construction resources with the larger refineries.

While the small business refiners as a category, and the small volume refineries as a category are expected to experience a greater challenge in complying with Tier 3 than larger refiners/refineries, within these categories are also refineries that are already complying with the Tier 3 sulfur standards or need take little action to comply with Tier 3. Consequently, providing a delay in compliance to these categories of refineries as a whole must be balanced against providing an unnecessary delay in compliance and/or a windfall in credit generation. To avoid windfall credits for those refineries that are already complying with the Tier 3 standard, we have also carefully constructed the program such that they generate credits relative to 30 ppm prior to 2017 like all other refineries and relative to 10 ppm beginning in 2017 just like all other refineries for use in complying with Tier 3. Furthermore, we do not believe that refineries that do not process crude oil (e.g., produce gasoline from blendstocks) experience the same challenge in complying with Tier 3, and thus do not warrant such relief. They have the ability to comply through low or even no capital cost changes relatively quickly and easily in comparison to the FCC naptha hydrotreating modifications required by many refineries that produce gasoline by processing crude oil.

We do not believe a complete exemption from the program is appropriate, as this could create situations where vehicles could receive fuel that is above a 10 ppm average sulfur standard. However, we do believe a short amount of additional lead time for these refiners and refineries will provide them needed assistance with compliance while still allowing the Tier 3 program to begin on January 1, 2017. Thus, the final Tier 3 program includes a delayed compliance schedule for small refiners and small volume refineries of January 1, 2020 for small refiners, which will allow these entities to postpone compliance with the Tier 3 program for up to three years. Small refiners and small volume refineries will have from January 1, 2017 through December 31, 2019 to continue production of gasoline with an average sulfur level of 30 ppm (per the Tier 2 gasoline sulfur program). This delayed compliance schedule is not intended as an opportunity for these refiners and refineries to increase their production of gasoline with sulfur levels greater than 10 ppm, but rather will help small refiners/small volume refineries with compliance with the Tier 3 program. Compliance with the 10 ppm annual average sulfur standard will begin on January 1, 2020, thus small refiners and small volume refineries may continue using Tier 2 gasoline sulfur credits through December 31, 2019 to meet their refinery average 30 ppm sulfur standard. Refiners must apply, and be approved, for small refiner or small volume refinery status. Applications are due on January 1, 2015.

Small Volume Refinery Definition

We disagree with comments that suggested we increase the size threshold for small volume refineries. As noted above, we are aware that some refineries that may experience higher compliance costs than other refineries and that these refineries are owned by a refiner/company that would not meet the definition of a small business. In recognition of this concern under the RFS program, Congress granted all refineries with a crude oil throughput of less than or equal to 75,000 barrels per calendar day (bpcd) additional time to comply. The Tier 3 final rule includes a small volume refinery net crude throughput of less than or equal to 75,000 bpcd, based on the highest crude throughput for the 2012 calendar year. In analyzing various crude throughput maximums between 75,000 and 90,000 bpcd, as suggested by a commenter, we do not believe it is appropriate or necessary to increase the threshold beyond what was previously set by Congress. The 75,000 bpcd limit set by Congress was to recognize those refineries that would have difficulty with compliance with a rulemaking (from both a cost and feasibility standpoint), raising this limit would go beyond Congress' intent.

Nor do we believe it is necessary or appropriate to extend this definition to include refineries that produce gasoline only from purchased blendstocks. The purpose of the relief is to allow lead time for capital investments for refineries that are producing gasoline from crude oil. Refineries using blendstocks can control their sulfur levels through their blendstock purchases. Furthermore, allowing this could open a significant compliance loophole that would be difficult if not impossible to enforce.

ABT for Small Refiners and Small Refineries

We are also finalizing provisions that would allow approved small refiners and small volume refineries to generate credits for overcompliance with the 30 ppm Tier 2 standard prior to January 1, 2020. Such credits generated by small refiners and small volume refineries can be traded/sold to non-small refiners for use by December 31, 2019, and the credit revenues could be used to help offset their Tier 3 investments. When the Tier 3 program begins on January 1, 2017, small refiners and small volume refineries may continue to generate credits for overcompliance with the 30 ppm sulfur standard (as they will still be subject to the Tier 2 standards through December 1, 2019), or they may generate credits for overcompliance with the Tier 3 10 ppm sulfur standard. Any credits generated for sulfur levels below 10 ppm will be eligible for compliance with either the Tier 2 or Tier 3 programs. Any credits generated for sulfur levels above 10 ppm (and below 30 ppm) will only be eligible for use in complying with the Tier 2 standards from 2017-2019. For example, in 2017, a small refiner with an annual gasoline sulfur average of 8 ppm could generate 20 ppm-volume Tier 2 credits (30 ppm-10 ppm) that could be used by other small refiners and small volume refineries, or banked by the refinery for future Tier 2 compliance. This small refiner would also generate 2 ppm-volume Tier 3 credits (10 ppm-8 ppm) that could be sold to refiners and importers subject to Tier 3, or banked by the refiner for future Tier 3 compliance. In response to comments, under the final program there is no longer any need for designation of credits for Tier 2 or Tier 3. The designation occurs automatically based on the sulfur level. Further, small refiners and small volume refineries will not be required to "opt-in" to the Tier 3 ABT program.

As discussed above, all credits generated prior to January 1, 2017 will be valid for use for five years or through December 31, 2019, whichever is earlier. There is a five year statute of limitations on recordkeeping, and credit life is tied to this limit. Allowing credits to be valid for longer than five years would violate this statute of limitations. While a previous EPA fuels program has allowed for a small business flexibility that would allow for credits to be sold to and used by small refiners only, in no case do these provisions allow for credit life beyond five years. Further, the January 1, 2020 compliance date for small refiners and small volume refineries is also the date on which no credits generated relative to 30 ppm may be used for compliance. The result is that all refiners and importers will be in compliance with the 10 ppm annual average sulfur standard, whether by producing gasoline with an average sulfur level of 10 ppm or using credits that were generated against a 10 ppm sulfur standard.

5.5.4 Other

What Commenters Said:

Commenter: Private Citizens

And finally, I was wondering – I guess the ABT speaks to that – will the refineries get credits of some sort for alternatives, or will there be some sort of a bonus or subsidy provided so that if an alternative, say, from an algae or greenfield comes along, it could be dropped in, and there could be an exchange of some sort.

Our Response:

With regard to the comment regarding credits or bonuses/subsidies for alternatives, this is not part of the Tier 3 ABT program. The flexibility afforded by the ABT program allows for the generation of credits relative to gasoline sulfur reduction, and these credits can then be used, or traded to another refiner, for compliance with the average gasoline sulfur standard. Allowing for credits for other alternatives would not necessarily meet the gasoline sulfur reduction goals of the Tier 3 program.

5.6. Compliance Provisions (Registration, Reporting, Recordkeeping, Exemptions)

5.6.1 Downstream Added Oxygenate

What Commenters Said:

Commenter: American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM)

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).

Commenter: Marathon Petroleum Company LP (MPC)

MPC does 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. This requirement would preclude a conventional gasoline producer adding downstream DFE from using the actual low sulfur level but an artificial (high) value. MPC recommends 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).

Commenter: Countrymark, Small Business Refiners (SBRs)

EPA states that oxygenates added downstream of the refinery may be included in the sulfur calculation. Where oxygenate added downstream from the refinery or import facility, an assumed 10.00 ppm sulfur content must be used.

We believe that this language should be modified to increase blending flexibility and encourage additional ethanol blending, up to a 10% limit. We recommend that parties blending gasoline and oxygenates without a Certificate of Analysis (COA) for oxygenates should assume that the sulfur content is 10.00 ppm. Any oxygenate that is blended with gasoline with a COA demonstrating that the sulfur content is less than 10.00 ppm may apply that sulfur-volume to the overall blend calculations.

This additional flexibility in blending will provide gasoline blending options and/or increase the possible sulfur credits that are available to meet compliance requirements. Credit generation should be permitted only for the obligated party as defined in the rule. This is important to the

CountryMark because we own and operate the refining and terminal assets. This flexibility provides a tangible relief and real options to u s as we own and operate facilities and are the obligated party.

Increasing our flexibility in blending low sulfur oxygenate blend components into our fuels enables us to deliver lower cost fuels to our communities. Including the oxygenate sulfur content in our final blend calculations will enable u s to reduce our operating costs in the refinery to offset some of the expected $250,000+ per year increase that we are anticipating as a result of this new rule.

Our Response:

In demonstrating compliance with the gasoline sulfur standards finalized under the Tier 3 program, gasoline refiners and importers may adjust the sulfur levels in the gasoline and blendstocks for oxygenate blending (BOBs) that they produce/import to account for the downstream addition of ethanol. We proposed that the sulfur content of denatured fuel ethanol (DFE) used for downstream blending would be assumed to be 10 ppm in making such demonstrations of compliance. We agree with the comments that refiners and importers should be allowed to use the actual sulfur content of DFE when a sulfur test result is available and when the refiner can demonstrate that the test result was derived from a representative sample of the DFE that was blended with the gasoline or BOB. We also agree that the sulfur content of in-use DFE will typically be lower than the Tier 3 program's 10 ppm sulfur cap for DFE. We assumed that DFE would have an average sulfur content of 5 ppm in conducting the refinery analysis to support the Tier 3 final rule. Therefore, the Tier 3 program requires that in determining their compliance with today's sulfur standards, refiners and importers must either use the actual sulfur content of the DFE established through testing of the DFE actually blended or assume a 5 ppm sulfur content for the DFE added downstream. To prevent potential bias, a refiner or importer must choose to use only one method during each annual compliance period.

5.6.2 Registration, Recordkeeping, and Reporting Requirements

5.6.2.1 Registration

What Commenters Said:

Commenter: Shell Oil Products for Shell and Motiva

There is an inconsistency between the preamble, 78 Fed. Reg. 29942, and the proposed regulations in 40 CFR 80.1650 pertaining to registration. In the proposed registration regulations in 40 CFR 80.1650 (a)(1), we recommend that the phrase "unless already registered under 80.76 or 80.103" be added so that new registrations are not required. Similarly, for 40 CFR 80.1650 (a)(3), we recommend that the phrase "unless already registered under 80.76" be added so that new registrations are not required. These changes would be consistent with the preamble on page 311 – "Most refiners, importers, and ethanol producers are currently registered with EPA under other

40 CFR part 80 fuels programs. We are proposing that those who are already registered would not have to register again.”.

Our Response:

Regarding the comments that suggested an inconsistency between the preamble and regulations for reporting, we agree with the comments and have changed the regulatory language accordingly.

5.6.2.2 Reporting

What Commenters Said:

Commenter: Countrymark; Small Business Refiners (SBRs)

Sections 80.1652 and 80.1653 establish reporting and recordkeeping requirements. We believe that the small refiner’s exemption should apply to this section. Small refiners and small volume refineries should begin reporting and recordkeeping when credit generation begins or by the compliance deadline of 2020, whichever is earlier. Requiring small refiners to meet this section of the rule prior to project implementation adds value for neither EPA nor small refiners.

Our Response:

Since the Tier 2 program essentially transitions into the Tier 3 program, all regulated entities under the Tier 3 program will continue to be subject to the reporting provisions and all other compliance requirements (e.g., recordkeeping) of the Tier 2 program until they begin participating in the Tier 3 program. As stated in the regulations at §80.1602, the requirements of the Tier 3 program (40 CFR part 80 subpart O) apply beginning January 1, 2017 except in the case of credit generation prior to 2017 and the small refiner/small volume refinery delay; the requirements of the Tier 2 program (40 CFR part 80 subpart H) continue to apply until that point.

5.6.2.3 Recordkeeping Requirements

What Commenters Said:

Commenter: Consumer Specialty Products Association (CSPA) & Automotive Specialty Products Alliance (ASPA)

The maximum treatment rate is currently stated on the product transfer document or the packaging for aftermarket additives. Further, it will not be overly burdensome for aftermarket additive manufacturers to maintain records of their additive production quality control activities, demonstrating that the sulfur content of additive production batches complies with the proposed sulfur requirement. Our members are committed to making five years of these reports available to EPA upon request.

Commenter: Countrymark

Sections 80.1652 and 80.1653 establish reporting and recordkeeping requirements. We believe that the small refiner's exemption should apply to this section. Small refiners and small volume refineries should begin reporting and recordkeeping when credit generation begins or by the compliance deadline of 2020, whichever is earlier. Requiring small refiners to meet this section of the rule prior to project implementation adds value for neither EPA nor small refiners.

Section 80.1653(g) requires all of the records collected to be made available to EPA upon request

We strongly oppose collecting and maintaining the names and titles of employees collecting samples and the names of employees performing laboratory analysis. We believe in protecting the privacy of our employees and enabling them to perform their job without fear that their personal information will be released directly to the public or indirectly to the press through a Freedom of Information request. In May and June 2013, several news outlets covered the release of farmers' personal information by EPA.

We appreciate EPA's desire for individual accountability at our facilities. If we cannot eliminate the need to collect employee names and positions, we request that EPA not take custody of this information upon data inspections. We request that this information remain at our facilities where we will maintain control of the personal information. Finally, if EPA does require possession of this data, we request that our employees information be protected under the Privacy Act and not be released to the public.

While examining recordkeeping requirements in section 80.1653, we notice that the recordkeeping requirements for denatured ethanol and other oxygenates and the recordkeeping requirements for fuel producers are significantly different. The recordkeeping requirements imposed on importers and parties that produce, import, sell, offer for sale, dispense, distribute, transport gasoline, refine crude oil into finished products are more than double those which oxygenate producers are required to produce.

We believe that the records requirements for both parties should be equivalent. We recommend that the recordkeeping burden be reduced as follows for Fuel Producers: eliminate name and title of person collecting sample and eliminate name of the tester. We further recommend that oxygenate producers collect the following information, as it is valuable information in maintaining fuel quality and tractability: Location, Time, Storage tank/truck identification, other testing results, test methodology used, oxygenate batch number, and ethanol production date.

The table below [of EPA-HQ-OAR-2011-0135-4781-A2] illustrates the differences between the two parties.

Commenter: Small Business Refiners (SBR)

Section 80.1652 and 80.1653 establishes reporting and recordkeeping requirements. We believe that the exemption for small refiners and small volume refineries should apply to this section. Small refiners and small volume refineries should begin reporting and recordkeeping when credit generation begins or by the compliance deadline of 2020, whichever is earlier. Requiring SBRs to meet this section of the rule prior to project implementation adds value for neither EPA nor SBRs.

Section 80.1653(g) requires all of the records collected to be made available to EPA upon request.

We strongly oppose collecting and maintaining the names and titles of employees collecting samples and the names of employees performing laboratory analysis. We believe in protecting the privacy of our employees and enabling them to perform their job without fear that their personal information will be released directly to the public or indirectly to the press through a Freedom of Information request. In May and June 2013, several news outlets covered the release of farmers' personal information by EPA.

We appreciate EPA's desire for individual accountability at our facilities. If we cannot eliminate the need to collect employee names and positions, we request that EPA not take custody of this information upon data inspections. We request that this information remain at our facilities where we will maintain control of the personal information. Finally, if EPA does require possession of this data, we request that our employees information be protected under the Privacy Act and not be released to the public.

While examining recordkeeping requirements in section 80.1653, we notice that the recordkeeping requirements for denatured ethanol and other oxygenates and the recordkeeping requirements for fuel producers are significantly different. The recordkeeping requirements imposed on importers and parties that produce, import, sell, offer for sale, dispense, distribute, transport gasoline, refine crude oil into finished products are more than double those which oxygenate producers are required to produce.

We believe that the records requirements for both parties should be equivalent. We recommend that the recordkeeping burden be reduced as follows for Fuel Producers: eliminate name and title of person collecting sample and eliminate name of the tester. We further recommend that oxygenate producers collect the following information as it is valuable information in maintaining fuel quality and tractability: Location, Time, Storage tank/truck identification, other testing results, test methodology used, oxygenate batch number, and ethanol production date.

The table [of EPA-HQ-OAR-2011-0135-4804-A2] below illustrates the differences between the two parties.

Our Response:

Regarding product transfer documents and recordkeeping for aftermarket additives, the Tier 3 program finalized the requirement that manufacturers of gasoline additives used downstream of the refinery at less than 1 volume percent must limit the sulfur contribution to the finished gasoline from the use of their additive to no more than 3 ppm when the additive is used at the maximum recommended treatment rate. The additive manufacturer will be required to maintain records of its additive production quality control activities which demonstrate that the sulfur content of additive production batches is such that when the additive is used at its maximum recommended treatment rate it will add no more than 3 ppm to sulfur content of the finished gasoline. The additive manufacturer will also be required to list the maximum recommended treatment rate on the product transfer document. Records will be required to be maintained for 5 years by additive manufacturers and made available to EPA upon request. We agree with the comments that these requirements will not impose a substantial burden on gasoline additive manufacturers.

As discussed above in Chapter 5.6.2.2, all regulated entities under the Tier 3 program will continue to be subject to the compliance provisions (such as reporting and recordkeeping) of the Tier 2 program until they begin participating in the Tier 3 program. As stated in the regulations at §80.1602, the requirements of the Tier 3 program (40 CFR part 80 subpart O) apply beginning January 1, 2017 except in the case of credit generation prior to 2017 and the small refiner/small volume refinery delay; the requirements of the Tier 2 program (40 CFR part 80 subpart H) continue to apply until that point.

Regarding the comments about concerns about employee privacy in recordkeeping, we do understand the commenters' concerns. However, in the case of an inspection or enforcement action, it is important for EPA's enforcement personnel to know who did the actual sampling and testing in the event that questions arise. We will work to ensure the privacy of individuals whose names appear in those records, and that they will not be released publicly.

We agree with the comments that enforcement and compliance assurance would be substantially improved by requiring oxygenate producers/importers and denaturant producers/importers to maintain records regarding the location, time, storage vessel identification, other test results, test methodology used, oxygenate batch number, and oxygenate production date. Hence, the Tier 3 FRM finalizes requirements to this effect.

5.6.2.4 Sampling and Testing Requirements

What Commenters Said:

Commenter: Flint Hills Resources, LP (FHR)

Individual Batch Reporting of Gasoline and Other Fuels Should Not Be Required

FHR believes that reporting of each batch of gasoline under §80.1652 has little value, and EPA should not consider individual batch reporting for DFE producers. FHR agrees that batch records should continue to be part of the recordkeeping requirements within §80.1653, but only aggregated reports be submitted to EPA. Similar to how the diesel sulfur program is currently structured, fuel producers should be required to keep batch records that demonstrate compliance with standards and support annual reporting. Individual batch records would be made readily available to EPA upon request or during inspections.

Our Response:

Chapter 5.3 of this Response to Comments document contains comments regarding the reporting requirements for oxygenate producers. As discussed in Chapter 5.3, we continue to believe that annual reports from oxygenate producers are an important enforcement and compliance assurance tool. Therefore, the Tier 3 FRM finalized the requirement that producers and importers of DFE and other oxygenates must submit annual reports to EPA that include the total volume of DFE/oxygenate produced and an attestation that all batches met fuel quality requirements.

It is also important for EPA's enforcement personnel to know who did the actual sampling and testing in the event that questions arise in the case of an inspection or enforcement action concerning gasoline, oxygenates, and certified ethanol denaturant. Therefore, the Tier 3 final rule requires that records be maintained by gasoline producers/importers, oxygenate producers/importers, and certified denaturant producers/importers regarding the name and title of the person who performs the required sampling and testing.

5.6.3 Sampling and Testing

What Commenters Said:

Commenter: Countrymark; Small Business Refiners (SBRs)

Sections 80.1630 and 80.1631 state that refiners and importers will collect, test, and retain samples from each batch of gasoline that is produced or imported; using the sample and testing methodology provided in the rule. We believe that the small refiner's exemption should apply to this section. Small refiners and small volume refineries should begin collecting, testing, and retaining samples when credit generation begins or by the compliance deadline of 2020, whichever is earlier. Requiring small refiners to meet this section of the rule prior to project implementation adds value for neither EPA nor small refiners and will produce data not reflecting an operator's post-implementation product.

Our Response:

As discussed in Chapter 5.6.2, above, Tier 2 compliance requirements for small refiners and small volume refineries, such as sampling and testing, will apply until participation in the Tier 3 program begins.

5.6.4 National Security Exemptions

What Commenters Said:

Commenter: Department of Defense Clean Air Act Services Steering Committee

Our enclosed comment supports EPA's proposed inclusion of a national security exemption for gasoline used in tactical equipment and other military vehicles and equipment covered by a National Security Exemption.

The Department of Defense (DoD) supports the inclusion by the Environmental Protection Agency (EPA) of a national security exemption (NSE) for gasoline used in tactical and other NSE-covered military equipment. NSEs are necessary for DoD until such time that low sulfur fuels are available worldwide.

Due to national security considerations, EPA's existing regulations provide either explicit NSEs to the military or allow the military or manufacturers to request and receive NSEs from emissions regulations for DoD motor vehicles, engines and equipment if the operational requirements for such vehicles, engines, or equipment warrant such an exemption.

In order to prevent adverse interaction with after-treatment devices required by EPA regulations in compliant engines, EPA also established fuel sulfur standards that apply to all fuels used in regulated vehicles and equipment. The availability of these low or ultra-low sulfur fuels in all locations and scenarios where DoD operates for national security purposes cannot be guaranteed. Therefore, EPA regulations for fuels also include NSE language, but only if the fuels are used in tactical military vehicles, engines, or equipment that are covered by a national security exemption.

EPA stated in the final 2007 Non-Road, Locomotive and Marine (NRLM) diesel fuel regulation (69 Fed. Reg. 38958, June 29, 2004), that providing an exemption for military diesel fuel used in tactical, non-road engines and equipment will not have any significant environmental impact. This conclusion was based on data provided by DoD for implementing a similar exemption provision in the highway diesel program. Also, EPA and DoD have developed, and effectively used for many years, a process to address and obtain NSE for the tactical vehicles, engines, and equipment covered by fuel exemptions on a case-by-case basis, when required. We believe, as EPA indicated in final NRLM diesel fuel regulation, that the NSE provides DoD with the needed flexibility to meet its goals of keeping vehicles, engines, and equipment ready for quick deployment overseas. We further believe that the exemptions are still needed by DoD to fulfill its mission on a worldwide basis, to respond adequately and quickly even if emerging economic or geopolitical situations will not allow the availability of either low or ultra-low sulfur fuels required for the proper operation of compliant engines.

Though gasoline use is not as common in military tactical vehicles and equipment as diesel, the same requirements for worldwide deployability exist. Currently, only Europe and a few isolated countries have regulations in place which meet the proposed 10 part per million (ppm) gasoline standard. Many parts of the world will not have the new 10 ppm sulfur gasoline available that will be required for Tier 3 gasoline engines, with a majority of countries producing 100-2,500 ppm sulfur gasoline. DoD expects that it may require NSE from the Tier 3 standards for some gasoline engines and equipment that are used overseas. At the same time, the fuel NSE proposed in this rule will cover any gasoline purchased overseas and remaining in the fuel tanks of the equipment when returned to the United States. In addition, DoD has previously and continues to procure fuel for long term storage in Maritime Prepositioning Ships. The fuel procured for this purpose may also return to the United States in equipment in which it was used. The sulfur content of the fuel currently in storage exceeds the proposed limits. Also, in DoD's role in support of disaster relief activities, often times higher sulfur fuel is procured to ensure a quick and efficient supply of fuel which meets the demand of these activities.

For example, DoD purchases modified commercial vehicles for our special operations forces which may not meet EPA Tier 3 emissions standards or may be designed to operate on gasoline that does not meet the Tier 3 standards. These vehicles are required so that our special operations forces have the capability to conduct missions where there is no military logistical presence and where vehicles must be maintained on the local economy.

In the case of our tactical vehicles, even if compliant fuels are available world-wide, there are cases where in-engine and after-treatment controls are incompatible with military operational requirements. For example, engine structural improvements allowing for higher pressure combustion, electronic engine and after-treatment controls, and the after-treatment systems themselves often do not meet military shock, vibration, electro-magnetic interference, reliability, and maintainability requirements necessary for operation in a combat environment.

Failure or performance degradation of an engine in combat can have unacceptable dire consequences such as personnel casualties or military mission failure. Therefore, DoD will continue to need access to NSE for both engines and fuels included in this rule and other mobile source regulations for the foreseeable future.

EPA should include the provision that exempts gasoline produced, imported, sold, offered for sale, supplied, offered for supply, stored, dispensed or transported for use in tactical military vehicles, engines, or equipment as proposed.

Our Response:

In both our diesel fuel and Tier 2 gasoline sulfur programs, we provided an exemption for fuel used in tactical military vehicles and nonroad engines and equipment with a national security exemption (NSE) from the vehicle and engine emissions standards. Due to national security considerations, some of our existing regulations allow the military to request and receive NSEs for vehicles, engines, and equipment from emissions regulations if the operational requirements for such vehicles, engines, or equipment warrant such an exemption. Fuel used in these applications is also exempt if it is used in tactical military vehicles, engines, or equipment that are not covered by an NSE but, for national security reasons (such as the need to be ready for immediate deployment overseas), need to be fueled on the same fuel as those with an NSE. This exemption is being continued in the Tier 3 gasoline program as well.

5.7. Other, including Alternatives

5.7.1. Butane Standard

What Commenters Said:

Commenter: Mid-Continental Energy (MCE)

EPA is proposing to reduce the sulfur content to 10ppm in butane blended into gasoline by terminal blenders. MCE supports this change with the request that butane blenders be allowed to use averaging on a monthly basis to meet the 10ppm. There are several streams of butane that have an average sulfur content of 15ppm to 20ppm. For example, a butane blender should be allowed to purchase some streams with 15ppm during the month if the average butane blended during the month calculates at 10ppm. This extra flexibility would be a benefit to potential butane blenders whose supply of butane with 10ppm sulfur could be limited.

Commenter: Independent Fuel Terminal Operators Association (IFTOA)

In the Preamble, EPA described the current butane blending rules and proposed to lower the sulfur standards that are now applicable to butane to a 10 ppm cap – consistent with the Tier 3 proposed standard for the annual average gasoline. Members of the Association are concerned that this reduced sulfur level would inhibit butane blending due to the reduced availability of butane with very low sulfur. The regulated community needs more flexibility because it is usually difficult and costly to find butane with a sulfur content of 10 ppm or below. Therefore, instead, EPA should consider focusing on the sulfur content of the final blend – not the butane component. Blenders downstream of the refiner/import gate should be permitted to add butane that meets the downstream per-gallon cap so long as the butane blending operation does not cause the blender's finished gasoline to have an annual average sulfur content above 10 ppm.

Recommendation: The Association recommends that EPA continue to provide flexibility to butane blending and consider a requirement that butane only need meet the downstream per-gallon sulfur cap so long as the butane blending operation does not cause the annual average sulfur content of the gasoline to exceed the proposed Tier 3 standard of 10 ppm. Moreover, the Association supports broadening the butane blending provisions to include pentane.

Provide greater flexibility for butane blending and expand butane blending provisions to include pentane.

Our Response:

As discussed in Section V.I. of the preamble to today's final rule, under the Tier 2 gasoline program, "purity" butane blended into gasoline downstream of the refinery is subject to a 30 ppm sulfur cap and other specifications regarding its composition.[15] This is consistent with the 30 ppm refinery average sulfur standard under the Tier 2 program. The Tier 3 FRM finalized

[15] 40 CFR 80.82.

the proposed 10 ppm sulfur cap for purity butane blended into gasoline effective January 1, 2017. This is consistent with the Tier 3 10 ppm refinery average sulfur specification.

Butane and has an inherently low sulfur content that can be made to meet a 10 ppm sulfur cap with relatively mild desulfurization techniques. We anticipate that butane suppliers will desulfurize these blendstocks to well below 10 ppm sulfur as part of their response to the Tier 3 gasoline sulfur requirements. There is no need to allow higher sulfur levels for butane blended voluntarily downstream that would result in higher gasoline sulfur levels. Furthermore, allowing butane used for RVP trimming to exceed a 10 ppm sulfur cap would needlessly complicate compliance assurance.

5.7.2. CNG/LPG In-Use Fuel Standards

What Commenters Said:

Commenter: Advanced Biofuels USA (ABFUSA)

Consideration of CNG and LPG Emissions Test Fuel: In the past sulfur content regulation of "natural gas" sources fuels was not seen as necessary for two reasons, 1) the low volume of use, and 2) the historically low sulfur content of US "conventional" natural gas sources. However, with "unconventional" (fracked) natural gas sources now providing over 60% of the US NG supply (US DOE/EIA 2012 data) sulfur content becomes an issue because of the higher content in the unconventional gas. Therefore, EPA should enact standards for sulfur content of NG and LNG transport fuels that are equal (in terms of pollutant/mile) of these proposed Tier 3 regulations.

Commenter: Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

...but emphasize that EPA should ensure that all market fuels, including LPG and CNG meet the same "total" sulfur standards as Tier 3 gasoline.

If market CNG or LPG do not meet the proposed Tier 3 emissions certification fuel standards, then there must be relief in the emissions standards to accommodate potential deterioration in vehicle emissions systems capability resulting from the use of higher sulfur fuels. The Coordinating Research Council Performance Committee is in the process of conducting a 10 U.S. city fuel survey on retail CNG. Two samples will be collected from each city and results are expected during the 4th quarter of 2013. CNG and LPG fuels are not subject to the same degree of regional refinery differences as conventional liquid fuels. However, there can be large differences in marketplace gaseous fuel quality as a result of: (1)the amount of processing they receive as a result of their source, i.e., well-head gas versus refinery gas; (2)the type of dehydration and filtering they receive just prior to or directly at retail dispensers.

U.S. CNG and LPG industries are at the front end of what appears to be the start of a long term growth trend, so it is an appropriate time to establish market and test fuel standards, including for sulfur.

Commenter: American Gas Association (AGA)

The American Gas Association appreciates that as natural gas increasingly moves into the mainstream as a motor vehicle fuel, the industry will need to work closely with the EPA to ensure a smooth transition. Natural gas is an emerging motor vehicle fuel that we believe offers tremendous societal benefits, including aiding in the transition to hydrogen fuel cell vehicles. If the agency elects to develop sulfur standards for CNG, we urge the agency to work with the natural gas industry to adopt a phased-in approach. Such an approach would allow the industry time to assess the current state of natural gas fuel quality with respect to sulfur, and to adopt any remediation practices that may prove to be required. Conversely, we fear an overly aggressive timeline toward regulation would stymie the adoption of an alternative fuel that offers the promise of significant benefits to our nation.

As noted by EPA in the proposed rule, there are currently no sulfur standards for the fuel used in compressed natural gas (CNG). EPA has requested comment on whether it is necessary for EPA to establish sulfur standards for CNG, and whether a 15 ppm sulfur cap similar to that established for highway Diesel fuel would be appropriate. EPA further requested comment on whether and how to address the sulfur contribution from odorants and other additives used in CNG.

The American Gas Association believes that, to the extent possible, standards for motor vehicle fuel should be fuel neutral. AGA appreciates the importance of regulating sulfur content in motor vehicle fuels, due to the potential damage that high levels of sulfur content in motor vehicle fuels can impose on the exhaust after-treatment systems on-board vehicles. Natural gas is an inherently cleaner burning fuel than gasoline or diesel, and dedicated natural gas vehicles do not require the same exhaust after-treatment systems required for gasoline and diesel vehicles to meet EPA standards for emissions of criteria pollutants. Natural gas sulfur content, when used for dedicated-use NGVs, is unlikely to be a significant issue.

However, the American Gas Association believes that dual-fuel vehicles – capable of running on either gasoline or CNG, or potentially diesel and CNG – will be an important market component as natural gas vehicles gain acceptance as a mainstream motor fuel. AGA recognizes that the sulfur content of natural gas could impact the efficacy of exhaust after-treatment systems designed to alternate between CNG and petroleum-based fuels. In other words, the sulfur content of CNG, when used for dual-fuel vehicles, could have negative impacts on the emissions of these vehicles while operating in a conventional fuel mode.

NGVs provide a number of social benefits, including reductions in some cases in emissions of nitrogen oxides and particulate matter, as compared to gasoline or diesel vehicles. The greater use of natural gas as a transportation fuel also offers additional societal benefits, including strengthening our national energy security, and improving our balance of trade, by displacing imports of foreign petroleum and insulating our economy from the comparative volatility of oil prices vis-a-vis natural gas prices. Projections by the Energy Information Administration (EIA) consistently indicate that domestic natural gas prices are likely to remain low and stable, while petroleum prices are likely to climb and exhibit greater volatility in the coming years and decades.

In the light-duty greenhouse gas/fuel economy standards finalized by EPA and NHTSA in August 2012, the agencies acknowledged the importance of encouraging NGV adoption into the marketplace because of the key role NGVs will play as a technology bridge to hydrogen-powered fuel cell electric vehicles (FCEVs).

The connection between NGVs and FCEVs is two-fold. First, technological developments related to on-board storage and fueling delivery, of compressed gases are likely to translate to some degree between both applications. Secondly, establishing a backbone of NGV infrastructure across the nation could lessen barriers to entry for FCEVs, since on-site reforming of hydrogen could provide fuel for FCEVs at stations initially established to serve an NGV market.

Natural gas is an emerging market competitor to gasoline and diesel fuel. Automobile manufacturers and the petroleum industry have spent decades studying and adjusting the composition of petroleum-based fuels, balancing engine and exhaust system requirements with refining specifications.

To date, end uses of natural gas have not had the same level of sensitivity to sulfur that is evident in vehicle applications. Because of this, little data is readily available concerning the sulfur content of CNG at the point of use. The American Gas Association is cognizant of the implications of sulfur content in CNG, and is currently working with the Coordinating Research Council (CRC) to support a national survey of natural gas fuel quality from the perspective of a motor fuel. This work was initiated in the fall of 2012, and is expected to yield results in the fall of 2013. Sulfur is among a number of the constituent components of CNG that is being tested as part of this work.

We would welcome the opportunity to share the results of this initial survey of CNG fuel quality at the point of use for motor fuel - the CNG fueling station - when the results become available. While a valuable first step in obtaining real-world data, we anticipate that additional work will likely be needed beyond the current CRC effort to provide a more complete national picture of CNG and sulfur content. AGA believes that a joint effort with EPA on data collection could be a valuable extension of this effort.

While data on sulfur content of CNG at the point of use is lacking, some information on sulfur content in the natural gas distribution and transmission system is available. Operators of interstate pipelines impose limitations on sulfur content for natural gas injected into their systems, as part of their commitment to ensuring pipeline quality. In the presence of moisture, sulfur can form highly acidic compounds that corrode the interior of the pipe. Termed “tariff restrictions,” these industry standards for sulfur content vary nationally from 0.5 grains per 100 standard cubic feet (grains/SCF) to approximately 20 grains/SCF. These standards correspond to levels between 8 ppm and about 300 ppm sulfur content.

It is extremely important to note that the 300 ppm standard is a maximum intended for unusual cases when natural gas producers do not have access to processing prior to injection into the pipeline. In real-world practice, natural gas with these higher levels of sulfur content are heavily diluted by the lower sulfur content gas that is in the norm in interstate pipelines.

Since the EPA request for comment was published, AGA has made initial inquiries to its members seeking data on sulfur content in their systems obtained at the city gate. As noted previously, traditional end-uses of natural gas in the residential and commercial sectors have not exhibited high sensitive to sulfur content, and so further data is not readily available. The AGA effort with the CRC is aimed at reducing uncertainty about CNG sulfur content by acquiring actual data at the consumer's point of use.

Additionally, it is critical to note that AGA member companies, as natural gas local distribution companies (LDCs), place the highest priority on the safety of their customers. For this reason, a sulfur-based odorant called mercaptin is introduced into the natural gas system by LDCs when they take possession of the natural gas at the city gate. This odorant is a critical safety measure that allows consumers to detect the presence of any natural gas leakage. The amount of sulfur introduced into the natural gas by mercaptin is approximately 5 ppm. We ask that, in considering any future sulfur standard for natural gas used as a motor fuel, that EPA weigh the importance of mercaptin as a safety measure.

Commenter: Countrymark; Small Business Refiners (SBR)

We do not believe that sulfur standards need to be established for CNG or LNG. According to DOE statistics, natural gas is less than 5 ppm of all sulfur compounds. This is sulfur associated with natural gas production and an odorant that is required for leak detection. Additional standards would be unnecessary testing and documentation required by parties involved in the CNG and LNG business. This unnecessary cost of compliance will be passed on to end users, increasing energy costs with no benefits attained.

Adding a sulfur standard for CNG and LNG increases the switching cost for consumers and may decrease corporation's willingness to participate in the market. Additional testing and documentation without tangible benefits to suppliers, customers, or environmental benefits without positive results does not deliver value for any party involved in the process.

Commenter: Private Citizen

We must be careful not to encourage CNG vehicles because the process used to extract natural gas in deep shale causes climate instability through methane releases, contaminates water, air, and food sources, and destroys communities.

Commenter: Private Citizen

Please do not make the mistake of supporting a switch from oil to fracked gas. The extraction process for fracked gas pollutes air, water, and cropland, destroys wildlife habitat, depletes water supplies, and buries millions of gallons of chemically compromised water thousand of feet underground where it can migrate and foul streams, lakes and rivers.

As if this weren't enough, thousands of trees are clearcut to make roads for the trucks that transport fracked waste water,, wildlife is impacted, communities are disrupted and the health of millions is in jeopardy.

Support renewables. A nation cannot support itself without its natural resources upon which everything depends.

Commenter: Manufacturers of Emission Controls Association (MECA)

MECA also supports defining fuel sulfur average limits or caps on any alternative transportation fuels (e.g., blends of alcohols with gasoline, natural gas) that are consistent with the proposed 10 ppm national average for gasoline or the existing 15 ppm national sulfur cap on diesel fuel.

Commenter: National Propane Gas Association (NPGA)

With respect to fuel specifications, EPA is proposing to reduce the maximum sulfur content in gasoline from the current 30 parts per million (ppm) to 10 ppm on an annual average basis beginning January 1, 2017. EPA is also proposing a sulfur maximum on a per-gallon basis with caps set at 80 ppm at the refinery gate and 95 ppm at any downstream locations. The Agency is also seeking input on changes to emissions test fuel specifications.

Although EPA's Tier 3 proposal is described as being fuel-neutral, there are elements of the proposed rule that could impact propane autogas, and as such, NPGA submits the following comments on the Tier 3 proposal.

As previously stated, EPA is seeking to lower the maximum sulfur content for gasoline, on an annual average basis, from the current 30 ppm to 10 ppm. In doing so, EPA states that this will "enable vehicles designed to the proposed Tier 3 tailpipe exhaust standards to meet these standards in-use for the duration of their useful life and facilitate immediate emission reductions from all the vehicles on the road at the time the sulfur controls are implemented."

The proposed changes to fuel specifications specifically apply to gasoline. However, EPA also requests input on whether it is necessary to establish sulfur standards for alternative fuels such as liquefied petroleum gas (LPG), i.e. propane autogas, and compressed natural gas (CNG) given that no such standards exist for these vehicles. In addition, EPA asks whether a 15 ppm sulfur cap similar to that established for highway diesel fuel would be appropriate. EPA also solicits input on the contribution of sulfur from odorants used in LPG.

With respect to sulfur standards for alternative fuels, NPGA understands that EPA is simply seeking input on this subject and not actually specifying a proposed sulfur maximum at this time. We further recognize that a specific proposal to this effect would have to be addressed under a separate rulemaking activity to allow for proper review by the public, which it cannot perform within the context of this NPRM since there is no maximum number proposed upon which to evaluate.

Nevertheless, the establishment of a sulfur maximum for LPG, i.e. propane autogas, presents a unique challenge that does not exist for gasoline or diesel fuel. Unlike gasoline or diesel fuel, propane autogas is odorless. Therefore, for safety reasons, federal hazardous materials regulations require that it be odorized to a level that indicates the presence of gas down to a concentration in air of not over 1/5 the lower flammability limit of LPG.

Further to this, NFPA 58, LP-Gas Code, requires that the fuel be odorized prior to delivery to a bulk plant (4), where the fuel is stored for subsequent distribution for vehicle fuel purposes or for other applications such as space or water heating. To meet these odorization requirements, it has been a long-standing industry practice to inject an odorant named ethyl mercaptan to the fuel.

Ethyl mercaptan is a sulfur-based odorant and is, without question, the most commonly used and available odorant in the United States. It is injected at a recommended rate of 1 pound per 10,000 gallons of LPG. For conservatism, it is not uncommon to see a slightly higher injection rate at 1.5 pounds per 10,000 gallons. This equates to approximately 15-20 ppm of sulfur that would be present in the fuel after it leaves the refinery or gas processing plant and prior to arrival at a retail marketer’s bulk plant.

NPGA does not believe that EPA should place maximum sulfur content requirements on propane autogas at this point in time for several reasons. First, consider that the establishment of sulfur maximums for gasoline and diesel require actions on the part of refiners or gas processors that would remove sulfur from the fuel. Likewise, with propane autogas, similar actions would be required for the removal of sulfur that may exist in the form of constituents such as carbonyl sulfide or hydrogen sulfide.

However, where things differ between the fuels is the required addition of a substance that contains sulfur as a constituent, namely ethyl mercaptan, which is an important and necessary safety measure. In doing so, this adds a layer of complexity to the issue of sulfur removal that would need to be fully vetted outside the construct of this proposed rulemaking to ascertain, if possible, where the proper balance exists between appropriate levels of sulfur removal and the need to maintain safety for a fuel that is used in applications beyond just vehicles.

Second, EPA would have to account for a variety of economic impacts including, among other things, the cost to produce low-sulfur propane autogas. In addition, EPA would need to take into account the cost impact on new or potentially separate fuel storage needs and capabilities for retail marketers of propane autogas to avoid intermixing the low-sulfur fuel with the fuel for non-vehicle applications.

Lastly, EPA solicits input on whether a 15 ppm sulfur cap similar to that established for highway diesel fuel would be appropriate. NPGA does not believe it would be appropriate to follow a similar approach to diesel. The current 15 ppm diesel requirement applies to all downstream locations, including distributors and retailers, which could be very problematic for retail autogas marketers.

In addition to all of the aforementioned factors that EPA must take into account when considering this subject, NPGA has a practical concern related to the establishment of sulfur maximums. In particular, by establishing a cap for gasoline, it begs the question as to what should be an appropriate maximum level for alternative fuels such as propane autogas and CNG, and it suggests there could be unintended consequences without a sulfur maximum. However, it would be impossible to realistically answer these questions given the extreme time constraints for responding to this complex NPRM imposed by EPA as it would require broad, collaborative input from all interested stakeholders such as fuel suppliers, fuel providers and those who develop the fuel specifications to determine the answers.

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4 - National Fire Protection Association (NFPA) 58, LP-Gas Code, 2011 Edition, Section 4.

Commenter: New York State Department of Environmental Conservation

Gaseous fueled vehicles need to be held to the same standards as liquid fuels.

EPA has requested comment regarding the sulfur content of natural gas and propane when used to fuel light duty vehicles. This issue is complicated by the fact that sulfur containing chemicals (mercaptans) are added to these gases to facilitate leak detection.

We believe that the competing demands of maintaining catalyst efficiency and ensuring adequate odorant levels can be met. We do not support relaxing the Tier 3 emission standards for gaseous fueled vehicles as an accommodation to mercaptan sulfur levels in these fuels.

Commenter: NGVAmerica

The Tier 3 rulemaking proposes to establish new, lower limits on the sulfur levels in gasoline and diesel fuel. The expected advantages of lower sulfur are the ability to provide not only lower emissions in new vehicles but also continued lower emissions over the life of such vehicles. The rulemaking also requests comment on whether EPA should impose similar sulfur requirements on natural gas when used as a motor vehicle fuel.

The proposal requests comment on whether natural gas should have to meet an in-use standard as well as a test fuel standard. EPA regulations currently include test fuel standards for natural gas but do not include any controls on sulfur levels.

EPA's notice specifically asks whether it should impose a 15 ppm sulfur limit for natural gas.

While we can understand the desire to impose similar performance standards on all motor vehicle fuels, we believe that it is not appropriate to impose any limits on natural gas for the following reasons:

1. The rulemaking record does not demonstrate that current natural gas sulfur levels need to be controlled in order for NGVs to meet the proposed emission standards;
2. The rulemaking record has not identified how sulfur levels would be controlled while maintaining appropriate odorant levels;

3. The rulemaking record has not identified who – producers, pipelines, gas utilities, fueling station operators – would be responsible for controlling sulfur limits in natural gas; and
4. The rulemaking record has not identified appropriate technologies for lowering sulfur in natural gas or the cost of these technologies and, therefore, no cost-benefit analysis has been conducted.

Based on the foregoing and as explained here, it would be premature to establish test-fuel specifications or in-use specifications for natural gas sulfur levels.

In preparing these comments, NGVAmerica consulted with industry experts in order to determine whether the industry currently has data on current sulfur levels. The most comprehensive assessment of natural gas fuel quality of which we are aware was conducted in 1992 by the Gas Research Institute (now Gas Technology Institute) (1). According to GTI officials, total sulfur was typically in the range of 0.34-0.39 grains/100 scf or about 9 - 13 ppm, mass basis. Maximum levels of 0.6-0.7 grains (18 - 22 ppm) were noted, but this was relatively rare. Transmission pipeline (non-odorized) gas was typically around 0.12 grains/100 scf (about 4 ppm). Based on these figures it appears that the levels contemplated by EPA would not present a problem for natural gas providers. Conversations with a major natural gas producer and also with one of the nation's largest natural gas utilities indicates that the natural gas they produce and deliver to customers also would be in line with the levels proposed by EPA.

We believe that these factors suggest that, rather than supporting the setting of a new national standard for natural gas, there likely is no need for such a standard. Moreover, we are extremely hesitant to support a 15 ppm level because the GRI data is now more than 20 years old, and we do not have enough comprehensive, recent data to support a 15 ppm level. Further, it would be unwise to support such a level without having an understanding of how sulfur would be controlled if, in fact, it needs to be controlled, and by whom would it be controlled.

Unlike the regulatory record compiled with respect to the petroleum industry and sulfur controls, there has not been an engagement with the natural gas industry – producers, pipelines, fuel providers, equipment suppliers, etc. – with respect to the technology that would be used to control sulfur levels. And unlike the example of the petroleum industry, it is not at all certain that the best means or the most efficient means of controlling sulfur limits in natural gas would be to control levels upstream as is the case with petroleum where sulfur is controlled at the refinery. Given that most natural gas is currently consumed for non-transportation purposes (electric generation, heating, industrial processes), it seems unlikely that EPA would or could legally impose upstream sulfur controls on the natural gas industry without a strong showing that such levels are necessary for other regulatory purposes. Therefore, it would appear that, if controls are necessary, they would be imposed at the fueling station. This presents more questions about what technologies would be used and how this would impact odorant levels since the odorant itself contains sulfur. The odorant (mercaptan) is added as a safety feature so that leaks of natural gas will be recognized. If the sulfur is pulled out presumably some odorant will have to be put back in at added costs and difficulty at the fueling station. All of these issues must be fully explored before a national standard can be set.

The questions raised by this rulemaking and any proposed sulfur limits on natural gas must be fully explored and considered before moving forward. Therefore, we would urge the EPA to forgo establishing new controls on natural gas sulfur levels. EPA should instead work with the natural gas industry to assess whether there is a need for a national sulfur standard, i.e. whether sulfur levels in natural gas present an emission issue for certifying new natural gas vehicles. These discussions should also begin to assess what types of technologies are available to control sulfur levels if in fact sulfur levels need to be controlled.

1 - Gas Research Institute, American Gas Association Laboratories, GF Steinmetz, Institute for Gas Technology, Variability of Natural Gas Composition in Select Major Metropolitan Areas of the United States 1990 – 1992 (March 1992).

Commenter: Pennsylvania Department of Environmental Protection (DEP)

The EPA should decide whether to require the same sulfur content in natural gas in order to attain the same emissions standards in natural gas-powered vehicles as those proposed for gasoline-powered vehicles.

As specified in the Preamble for the proposed Tier 3 rule, there are currently no sulfur specifications for the test fuel used for certifying natural gas vehicles nor for the test fuel used for certifying liquefied petroleum gas (LPG) vehicles (78 FR 29,914). In addition to seeking comments on the appropriateness of amending 40•CFR section 86.113 to reference 40 CFR Part 1065 for both natural gas and LPG test fuels, EPA also requested comments on amending the specifications to better reflect in-use fuel characteristics. Additionally, EPA requested comment on the appropriateness of aligning the sulfur specifications with those that apply for gasoline test fuel.
Sulfur levels in natural gas are typically lower than sulfur levels in gasoline by two orders of magnitude. Sulfur levels in gasoline average 0.034 percent currently and will be reduced to 0.012 percent. Sulfur levels in natural gas average 0.0005 percent sulfur from the wellhead. Natural gas providers add odorants to the natural gas, however, that can have high levels of sulfur. Natural gas-powered vehicles will have the same control equipment installed as is installed on gasoline-powered vehicles. EPA should determine if it is appropriate to establish a standard for sulfur in natural gas that will be used in natural gas-powered vehicles, including sulfur in the odorants that would meet the same vehicle standards that Tier 3 gasoline-powered vehicles would be required to meet under EPA's proposed rule.

Commenter: Robert Bosch GmbH, Gasoline Systems, Germany

The best approach would be a standardization on a basis of the actual CEN standardization for CNG fuel in Europe.

Commenter: Private Citizen

The solution to the pollution problem is right under your noses! Natural gas! All internal combustion and turbine engines run quite well on it. It's clean, non-polluting, and cheap! Why won't you acknowledge it? Has big oil tied your hands? With the finding of huge pockets of it popping up everyday, one would think of it was a God send. What's holding up start? City and state, and federal government would use it and benefit hugely. Saving monies, cleaning the atmosphere, etc.. Don't send it overseas to benefit countries that are not our friends. Benefit us! Equipment using it lasts longer, goes longer between oil changes, requires less tune ups, burns cleaner. It doesn't require a rocket scientist to figure this out. Jump on the band wagon, do something right for a change. Now, everything has been built to run on up to 10% ethanol. I hear whispers about you people wanting to raise that limit to 15% ethanol. Won't work! As of today, some small engine manufacturers are telling their users to use mid-grade gasoline to correct starting, running, and performance problems. Think of the impact on people if they have to purchase new equipment to do lawn work. What of the people who are forced to purchase new cars?

Commenter: VNG.CO

VNG.CO (VNG) submits these Comments in the above-referenced docket. Based in Pennsylvania, VNG is developing a nationwide, retail compressed natural gas (CNG) fueling network specifically for light duty vehicles. VNG will be collocating its CNG fueling facilities at existing gasoline stations in order to provide a convenient and familiar fueling experience. While initially serving corporate fleets, VNG's fueling facilities will also support mass market adoption of natural gas vehicles (NGVs) and can be adapted to dispense advanced gaseous fuels like renewable natural gas (RNG) and hydrogen. VNG offers its recommendations below because the EPA's consideration of motor vehicle emissions and fuel standards may impact the development of the NGV market in ways the EPA may not have considered.

It is widely recognized that the shale gas revolution has transformed the U.S. energy landscape with its promise of abundant, low-cost natural gas supplies for decades to come. This has led to a growing interest in natural gas vehicles (NGVs), which offer major environmental, economic, and security benefits compared to petroleum-based gasoline and diesel fuels. While the NGV industry has historically focused on the heavy-duty segment, this sea change in US energy production has also led to increasing attention on the potential of light-duty NGVs by automakers, compressed natural gas (CNG) refueling service providers like VNG, and policymakers – particularly at the federal level:

- President Obama has repeatedly hailed the importance of both light-duty and heavy-duty natural gas vehicles, including in his 2012 Blueprint for an America Built to Last1 and his 2013 Blueprint for a Clean and Secure Energy Future. (2)
- The National Petroleum Council of the U.S. Department of Energy and the National Academy of Sciences have both recently released comprehensive studies of alternative fuels which have found NGVs to have the greatest potential for mass-market adoption and reductions of oil use of any light-duty vehicle technology over of the next two decades. (3,4)
- EPA acknowledged the potential of light-duty NGVs to accelerate the commercialization of zero-emission hydrogen fuel cell electric vehicles (FCEVs) in the 2017-2025 light-duty GHG rules, awarding these vehicles special multiplier incentives to stimulate their development. (5)

However, despite this growing recognition of the potential of light-duty NGVs to reduce air pollution, reduce petroleum imports and reduce consumers' fuel costs, the market for these vehicles is still at a nascent stage. While refueling service providers such as VNG are making progress in expanding natural gas fuel availability, there are still just over 1,200 CNG fueling stations nationwide – fully half of which are not accessible to the public6 – compared to about 100,000 gasoline stations.7 Light duty NGV product offerings are limited to the Honda Civic Natural Gas, dual-fuel NGV pickups from GM and Chrysler, and a variety of offerings from conversion companies (notably Westport, IMPCO, and others) – all of which are currently being produced and sold in the U.S. at very low volumes and high incremental costs compared to similar models powered by gasoline or diesel fuel.

Given the tenuous stage of the development of this market, it is critical that new regulations such as the Tier 3 regulations do not place unnecessary burdens on the industry. Rather, wherever possible the Tier 3 regulations should encourage the development of the market for light duty NGVs. This can be assured in two ways:

- Avoiding the implementation of sulfur content regulations for CNG. There is no evidence that such rules are needed, and the implementation of such regulations for natural gas transportation fuel raises unique issues compared to regulations applicable to gasoline.
- By avoiding unnecessary regulatory burdens on CNG fuel as well as reducing existing and future inequalities in the vehicle certification process, EPA could play an important role in accelerating the development of the NGV industry by reducing incremental costs to consumers, with no reduction in the overall efficacy of the Tier 3 program. Achieving this would be consistent with EPA's mandates under the Clean Air Act as well as Executive Order 13563: Improving Regulation and Regulatory Review – which, among other things, calls for regulations that "promote economic growth, innovation, competitiveness, and job creation," through use of "the least burdensome tools for achieving regulatory ends" as well as "flexible approaches." (8)

In the Notice of Proposed Rulemaking (NPRM), EPA requests comment on whether it is necessary to "establish sulfur standards for CNG and LPG fuels, and whether a 15 ppm sulfur cap similar to that established for highway diesel fuel would be appropriate," potentially on the grounds of EPA's intent to make the regulations "fuel neutral."[9] However, because of the inherent differences between natural gas and gasoline, it would be inappropriate for EPA to regulate the sulfur content in CNG.

There is no evidence that the sulfur content of CNG fuel is sufficient to impact the catalyst efficiency of NGVs;

. There is no data on the average sulfur content of natural gas, and gas composition will in any case vary significantly between different regions;

. There is no evidence or information about the means or costs for regulating the sulfur content of natural gas motor vehicle fuel; and

. Unlike gasoline, which is only used as vehicle fuel, the natural gas compressed for CNG is used for a wide range of purposes (power plants, home heating, etc.) which do not and will not have sulfur regulated.

Thus, imposing sulfur regulations on CNG vehicle fuel has not been shown to be necessary, would have uncertain costs, and risks discouraging the use of natural gas as a vehicle fuel. If sulfur regulations were imposed on upstream natural gas producers or utilities, these entities (and their many customers) would object to the additional cost of processing 100 percent of their natural gas supplies to comply with a regulations that would currently apply to the less than 0.2%

of total US gas demand used for transportation.[10] Alternately, if the burden of compliance were to fall on downstream CNG retailers, it would impose unknown additional costs at every CNG dispensing site that would have to be recovered from relatively low volumes of fuel, making it even more difficult for natural gas to replace petroleum-based motor vehicle fuels, contrary to EPA's goals.

Regardless, much more data on the levels of sulfur currently present in natural gas, the impacts of this sulfur on NGV emissions, and the means and costs for reducing this sulfur content should be obtained before any potentially costly decisions to regulate the sulfur content of natural gas motor vehicle fuel are made.

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1 Slack, Megan. "Everything You Need to Know: President Obama's Blueprint for American-Made Energy." White House Blog. 26 Jan 2012. http://www.whitehouse.gov/blog/2012/01/26/everything-you-need-know-president-obamas-blueprint-american-made-energy?twp=twt
2 White House. "FACT SHEET: President Obama's Blueprint for a Clean and Secure Energy Future." 5 Mar 2013. http://www.whitehouse.gov/the-press-office/2013/03/15/fact-sheet-president-obama-s-blueprint-clean-and-secure-energy-future
3 National Petroleum Council. "Future Transportation Fuels: Natural Gas Analysis." 28 May 2013. http://www.npc.org/FTF-report-080112/Chapter14-NaturalGas-052813.pdf
4 National Academy of Sciences. "Transitions to Alternative Vehicles and Fuels." March 2013. http://www.nap.edu/catalog.php?record
5 Environmental Protection Agency. "2017 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions and Corporate Average Fuel Economy Standards; Final Rule." Federal Register, 15 Oct 2012, p. 62815.http://www.gpo.gov/fdsys/pkg/FR-2012-10-15/pdf/2012-21972.pdf
6 Alternative Fuels Data Center. "Alternative Fueling Station Locator." Department of Energy, Energy Efficiency and Renewable Energy Program. Accessed 28 June 2013. http://www.afdc.energy.gov/locator/stations/
7 U.S. Census Bureau. "Economic Census, Industry Snapshot: Gasoline Stations with Convenience Stores." 2007. http://www.census.gov/econ/census/pdf/44711.pdf
8 The White House. "Executive Order 13563 – Improving Regulation and Regulatory Review." 18 Jan 2011. http://www.whitehouse.gov/the-press-office/2011/01/18/improving-regulation-and-regulatory-review-executive-order
9 Environmental Protection Agency. "Control of Air Pollution From Motor Vehicles: Tier 3 Motor Vehicle Emission and Fuel Standards; Proposed Rule." Federal Register, 21 May 2013, p. 29826.
10 Energy Information Administration. "Annual Energy Outlook 2013." http://www.eia.gov/forecasts/aeo/

Our Response:

As discussed in Section V.J. of the preamble to the final rule, EPA is deferring finalizing in-use sulfur requirements for CNG/LPG in this final rule to provide additional time to work with stakeholders to collect data on current CNG/LPG sulfur content, to determine whether additional control of in-use CNG/LPG sulfur content is needed, and to evaluate the feasibility and costs associated with potential additional sulfur controls. Given that the information in the public comments suggests already low sulfur levels in CNG/LPG, the Tier 3 program vehicle emissions standards will apply to CNG/LPG vehicles in addition to vehicles fueled on gasoline, diesel fuel, or any other fuel.

For those comments that suggested that EPA should either promote the use of natural gas or constrain its use due to concerns over fracking, such comments are beyond the scope of the Tier 3 rulemaking. We sought comment only on the sulfur standards for CNG and LPG if they are used in motor vehicles.

5.7.3. Other

What Commenters Said:

Commenter: Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

Market fuel gasoline RVP for the summer season should be capped at 9 psi RVP, including within that the statutory one pound waiver for E10.

Our Response:

The regulation of gasoline RVP is beyond the scope of the Tier 3 final rule.

What Commenters Said:

Commenter: American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM)

Combined with other regulations, such as the RFS2, this rule would impact domestic fuel supplies, result in increased consumer costs, and affect energy security.

Our Response:

Given the estimated costs and impacts of the Tier 3 program, as discussed in both the preamble to the final rule and in the RIA, we do not expect this rule to negatively effect U.S. energy security – or the supply or distribution of gasoline or other fuels.

What Commenters Said:

Commenter: Private Citizen

As an intermediate transition from the continued dependence on poisonous polluting carbon-based fuels, I support the new Vehicle and Gasoline Standards. However, I also support rapid replacement of such fuels by one that is totally clean (no pollution) and requires no new technological development: hydrogen, derived from water by electrolysis, will make us totally energy-independent. Air, land, and oceanic vehicles can burn liquid hydrogen. The mass-produced cost of transforming existing motor vehicles' engines to run on hydrogen instead of gasoline will be one-tenth the cost of replacing them all with electric vehicles, and no mining or drilling is required as is the case with needed battery-replacement raw materials. The electricity needed to produce hydrogen needs to come from natural solar, wind, and tidal-current sources. A solar-hydrogen economy will result in 99% less pollution! Study descriptions by International Society of Hydrogen Engineers scientist Harry Braun at http://PhoenixProjectFoundation.US ... also consider the arguments for Lunar Solar Power (eight times more efficient, without occupying any human habitat areas, and allowing direct energy transfer to all urban centers on Earth), by scientist David Criswell – a noble plan using proved technology to bring cheap electricity to every person on Earth... http://lunarsolarpowersystem.blogspot.com (developing now, a new website, http://lunarsolarpower.org will promote LSP).

Our Response:

The Tier 3 program vehicle emissions standards are fuel neutral (i.e., they apply regardless of the type of fuel that vehicle uses, including hydrogen). The promotion of alternative energy sources (including solar energy) is beyond the scope of the Tier 3 final rule.

What Commenters Said:

Commenter: Private Citizen

Let's transform our cars so they can run on alcohol fuel. Please make it legal for retailers to buy wholesale from local alcohol fuel plants E-100 Ethanol. Make it legal for local communities to operate local alcohol fuel plants in zones recognized as industrial for sustainable fuel and energy rather than in zones recognized as heavy industrial. Please make it the law that automobile manufactures must install dedicated ethanol engines in a high percentage of all new cars. If all of the above is done, then local economies will be revived; our air, land, and water would become clean again; and perpetual war in Afghanistan and the Mid East Region will end. We must become a nation dedicated to sustainable fuel. Support ethanol fuel and support the Tier 3 clean vehicle and gasoline standards.

Our Response:

The Tier 3 program vehicle emissions standards are fuel neutral (i.e., apply regardless of the type of fuel that vehicle uses, including E100.) The consideration of a potential requirement to mandate the production of dedicated E100 engines by automobile manufacturers is beyond the scope of the Tier 3 final rule.

What Commenters Said:

Commenter: Private Citizens

The proposed fuel and emissions law changes are good, but the increases in automobile prices and gasoline are not. These so called higher prices for cars and the fuel used, is not the answer.

The use of more alcohol in motor fuel is. Cleaner burning engines of today can use 10-15 percent gasoline to 80-85percent alcohol, that is the combination that can reduce emissions. Fuel additives can come from all types of renewable sources, and reduce the oil imports plus lower fuel cost. The keystone pipeline should be built, and have a second source of refining, the east coast of NY and NJ—there are huge refineries there and can handle the oil to be processed.

Our Response:

The Tier 3 program vehicle emissions standards are fuel neutral (i.e. apply regardless of the type of fuel that vehicle uses, including higher level ethanol blends.) The construction of the Keystone pipeline is beyond the scope of the Tier 3 final rule.

What Commenters Said:

Commenter: Mercedes-Benz USA, LLC on behalf of Daimler AG

To provide Mercedes-Benz and other OEMs a degree of certainty and incentive that costs associated with the design, development, certification and production of vehicles dedicated to operation on Tier 3 Fuel are wise investments in the future of the US and global environments, Mercedes-Benz requests the following:

EPA grant a reduction in the Mercedes-Benz (or OEM) total annual corporate CO2 compliance burden, based on the following equation per vehicle model certification family and a CO2 Burden Reduction Multiplier:

CO2 Burden Reduction =

CO2 output on Tier 3 certification fuel/equivalent CO2 output on 91 AKI Tier 2 E0 certification fuel x projected annual sales percentage of corporate gasoline-powered vehicles optimized for operation on Tier 3 fuel by MY / total corporate gasoline-powered vehicle sales projection by MY x annual OEM corporate CO2 projected output

As an incentive for early adoption of Tier 3 Fuel capability, the CO2 Burden Reduction Multiplier would be applied according to this schedule:
MY 2016 and prior: 100% of CO2 Burden Reduction
MY 2017-2019: 50% of CO2 Burden Reduction
MY 2020-2022: 25% of CO2 Burden Reduction
MY 2023 and later: no additional CO2 Burden Reduction

In the event of limited Tier 3 fuel availability nationwide, but where the necessary hardware to support Tier 3 fuel usage has already been incorporated in vehicle models MY2016-2022 as well as prior, Mercedes-Benz requests the following:

EPA grant a reduction in the Mercedes-Benz (or OEM) total annual corporate CO2 compliance burden, based on the CO2 Burden Reduction equation per vehicle model line:

MY 2016 and prior: 50% of the CO2 Burden Reduction
MY 2017-2019: 25% of CO2 Burden Reduction
MY 2020-2022: 15% of CO2 Burden Reduction
MY 2023 and later: no additional CO2 Burden Reduction

These corporate CO2 burden reductions would end MY 2023 or 90% retail station penetration of a high-octane mid-blend ethanol retail fuel, whichever comes first.

In order to provide incentive for fuel producers to achieve an expedient and substantial marketplace penetration of a Tier 3 fuel similar to the proposed certification fuel, it is further proposed that a Federal Fuels Tax discount or equivalent RIN credit be applied to each gallon of Tier 3 fuel produced for US consumption. This discount or credit would be equal to:

Producer Credit = 1.00 - (net heating value of the Tier 3 certification fuel divided by the NHV of 91 AKI Tier 2 E0 certification fuel).

This Producer Credit would also expire MY2023 or after 90% retail penetration of a Tier 3 is achieved, whichever comes first.

13 - Resources for the Future, Reassessing the Oil Security Premium (February 2010), available at http://www.rff.org/RFF/Documents/RFF-DP-10-05.pdf.
14 - Renewable Fuels Association, Battling for the Barrel: 2013 Ethanol Industry Outlook, p. 1, supra.
15 - See Stein et al., An Overview of the Effects of Ethanol-Gasoline Blends on SI Engine Performance, Fuel Efficiency, and Emissions, supra.
16 - MathPro Inc., Analysis of the Refining Costs and Associated Economic Effects of Producing 92 AKI Gasoline in the U.S. Refining Sector (October 30, 2012).
17 - Stillwater Associates, The Cost of Introducing an Intermediate Blend Ethanol Fuel for 2017- and-Later Vehicles, (October 17, 2012).

Our Response:

Consideration of greenhouse gas requirements for vehicle manufactures and potential federal fuel tax credits are beyond the scope of the Tier 3 rulemaking.

What Commenters Said:

Commenter: Private Citizens

I am disappointed in the fact that neither the EPA nor UCS can't come up with a better method of cleaning up automobile exhausts. It is time to stop using fossil fuels to produce our energy and switch to a hydrogen economy in which hydrogen is used in combination with fuel cells. The only exhaust is pure drinkable water.

As a weak secondary alternative, I would support the Tier 3 standards for tailpipe emissions and low-sulfur fuel, and urge the EPA to finalize these standards by the end of 2013.

Every major automobile manufacturer is designing new fuel cell automobiles. Why can't the EPA and federal government learn more about what's going on in many countries where the number of fuel cell autos and buses are on the increase. It's time to get with it!

While we've made progress cleaning up our cars and trucks in recent years, they remain a leading source of air pollution. More than one in three Americans still live in areas where air pollution levels exceed at least one federal health standard. Hydrogen fuel cell autos would correct this.

The Tier 3 standards would only reduce smog-forming pollutants and soot, which pose a particular danger to those suffering from asthma and other lung ailments. A hydrogen economy would not only REDUCE the pollution but would STOP it.

Meeting the Tier 3 standards is achievable and necessary for our health. That's why public health and environmental justice advocates, automakers, and state air quality regulators, environmental and science-based advocacy groups all support Tier 3. The only one standing in the way is the oil industry and their allies in Congress, but we can't wait for their green light to clean up our air. More important, we can't wait for the EPA and UCS to stop supporting the fossil fuel industry.

Our Response:

The Tier 3 program vehicle emissions standards are fuel neutral (i.e., apply regardless of the type of fuel that vehicle uses, including hydrogen.) The promotion of the use of hydrogen as a motor fuel is beyond the scope of the Tier 3 final rule.

What Commenters Said:

Commenter: Monroe Energy, LLC

Monroe operates a petroleum refinery in Trainer, Pennsylvania. As a merchant refiner, Monroe can only comply with its RFS2 obligations by purchasing renewable identification numbers (RINs). The recent and ongoing spike in the price of RINs will require Monroe to spend, on an annual basis, a very significant amount of money to comply with RFS2. Requiring Monroe to spend such additional capital investments to comply with the Tier 3 gasoline sulfur standards, and its nominal environmental benefit, will compound Monroe's (and other merchant refiners') economic injury. Therefore, EPA should not promulgate a Tier 3 sulfur standard until it has corrected the errors in the RFS2 rule.

The costs of compliance should not be evaluated in a vacuum; rather, they need to be balanced against other federal and state regulations, including the renewable fuel standard (RFS2).

Our Response:

Issues pertaining to a refiner's annual RFS2 obligations are being addressed in separate EPA actions and are beyond the scope of the Tier 3 rulemaking. We do not believe there is compelling reason to link the completion of the annual RFS2 rulemakings on the RFS volume obligations to the promulgation of the Tier 3 final rule. Issues associated with the costs to refiners in complying with the Tier 3 sulfur requirements are addressed in Chapter 7.2 and the cost effectiveness of the Tier 3 sulfur requirements is addressed in Chapter 7.3 of this Summary and Analysis of Comments document.

6 Regulatory Streamlining and Technical Amendments

What We Proposed:

EPA proposed a range of technical amendments and regulatory streamlining actions as part of the Regulatory Review initiative. Some of these may have some bearing on implementation of the Tier 3 vehicle and fuel standards, while others deal with other aspects of EPA's existing fuel and vehicle regulations. The comments in this chapter correspond to Section VI of the preamble to the proposed rule. A summary of the comments received and our response to those comments are located below.

6.1. Fuels Program

6.1.1. Regulatory Streamlining and Tech Amendments

What Commenters Said:

Commenter: American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM)

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.

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.

Commenter: Irving Oil Terminals Inc.

EPA has proposed a number of regulatory changes to the Gasoline Program such as (1) reducing testing and reporting requirements of certain RFG parameters during the winter months; (2) updating of test methods for various fuel parameters; (3) designation of an alternative, independent laboratory; (4) elimination of unnecessary diesel fuel pump labeling; (5) extension of Performance Based Measurement System to other fuel parameters and test methods; (6) provision for de minimis changes in batch volume reports, and (7) attest engagements. Irving Oil supports these proposals. They would streamline registration, recordkeeping and reporting, reduce costs and free up personnel to focus on more significant areas of compliance.

Commenter: Marathon Petroleum Company LP (MPC)

MPC also supports the fuel streamlining steps that EPA has identified and is willing to work with EPA to identify further streamlining actions that can be taken. 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.

Commenter: PBF Energy Inc.

PBF supports the regulatory streamlining efforts included in the proposed rule.

Commenter: Phillips 66 Company

We are appreciative of the effort to streamline various portions of existing regulations. With changes over time, there are several areas that need "clean-up" and this effort will reduce confusion and burden on the regulatory parties. We offer the following comments on the proposed revisions as well as suggestions for other provisions that we feel would add value and should be considered.

Our Response:

EPA appreciates the industry support for the current effort to streamline applicable regulatory provisions in a timely and environmentally sound manner.

6.1.1.1. Complex Model Testing & Reporting

EPA proposed several amendments related to the reduction of testing and reporting of complex model gasoline parameters.

What Commenters Said:

Commenter: American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM)

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.

Testing and reporting for Complex Model fuel parameters: 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 NOx 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 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.

Commenter: Independent Fuel Terminal Operators Association (IFTOA)

EPA is proposing to reduce the testing and reporting requirements for certain fuel parameters associated with the complex model. The Association supports the Agency's efforts to eliminate regulatory obligations that are no longer needed. Such streamlining would reduce compliance costs and allow companies to focus more efficiently on more important aspects of compliance.

IFTOA recommends that EPA adopt the proposed amendments to streamline testing and reporting obligations.

Commenter: Sutherland Asbill & Brennan LLP (Sutherland)

Testing and Reporting of Fuel Parameters. EPA proposes to streamline the requirements for testing and reporting. Sutherland encourages all attempts at streamlining and simplifying the reporting requirements. Additionally, EPA should clarify whether it would like daily batch level production reports.

Commenter: Marathon Petroleum Company LP (MPC)

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.[30] 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 as it will be providing relief from a requirement. EPA should specify in the Preamble of the final rule that this will be retroactively applied.

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 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.

Commenter: Phillips 66 Company

- Sampling and testing of fuel properties - We agree with the proposed elimination to test and report API gravity. Although EPA has proposed other modifications to potentially reduce the sampling and testing burden, we think the proposal does not go far enough. Currently, the complex model is only used to certify VOC controlled reformulated gasoline. Therefore, the full slate of properties that must be analyzed and input into the model for calculation of VOC emission reductions should only be required for reformulated gasoline or RBOB designated as VOC controlled. There should be no requirement to test conventional gasoline or non-VOC controlled reformulated gasoline or RBOB for olefins, aromatics, and distillation. This change would significantly reduce the laboratory testing burden and should be implemented effective upon promulgation of the final rule.

Commenter: Shell Oil Products for Shell and Motiva

The preamble, under the Reporting Requirements section, 78 Fed. Reg. 29942, proposes denatured fuel ethanol batch reports to include properties and volume effective January 1, 2017. It is suggested that 40 CFR 80.1451 be amended to include the requirements of this additional reporting and 40CFR 80.1464 be amended to include attestation engagement procedures for this additional reporting. In this way, there is consistency with both ethanol and gasoline batch reports on how they are reported and attested.

Our Response:

We are streamlining and reducing the reformulated gasoline (RFG) and conventional gasoline (CG) testing and reporting burden of gasoline refiners and importers by reducing the testing and reporting requirements of certain fuel parameters associated with the complex model. With the phasing out of complex model standards[1], reduced testing and reporting is appropriate, particularly for RFG. In cases where a refiner is subject to only benzene, RVP, and sulfur standards, certain parameters no longer need to be tested and reported on an every-batch basis. However, refiners producing RFG during the summer volatile organic compound (VOC) control season will still need to use the complex model to determine VOC performance, and thus must still measure and report the relevant complex model fuel parameters. Sulfur and benzene will continue to be tested and reported on an every batch basis as these values are necessary for the Tier 2 and Tier 3 gasoline sulfur and MSAT2 benzene programs. In addition, small refiners that are subject to the delayed compliance option for the 0.62 volume percent benzene standard will have to use the complex model (and thus measure all complex model parameters) until 2015 for CG MSAT1 compliance.[2]

Currently, there are 17 complex model parameters on the RFG/anti-dumping batch report. We are reducing testing and reporting requirements for some of these parameters for RFG, CG or both in this final rule. All other reporting requirements not changed by the final rule

[1] Per §§80.41(e) and (f), and §80.101(c), applicable NOx and toxics emissions requirements are superseded by the Tier 2 gasoline sulfur standards and MSAT2 benzene standards, respectively.
[2] 61 FR 17230 (March 29, 2001).

are still in effect. For both RFG and CG, we are eliminating testing and reporting of American Petroleum Institute (API) gravity. Regarding the effective date for this change, we have applied it retroactively in keeping with the proposed date. In addition, we are finalizing reporting requirements for refiners that either have gasoline containing oxygenates or that include oxygenates added downstream in compliance calculations.

For winter RFG, we are eliminating the requirement to test and report aromatics, distillations and olefins on an every batch basis and instead are allowing testing and reporting of monthly composites. Commenters from the refining industry strongly suggested that we eliminate testing of these parameters altogether, since they are not needed, and their elimination would further reduce the burden on regulated parties. While we agree that a reduction in burden would occur if refiners were not required to test, even on a monthly composite basis, for these parameters, the many interconnected aspects of the RFG program make any seemingly innocuous change potentially fraught with unintended consequences. Thus, we are will evaluate completely eliminating the testing of these parameters in any future fuel program restructuring.

In the proposal, we stated "…values for aromatics, olefins, and distillation terms may continue to be determined from monthly composites." Some commenters viewed the term "may" in that sentence as meaning that reporting for those parameters is optional. That is an incorrect interpretation. In this final rule, we are finalizing requirements for use of either monthly composites or batch testing. The parameters must still be measured and reported. Commenters in the refining industry do not think these parameters need to be measured at all for parties subject to the MSAT2 benzene standard, as compliance with that standard is not dependent on aromatic, olefin, or distillation values. As mentioned earlier, there are several areas of the RFG and/or anti-dumping programs where testing and reporting burden could likely be reduced; however, we have not fully evaluated the implications of changing the current requirements, and thus we are leaving consideration of such changes to a future broader program restructuring.

6.1.1.2. De Minimis Threshold for Batch Volumes

What Commenters Said:

Commenter: American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM)

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.

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.

Commenter: Chevron Products Company; Marathon Petroleum Company LP (MPC)

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 the 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.

Commenter: National Biodiesel Board (NBB)

NBB Opposes the Proposed Application of a "De Minimis" Correction to Obligated Parties Renewable Volume Obligations Under the Renewable Fuel Standard Program.

In the Tier 3 Proposal, EPA proposes new § 80.10, which would provide that obligated parties would not be required to "correct unintentional errors in reporting batch volume on previously submitted batch reports." 78 Fed. Reg. at 30,003. With respect to the RFS2 program, this provision would apply "only to the volume of fuels produced or exported that result in a renewable volume obligation under subpart M." *Id.* The Tier 3 Proposal's entire explanation for this provision is one paragraph and is as follows: We are proposing for the correction of batch volume reports to allow for de minimis changes in reporting compliance that would not require a complete resubmission of compliance reports when a minor discrepancy of a few barrels is uncovered. This allowance for the correction of batch volume reports would apply to reporting for: RFG, anti-dumping, gasoline and diesel sulfur, MSAT2 and the RFS renewable volume obligation (RVO) (for RFS, this would only apply to the volume of fuels produced or exported that result in a RVO for obligated parties). We are proposing a new section 80.10 to define de minimis, for the purpose of this allowance, as no more than 500 gallons or by no more than 1 percent of the true batch volume in gallons, whichever value is less. We request comment on whether or not a different amount would be more appropriate.

Id. at 29,952. This one paragraph buried in a 377-page proposal is wholly insufficient for the public to meaningfully comment. NBB opposes the application of any so-called "de minimis" corrections to reporting renewable volume obligations.

In the RFS2 program, Congress "directed" EPA "to ensure that transportation fuel sold or introduced into commerce in the United States . . ., on an average annual basis, contains at least the applicable volume of renewable fuel, advanced biofuel, cellulosic biofuel, biomass-based diesel" under the statute. *NPRA v. EPA*, 630 F.3d 145, 147 (D.C. Cir. 2010), *reh'g denied*, 643 F.3d 958 (D.C. Cir. 2011), *cert. denied*, 132 S. Ct. 571 (2011); see also 42 U.S.C. § 7545(o)(2)(A)(i), (iii), (o)(3)(B). Thus, EPA's obligation is to enforce the statutory volumes. The means of enforcing the statutory volumes that EPA has established is through the annual renewable volume obligations for *each* obligated party.

Unlike the other programs where the "de minimis" reporting correction may apply,[1] the RFS2 program is a volume mandate and compliance is contingent on the actual volume of gasoline or diesel fuel produced or imported. While the Tier 3 Proposal does not provide adequate information as to how the correction would apply for the RFS2 program, on its face it would appear as though an obligated party can under-report its gasoline production and, thereby, reduce its renewable volume obligations. While EPA claims the volume is de minimis (500 gallons or no more than 1 percent of the true batch volume, whichever is less), EPA provides no explanation as to whether that means, for example, each shipment overseas or each batch of fuel produced. Even if the correction applies to the one time volume reported at the end of the year, each obligated party can do so, potentially resulting in significantly less RINs actually being required. This is in clear violation of EPA's obligation to "ensure" the *minimum* volumes are met. While an agency may have certain inherent authority to provide for de minimis exemptions in certain statutory schemes, such authority is not available where there is "an 'extraordinarily rigid' statutory mandate," as is the case here. *See Sierra Club v. EPA*, 705 F.3d 458, 468 (D.C. Cir. 2013) (citation omitted); *see also Kentucky Waterways Alliance v. Johnson*, 540 F.3d 466, 491 (6th Cir. 2008) (recognizing such authority "is not an ability to depart from the statute . . .") (quoting *Ala. Power Co. v. Costle*, 636 F.3d 323, 360 (D.C. Cir. 1979)).

This de minimis "correction" would also appear to be yet another means to reduce the statutory volumes in a manner that is beyond EPA's authority. The statute provides EPA with limited waiver authority, imposing stringent procedural and substantive criteria on when EPA can reduce the statutory mandates. *See* 42 U.S.C. § 7545(o)(7). In addition to the clear requirements that EPA ensure "at least" the applicable volumes of renewable fuel are sold, this limited authority evidences that Congress sought to restrict EPA's authority to reduce the statutory volumes, and a "de minimis" error in reporting of gasoline or diesel fuel production or imports is not among the reasons EPA can use its authority. The Tier 3 Proposal provides no explanation for EPA's authority to allow for such correction. Such an omission is likely because there is no such authority for EPA to do so. *See Sierra Club v. Tennessee Valley Auth.*, 430 F.3d 1337, 1346-49 (11th Cir. 2005) (finding Alabama's 2% de minimis rule impermissibly modified requirements in State Implementation Plan without undergoing proper procedures).

Further, the general rationale for providing de minimis exemptions is administrative burdens. *See Sierra Club*, 705 F.3d at 462 (citation omitted). While such administrative burdens may justify providing renewable fuel producers with a de minimis exemption for certain under-or over-reporting of RIN generation, which does not appear to even be contemplated by EPA in the proposal, there is no such administrative burden with respect to obligated parties annual reporting of their renewable volume obligation. Nonetheless, EPA's proposal is limited only to obligated parties with no discussion whatsoever as to the administrative burdens to support such an exemption. Thus, EPA has not (nor can it) meet its burden to show why this de minimis "correction" is necessary here. *Kentucky Waterways Alliance*, 540 F.3d at 491 ("Determination of when matters are truly *de minimis* naturally will turn on the assessment of particular circumstances, and the agency will bear the burden of making the required showing.") (quoting *Greenbaum v. EPA*, 370 F.3d 527, 534 (6th Cir. 2004)).

In fact, EPA cannot identify any administrative burden or need for such a "correction" allowance. Unlike the numerous calculations necessary for the RIN generation and transactions that a producer must undertake on a per batch basis, obligated parties and exporters are only required to submit an annual compliance report. Such report is required two months after the end of the year, and EPA does not explain why an obligated party or exporter cannot obtain accurate numbers for the volume of gasoline or diesel fuel it produced or imported within that time.[2] Indeed, in this same proposal, EPA is proposing to extend the time for obligated parties to submit their compliance reports by another full month. EPA's rationale for this extension is to give obligated parties more time to address volume discrepancies identified through "volumetric auditing." 78 Fed. Reg. at 29,952.

Because EPA failed to provide any legal or factual support for its proposal, it also should not be allowed to manufacture such support in any final rule. Even if responding to comments, EPA cannot circumvent the notice and comment requirements of the Clean Air Act and Administrative Procedure Act. The Clean Air Act requires EPA to provide notice of its proposed rule through a statement of its basis and purpose, and to give the public a meaningful opportunity to comment. 42 U.S.C. § 7607(d)(3), (4), (5); *see also* 5 U.S.C. § 553(b), incorporated by reference in 42 U.S.C. § 7607(d)(3) (requiring "reference to the legal authority under which the rule is proposed" and notice of "either the terms or substance of the proposed rule or a description of the subjects and issues involved"). "The significance of rulemaking cannot be underemphasized. It gives parties affected by a decision an opportunity to participate in the decision-making process and forces EPA to articulate the bases for its decisions." *Donner Hanna Coke Corp. v. Costle*, 464 F. Supp. 1295, 1305 (W.D.N.Y. 1979) (citation omitted); *see also Envtl. Integrity Project v. EPA*, 425 F.3d 992, 996 (D.C. Cir. 2005) ("[N]otice requirements are designed (1) to ensure that agency regulations are tested via exposure to diverse public comment, (2) to ensure fairness to affected parties, and (3) to give affected parties an opportunity to develop evidence in the record to support their objections to the rule and thereby enhance the quality of judicial review.") (citation omitted); *Weyerhaeuser Co. v. Costle*, 590 F.2d 1011, 1028 (D.C. Cir. 1978) (Court will defer to agency "so long as we are assured that its promulgation process as a whole and in each of its major aspects provides a degree of public awareness, understanding, and participation commensurate with the complexity and intrusiveness of the resulting regulations.") (citations omitted). Given EPA's obligations under the RFS2 program and the apparent potential for the proposal to reduce the overall volumes actually required, it was incumbent on EPA to ensure that it provided adequate notice and a meaningful opportunity for the public to comment.

Commenter: Phillips 66 Company

De Minimis Reporting Changes – We are very appreciative that EPA has recognized this issue and proposed an allowance for de minimis volume errors and corrections. We strongly support the concept of a de minimis volume allowance. However, the de minimis level proposed is far too small to be of any utility. Fortunately, the systems in place to measure and report batch volumes are very efficient and accurate. Unfortunately, there are some instances where slight errors do occur. Currently when an error is discovered, no matter how small the volume difference, it results in having to change the batch reports and resubmit with the corrected volumes. EPA has proposed a de minimis level of 500 gallons or 1% of the batch volume, whichever is less. Typical pipeline batch volumes are 25,000 barrels. A 500 gallon difference in a 25,000 barrel batch constitutes a 0.05% difference.

We suggest the de minimis level be set at 0.5% for each batch. No further action should be necessary such as recalculation of property averages with the uncorrected volumes versus the corrected volumes. These should be considered de minimis from all aspects.

Our Response:

We proposed that parties who submit batch reports would not be required to correct inconsequential errors in reporting batch volumes under certain conditions, the primary condition being that the discrepancy met the definition of "de minimis", which as proposed, was an amount no greater than the smaller of 500 gallons or one (1) percent of the true batch volume. Under the proposal, regulated parties would no longer be required to provide a complete resubmission of a compliance report when a minor discrepancy of a few barrels was uncovered. We proposed that this new provision would apply to reporting for RFG, anti-dumping, gasoline and diesel sulfur, and MSAT2. We proposed that it would also apply to the RFS renewable volume obligation (RVO), but would only apply to the volume of fuels produced or exported that result in a RVO for obligated parties.

We have decided not to finalize the proposed de minimis provisions at this time. One of the primary motivations for proposing the de minimis provision was to avoid the need for inconsequential corrections to production volumes that would have no impact on compliance with standards that rely on production volumes (e.g., average standards and RFS). Late changes to production volumes for whatever reason can necessitate simultaneous changes to compliance calculations that, if de minimis, would have no meaningful impact on compliance. However, as comments highlight, it is has proven difficult to set an acceptable de minimis threshold that can apply across all potential situations. Furthermore, the proposed provision focused only on volume corrections, but in reality our experience suggests that corrections often take place for other purposes such as data entry, coding, formating or other typographical errors – not only minor corrections to reported volume. We believe that adjusting reports for inconsistencies will become less burdensome, as EPA intends to transition all reporting to electronic reporting in the future. In addition, EPA received input from the regulated community about a de minimis provision specifically as it related to the RFS program. We are finalizing a one-month delay in the RFS reporting deadline, which we believe will provide obligated parties with more time to review and correct their records and reports, and help to minimize the need for late corrections. We will revisit the need for a de minimis threshold in the future if these changes prove insufficient.

6.1.1.3. Reporting Deadlines

What Commenters Said:

Commenter: American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM)

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.

Commenter: Chevron Products Company

Chevron is very much in favor of EPA's proposal to align reporting dates between the various Part 80 programs and appreciates the extension of fourth quarter and annual reporting deadlines to March 31. We recommend that EPA should extend the attest engagement deadlines by an additional month from May 31 to June 30 to allow sufficient time for the significant data-gathering and back-and-forth communications required to complete those engagements. While it may be possible to begin some of this work ahead of the new reporting deadlines, it is much more effective to focus on the reporting itself before shifting to the attest activities. We believe that extending these annual deadlines will significantly reduce the risk of error and rework in annual compliance reporting.

Commenter: Marathon Petroleum Company LP (MPC)

EPA should eliminate quarterly reporting for the RFG/RBOB batch reports. Data for all summer RFG/RBOB batches should be submitted once a 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.

Commenter: Phillips 66 Company

Change in reporting dates – Overall, the concept of aligning the various reporting dates and being able to develop a unified and simplified reporting form is a good one. Providing additional time is beneficial. We appreciate the Agency providing this change.

Commenter: Weaver and Tidwell LLP

Assuming the EPA implements the reporting deadline changes contemplated in the NPRM, Weaver suggests that the deadline for submission of the annual attest reports be extended by one month (June 30 following the end of the compliance year). The proposed change of the annual reporting date for gasoline and RFS reports from the last day of February to March 31 following the end of the compliance year, without a corresponding change in the due date for annual attest reports, shortens the period of time for conducting the required attest work by one month. Regulated parties are often subject to attest engagements at multiple facilities and for various activities that are all inter-related (i.e., gasoline refiner being subject to gasoline attest engagements [each applicable subpart], as well as an RFS attest engagement). Therefore, the attest engagements can take a substantial amount of time to complete.

Weaver would like to emphasize the importance of the attest function in relation to compliance with the EPA's fuels regulations as a whole. The EPA receives completed annual attest reports which, in many cases, reflect compliance with the regulations. However, in our experience, during the performance of the attest procedures, a myriad of reporting and compliance issues are frequently discovered that can be and are remediated by the regulated party prior to the completion of the attest engagement (hence, a "clean/cleaner" attest report is prepared and filed with the EPA). If not for the independent attest engagement, it is our belief that many of the issues unearthed and remedied as part of the attest would otherwise go unchecked and undiscovered, thus shifting an increased level of review, investigation, and enforcement burden to the EPA. Without sufficient time to find, research and resolve these errors, omissions, and other instances of non-compliance, the efficacy of the attest function is diluted.

Commenter: Turner, Mason & Company

The change in the reporting date for the fourth quarter and annual reports could significantly impact those who report to the EPA under 40 CFR 79 & 80. The reporting deadline for those reports is being pushed back by a month to March 31. The reporting deadline for the first quarter of the year is being pushed back by one day to June 1. In contrast, the reporting deadline for attestation reports remains the same at May 31.

Because entities tend to delay submission of their reports to the EPA until all activities have been completed, the time available to conduct an attestation under the current regulations is three months. Under the current reporting schedule, it is already difficult to obtain data, conduct the attestation, review the attestation with the affected party, revise the attestation based on additional information provided by the affected party, obtain management representation letter(s) signed by the responsible corporate officer, and produce the final attestation report within the three month timetable currently existing.

It is our experience at Turner, Mason & company that those involved in generating and submitting reports to the EPA are the same people that provide data for the attestations. Based on these new reporting deadlines, the months of April and May will become even busier for them. Under the new reporting schedule, they will be preparing the first quarter reports simultaneously to providing data to the attester(s) because of the increased workload in the shorter timeframe for these workers, we expect an increase in reporting errors. Thus, we find that extending the deadline for attestation reports by a month to June 30 would provide a month of relatively lighter workload for those involved in the attestations and reduce the probability of reporting error.

Commenter: Shell Oil Products for Shell and Motiva

In regards to Amendments Related to Reporting 78 Fed. Reg. 29949, we concur with the proposal to adjust and be consistent with reporting dates for various EPA programs. However, with the annual reporting date being moved from February 28 to March 31, the attestation engagement reporting date needs to be adjusted also. Currently, the attestation engagement report is due May 31 and we recommend the due date be changed to June 30 in order to continue to provide 3 months between the due dates of the annual report and the attestation engagement report. As proposed, a timeframe of two months between the annual report due date and attestation engagement report due date is too short of a time period.

Our Response:

In the final rule, EPA is amending various provisions to reduce the number of different reporting deadlines that regulated parties must meet and to enable the future use of a unified and simplified reporting form. Currently under 40 CFR parts 79 and 80, there are ten separate cyclical reporting dates each year (eleven in a leap year). Streamlining reporting deadlines will allow EPA to develop a single, user-friendly, electronic form that will collect all required data, maximizing the capability of electronic reporting to provide reuse of data and avoid duplicate data submission. EPA's goal is to simplify reporting and reduce the number of hours parties spend preparing and submitting reports while simultaneously improving data received from stakeholders. This overall effort responds to Executive Orders 13563 and 13610, which direct government agencies to simplify rules and to achieve reductions in paperwork and reporting burdens, and is part of EPA's agency-wide effort to streamline regulatory reporting requirements.

We are amending these deadlines so that all affected programs use the same four reporting deadlines. Programs that will be affected by this change include:

- the fuels and fuel additives registration program (40 CFR part 79, subpart A);
- the Reformulated Gasoline and Anti-Dumping program (40 CFR part 80, subparts D and E);
- the Gasoline Sulfur program (40 CFR part 80 subpart H);
- the Motor Vehicle, Nonroad, Locomotive, and Marine Diesel program (40 CFR part 80 subpart I);
- the Gasoline Benzene program (40 CFR part 80 subpart L);
- the Renewable Fuel Standard program (40 CFR part 80 subparts K and M); and
- the Tier 3 program being finalized today (40 CFR part 80 subpart O).

Consistent with the proposal, we are finalizing that reporting deadlines will be standardized as follows: June 1, for all reports covering quarter 1 of the compliance year (January through March); September 1, for quarter 2 (April through June); December 1, for quarter 3 (July through September); and March 31 for quarter 4 (October through December). End-of-year compliance reports will also be due on March 31. These changes will either delay or maintain current deadlines for nearly all required reports. Deadlines for all other annual reports will either be maintained if they matched the new quarterly deadline, or extended to match the new quarterly deadline. It should be noted that even with the changes finalized today, respondents will still have the option to report earlier than any given deadline. Some commenters in the refining industry suggested eliminating all quarterly reporting for RFG if winter aromatics, olefins and distillation are no longer required to be reported as they suggested. These values are normally reported in the 1st and 4th quarters. As one commenter stated, "In addition, there is no point in splitting up summer RFG/RBOB reporting between the 2nd and 3rd quarters." We disagree. As noted above, winter aromatics, olefins and distillation are still required to be reported, albeit on a monthly composite basis. Thus, the need for quarterly reporting remains. However, we expect that the need for quarterly reports will be evaluated as part of a future broader program restructuring.

EPA proposed not to include "Attest Engagements" (currently due May 31 of the following year) or reporting related to specific events under the Fuels Program, such as trading Renewable Identification Numbers (RINs) in EPA's Moderated Transaction System (EMTS), in the reporting revisions described above. Rather, all reporting deadlines for Attest Engagements and reporting specific events will remain the same. Some commenters suggested that if the annual and fourth quarter reporting deadlines were to be extended to March 31 of each year, then the attest engagement date should also be shifted one month from May 31 to June 30 to allow sufficient time for the significant data-gathering and communications required to complete those engagements. EPA is not changing the compliance period associated with the new extended reporting date, but rather, is simply allowing additional time for data review, preparation and reporting. EPA does not believe that extending the attest engagement date is necessary because companies have the flexibility to use the extra reporting time to begin preparation for the attest engagement if they prefer. As stated previously, the extension to reporting deadlines does not preclude stakeholders from reporting before the deadline. EPA is not extending the date for attest engagements from May 31 to June 30. That said, EPA is streamlining reporting dates to aid in our development of a single electronic reporting format and is updating the due date for attest engagements found in part 80 from May 31 to June 1. This change will not affect compliance or increase burden of reporting entities. Rather, the purpose of streamlining various reporting deadlines is to ease reporting burden and help aid EPA in the development and implementation of a single electronic reporting format.

6.1.1.4. Previously Certified Gasoline (PCG)

What Commenters Said:

Commenter: American Petroleum Institute (API) and the Association of Fuel & Petrochemical

Manufacturers (AFPM); Marathon Petroleum Company LP (MPC)

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).

Commenter: Independent Fuel Terminal Operators Association (IFTOA)

Under current regulations, when refiners and importers are blending gasoline with Previously Certified Gasoline ("PCG"), they must test (1) the PCG for benzene before addition of the blendstock, (2) test the combined blend of PCG and blendstock for benzene, (3) calculate the properties of the blendstock by treating the PCG as a negative volume batch, and (4) treat the blended product as a positive batch. As EPA properly recognizes, due to variability in the benzene test method, this approach can, at times, result in calculated blendstock benzene concentrations that are negative, which is physically impossible. Therefore, EPA is proposing an alternative that would allow greater flexibility. EPA would amend the regulations to permit refiners and importers to sample and test each batch of the blendstock directly, and treat the blendstock as the produced batch for blendstock that is blended into PCG. This approach is very sensible and would eliminate illogical test results that have occurred in the field.

IFTOA recommends that EPA adopt the alternative test method that has been proposed. It would provide a far more accurate test result and allow for more practical compliance.

Our Response:

Consistent with the proposal, for blendstock that is blended into previously certified gasoline (PCG), we are finalizing an alternative requirement that allows refiners to directly sample and test each batch of blendstock, and treat the blendstock as a produced batch. We note that this practice is already allowed under the Tier 2 sulfur program.

6.1.1.5. Imports by Truck

What Commenters Said:

Commenter: Independent Fuel Terminal Operators Association (IFTOA)

Under current regulations, when conventional gasoline is imported into the United States by truck, compliance with fuel parameters may be demonstrated by testing fuel in the storage tank from which the trucks are loaded. See 40 CFR Part 80, Subpart E, Section 80.101(i)(1) and (3). However, pursuant to 40 CFR Part 80, Subpart L, Section 80.1347, each batch of gasoline produced or imported (RFG or conventional gasoline) must be sampled and tested for compliance with the benzene standard. The inconsistency of these two regulations has resulted in importers spending thousands of dollars testing each truck that enters the United States and this additional testing – testing each truck versus testing the tank from which the trucks are loaded – is unnecessary. It provides no greater testing accuracy and is so costly that it has a chilling effect on truck imports. Therefore, the Association welcomes the EPA's proposal to make the regulations consistent and allow gasoline imported into the U.S. by truck to demonstrate compliance by testing the gasoline in the storage tank from which the trucks are loaded.

IFTOA endorses EPA's proposal to allow gasoline imports made by truck to demonstrate compliance with applicable fuel parameters by testing the gasoline in the tank from which the trucks are loaded in accordance with the requirements set forth in 40 CFR Part 80, Subpart E.

Commenter: Irving Oil Terminals Inc.

EPA has proposed to allow entities that import conventional gasoline into the United States by truck to demonstrate compliance by following the sampling and testing requirements in Subpart E — sampling and testing of the storage tank that feeds the truck imports — as an alternative to the sampling and testing requirements of Subpart L that some have interpreted to require the testing of every truckload. Irving Oil strongly supports this amendment and commends the EPA for allowing importers to use a practical and more economic means of testing that provides the same degree of accuracy and makes the provisions in Subpart E and Subpart L consistent.

Our Response:

We are allowing importers who import gasoline into the United States by truck to use the sampling and testing requirements in subpart E for truck importers as an alternative to the sampling and testing requirements in subpart L. EPA provided these alternative requirements in subpart E to eliminate the need to test every truckload of imported conventional gasoline for all complex model parameters, including benzene. Since Subpart L also requires importers to test every truckload of imported gasoline for benzene, EPA believes it is appropriate to allow truck importers of gasoline to use the sampling and testing requirements in subpart E as an alternative.

6.1.1.6. Diesel Tech Amendments

What Commenters Said:

Commenter: Chevron Products Company

Diesel Pump Labels: Chevron supports the removal of the requirement for diesel fuel pump labels for 15 ppm highway diesel fuel. We do not expect that this will cause confusion for consumers and agree with EPA's assertion that voluntary labeling is always an option for retail and wholesale facilities should that become an issue. It should be noted that §80.572(a) already contains an expiration date for these labeling requirements. The current regulations show an expiration date of September 31 [sic], 2014 and the amendment proposed in this rulemaking is actually extending the expiration date to November 30, 2014. There appears to be no reason for any extension and we assume this is an error. As EPA states in its preamble, these labels have been unnecessary since December 1, 2010. Therefore, an immediate removal of the requirement would be entirely appropriate.

Should the labeling requirements remain in place, we oppose the regulatory changes proposed that do nothing but underline the words 'prohibits' and 'required' in the current labeling requirements. If this requires that existing labels, which are no longer required after 2014, be updated, it's an expensive and burdensome proposition with little tangible benefit.

Commenter: Magellan Midstream Partners, L.P.

Transmix exemption — EPA has proposed per-gallon and marker requirements for NRLM diesel fuel, ECA marine fuel, and heating oil downstream of the refiner or importer. EPA has also clarified that this provision does not apply to LM diesel fuel produced from transmix or interface fuel that is sold or intended for sale in areas other than those listed in §80.510(g)(1) or (g)(2), as provided by §80.513(f).

Magellan Comment — we agree with EPA on the transmix exemption and strongly encourage the agency to adopt this provision. The high levels of sulfur in jet fuel create challenges for transmix processor because access to certain markets has been restricted.

Our Response:

We are removing the requirement for diesel fuel pump labels for 15 ppm highway diesel fuel. Beginning December 1, 2010, all highway diesel fuel was required to be 15 ppm or less; thus, highway diesel fuel labels are no longer needed to distinguish it from 500 ppm highway diesel fuel. However, we do recognize that it may confuse consumers who are accustomed to seeing the highway diesel fuel pump labels if those labels were to disappear, thus, retail and wholesale purchaser-consumer facilities will be free to continue labeling to eliminate confusion if they so choose. The elimination of this requirement from the regulations does not preclude retail and wholesale purchaser-consumer facilities from keeping 15 ppm highway diesel fuel pump labels, it only eliminates the EPA requirement that such labels must be present.

We are finalizing the proposed change to §80.511.

6.1.1.7. Test Method Updates

What Commenters Said:

Commenter: American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM); Marathon Petroleum Company LP (MPC)

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.

Commenter: Chevron Products Company

Test Method Reporting: Numerous updates are proposed to add the requirement that test methods be reported whenever fuel properties are reported under existing programs. Understanding that this is intended to enable the Performance Based Measurement System, we urge the EPA to consider how best to simplify the adoption of this requirement in its reporting procedures. Adding a test method field corresponding to every property field on existing report forms would greatly increase the size and complexity of those forms and, where the PBMS is not employed, would add no value. We recommend allowing obligated parties to report standard test methods in one separate notification and indicate exceptions, if any, separately.

Commenter: Independent Fuel Terminal Operators Association (IFTOA)

In the Preamble that accompanied the proposed rules, EPA explained that refiners, importers and oxygenate blenders producing gasoline and diesel are required to test various fuel parameters. In a number of the regulations, there are references to test methods that have been revised or updated since the regulation was adopted. Therefore, EPA is proposing to amend the regulations and to reflect the new or updated ASTM test methods.

The Association supports the basic concept of the proposal – updating test methods. However, the Association believes that the regulations should be amended to authorize refiners, importers and oxygenate blenders to use the current version of the test method at the time of the testing – not one current at the time the final rule is adopted. In this way, industry would be employing methods that ASTM deemed appropriate and would facilitate better operation for the user of the test method. In addition, EPA should retain those alternative test methods it has already approved for use.

Recommendation: The Association supports EPA's efforts to reference updated/revised test methods in the regulations used to test gasoline and diesel fuel parameters. However, the Association recommends that EPA go further with its amendment and authorize testing using the current version of the applicable test method as of the date of testing or an alternative test method approved by EPA.

Organization:Irving Oil Terminals Inc.

Irving Oil supports the updating of test methods used for various fuel parameters and also recommends that the regulation require compliance to 'the most current version of each method' instead of specifying a revision status date. This would allow the EPA and industry to perform testing by responding with the most current technology available.

Commenter: Phillips 66 Company

Update Test Method references - We support the proposal to update the referenced test methods to more current versions but ask that EPA check for the most current versions.

Our Response:

Refiners, importers and oxygenate blenders producing gasoline and diesel motor vehicle fuel are required to test RFG, CG and diesel fuel for various fuel parameters including aromatics, benzene, distillation, olefins, oxygenate content, RVP, and sulfur. As stated in the proposal, a number of relevant regulatory provisions had references to test methods that have been revised and updated. Several comments were received indicating that since the time of the proposal, some of the proposed updates have been further revised and updated and the desire was expressed for the regulated community to have the opportunity to use the most current version of each of these test methods. Consistent with the proposal, in this final rule we are updating those test methods to reflect current test methods in order to ensure that all test methods are readily available to the regulated community. (See Section VI.A.1.c of the preamble to the final rule and more specifically Table VI-2 for the list of test methods.)

6.1.1.8. Broader Regulatory Streamlining

What Commenters Said:

Commenter: American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM); Marathon Petroleum Company LP (MPC)

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.

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.

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.

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.

Commenter: Chevron Products Company

Regulatory Streamlining General Requirements and Deadlines: Chevron supports the reduced reporting requirements for reformulated gasoline and EPA's focus on simplifying reporting to those elements critical to compliance. We strongly encourage EPA's notion of performing a comprehensive restructuring of the Part 79 and 80 regulations to improve comprehension, reduce compliance costs and simplify reporting. Identifying all of the various opportunities for consolidation and simplification would go well beyond the timing and scope of this rulemaking but we encourage EPA to immediately form a working group with industry representatives to pursue a follow-up rulemaking with the goal of proposing regulatory updates by the first quarter of 2014.

Commenter: Irving Oil Terminals Inc.

Certification of Fuels (RFG and CG) and Commingling: EPA has asked for comments on the need to revise the regulations surrounding RFG and conventional gasoline relating to such issues as areas of sale and commingling of product. Irving Oil supports efforts to streamline the regulations and had anticipated proposals to address these issues. There are at least two reasons to move forward with such revisions.

First, there have been several times when Irving Oil has had gasoline certified as conventional gasoline that meets the specifications/requirements for RFG. When an emergency occurred in a nearby RFG-market and there were shortages of product, Irving OH could have moved its conventional gasoline to the RFG area to alleviate the problem. However, it was prevented from doing so because it could not recertify the gasoline, even though it met the RFG standards and would not have adversely affected air quality.

Second, at present, a company may not commingle RFG and conventional gasoline in the same tank. However, in those instances when gasoline meets both the RFG and conventional gasoline standards, use of commingled storage, coupled with robust recordkeeping, would substantially reduce costs and facilitate more effective operations.

Commenter: Magellan Midstream Partners, L.P.

80.82 Sulfur Sampling Results at Time of Transfer:
Magellan Comment — The revised 40 CFR 80.82(i)(2)(iii) specifies that butane blenders must obtain a copy of the butane supplier's test results at the time of each transfer of butane. This requirement is an unnecessary burden because the same test results often apply to multiple shipments of butane over the course of days or weeks. Rather than requiring redundant

conveyance of the same information, it should be adequate assurance to require that the blender obtain test results that represent each batch. Magellan proposes that 80.82(i)(2)(iii) be revised to include the following language: 'The butane blender must obtain a copy of the supplier's test results to represent each transfer of butane to the butane blender.'

80.1347(6) Benzene sampling upon receipt at refinery vs. refiner:
Magellan Comment — The revised 40 CFR 80.1347(a)(6) specifies that when sampling blend stock for benzene representation the refiner must take the sample when the blend stock is received at the refinery. We propose that the refiner should be allowed to take this representative sample upon receipt by the refiner, but that the sample need not be taken at the specific refinery where the blendstock is blended into previously certified gasoline. We propose changing the words 'at the refinery' to 'by the refiner.'

As discussed in the recent call and in our comments to the proposed rule, Magellan strongly supports a revision to 80.1347 (a) (6) from 'when it is received at the refinery' to 'when it is received by the refiner'. The reason for the modification is to allow for a gasoline blender to receive, sample, and test blend stock at a central company facility and then distribute that same blend stock to various other company owned refineries. This change would avoid the need to build blend stock storage at each refinery facility or to sample every truck load of blend stock blended at a location that did not have blend stock storage. Construction of dedicated blend stock storage at all facilities would be extremely expensive or in some cases is physically impossible due to space constraints and sampling of individual truck loads is logistically challenging and unduly expensive. An oversight program similar to that found in 80.82 could be implemented to ensure that blend stock quality is maintained during transport.

Commenter: National Biodiesel Board (NBB)

EPA Should Review and Conform the Various Product Transfer Document Requirements that May be Applicable to Biodiesel: In the Tier 3 Proposal, EPA notes that the fuel industry has requested EPA to review its Part 79 and Part 80 regulations to look for further ways to streamline the regulations. "EPA requests comments on potential areas in the fuel regulations that may benefit from such a more comprehensive streamlining effort." 78 Fed. Reg. at 29,953. As NBB noted in its comments on the Quality Assurance Program proposal, *see* EPA-HQ-OAR-2012-0621-0069 at 57-58, there are numerous disclosure requirements that must be included on product transfer documents for biodiesel blends, and NBB requests that EPA review and conform these requirements.

Biodiesel is subject to product transfer document requirements under the RFS2 program and the ultra-low sulfur diesel fuel program. This may be in addition to any state requirements as well. EPA should consider whether these statements can be consolidated to address the various regulatory programs without conflicting with potential state requirements. While the definitions for other diesel fuels may be different under the various programs, it is not for biodiesel. Biodiesel is fuel that meets ASTM D 6751. This is the standard that is applicable to biodiesel regardless of its use, although the finished fuel may be subject to another ASTM standard such as heating oil (ASTM D 396). There simply is little need for EPA to require long and overlapping statements on biodiesel product transfer documents. Thus, NBB recommends that

EPA require one statement that can cover these various requirements. For example, it should be sufficient to state that: “This volume of fuel is or contains biodiesel for which RINs have been generated under § 80.1426, is designated or intended for use as or in transportation fuel, heating oil or jet fuel.” For blends, EPA may also require disclosure of the sulfur content to ensure compliance with 40 C.F.R. § 80.590.

Commenter: Phillips 66 Company

Other Streamlining Issues – EPA has asked for comment on other provisions that we feel should be considered that would increase efficiency and reduce costs. There are several issues that the industry has discussed with EPA that we still feel should be pursued. In addition, Phillips 66 has internally identified an issue that we ask the Agency to consider. These are:

CBOB – simplification of process to allow inclusion of ethanol blended downstream - The current process for RBOB certification and downstream quality assurance should be replicated for CBOB. Although there is a process in the regulations for capturing ethanol volumes blended into conventional gasoline or CBOB downstream, it is virtually impossible to utilize in situations where a refinery is shipping fuel on large fungible pipeline systems (such as Colonial Pipeline). Back in 2006, EPA finalized regulations that provide refiners an alternative quality assurance and downstream sampling and testing program for RBOB. This program needs to be replicated and extended to CBOB. The industry has previously done extensive work in looking at sections of the regulation and potential language changes necessary to provide this option. In addition, the RFG Survey Association has outlined a program to provide the quality assurance sampling and testing that would be required, similar to the current program for RBOB. Our industry could provide updated information to the Agency in an expedited manner for inclusion in this rulemaking. Currently, refineries have to test properties on CBOB or conventional gasoline on a clear basis for batch reporting purposes to EPA. However, they are also having to hand blend ethanol into the samples and test to assure the fuel will meet performance standards on a blended basis. Providing the requested regulatory change would simplify the laboratory sample handling and testing.

Our Response:

Today’s rule also clarifies the list of products that are not to be included in a refinery’s or importer’s compliance determination under §80.1240. Refiners and importers are currently required under §80.1235(b)(2) to exclude oxygenate added to finished gasoline, RBOB or CBOB downstream of either the refinery that produced the gasoline or the import facility where the gasoline was imported. This conflicts with EPA’s intended approach in §80.1238(b), which allows refiners and importers to include oxygenate blended downstream of a refinery or import facility in their annual average benzene calculation, provided the refiner or importer meets certain requirements. We are finalizing changes that will allow refiners and importers to include oxygenate blended downstream of their facility and that will make these related sections consistent. EPA received significant support for this action from commenters.

The current set of fuel regulations is the result of programs that have been established over the years to reduce emissions from mobile sources. These programs include gasoline volatility (RVP), reformulated gasoline and anti-dumping, sulfur control (which today's Tier 3 program will revise), mobile source air toxics (MSAT1), benzene control (MSAT2), and the renewable fuel standards (RFS). Most of these regulations have been amended numerous times.

The RFG and anti-dumping regulations in particular contain some of the more extensive requirements on sampling, testing, and reporting. They also have some of the more stringent restrictions on gasoline use (e.g., restricting where fuel produced can be sold, what it may be commingled with, etc.). EPA used the RFG and anti-dumping rules as the foundation for many aspects of subsequently developed fuel regulatory programs. However, the subsequent rules, considered as a whole, have supplanted most of the RFG and anti-dumping standards. For this reason, we proposed to streamline the regulations in several places as described above. Initial discussions with fuel industry representatives have indicated that a comprehensive review of the complete set of fuel regulations contained in 40 CFR parts 79 and 80 ("Registration of Fuels and Fuel Additives" and "Regulation of Fuels and Fuel Additives," respectively) could lead to further streamlining of the regulations beyond the streamlining provisions being finalized today. EPA expects that further streamlining would result in more efficient and less costly compliance determinations for affected parties while maintaining the environmental benefits of the programs. In many cases such changes could require not just the removal or streamlining of existing provisions but also the replacement of several provisions with new, less onerous ones that require further development, notice and comment. We intend to continue to seek comment in future actions on potential areas in the fuel regulations that may benefit from such a more comprehensive streamlining effort. For example, it may be possible for the RFG VOC standard to be met if a sufficiently stringent RVP level is attained. Under this scenario, sampling and testing requirements at the refinery would be reduced. Another potential scenario could involve consolidation of some RFG and anti-dumping rules; for example, a single set of rules governing the treatment of downstream ethanol blending and in-use surveys could provide greater efficiency and flexibility regarding fuel distribution.

We received a number of comments supporting the concept of further streamlining in 40 CFR parts 79 and 80, including suggestions for additional areas of the regulations to consider in the future.

6.1.1.9. Other

<u>Alternative Laboratory</u>

What Commenters Said:

Commenter: American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM); Marathon Petroleum Company LP (MPC)

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.

Commenter: Phillips 66 Company

Alternative designated lab – We support the proposed provision to allow designation of an alternative lab. There are occasions when the primary designated lab has an instrument outage or other problem preventing them from being able to complete the necessary sample analysis. Providing another option will alleviate these issues when they arise.

Our Response:

Refiners have indicated to EPA that significant problems are created when a facility's designated lab is nonoperational and testing cannot be performed at the lab during that time period. We are thus finalizing (at §80.65(f)(5)) that a facility will have the ability to designate a back-up or alternative lab for testing during such times. In no case could this alternative lab be used to select the best test result, rather it may only be used on those occasions where operational necessity causes a need for it (e.g., the normal lab is closed, the apparatus for certain test methods are down, or independent lab personnel are not available).

Responsible Corporate Officer

What Commenters Said:

Commenter: Phillips 66 Company

Changes needed in registration update procedures – Currently, any update to a company or facility registration requires signature from a responsible corporate officer (RCO) no matter the nature of the change. This process, which requires senior level approvals for relatively minor administrative updating, is very burdensome for executives and can be streamlined using sufficient company delegations. An example of this is a change in the facility contact information: a simple revision to a phone number requires RCO signature. We strongly encourage the EPA to provide flexibility in this process by granting authority to the RCO's designated company editor to make these changes without requiring additional RCO signatures. Also, there should be a mechanism for an RCO to designate which notifications are directed to him/her directly or to specifically choose to have notifications go to his chosen editor instead. An example is the notifications that go out when reports are submitted or resubmitted. In the situation where the company has a significant number of facilities, these notifications add greatly to the RCOs e-mail load. Our company editor would be happy to work directly with the EPA to help outline some specific changes that would alleviate burden and frustration in this area.

Our Response:

Regarding the suggestion that EPA revise the instances when a "responsible corporate officer" signature is required, we understand the concern expressed, but do not believe a regulatory action is necessary to address this concern. Rather, this issue is best addressed via administrative procedures. EPA plans to further evaluate this specific concern and similar "responsible corporate officer" issues and address the concerns in the future, outside of the regulatory framework.

<u>Diesel Cetane Number</u>

What Commenters Said:

Commenter: Ford Motor Company (Ford)

Diesel – Need for Increased Market Fuel Cetane Number: Ford would like to take this opportunity to recommend the need to increase the minimum cetane number in typical diesel market fuel to the EPA's attention for future regulatory action.

A higher cetane number is preferred to support a shorter ignition delay and better ignition quality as these are important to achieving the stringent Tier 3 emission standards. An increase in cetane number generally results in decreased emissions of HC, CO, and NOx. Increased cetane number results in a slower rise in combustion pressure, which leads to lower gas temperatures and in turn reduces the formation of NOx. Low levels of in-use cetane rating can increase white smoke emissions during cold start and lower cetane ratings result in higher combustion noise - the low ignition quality of the fuel causes rapid burning of the larger amount of fuel injected before ignition occurs, which results in higher cylinder peak pressure and creates the characteristic diesel noise. Additionally, running an engine on diesel fuel with a lower cetane number than required will result in cold starting difficulties, reduced performance, and increased emissions.

As a result of refineries optimized for maximum gasoline production, specified cetane levels are typically lower in North America than in Europe. In order to maintain the balance between the highest fuel economy and lowest emissions, diesel engines are designed based on fuels that are most representative of the market fuels where the vehicle will be sold. This makes it imperative for market fuel specifications to have tolerances that allow little variation in the fuel properties so that the engines will perform as close to the design standard as possible. The current ASTM D975 minimum cetane rating specified is too low to achieve maximum fuel economy and emissions improvements that are required in the near future.

Recommendation: Ford supports raising the minimum cetane level to 51 in order to align with European Union (EU) specifications, which will foster diesel engine technology advancements in global product development.

Our Response:

As noted by the commenter, this comment is outside the scope of the Tier 3 rule. If a future rule is promulgated regarding diesel cetane number, the commenter's suggestion could be considered at such time.

6.1.1.10. RFS

General

What Commenters Said:

Commenter: National Biodiesel Board (NBB)

While NBB appreciates the opportunity to comment on the proposed amendments to the RFS2 program, it is concerned with EPA's decision to make these proposals as part of an unrelated rulemaking and with insufficient explanation as to the legal authority or rationale supporting such changes. This is even more troubling given the extensive proposals on the RFS2 program that were recently made in the notices regarding the Quality Assurance Program and technical amendments. Thus, NBB requests EPA provide more explanation for the amendments, as required by the Clean Air Act, and a meaningful opportunity to comment on them.

Our Response:

We disagree with the comment. The Agency utilized the Tier 3 rulemaking to also propose and finalize a number of relatively minor regulatory streamlining actions cutting across our vehicle and fuel programs, including several that related to the renewable fuels program. These actions were fully noticed in the proposal.

At proposal, we explained the need to revise and streamline certain provisions in order to reduce the burden on industry or in other words to provide additional flexibility. We explained that these revisions would have no expected environmental impact. Specifically, we proposed changes to the RFS2 annual report date from the last day of February to March 31. EPA intended the change would 1) alleviate staffing problems for regulated entities because the regulatory requirements are often handled by the same personnel and 2) provide relief from the urgent need to obtain RINs when small discrepancies in gasoline production or import volumes are realized. We also explained that streamlining reporting dates would allow EPA to develop a single, user-friendly, electronic form that would collect all required data, maximizing the capability of electronic reporting to provide reuse of data and avoid duplicate data submission. Additionally, we sought comment on whether the same date extension from the last day of February to March 31 should apply to those transferring RINs in EMTS for satisfying RVOs under the previous compliance year. We are not finalizing this change in this final rule, in response to comments. Further, EPA proposed not to include "Attest Engagements" (currently due May 31 of the following year) or reporting related to specific events under the Fuels Program, such as trading Renewable Identification Numbers (RINs) in EPA's Moderated Transaction System (EMTS), in the reporting revisions described above. Rather, all reporting deadlines for Attest Engagements and reporting specific events will remain the same. Finally, we proposed that parties who submit batch reports would not be required to correct inconsequential errors in reporting batch volumes under certain conditions, the primary condition being that the discrepancy met the definition of "de minimis", which as proposed, was an amount no greater than the smaller of 500 gallons or one (1) percent of the true batch volume. (See 78 FR 29950-29953). As discussed in Chapter 6.1.1.2 above, we are not finalizing any de minimis provisions at this time.

Reporting Dates

What Commenters Said:

Commenter: Chevron Products Company

In conjunction with the RFS compliance deadline, the ability to trade RINs in EMTS for satisfying previous year RVOs should be extended to March 31 as well to enable maximum compliance flexibility. An end-of-February cutoff date would mean a de facto end-of-February deadline to finalize compliance reporting given the potential need to purchase additional RINs for compliance.

Commenter: Independent Fuel Terminal Operators Association (IFTOA)

March 31 Annual Reporting Date and Trading: EPA is proposing to amend the annual reporting date for the Renewable Fuel Standard Program. Currently, compliance must be demonstrated by February 28 for the prior year. EPA is proposing to change that date to March 31. In addition, the Agency has asked for comments on whether trading of RINs used to demonstrate compliance should also continue through March 31.

The Association supports the change to the annual reporting date, but believes that all trading of RINs to meet the prior year's obligations should cease on February 28. In this way, members of the regulated community would have sufficient time to (a) calculate their precise RVOs for the prior year, (b) determine the volume of RINs held in inventory,(c) verify those RINs, and (d) prepare the reports in a timely manner. Separating the close of RIN trading from RIN reporting by a month should improve compliance and reporting accuracy.

Recommendation: The Association supports the proposed change in the annual reporting date from February 28 to March 31, but opposes any change to the date when RIN trading ceases; the later should remain at February 28.

Commenter: Irving Oil Terminals Inc.

Change in Annual Reporting Date — March 31: EPA has proposed to change the RFS2 annual reporting date from February 28 to March 31. EPA is also seeking comment on whether the ability to transfer RINs into the EMTS to meet an obligated party's previous compliance year's Renewable Volume Obligation ('RVO') should be extended to March 31 as well. Irving Oil supports the annual reporting change to March 31. However, it believes that the February 28 deadline for RIN trading and meeting a company's RVO should be retained. By allowing a month to elapse between the two activities, obligated parties have sufficient time to complete their accounting, verify their RVO and RIN inventory and work through their approval process with the Responsible Corporate Officer. This separation would facilitate more accurate reporting to EPA.

Commenter: National Biodiesel Board (NBB)

NBB Requests Clarification as to the Proposal to Amend the RFS2 Annual Report Date and Potential Implications for the RIN Market. In a purported attempt to address "a staffing problem" with respect to the RFS2 annual compliance reporting and reporting under other fuels programs, EPA is proposing to revise the annual compliance reporting date in 40 C.F.R. § 80.1451 for obligated parties from February 28 to March 31. 78 Fed. Reg. at 29,952. NBB does not necessarily oppose such an extension, but it is wholly unclear whether the proposal is truly addressing such a staffing issue and, thus, is necessary. In particular, EPA cites the RFG and anti-dumping compliance deadlines, but EPA is also proposing to move several of those February 28 due dates to March 31. *See id.* at 30,012, 30,015. NBB requests clarification as to EPA's rationale for the need to move the dates.

EPA also contends that the extension will allow obligated parties to conduct a "volumetric auditing . . . and would have no impact on . . . compliance with the standard." 78 Fed. Reg. at 29,952. However, EPA provides no explanation as to what this "volumetric auditing" is, if it applies to all gasoline/diesel (or, e.g., just RFG audits), or when it occurs. It simply is unclear why obligated parties need 90 days to identify their volumes and obligations under the RFS2 program. That being said, NBB does not necessarily object to a March 31 deadline, so long as the extension is only intended to allow additional time to ensure accurate volumes are reported, and not to affect the RIN market. The Tier 3 Proposal provides no explanation as to whether the additional month will have an effect on the RIN market. Instead, EPA simply concludes that it will have no impact on compliance with the standard. There is substantial RIN activity in January and February to allow parties to true-up their RIN inventory to ensure they have sufficient RINs. As EPA is aware, there is much speculation in the RIN market, and it is unclear how this extension may affect that market. Moreover, many negotiations for fuel contracts for the coming year are done at the beginning of the year, when obligated parties apparently will still be addressing the prior year's compliance.

Further, NBB requests more information before EPA considers allowing ongoing RIN transfers in the EMTS through March 31 for compliance with the prior year. The RFS2 program is intended to spur production, and such an extension may only lead to more speculation and ease of purchasing prior year RINs rather than actual purchase of wet gallons. In either case, EPA does not provide sufficient explanation as to its proposed change, and, thus, NBB requests that EPA carefully consider such impacts and allow the public time to comment on its assessment.

In addition, in its comments on the Quality Assurance Program, NBB requested more transparency and consistency as far as reporting of available RINs and compliance by obligated parties. *See* EPA-HQ-OAR-2012-0621-0069 at 60-61 (Apr. 18, 2013). We are also concerned that the additional month will further delay EPA's release of such information. Again, NBB requests that EPA carefully consider the potential impacts of the proposed change.

NBB notes that EPA also has proposed to revise the due dates for the quarterly reports under 40 C.F.R. § 80.1451(f). In particular, for the last quarter, EPA proposes to extend the deadline by an additional month. Again, NBB does not necessarily oppose the extension, but if the February 28 deadline remains for obligated parties, their RIN activity and transaction reports should continue to be due the same date.

Commenter: Shell Oil Products for Shell and Motiva

EPA requested comment on Amendments Related to RFS2 Annual Report Date,78 Fed. Reg. 29952, specifically the date to be able transfer RINs in EMTS for satisfying RVOs for the previous compliance year. We request that the ability to transfer RINs in EMTS for satisfying RVOs under the previous compliance year be extended to March 31 to coincide with the proposed annual report date for other EPA programs.

Commenter: Sutherland Asbill & Brennan LLP (Sutherland)

Reporting Deadlines. The Proposed Rule would change the reporting deadlines to enable the use of a unified and simplified reporting form and reduce the number of deadlines facing regulated parties. EPA solicited comments regarding whether the ability to transfer Renewable Identification Numbers ('RINs') in EMTS for the purpose of satisfying Renewable Volume Obligations ('RVOs') under the RFS from the previous compliance year should be extended to March 31. Sutherland believes this is a logical extension, and encourages EPA to extend the deadline to transfer such RINs to March 31.

Our Response:

EPA is finalizing the proposed changes to the RFS2 annual report date from the last day of February to March 31. EPA intended the change would 1) alleviate staffing problems for regulated entities because the regulatory requirements are often handled by the same personnel and 2) provide relief from the urgent need to obtain RINs when small discrepancies in gasoline production or import volumes are realized. Streamlining reporting dates will allow EPA to develop a single, user-friendly, electronic form that will collect all required data, maximizing the capability of electronic reporting to provide reuse of data and avoid duplicate data submission. Commenters generally agreed with the proposed date change. One commenter pointed out that the staffing issue described would not be addressed by the change date because EPA is changing both RFG and Anti-dumping compliance deadlines to March 31 – same as the RFS2 annual reporting. EPA understands the point made but nonetheless, believes that delaying the RFS reporting date will give reporting entities additional time and flexibility to review data and will have no impact on emissions, air quality, or compliance with the standard. EPA also believes that the overarching goal of streamlining reporting dates to develop a single electronic reporting format, in and of itself, will provide general relief to regulated parties. Comments received generally support this view.

EPA requested comment on whether or not the same date extension from the last day of February to March 31 should apply to those transferring RINs in EMTS for satisfying RVOs under the previous compliance year. Some commenters wanted to have RIN trading through the new deadline (March 31), while others wanted trading to end on the last day of February to allow time for data cleanup which could improve compliance and reporting accuracy. One commenter also pointed out that changing the RIN trading deadline might have an unforeseen impact on the RIN market and suggested EPA carefully consider this possibility before making a decision on extending the RIN trading date. EPA agrees that providing enough time for data cleanup is important to ensure reporting accuracy and meet compliance goals. In addition, EPA understands stakeholders' concerns about how such a change in RIN trading could conceivably impact the RIN trading market dynamics. As such, RIN transfers in EMTS for satisfying RVOs under the previous compliance year will continue to end on the last day of February.

6.1.2. Performance-Based Measurement Systems (PBMS)

6.1.2.1. Comments in Support of our Proposed PBMS Requirements

What Commenters Said:

All the comments we received were in support of PBMS.

Commenter: Chevron Products Company

Chevron supports to adoption of the Performance Based Measurement Standards concept. Chevron actively participated in the development of the API/AFPM comments on this proposal. We refer you to those comments as our detailed feedback on this section.

Commenter: American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM)

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.

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.

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.

Commenter: Marathon Petroleum Company LP (MPC)

MPC supports adopting the Performance Based Measurement Systems proposal although we have provided some clarifications. 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.

Qualification criteria for designated test method installations that are “Method-Defined” parameters instruments and not used to qualify other “Method-Defined” methods (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.

Qualification criteria for method defined parameter instruments other than designated test methods (p. 29961): We agree with the proposed qualification criteria for Method Defined Parameter Instruments for VCSB Method-Defined Parameter Test Methods.

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.

Commenter: PBF Energy Inc.

PBF supports the inclusion of the proposed Performance Based Measurement Standard (PBMS) in the new rule for sulfur measurement.

Commenter: Shell Oil Products for Shell and Motiva

In general, we support the PBMS concept.

Commenter: Phillips 66 Company

Performance Based Measurement Systems – We are supportive of this effort – some modifications are suggested.

We are appreciative of the effort EPA has put forth to include a PBMS proposal in this rulemaking. The industry has been working collaboratively with EPA for many years to develop this concept – one that was first put into practice with the ultra-low sulfur diesel rulemaking. We support the proposal to exempt existing installations of designated test methods that have been in use for six months. As EPA states, requiring their qualification could be disruptive and burdensome to those operators and are already being used to certify fuels.

Our Response:

We acknowledge the support. For those companies that participated in the issuance of the API/AFPM comments on PBMS compliance deadlines, applicability of PBMS to in-line blending and specific PBMS requirements, please see below for our response to these AFI/AFPM comments.

6.1.2.2. Comments on the Proposed Compliance Period for PBMS

What Commenters Said:

Commenter: American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM)

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.

Commenter: Marathon Petroleum Company (MPC)

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.

Commenter: Phillips 66 Company

The proposed timing of November 30, 2014 for labs to have completed their qualification of test methods is too aggressive. A lab could be currently using multiple alternative methods that will need to be qualified under these new provisions. We would anticipate some modifications to the proposed rule based on comments received. Labs would wait for final rulemaking and additional needed detailed guidance before beginning the qualification process. There is a need for further clarification and implementation guidance beyond what is in the proposed rule in order to develop uniform qualification processes. Also the qualification process for some methods requires reference instruments to meet certain criteria for at least five months prior to application. A minimum of 18 months from publication of the final rule is a much more reasonable time requirement for labs to complete the test qualification process.

Commenter: Shell Oil Products for Shell and Motiva

We do believe, however, that in some ways the proposal is unnecessarily complicated and should be simplified. We agree with the proposal to exempt existing (in use for six months prior to publication of the proposal) installations of designated test methods that are method-defined parameters from the qualification requirement. We also agree with the proposed 40CFR 80.47(b)(3) to exempt existing (in use for six months prior to publication of the proposal) installations of D2622 from the accuracy and precision qualification requirements.

Our Response:

PBMS will be effective January 1, 2016, see Section VI.A.2.h of the Tier 3 final rule as well as 40 CFR 80.47. The Agency has chosen the approval option of only requiring Non-VCSB test methods to receive Agency approval starting January 1, 2016. VCSB test methods will be self qualified either through their respective VCSB or on a site specific basis. Please see Section VI.A.2.h of the Tier 3 final rule preamble as well as the final regulations at 40 CFR 80.47.

6.1.2.3. Applicability of PBMS to in-line Blending Methods

What Commenters Said:

We received several comments requesting our extension of PBMS to in-line blending methods.

Commenter: American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM); Marathon Petroleum Company LP (MPC)

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.

Our Response:

The final requirements apply to the qualification of analytical test instrumentation and methods used to measure various characteristics of individual fuel samples. Consistent with our proposal, it does not apply to sampling methods or in-line blending methods. This is because, in-line blending already has a certification process that sets forth qualification criteria that take into account the unique combinations of sampling, control, and analysis that are involved with in-line blending. See 40 CFR 80.65(f).

6.1.2.4. Categorization of Fuel Parameters as Absolute or Method Defined

What Commenters Said:

We received several comments in support of our categorization of fuel parameters as either absolute or method defined.

Commenter: American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM)

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 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.

Commenter: Marathon Petroleum Company LP (MPC)

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.

Our Response:

The Agency is finalizing the categorization of fuel parameters as absolute or method defined as proposed. The absolute fuel parameters are sulfur in gasoline and sulfur in butane. All other fuel parameters besides sulfur have been finalized as method defined fuel parameters. The following fuel parameters are method defined fuel parameters: Olefins, Reid Vapor Pressure (RVP), Distillation, Benzene, Aromatic content of gasoline and diesel fuel, and Oxygen and oxygen content analysis.

6.1.2.5. Comments on the PBMS Requirements

EPA Should Not Extrapolate Precision Qualification Criteria for Absolute Parameters to Those Used for Method-Defined Parameters.

What Commenters Said:

Commenter: American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM); Marathon Ashland Petroleum LP (MPC)

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:

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. 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.

Our Response:

EPA has adopted the TPI approach for setting precision criterion for method defined parameters, see Section VI.A.2.c.iii of the preamble to the Tier 3 final rule as well as 40 CFR 80.47.

<u>EPA's Proposed Accuracy Qualification Requirements for Reference Installations are Overly Restrictive</u>

What Commenters Said:

Commenter: American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM); Marathon Ashland Petroleum LP (MPC)

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. The proposed qualification criteria for designated method installations used to qualify method-defined parameter instruments should be relaxed to be more realistically achievable.

Our Response:

EPA has changed the requirement that reference installations of the designated test method should be shown to be in the middle 50% of the distribution measurements of an industry monthly inter-laboratory crosscheck program for 3 out of 5 successive exchanges. See Section VI.A.2.d of the preamble to the Tier 3 final rule as well as 40 CFR 80.47.

<u>Sites Should Be Granted Greater Flexibility in the Choice of Procedures to Comply with the Proposed Statistical Quality Control (SQC) Requirements</u>

What Commenters Said:

Commenter: American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM); Marathon Ashland Petroleum LP (MPC)

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.

Our Response:

The Agency agrees the Q-procedure is functionally equivalent to the I-procedure and that laboratories should be given the flexibility to use either of these two procedures instead of both, as proposed.

<u>Recommend that EPA Specify ASTM D86-07</u>

What Commenters Said:

Commenter: American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM); Marathon Ashland Petroleum LP (MPC)

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:

'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 (T10, T50, and T90). 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 of control chart data in Figure 15 [of EPA-HQ-OAR-2011-0135-4276-A2] supplied by a producer.

Our Response:

EPA has based the distillation precision criterion on ASTM D86-07, see preamble Section VI.A.2.c.iii and Table VI-9, as well as 40 CFR 80.47. In addition, the accuracy demonstration must be based on the reference installation of the ASTM D86-07 test method along with use of ASTM D6708 in determining if a correction equation is warranted.

EPA's Proposed Accuracy Qualification Requirements for Reference Installations Are Overly Restrictive

What Commenters Said:

Commenter: American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM); Marathon Ashland Petroleum LP (MPC)

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.

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 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.

Our Response:

EPA has changed the requirement that reference installations of the designated test method should be shown to be in the middle 50% of the distribution measurements of an industry monthly inter-laboratory crosscheck program for 3 out of 5 successive exchanges. See section VI.A.2.d of the Tier 3 final rule as well as 40 CFR 80.47.

<u>ILCP Data</u>

What Commenters Said:

Commenter: American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM); Marathon Ashland Petroleum LP (MPC)

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 >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.

Our Response:

The Agency has made the change in the final regulations to allow VCSBs to make use of ILCP data for conducting ASTM D6708 assessments for method defined fuel parameters.

<u>EPA Should Provide an Example of an Acceptable ASTM D6708 Assessment</u>

What Commenters Said:

Commenter: American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM); Marathon Ashland Petroleum LP (MPC)

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.

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

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.

Our Response:

The flowchart examples have been corrected and placed in the docket to reflect the editorial comments for absolute fuel parameters and also to reflect specific comments the Agency has accepted in regards to method defined fuel parameters. For the absolute fuel parameter of sulfur, PMBS has been successfully demonstrated by over 800 test facilities for sulfur in diesel fuel. Therefore we believe the regulated industry is familiar with how to meet the accuracy and precision criterion for the absolute fuel parameters of sulfur in gasoline and sulfur in butane. For the method defined fuel parameter, such an example already exists in ASTM D6708 that is available to the industry and with which they are already familiar. If further explanation is needed for either the absolute or method defined fuel parameter approaches, the Agency can do so through future discussions and guidance.

EPA Should Remove the Term 'Robust' from the Final Rule Preamble and Regulatory Language

What Commenters Said:

Commenter: American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM); Marathon Ashland Petroleum LP (MPC)

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.

Our Response:

EPA agrees with this comment and has thus removed the term "robust" from the applicable final regulations.

Sites Should be Granted Greater Flexibility in the Choice of Procedures for Statistical Quality Control (SQC) Requirements (78 FR 29962)

What Commenters Said:

Commenter: American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM); Marathon Ashland Petroleum LP (MPC)

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.

Our Response:

The Agency agrees the Q-procedure is functionally equivalent to the I-procedure and that laboratories should be given the flexibility to use either of these two procedures instead of both of these two procedures as proposed in the Statistical Quality Control requirements for PBMS. The Agency also agrees for sites opting to use the Q-procedure, the very first run on the new QC batch should be calibrated by either an overlap in-control result of the old batch, or by a single execution of an accompanying standard reference material (SRM). Thus the new result would be considered validated if the single result of the SRM is within the established site precision of the ARV of the SRM. We have revised the regulations to reflect these changes. See preamble Section VI.A.2.g as well as 40 CFR 80.47.

Qualification Criteria and Test Method Approval Date

What Commenters Said:

Commenter: American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM); Marathon Ashland Petroleum LP (MPC)

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?

Our Response:

The Agency is going forward with the exemption date for designated test methods as explained in the proposed preamble and has made this correction in the final regulations. The Agency has chosen the approval option of only requiring Non-VCSB test methods to receive Agency approval starting January 1, 2016. VCSB test methods will have the option to either self qualify either through their respective VCSB or on a site specific basis. Please see Section VI.A.2.h of the Tier 3 final rule preamble as well as the final regulations at 40 CFR 80.47.

Requirement for Test Method Qualification Applications to Include a Complete Operational Description of the Test Method in Question

What Commenters Said:

Commenter: American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM); Marathon Ashland Petroleum LP (MPC)

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.

Our Response:

The Agency has chosen the approval option that only Non-VCSB test methods will be submitted for approval to that Agency. VCSB test methods will either qualify through their respective VCSB or on a site specific basis. The Agency agrees that during a potential audit, reference to a particular VCSB test method designation number should suffice for the method utilized through self-qualification by that particular facility as long as the VCSB follows the requirements specified at 40 CFR 80.47(l). The Agency agrees that a simple citing of the ASTM test method designation number would suffice for requirements of the operational description of an ASTM test method. Please see 40 CFR 80.47.

Temporal Distribution of Precision Tests

What Commenters Said:

Commenter: American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM); Marathon Ashland Petroleum LP (MPC)

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.

Our Response:

The Agency has chosen option 2 (arranging tests into no fewer than five batches of five or fewer tests each, with only one such batch allowed per day) for temporal distribution of precision tests. Please see 40 CFR 80.47.

Statistical Control Requirements Governing the Operation of Reference Installations

What Commenters Said:

Commenter: American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM); Marathon Ashland Petroleum LP (MPC)

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" but only with the proviso that:
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 restart. In other words, the system is still considered as being 'in control'.

Our Response:

The Agency agrees and has made this change to the regulations. Please see applicable Statistical Quality Control requirements at 40 CFR 80.47.

<u>Use of Reference Materials in Qualifying and Maintaining Alternative Analytical Techniques</u>

What Commenters Said:

Commenter: American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM); Marathon Ashland Petroleum LP (MPC)

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).

Use of reference materials in qualifying and maintaining alternative analytical techniques (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).

Our Response:

The regulations state that a facility conduct tests on every instrument with a commercially available gravimetric reference material, or check standard as defined in the ASTM D6299 at least 3 times a year using good laboratory practices.

5O) 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)

What Commenters Said:

Commenter: American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM); Marathon Ashland Petroleum LP (MPC)

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.

Our Response:

We acknowledge the support of this comment.

Test Performance Index

What Commenters Said:

Commenter: American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM); Marathon Ashland Petroleum LP (MPC)

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." 37 - Rosner, Technometrics, Vol. 25, May 1983

Our Response:

The Agency has incorporated by reference ASTM D6792 into the regulations.

Reference Installations

What Commenters Said:

Commenter: American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM); Marathon Ashland Petroleum LP (MPC)

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" but only with the proviso that:
-Regular maintenance and/or re-calibration conducted during the 5 month in-control qualification period is considered as part of in-control normal operation
-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'.

Our Response:

The Agency agrees and has made this change to the applicable accuracy and precision statistical control section of the regulations at 40 CFR 80.47(n)(2)(ii), 40 CFR 80.47(o)(2)(ii) and 40 CFR 80.47(p)(2)(ii).

Repeatability Criterion Alternatives

What Commenters Said:

Commenter: PBF Energy Inc.

PBF will evaluate the option provided in the proposal to voluntarily convert other RFG test methods to PBMS. We are aware that some of the methods may have higher variability and it may be difficult to meet the precision qualification measurement requirements as proposed. EPA should examine alternatives to the 1.5 times repeatability criterion discussed in the proposal if it is desired to have more refiner participation in the voluntary portion of the program.

Our Response:

EPA has adopted the TPI approach for setting precision criterion for method defined parameters, see Section VI.A.2.c.iii of the preamble to the Tier 3 final rule as well as 40 CFR 80.47.

6.1.2.6. Comments on the Proposed Regulatory Text

What Commenters Said:

Commenter: American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM); Marathon Petroleum Company LP (MPC)

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.

Commenter: Turner, Mason & Company

Under the proposed regulations, after November 29, 2014, the determination of sulfur in gasoline must be performance based, and other gasoline tests may be performance based. The performance based approval procedures are similar to those for the diesel sulfur determination. However, the EPA has added the additional step that the performance based procedures require an independent third party scientific review and written report, and verification of the information provided. The report and verification requires a site visit and review by an independent chemist and statistician who has received at least a bachelor's degree in science from an accredited college in the United States, with professional work experience in the petroleum or oxygenate field.

We propose that a chemical engineer with demonstrated experience in analytical techniques can perform the same function. Chemical Engineers have a strong background in chemistry, and, based on trends within industry, they will also have experience in statistical process control. Thus, we propose that the EPA should allow chemical engineers who can demonstrate their experience to be acceptable for providing an independent third party review and verification.

Our Response:

EPA agrees and has amended the final PBMS regulations to include chemical engineers and non-US degreed subject matter experts with equivalent knowledge and qualifications as third party oversight reviewers. See Section VI.A.2.f of the Tier 3 final rule preamble and 40 CFR 80.47.

What Commenters Said:

Commenter: Shell Oil Products for Shell and Motiva

We do believe, however, that in some ways the proposal is uncessarily complicated and should be simplified. The Agency requested comments on several items. For Agency Approval of Only Non-VCSB Methods, 78 Fed. Reg. 29964, we concur that only Non-VCSB methods need agency approval for method-defined parameters and absolute fuel parameters. Documentation should be submitted to the agency only for non-VCSB methods for qualifications for method-defined parameters and absolute fuel parameters.

In regards to qualification of test methods, id., we believe the Agency should not require qualification of all analytical test methods for the fuel parameters in 40 CFR 80.

In the proposed 40 CFR 80.47(k)(2), pertaining to criteria for reference installations, it mentions the use of an industry monthly inter-laboratory crosscheck program. In order to have the option to use other crosscheck programs besides ASTM, we recommend that the criteria for the reference installations refer to the use of a commercially available monthly inter-laboratory crosscheck program.

Our Response:

The Agency is finalizing the exemption date for designated test methods as explained in the proposed preamble and has made this correction in the final regulations. The Agency has amended the regulations to allow commercially available inter-laboratory crosscheck program data for meeting PBMS qualificaiton requirements described in final regulations at 40 CFR 80.47(k).

What Commenters Said:

Commenter: International Federation of Inspection Agencies (IFIA), Americas Petroleum Regional Technical Committee (APTRC)

It appears that EPA is proposing to add precision and accuracy requirements for tests that are put into use after May 30, 2014. These requirements are summarized in Table 1 [of EPA-HQ-OAR-2011-0135-4292-A1].

There does appear to be any exclusions for Alternate Test Methods in Section 80.47 ((i)(4) and also in Sections ((b)(3), (d)(2), (f)(2), (g)(2), (h)(2), (i)(2). IFIA recommends that these sections be excluded from this requirement as well.

Section 80.47 (k)(2): IFIA interprets this section that reference installation of method defined fuel parameters (i.e., excluding Sulfur Test Methods) must be shown to be within an acceptable tolerance range of consensus value averages in Proficiency Testing Programs. They also must be monitored by SQC in accordance with D6299.

Based upon this interpretation is appears that correlations of Alternate Test Methods to Primary Test Methods may only be performed using a Reference Installation. IFIA recommends that there be a provision for correlating to Primary Test Method ARV's of ILCP samples as well.

Section 80.47 (l)(1-4): This section states that for test methods that are not listed as being a Primary Test Method (including Alternate Test Methods, VCSB Test Methods that are not listed as being an Alternate Test Method and Non-VCSB Test Methods), their precision should be evaluated according to sections (b) through (i) and accuracy should be evaluated according to D6708. Also, regarding the accuracy check, if the difference is "null" then a correlation need not be applied but if "not null" then a correlation needs to be applied to the Primary Test Method.

Based on the above section, it seems evaluation by D6708 is mandatory. However IFIA recommends that it should be up to the laboratory to do a correlation in lieu of this, even if by D6708 it would not be required. The reasoning for this is that as time elapses a lab may find itself in and out of meeting D6708 tolerance requirements.

Sections 80.47 (1) and (2): IFIA requests confirmation of the following interpretations:
For Sulfur determinations, Gravimetric Reference Standards or Check Standards will need to be analyzed at least quarterly and once 15 or more results are gathered both an I and MR Chart should be constructed with control limits as defined in this section of the CFR.
That SQC be in place according to D6299 and that the Q procedure be used when replacing QC Material.

Sections 80.47 (o)(1) and (o)(2): This section is applicable to the Non-Sulfur Test Methods and basically the same as 80.47(n)(1), the accuracy check standard must be on an "ordinary fuel".

IFIA has two recommendations on this element of the section. Regarding the proposal that the accuracy check standard be an "ordinary fuel", this may cause issues over time as the integrity of a gasoline sample will likely be compromised. This is of particular concern for RVP and Olefins where there will be a propensity for drift and also Distillation where there will be a sizeable sample consumption. First, IFIA recommends that labs be allowed to plot the delta from the ARV [Accepted Reference Value] (obtained value minus ARV) instead of the obtained value. Second, instead of being mandated that this be done quarterly, IFIA would recommend three (3) times per year so that this requirement is in-line with ASTM ILCP sample cycle frequency.

This section states that the ARV must be determined according to D6299. IFIA believes this is an odd statement as the ARV is usually representative of the consensus value or mean (after outliers have been rejected).

This section also includes a mandate for monitoring the average of the most recent result and the one preceding it to determine if that average is greater than 0.75R. IFIA views this as overly complex. IFIA proposes that each value be compared against R instead.

Below 80.46 (h)(1)(vii), it seems as though the next section should list the test method for RVP (D5191-10b EPA Eq).

IFIA recommends adding a Section 80.47 (a)(14) to further explain the term *reference installation* as referred to in 80.47 (k). This is defined (at least somewhat) in the EPA Tier III on page 29958, column 1 midway down, as a method used for qualifying an *alternate test method.*

Our Response:

Effective January 1, 2016, for the reasons discussed in the Tier 3 proposed and final rule, all alternative test methods must meet the PBMS criterion described at 40 CFR 80.47. The Agency has amended the regulations to allow the use of both commercially available and voluntary consensus standards board inter-laboratory cross check data in meeting the PBMS criterion described at 40 CFR 80.47. If a laboratory chooses to use either a VCSB or non-VCSB method defined fuel parameter test method, in meeting the PBMS criterion for accuracy, the lab must use ASTM D6708 to determine the need for a correction equation. Please see our final regulations at 40 CFR 80.47. The Agency has made rule language changes to reflect that test facilities can conduct verification of new QC material three times a year in order to align this requirement with ASTM ILCP program sample cycle frequency.

What Commenters Said:

Commenter: Weaver and Tidwell LLP

i. As currently proposed, the primary regulatory methods and alternative regulatory methods listed in 80.46 are exempted from the performance based testing requirements in 80.47. Is the exemption for the methods listed in 80.46 dependent on 80.46 complying exactly with all the requirements listed in those methods (i.e., apparatus, reagents, calibration, quality control, procedures, calculations, etc.)? If the requirements of these methods are not followed exactly or are modified in any manner, do the modifications constitute a new method that must be qualified as required in 80.47?

ii. Change the wording in 80.46(a)(1) – The wording in this section uses the word "must" concerning the use of 80.47 after the appropriate date in 2014. Other paragraphs in this section use the word "may". We request that EPA change the word in 80.46(a)(1) from "must" to "may" for consistency.

Some specific modifications to the 80.46 method are listed below. Would any of the listed modifications to the method individually or in combination be sufficient to void the exemption from the performance based requirements of 80.47? As a secondary associated question, would the EPA cite any of these modifications in enforcement actions?

(a) For olefin content (80.46(b)), ASTM D1319, Section 6.5 requires the use of a hypodermic syringe with a needle having a length of 102 mm. Would the use of a hypodermic syringe with a needle having a length of ~ 50mm be sufficient to void the exemption from the requirements of 80.47?

(b) For olefin content (80.46(b)), ASTM D1319, Section 7.2 requires that the fluorescent indicator dyed gel be stored in a dark place under an atmosphere of nitrogen. Would the failure to store the fluorescent indicator dyed gel in a dark place under an atmosphere of nitrogen be sufficient to void the exemption from the requirements of 80.47?

(c) For olefin content (80.46(b)), ASTM D1319, Section 10.1 requires that the appropriate amount of fluorescent indicator dyed gel (3 – 5 mm) be added to the analytical column. Would the addition of an inappropriate amount of fluorescent indictor dyed gel (less than 3 mm or more than 5mm) be sufficient to void the exemption from the requirements of 80.47?

(d) For olefin content (80.46(b)), ASTM D1319, Section 10.3 requires that the hypodermic syringe be chilled to less than 4 °C. Would failure to chill the hypodermic syringe to less than 4 °C be sufficient to void the exemption from the requirements of 80.47?

(e) For olefin content (80.46(b)), ASTM D1319, Section 10.5 requires that the second set of readings of the zone measurement boundaries be made after the sample has advanced at least another 50 mm down the column. Would making the second set of readings before the sample had advanced another 50 mm down the column be sufficient to void the exemption from the requirements of 80.47?

(f) For olefin content (80.46(b)), ASTM D1319, Section 11.1 requires that percentages of hydrocarbon types be calculated for each set of readings and then that the percentages of hydrocarbon types from each set of readings be averaged to obtain the reported values. Would calculating the reported values in a different way (averaging the zone lengths from each of set of readings and then calculating the percentages of hydrocarbon types using the averaged zone lengths) be sufficient to void the exemption from the requirements of 80.47?

(g) For Reid vapor pressure (80.46(c)), ASTM D5191, Section 8.4.1 requires that, for transparent containers, the sample container be opened to momentarily, even if the appropriate liquid level can be verified externally. Would failure to open the transparent container prior to beginning the aeration cycles required in Section 8.4.2 volume can be verify the be sufficient to void the exemption from the requirements of 80.47?

(h) For Reid vapor pressure (80.46(c)), ASTM D5191, Section 11.1 requires a verification standard be tested every day the analyzer is used to perform testing. Recommended verification standards are listed in Section 7 and those suggested verification standards having calculated acceptable testing range intervals listed in Table 1. Section 11.2 requires that, if the verification standard results are outside the acceptable testing range intervals listed in Table 1, the verification standard must be rechecked or the calibration of the analyzer must be checked. Would the use of a verification standard not listed in Section 7 or Table 1 that does not have an established acceptable testing range interval (i.e. hexane) be sufficient to void the exemption from the requirements of 80.47?

(i) For distillation (80.46(d)), ASTM D86, Section 10.19 requires that the residue be measured in a 5 mL graduated cylinder. Would measurement of the residue using a graduated cylinder having a different volume (i.e. 10 mL marked with 0.1 mL graduations) be sufficient to void the exemption from the requirements of 80.47?

(j) For aromatic content (80.46(f)), ASTM D5769, Section 11.1 requires that ~ 10 grams of sample be mixed with the appropriate volume of internal standard during the sample preparation procedure. Would the use of a significantly different amount of sample (i.e. ~ 1 gram) during the sample preparation procedure be sufficient to void the exemption from the requirements of 80.47?

(k) For oxygenates (80.46(g)(2), ASTM D4815, Section 13.1 requires that the sample and internal standard be prepared in a capped 10 mL volumetric flask. Given the sample is being prepared gravimetrically, would preparation of the sample in a different type of container (i.e. a capped 10 mL scintillation vial) be sufficient to void the exemption from the requirements of 80.47?

iii. Questions relating to 80.46 - Can the procedures in ASTM D6708 be used to avoid the requirement to correlate the results from the alternate methods listed in 80.46 to the primary regulatory methods listed in that section? In our reading of 80.46, sections 80.46(a)(3) for sulfur content, 80.46(b)(2)(ii) for olefin content, 80.46(f)(3)(ii) for aromatic content, and 80.46(g)(2)(ii) for oxygen content refiners and importers must report results from the alternate methods that have individually been correlated to the primary regulatory methods. Our interpretation appears to be supported by the attached excerpt from the EPA Q&A documents (see Appendix 1).

Demonstrating acceptable correlation between the alternate methods and the primary methods using the procedures in ASTM D6708 would not ensure that an analytical result from an alternate method that was determined by an individual measurement system would be mathematically identical to the result determined by the primary reference method (consistent with the specified reporting significant figures). If the EPA contemplates allowing the use of the procedures in ASTM D6708 to eliminate the requirement to correlate the alternate methods to the primary regulatory methods in 80.46, then the text in sections 80.46(a)(3), 80.46(b)(2)(ii), 80.46(f)(3)(ii), and 80.46(g)(2)(ii) will have to be revised.

iv. 80.47(l)(3) – This section requires that a VCSB Method-Defined Parameter test method that is a candidate for qualification provide information about whether or not a correlation equation must be applied that predicts the designated test method results from the applicable method-defined alternative test method.

In our experience, it is likely that some laboratories may wish to qualify ASTM D6378 as a method-defined alternative test method for measuring Reid vapor pressure. ASTM D6378 includes a correlation equation to convert test results from ASTM D6378 to an equivalent value determined by ASTM D5191. However, that correlation equation relates the result from ASTM D6378 to a Reid vapor pressure determined by ASTM D5191 using the correlation equation in ASTM D5191, Section 14.2 (DVPE, psi = (0.965*X) - 0.548) rather than the equation required in 80.46(c) (RVP, psi = (0.956*X) – 0.347) where X = the total vapor pressure. For results generated according to ASTM D6378, the correlation equation specified in the method is insufficient to produce a Reid vapor pressure result equivalent to the original method and must be modified further to yield a result equivalent to the results required by 80.46(c).

v. Remove wording from 80.47 - EPA should consider removing the requirement that “All sample handling, testing, procedures and tests must be conducted using good laboratory practices” from 80.47. We agree that use of good laboratory practices is an excellent idea, however, the definition of “good laboratory practices” is somewhat subjective and the regulations provide no referenced list of “good laboratory practices” - providing a legally enforceable set of criteria.

Our Response:

i) Only those designated test method in use 6 months prior to the publication of the Tier 3 final rule are exempt from the PBMS accuracy and preicsion criterion described at 40 CFR 80.47. Those designated test methods will still be required to meet the applicable SQC requirements described at 40 CFR 80.47. In addition, if the user of a particular VCSB test method decides to deviate from the required apparatus, reagents, calibration, quality control, procedures or calculations, etc., that are specified in a particular VCSB test method, then by definition, the user would not be meeting the operational description of the VCSB test method, and thus have the option to qualify such a test method as a non-VCSB test method.

ii) Once PBMS is effective, January 1, 2016, all test methods must meet the requirements of 40 CFR 80.47, except those designated test methods in use 6 months prior to the publication of the Tier 3 final rulemaking. In regards to questions 6(D)(ii)(a) through 6(D)(ii)(k), as stated above, if a user of a particular VCSB test method decides to deviate from the required apparatus, reagents, calibration, quality control, procedures or calculations, etc., that are specified in a particular VCSB test method, then by definition, the user would not be meeting the operational description of the VCSB test method, but that user does have the option to qualify such a test method as a non-VCSB test method. The Agency notes one exception, for question B(f) on olefin content, where Weaver and Tidwell LLP asks about a particular modification to D1319, Section 11.1 requires that percentages of hydrocarbons types from each set of readings be averaged to obtain reporting values. Would calculating the reported values in a different way (averaging the zone lenghts from each set of readings and then calculating the percentages of hydrocarbon types using the averaged zone lenghts) be sufficient to void the exemption from the requirements of 90.47? The answer is no, unless the mathematics, including the oxygenate correction, yields different results.

iii) Once PBMS is effective, on January 1, 2016. the user of a VCSB method defined test method or Non-VCSB test method must utilize ASTM D6708 to determine the need for a correction equation for the candidate alternative test method. Please see the final regulations at 40 CFR 80.47.

iv) For RVP, once the user of an alternative test method such as ASTM D6378 has demonstrated thourgh the use of ASTM D6708 whether a correction equation is needed or not, they will still need to use the equation described in 40 CFR 80.46(c) for reporting purposes for the RVP fuel parameter.

v) EPA believes that all sample handing, testing, procedures and tests must be conducted using good laboratory practices and thus has retained the term good laboratory practices in the regulations.

6.1.3. Downstream Pentane Blending

What Commenters Said:

Commenter: American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM); Marathon Petroleum Company LP (MPC)

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.

Commenter: Independent Fuel Terminal Operators Association (IFTOA)

EPA also explains in the Preamble that there is a substantial increase in the production of natural gasoline liquids (such as pentane) occurring as a by-product from the increased production of domestic natural gas and crude oil in the United States. In addition, butane blenders have asked EPA to broaden the downstream butane blending provisions to include pentane to help increase the domestic supply of gasoline and to take advantage of this enhanced natural gasoline liquids market. Finally, EPA states that pentane blending may have a marginally beneficial effect on vehicle emissions. For these reasons, the Association supports expanding the downstream butane blending provisions to include pentane.

Recommendation: The Association recommends that EPA continue to provide flexibility to butane blending and consider a requirement that butane only need meet the downstream per-gallon sulfur cap so long as the butane blending operation does not cause the annual average sulfur content of the gasoline to exceed the proposed Tier 3 standard of 10 ppm. Moreover, the Association supports broadening the butane blending provisions to include pentane. Provide greater flexibility for butane blending and expand butane blending provisions to include pentane.

Commenter: Magellan Midstream Partners, L.P.

EPA currently provides flexibility for butane a blender which reduces the compliance burden. Should EPA provide the same flexibility for pentane blenders?

Magellan Comment — Yes, absolutely. We agree that it would be appropriate to allow pentane meeting certain specifications (specifications which include RVP and volatility limits) to be used in the production of gasoline using a method which would reduce the compliance burdens normally associated with refiner sampling and reporting. However, we do not believe this should be limited to 'pentane' but should as also include gasoline range hydrocarbons. For instance, heavy naphtha can be an appropriate gasoline blendstock, but would not fit in the pentane or natural gasoline definition.

Also as discussed, we encourage EPA to include a provision in the final rule which will provide compliance requirements for refiners that blend pentane or other gasoline range hydrocarbons downstream similar to those that apply to butane blenders. We feel it is appropriate to extend this opportunity to all gasoline range hydrocarbons rather than just for pentane blending. As greater levels of domestic oil and gas are produced, our nation will have increased natural gas liquids (NGLs) available for domestic utilization. We believe it is appropriate to allow gasoline range hydrocarbons meeting certain specifications to be used in the production of gasoline using a method which would reduce the compliance burdens normally associated with refiner sampling and reporting.

Commenter: Sunoco Logistics Partners L.P.

Sunoco Logistics also supports the broadening the downstream butane blending provisions to include pentane, provided the finished gasoline meets all applicable federal and state motor fuel quality standards. There has been rapid and unprecedented growth in the production of natural gas liquids (ethane, propane, butane and natural gasoline) - by products of the increased domestic natural gas and crude oil development in multiple shale regions in the U.S. We see a substantial opportunity to increase domestic gasoline supply with the downstream blending of the pentane fraction of natural gasoline streams. Pentanes (C5) are clean burning alkanes like butane (C4). Like butane the pentane fraction has always been present in gasoline. With a significantly higher boiling point-

Pentanes 82-97 °F
Butanes 11-31 °F

downstream blending of pentane at a constant volatility will result in reduced vehicle evaporative emissions than downstream butane blending.

Pentane blending and the specifications required to assure proper finished fuel performance and vehicle operability should generally mirror existing butane specifications:

Commercial Grade Pentane-
95% purity minimum
Sulfur <= 30ppm, then <=10ppm consistent with Tier 3 implementation date
Benzene <= 0.03 volume percent
Olefins <= 1.0 volume percent
Aromatics <= 2.0 volume percent
C6+ content <= 5.0 volume percent

Non- Commercial Grade Pentane-
Sulfur <= 30ppm, then <=10ppm consistent with Tier 3 implementation date
Benzene <= 0.03 volume percent
Olefins <= 10.0 volume percent
Aromatics <= 2.0 volume percent
C6+ content <= 5.0 volume percent

Downstream testing and oversight provisions for the commercial and non-commercial pentane streams could similarly parallel existing regulations for butane blending.

With these specifications assuring fuel performance, vehicle operability and the aforementioned reasons of increased domestic gasoline supply and lower evaporative emissions, the effective date of new pentane blending regulations should be set upon Final Rule publication.

Downstream Butane and Pentane Blending Sulfur Credit or Averaging Provisions: The proposed reduction in gasoline sulfur levels requires significant lead time and flexible compliance options to ensure a stable, adequate and affordable supply of fuel for the consuming public. Historically, EPA has devised various credit and averaging options for some transition period to ease supply concerns due to non-compliance. Like refiners, downstream blenders face the same challenges with the Tier 3 sulfur rules. A major supply source of the downstream blend components are the impacted domestic refiners and importers. Supply of 10ppm butane and pentane five years into the future is difficult to forecast. During the most recent transition from 140 to 30ppm in butane blending gasoline in 2003-5, a significant portion of the butane supply for blenders was non-compliant. Projecting forward to the implementation of the new Tier 3 Sulfur rules, it is realistic to expect a similar and perhaps more significant portion of supply from refiners and importers would be similarly noncompliant with the proposed 10ppm level. Accordingly, annual averaging for butane and pentane blenders to the 10ppm with the present 30ppm cap seems reasonable, uncomplicated and sufficient to maintain adequate, stable supply during the transition. At a minimum, blenders should have the same type of compliance flexibility as refiners during the transition period.

Our Response:

As discussed in Sections V.I and VI.A.3.of the preamble to the final rule, and consistent with our proposal, we are finalizing pentane blending provisions that are similar to those in place for butane under the Tier 2 program.[3] We are finalizing a 30 ppm sulfur cap for pentane blended into PCG (blender-grade) that will be effective until December 31, 2016, after which a 10 ppm sulfur cap will become effective. This is consistent with the Tier 3 10 ppm refinery average gasoline sulfur specification and Tier 3 specifications for butane blended into PCG.

As is the case with butane used by downstream butane blenders, we believe that blender-grade pentane that can be manufactured to meet the Tier 3 program sulfur caps with relatively mild desulfurization techniques and/or the choice of low-sulfur feedstocks. We further believe that allowing pentane used for RVP trimming to exceed a 10 ppm sulfur cap would needlessly complicate compliance assurance, defer some of benefits of the Tier 3 sulfur requirements, and would be inconsistent with the premise of implementing additional programmatic flexibilities that do not detract from the environmental goals of the Tier 3 program.

During our discussions with stakeholders following the proposal and from the review of public comments, we became aware of additional potential issues associated with assuring the quality of pentane for gasoline blending beyond those that exist for butane. In response to comments and to further limit variability in pentane quality, C6 and higher hydrocarbons in pentane blended into gasoline must be limited to 5 volume percent or less. In phone conversations with stakeholders during our review of the written comments, we were also made aware of the possibility that parties that handle natural gasoline liquids (NGL) might misinterpret the pentane blending provisions finalized today to apply to natural gas liquids.[4] A pentane stream for gasoline blending does not currently exist, and there are currently varying definitions of NGL, which is sometimes referred to pentanes-plus. Concerns also arose regarding potential contamination if the same equipment is used to transport blender grade and NGL. Consequently, in today's rule, we are finalizing the following additional requirements, that will preclude potential confusion of NGL with blender grade pentane, help ensure that the quality of blender grade pentane is maintained throughout the distribution system, and facilitate EPA enforcement and compliance assurance of the quality requirements for blender grade pentane.[5]

We believe that the butane blending provisions have reduced the burden of compliance with EPA gasoline quality requirements. We anticipate that expanding the provisions to allow pentane to be blended into PCG that we are finalizing in the Tier 3 FRM will further reduce the burden of compliance. The requirement that final blends must comply with maximum gasoline volatility requirements will ensure that the flexibility to conduct downstream RVP trimming will

[3] The requirements for butane blenders are found in 40 CFR 80.82.
[4] Memorandum to the docket entitled "Tier 3 Phone and E-Mail Log".
[5] The requirements for producers of blender-grade pentane and for pentane blenders are discussed in Section VI.A.3. of the Tier 3 FRM preamble.

not reduce the environmental benefits of EPA's gasoline quality requirements. Due to its lower volatility compared to butane, larger volumes of pentane than butane can be blended into gasoline while still meeting the gasoline RVP standards. Thus, allowing pentane to be blended into gasoline downstream of the refinery may displace butane blending. Since pentanes have a lower boiling point than butane, this could result in some environmental benefit from reduced vehicle evaporative emissions.

We are not expanding the downstream blending provisions beyond pentane in today's rulemaking. Pentane is a clean burning alkane like butane. The only concern with respect to the effect of downstream pentane and butane blending on vehicle emissions can be addressed through compliance with gasoline maximum volatility requirements. Less is known about the potential impacts on vehicle emissions of the downstream blending of blendstocks other than butane and pentane. We note that such blendstocks can still be utilized by refiners.

We therefore disagree with the comment that we should allow blending of heavier boiling range hydrocarbons, such as heavy naptha, would also likely raise additional compliance assurance issues. Similar to butane, blender grade pentane requires special pressure vessels for transport, storage, and blending into gasoline due to its relatively high vapor pressure / boiling point.[6] These special equipment and handling needs present significant barriers to entry into the pentane blending market, thereby limiting the potential number of parties engaged in the market. The substantial investments needed for such special equipment also provides assurance that parties engaged in the pentane blending market will be motivated to comply with EPA requirements. These factors make us confident that the compliance assurance requirements finalized in the Tier 3 FRM are sufficient to support provisions for pentane blending. On the other hand, in the case of heavier hydrocarbons that are liquid under ambient conditions, gasoline handling equipment could be used. This would greatly multiply the number of potential parties that could supply product to downstream blenders, thereby substantially increasing compliance assurance concerns. Therefore, we are not finalizing provisions for downstream blending of hydrocarbons other than blender-grade pentane.

6.1.4. Top Tier Detergent Equivalence

What Commenters Said

Commenter: Chevron Products Company

Regulatory Streamlining General Requirements and Deadlines – Gasoline Deposit Control Program

Chevron's experience with respect to compliance with EPA's and the top tier deposit control requirements confirms the following statement in this section: 'It is widely accepted that conformance with the Top Tier intake valve deposit (IVD) and fuel injector deposit (FID) control testing is more challenging than complying with the EPA IVD and FID testing requirements.' In

[6] The boiling point of pentane is ~ 97° F and butane is ~30° F.

fact, our years of extensive experience with respect to deposit control and related vehicle/engine performance testing, combined with the vast body of technical literature on the subject, shows that compliance with the Top Tier IVD/FID requirements results in enhanced improvements in emissions and performance compared to fuels with deposit control additive levels that merely meet EPA's deposit control requirements.

Chevron supports EPA's proposal to accept test data demonstrating conformance with the Top Tier program as alternative data under EPA's Deposit Control Program.

However, in proposed regulation §80.177(b)(1)(iv), EPA proposes that test fuel used for intake valve deposit testing using the procedure specified in §80.176(b) (the Top Tier IVD test) contain 'no less than 240 ppm sulfur.' The Top Tier Deposit Control Standard section 1.3.1.2 clearly states that the fuel shall 'Contain no less than 24 mg/kg sulfur.' Given EPA's consideration of permitting Top Tier IVD/FID data as an alternative, we believe the proposed 240 ppm minimum sulfur requirement in this proposed section is the result of a typographical error and should be corrected to 24 ppm (mg/kg) in the final rule.

Our Response:

As discussed in Section VI.A.4. of the preamble to the final rule, we are adopting the proposed amendments to EPA's gasoline deposit control regulations to accept test data collected for the industry-based "Top-Tier" deposit control program as demonstration of compliance with EPA's intake valve deposit (IVD) and fuel injector deposit (FID) control requirements. We note that we received comments that supported the "Top Tier" deposit control gasoline standards developed by four major automakers because they provide a more robust level of the control of vehicle engine and fuel systems than that provided by the EPA deposit control requirements.[7] We also note that several major gasoline marketers have adopted Top Tier for their gasoline. Accepting IVD/FID test data that complies with the Top Tier requirements in place of the standard EPA IVD/FID testing requirements will provide significant savings to industry from reduced deposit control testing while maintaining the emissions benefits of EPA's gasoline deposit control program.

In response to the comments that identified a typographical error in the proposed regulations to codify the Top Tier testing requirements at §80.177(b)(1)(iv), i.e., test fuel used in IVD testing must contain no less than 240 ppm sulfur, we have corrected the error in the regulations finalized in the Tier 3 final rule. The revised §80.177(b)(1)(iv), now states that test fuel used in IVD testing must contain no less than 24 ppm sulfur, consistent with the Top Tier deposit control standard.

6.2. Engine, Vehicle, and Equipment Program Technical Amendments

6.2.1. Engine and Vehicle Test Procedures (including Reference Methods)

[7] The industry-based Top Tier deposit control program is discussed at http://www.toptiergas.com/

6.2.1.1. Heavy-Duty Vehicle Testing

What Commenters Said:

Commenter: Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

HDV Testing: Discusses HDV evap test procedures. To simplify and streamline the CFR regulations industry proposes that EPA reference the LD evap test procedures and remove the HD evap test procedures from the HD subpart. LD evap test procedures would be utilized for all chassis certified evaporative emission testing.

Our Response:

We agree with the comment and have drafted the final rule accordingly.

6.2.1.2. Durability

What Commenters Said:

Commenter: Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

Component Durability: We note that proposed §§ 86.1823-08(g) and 86.1824-08(h) direct manufacturers to "use good engineering judgment to determine that all emission-related components are designed to operate properly for the full useful life of the vehicles in actual use." The Alliance and Global Automakers support this language.

Automobile manufacturers have strong incentives to produce vehicles whose emission-related components (as well as other components) are durable. The failure of an emission-related component in substantial numbers, within a class or category of vehicles, during a vehicle's useful life can give rise to the need for an emission-related recall. Manufacturers seek to avoid such recalls, which can be very costly and can also result in reduced customer satisfaction. As a result, manufacturers have developed a variety of techniques to evaluate the durability of emission-related components, with the goal of ensuring that they remain functional throughout the full useful life of the vehicle. Such techniques may include vehicle testing, bench testing of selected components, computer modeling, and other methods. In some cases, manufacturers provide suppliers with durability-related component specifications and require the supplier to attest that the specification is met using whatever data the supplier deems necessary to support the attestation. Collectively, these techniques come under the rubric of "good engineering judgment." The manufacturer, rather than the government, decides what information it needs to determine that its emission-related components will be durable. Manufacturers have honed these techniques over the years, and in the overwhelming majority of cases they work very well.

In a Supplemental Notice of Proposed Rulemaking issued on January 17, 2006, EPA discussed the issue of component durability and discussed possible options for further rulemaking in this area. 71 Fed. Reg. 2843. Option A would allow manufacturers to continue making "good engineering judgment" determinations. EPA outlined two other options, B and C, that would also require manufacturers to conduct "whole-vehicle testing" of certain vehicles. The problem with Options B and C is that they would seek to impose a brand new set of "one-size-fits-all" tests across the industry. Clearly, Options B and C would impose significant additional costs on vehicle manufacturers, who would be forced to deploy additional human and facility resources to conduct time-consuming vehicle tests. In contrast to the certain and substantial costs associated with these tests, the benefits of such tests would be negligible. Mandated, cookie-cutter tests are unlikely to be particularly effective in assessing component durability; at best, they may produce data that is duplicative of information that the manufacturer has already obtained at less cost by other methods.

The CAA gives EPA discretion to determine what types and sources of information manufacturers and the Agency may rely on in the course of the vehicle certification process. Nothing in the Act requires EPA to mandate uniform tests for every conceivable aspect of vehicle certification. Here, manufacturers have a strong track record of producing vehicles with durable emission-related components through their use of good engineering judgment. Moreover, they have strong incentives to continue doing so.

Recommendation: In light of the above, we support EPA's proposal to maintain the "good engineering judgment" standard for component durability and refrain from imposing costly and unnecessary new tests on the automobile industry.

Commenter: Afton Chemical Corporation

EPA's Tier 3 proposal includes "a variety of technical amendments to certification-related requirements for engines and vehicle emission standards." As explained more fully below, Afton Chemical's comments relate solely to those technical amendments, and in particular, the test methods and procedures that EPA has proposed for use by vehicle manufacturers to demonstrate compliance with the new Tier 3 emission standards. As the Agency should be aware, it has worked diligently in recent years to improve the transparency of the vehicle certification process under § 206 of the Clean Air Act ("CAA" or "Act"). Afton Chemical has very much appreciated those efforts. EPA's Tier 3 proposal provides a further opportunity for EPA to enhance the transparency of the vehicle certification process in accordance with the rulemaking requirements of CAA § 206(d).

Afton Chemical markets specialty chemicals for use in motor vehicle fuels and lubricants. One of Afton Chemical's objectives is to market products that improve the performance of fuels and lubricants in motor vehicles. For this reason, Afton Chemical has a direct and substantial interest in the nature and scope of the test methods and procedures used by EPA to evaluate motor vehicle performance. How EPA decides to test motor vehicles under the requirements of § 206 of the Act (42 U.S.C. §7525) may impact the design or viability of Afton Chemical's products. This impact can be direct, to the extent that Afton Chemical's products may potentially influence the outcome of the tests, or indirect, to the extent the test methods and procedures impact the way in which motor vehicle manufacturers design their vehicles to operate. In either case, access to the Agency's test methods and procedures provides Afton Chemical an important tool for evaluating its own products.

When EPA adopted the existing "Tier 2" vehicle emission standards in 1999, Afton Chemical (then Ethyl Corporation) sought judicial review of the Tier 2 regulations seeking to ensure that EPA developed all test methods and procedures used for motor vehicle "certification" under CAA § 206 by rulemaking as specified in CAA § 206(d). Afton Chemical's legal challenge culminated in a decision vacating the Tier 2 regulations and remanding the regulations to EPA for further rulemaking. See Ethyl Corporation v. EPA, 306 F.3d 1144 (D.C. Cir. 2002).

In 2006, following additional public notice and comment, EPA issued new certification regulations intended to comply with the court's mandate in Ethyl Corp. v. EPA. At the same time, EPA issued a supplemental notice of proposed rulemaking intended to address one of the comments made by Afton during the rulemaking process related to test methods and procedures used to establish emission control "component durability" as part of EPA's certification program. As EPA noted at the time, "Afton has raised an important issue." To address that issue, EPA proposed three options for establishing component durability and vehicle manufacturers and Afton Chemical thereafter submitted extensive comments on those three options (6).

In March 2006, Afton Chemical sought judicial review of EPA's new certification regulations. Those petitions for review are being held in abeyance, however, pending EPA action on an administrative petition for reconsideration of the then-new certification regulations Afton Chemical submitted to EPA a few weeks later. Afton Chemical's petition addressed three general issues:

1. EPA's implementation of a procedure using "equivalency factors" that relates various proprietary test methods used by automakers to test their vehicles to a "standard road cycle" established by EPA as part of the then-new certification regulations. Among other things, Afton Chemical expressed concern that (a) the automakers might assert that the equivalency factors are confidential business information thereby foreclosing release of equivalency factors to the public at large, and (b) the equivalency factors might be of limited value if automakers opted to report only a single "worst-case" equivalency factor covering their entire product line (8).
2. EPA's treatment of vehicles certified after issuance of the mandate in Ethyl Corp. v. EPA and prior to the effective date of the new certification regulations; and
3. EPA's failure to adopt by regulation test methods and procedures for assessing the durability of vehicle emission control system components, either individually or together as an integrated system.

In April 2007, EPA developed a new durability webpage that can be found at www.epa.gov/otaq/regs/ld-hwy/durability. Guidance included on the webpage indicated then (and now) that it would provide "more information specifically related to the implementation of the new emissions durability rule and the future component durability rule, once it is finalized." Consistent with that statement, in March 2009, EPA posted an initial report containing equivalency factors for all certified 2008 model year vehicles. Thereafter (presumably sometime during 2010), EPA posted a second report containing equivalency factors for all certified 2008 model year vehicles.

Finally, the court order holding in abeyance Afton Chemical's legal challenge to the 2006 certification regulations also required the parties to submit status reports to the court on a rolling 90 day basis. Since the court's order, twenty-seven status reports have been submitted to the court, the most recent on April 1, 2013. In all of those reports, EPA represented that it was continuing its examination of "the administrative record and comments regarding Afton's administrative Petition for Reconsideration" to determine whether it "has merit" and that the Agency would "make a final determination whether or not to grant that administrative petition as soon as is practicable" (14).

EPA's Tier 3 Proposal as It Relates to Vehicle Certification under CAA § 206: EPA's Tier 3 proposal includes a number of proposed revisions to the pre-existing CAP 2000 vehicle certification regulations. One such proposed regulation is 40 C.F.R. § 86.1823-08(g), pertaining to emission component durability testing. EPA has proposed adoption of the following regulatory text:

(g) Emission control component durability. The manufacturer shall use good engineering judgment to determine that all emission-related components are designed to operate properly for the full useful life of the vehicles in actual use.

Despite the fact that the foregoing language exactly matches the first of the three options EPA proposed in 2006 in its supplement notice to address Afton Chemical's concerns about the test methods and procedures used to demonstrate component durability, EPA nowhere addresses (a) why the Agency has apparently opted to adopt the first of the three options for component durability proposed in 2006 (and presumably rejected the other two options (or any others that might have been adopted)); (b) Afton Chemical's administrative petition for reconsideration (which addresses the same issue), or (c) whether the proposed regulatory text is intended to provide EPA's response to Afton Chemical's reconsideration petition (as it unavoidably does) (16).

As previously acknowledged, EPA has substantially improved the transparency of the vehicle certification program and Afton Chemical fully supports the Agency's efforts in that regard. The Tier 3 proposal provides EPA another opportunity to enhance transparency by adopting appropriate test methods and procedures for establishing the durability of emission control system components by rulemaking as required by § 206(d) of the Act (17). Afton Chemical therefore requests that the Agency address this important issue (including the long-pending administrative petition for reconsideration) as part of its continuing assessment of the Tier 3 proposal (18).

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6 - See id. at 2847-2848. The comments submitted by Afton Chemical and automaker associations can be found at www.regulations.gov in docket: EPA-HQ-OAR-2002-0079. Afton Chemical incorporates by reference (as if included directly in these comments) all of the documents contained in the foregoing docket.
8 - See www.regulations.gov: docket EPA-HQ-OAR-2002-0079-0033, pp. 3-7.
14 - See, e.g., Afton Chemical Corporation v. Environmental Protection Agency, Case Nos. 06-1095 and 06-1096, Status Report (April 1, 2013).
16 - EPA states only that "[m]anufacturers and catalyst suppliers perform detailed studies evaluating the cost and emission control performance of aftertreatment systems." Draft Regulatory Impact Analysis: Tier 3 Motor Vehicle Emission and Fuel Standards (March 2013) (EPA-420-D-13-002), p. 1-26. As

Afton Chemical noted in comments responding to EPA's supplemental notice concerning emission control system component durability, "[i]f good engineering judgment is to be the test for component durability, then EPA has to specify in its regulations what the test entails with sufficient specificity that interested members of the public will know how good engineering judgments are made by each automaker and can potentially replicate the exercise of engineering judgment in any particular case." See www.regulations.gov: docket EPA-HQ-OAR-2002-0034, pp. 3-4.
17 - Several other provisions in EPA's Tier 3 proposal also identify "good engineering judgment" as the metric for establishing the durability of emission-related components, including those that control evaporative and re-fueling emissions. See, e.g., 40 C.F.R. § § 86.1810.1(c), 86.1824(h) and 86.1825-08(h). As with EPA's proposed revision to 40 C.F.R. § 86.1823(g), these other provisions fall short of the rulemaking directive in § 206(d) of the Act (as Afton has explained in its administrative petition for reconsideration and related comments).
18 - The passage of time has obviated the need for EPA to address the second issue addressed in Afton Chemical's administrative petition for reconsideration so Afton Chemical formally withdrawals that part of its petition. See www.regulations.gov: docket EPA-HQ-OAR-2002-0033, pp. 8-15. Regarding the first issue addressed in Afton Chemical's petition, release by EPA of equivalency factors for all vehicles in the manner employed by EPA (i.e., reporting equivalency factors for each vehicle and each catalytic converter on each vehicle) addresses most, but not all of Afton Chemical's concerns about implementation of the equivalency factor procedure. Afton Chemical notes, for example, that EPA has not updated its durability webpage to include any equivalency factors other than those for the 2008 model year even though EPA represents on its webpage that it would update equivalency factors on a semi-annual basis. See http//www.epa.gov/otaq/regs/ld-hwy/durability ("The equivalency factor must be provided by manufacturers of light-duty vehicle, light-duty trucks and heavy-duty vehicles each model year and will be published semi-annually on this site.").

Our Response:

In the Tier 3 proposal, EPA included purely administrative changes to the component durability regulations for vehicle certification to remove regulatory citations from the text. The component durability regulations referenced older versions of the component durability regulations promulgated in 1999. In the Tier 3 proposal, EPA's intent was merely to remove the 1999 citations and replace them with "plain language" describing the same, unchanged regulatory requirements. That proposed change may have inadvertently led to the mistaken impression that EPA was proposing a final decision on a separate rulemaking proposal, the component durability proposal, published in 2006 (71 FR 2843, Jan. 17, 2006). Given the confusion regarding the purpose and effect of the proposed changes, and our intent not to make any substantive changes or decisions related to these provisions in this rulemaking, we are not finalizing the proposed revisions.

As noted in comments, Afton Chemical has also submitted a petition for reconsideration for the 2006 Durability Final Rule (71 FR 2810, Jan. 17, 2006). The Tier 3 rule does not address that petition and does not include a response to that petition for reconsideration. EPA will finalize its response to that petition separately.

6.2.2. Other

6.2.2.1. Fuel Economy Labeling

What Commenters Said:

Commenter: American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM); Marathon Petroleum Company LP (MPC)

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.

Commenter: Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

Under Fuel Economy Labeling: We request comment on applying smog ratings to TZEV vehicles; in particular, we request comment on any appropriate differentiation of TZEV vehicles, such as assigning different smog ratings based on the particular SULEV exhaust emission standards or the allowance value for different all-electric range values. We request comment on these and other alternative approaches to revising the specifications for the smog rating on the fuel economy label.

We also request comment on whether one or more transition rating scales would be appropriate to gradually adjust the smog rating scale as the fleet average standards become more stringent.

With respect to the Smog Ratings for TZEVs, we recommend EPA work with industry to develop an appropriate method that will account for real-world emissions based on factors such as exhaust certification level and all-electric range. We believe that the appropriate accounting for real-world emissions of TZEV should be addressed in BOTH the smog ratings AND the value used to calculate fleet average NMOG+NOx.

With respect to transition to different smog ratings, the intent of smog ratings are to inform consumers. Consequently, consistency is very important. It is possible, and in fact likely, that two vehicles identical in all respects except MY, will have different smog ratings for no other reason than changes to the scoring. Such discrepancies lead to confusion and lead customers to ignore the label all together or incorrectly believe that a newer cleaner vehicle has the same emissions as an older vehicle. While it might be necessary to make changes to the label at some point, we recommend severely limiting those changes.

Our Response:

In addition to the current rating scale, which will apply through MY 2017, EPA is finalizing one interim scale between now and MY2025. Though the standards will become more stringent annually, we believe it is important to strike a balance between maintaining consistency of the smog rating scales across multiple model years and targeting the midpoint of the smog rating to be at the current fleet average standard. An interim scale will allow for both. EPA understands that the first model year of a new rating scale may need additional explanation to ensure consumers understand that the rating scale has changed. We intend to help communicate these changes via fueleconomy.gov and EPA's Green Vehicle Guide.

EPA plans to develop guidance for smog ratings for TZEV vehicles in its annual fuel economy guidance letter. Therefore we are not finalizing a smog rating for California TZEV vehicles at this time.

In addition to the current rating scale, which will apply through MY 2017, EPA is finalizing one interim scale between now and MY2025. Though the standards will become more stringent annually, we believe it is important to strike a balance between maintaining consistency of the smog rating scales across multiple model years and targeting the midpoint of the smog rating to be at the current fleet average standard. An interim scale will allow for both. EPA understands that the first model year of a new rating scale may need additional explanation to ensure consumers understand that the rating scale has changed. We intend to help communicate these changes via fueleconomy.gov and EPA's Green Vehicle Guide.

6.2.2.2. Vehicle Labeling

What Commenters Said:

Commenter: Ford Motor Company

Ford … recommends that the requirement for vehicle ULSD labels be removed. Such vehicle labeling would be unnecessary for the same reasons that the ULSD pump label is no longer needed.

Our Response:

EPA has already modified §86.1807-01(h) to discontinue the vehicle labeling requirement related to ULSD for model year 2014 and later vehicles subject to chassis-based standards (77 FR 34146, June 8, 2012). We proposed in the Tier 3 NPRM to adopt this same provision for vehicles equipped with engines certified to the engine-based standards in 40 CFR part 86, subpart A. We are including this provision without modification in the final rule.

7. Costs

What We Proposed:

The comments in this chapter correspond to Section VII of the preamble to the proposed rule and address the estimated costs of the program. Summaries of the comments received and our responses to those comments are located below.

7.1. Costs of the Vehicle Standards

What Commenters Said:

Commenter: Consumers Union

In their comments, the Consumers Union states that, in addition to the tremendous public health benefits, vehicle owners will also see direct financial benefits from the proposed rule. The Consumers Union argues that lowering the sulfur content in gasoline cleans up exhaust from older cars, reduces corrosion of emissions control systems for existing vehicles and increases the lifespan of catalytic converters which can cost hundreds to thousands of dollars to replace.

Commenter: Peoples Republic of China

In their comments, the Peoples Republic of China had a somewhat opposite view stating that, since the useful life is being increased to 150,000 miles, manufacture costs will increase due to the need for more durability testing—costs which will result directly in the rise of the sales price of each vehicle. Their comments went on to recommend that the useful life under Tier 3 be the same as that under Tier 2.

Our Response:

We agree with the comment that reducing the sulfur level of gasoline will clean up exhaust from the majority of older cars as observed in our Tier 2 sulfur test program and analysis (see the final RIA). However, current sulfur levels have not demonstrated a deleterious impact on system durability and, therefore, we have not included any change in catalytic converter lifespan or included any such savings in our cost analysis.

Regarding the comment from the People's Republic of China, we have carefully considered the vehicle costs associated with the Tier 3 standards and present those costs in detail in Chapter 2 of the final RIA.

What Commenters Said:

Commenter: Emissions Control Technology Association (ECTA)

In their comments, the Emissions Control Technology Association (ECTA) states their belief that EPA's track record in estimating future technology costs has traditionally been shown to be very conservative (SAE 2002-01-1980). ECTA goes on to state their belief that The Tier 3 hardware cost estimates are also on the high side. As an example, ECTA notes that they are aware of advanced substrate developments being tested with customers that will decrease precious metal usage possibly 10-20% below current levels.

Commenter: International Council on Clean Transportation (ICCT)

In their comments, the International Council on Clean Transportation (ICCT) states that the costs to comply are modest and likely overstated in the proposal [EPA-HQ-OAR-2011-0135-4304-A1, p. 1]. ICCT also states that major advancements have occurred in vehicle emission control technology: catalysts have improved dramatically; fuel injection is more precise; feedback of actual air/fuel ratio is faster; software algorithms to predict air/fuel ratio have improved; drive-by-wire systems allow air and fuel to be changed simultaneously; and, development of initial idle retard for cold starts can bring the catalyst above light-off temperature before the initial 20-second idle is done. ICCT claims that, as these and other improvements are primarily due to better software algorithms, meeting the vehicle standards will be easier and will cost much less than assumed in the proposed rule. ICCT highlights their own analyses which found that catalyst precious metals will cost only about a third as much as estimated in the draft RIA and that optimized close-coupled catalyst, optimized thermal management, secondary air injection, and hydrocarbon adsorbers will not be needed on the vast majority of vehicles and/or will cost much less than estimated in the draft RIA.

ICCT also points to recent research by Honda and Johnson Matthey showing platinum group metal (PGM) usage could be reduced by 25% with respect to current Tier 2 Bin 5 levels and still provide LEVIII SULEV30 compliance (i.e., Tier 3 Bin 30) by using an improved layered catalyst and improved oxygen storage capacity (OSC). ICCT also notes research by Umicore in which Umicore stresses the importance of a combined NMOG+NOx standard as being less demanding than separate NMOG and NOx standards ICCT also provided their assessment that a 20% increase in PGM loading is the most that would be required for Tier 3.

ICCT also states that the proposal appears to place too much emphasis on early LEVII-SULEV vehicles, some of which used secondary air injection or HC adsorbers to ensure compliance. ICCT argues that these were the first vehicles to comply with lower emission standards and they were relatively low volume making it easier and cheaper for manufacturers to add existing hardware than to invest the engineering resources to fully optimize precise air/fuel control and fast light-off strategies, or to develop new hardware. ICCT adds that many manufacturers were able to meet the LEVII-SULEV standards without such additional hardware, even on their first attempt.

Commenter: Manufacturers of Emission Controls Association (MECA)

In their comments, the Manufacturers of Emission Controls Association (MECA) states general agreement with the proposed cost estimates but, given that the Tier 3 vehicle cost estimates were assembled approximately two years before the proposal was publicly released, MECA encouraged an update to the costs with the latest projections from the automobile industry and emission control industry. MECA states their belief that a number of factors will allow projected Tier 3 compliance costs to be lower than the proposed estimates. MECA notes that these factors include available and continued improvements in three-way catalyst technology, the additional flexibility of meeting a combined NMOG+NOx Tier 3 standard versus meeting individual NMOG and NOx emission standards, and the trend of engine/vehicle downsizing that auto manufacturers will use to comply with the future fuel economy/greenhouse gas emission standards.

Commenter: Sierra Club

In their comments, the Sierra Club argued that the proposal had demonstrated that the substantial increase in stringency of the proposed rule does not have correspondingly high costs. The Sierra Club suggested that this is because federal fleets already are demonstrating actual emissions performance much cleaner than the level to which they are certified. The Sierra Club also argues that not every technology will be required on all vehicles to meet the proposed standards, and only the most difficult powertrain applications will require very expensive emissions control solutions.

Our Response:

EPA agrees with these commenters that our proposed vehicle cost estimates used dated information and the estimated vehicle costs presented in the proposal were inappropriately high. For the final rule, as described fully in Chapter 2 of the final RIA, we have updated our vehicle cost estimates. In doing so, we have incorporated information from ICCT's study (SAE 2013-01-0534), ICCT's docket comments on the proposal, and a Umicore study (SAE 2012-01-1245). As a result, the vehicle cost estimates in the final rule and, in particular, the catalyst loading costs are considerably lower than in the proposal. Further, we consider the final estimates to be much more transparent in that they provide much greater detail behind the estimates, and we consider them far more robust given the greater level of supporting information

Regarding MECA's statement that engine downsizing in the context of green house gas standards would help reduce Tier 3 costs, we agree and have accounted for that effect by using the EPA-projected fleet mix resulting from the 2017-2025 GHG standards. That fleet mix contains a predominance of gasoline I4 engines which are the least costly engines at meeting Tier 3 emissions standards. The fleet mix used in the final rule and how it differs from the proposed rule is discussed in Chapter 2.7 of the final RIA.

Regarding the comments from the Sierra Club, we agree that some vehicles are demonstrating compliance with the Tier 3 standards today and have incorporated that fact into the final vehicle cost analysis. We also agree that not every technology will be required on all vehicles and have incorporated that fact into our analysis via the penetration (or application) rates presented in Tables 2-16 and 2-17 of the final RIA.

7.2. Costs of the Fuel Program

What Commenters Said:

Commenter: International Council on Clean Transportation (ICCT)

There are two additional very important points. First, reducing gasoline sulfur will result in large emission reductions not just from future Tier 3 vehicles, but also from the entire in-use fleet. The impacts of sulfur on older vehicles, in grams/mile, are fully as large as on Tier 3 vehicles, if not larger. As most of the sulfur impacts on catalysts are reversible, reducing gasoline sulfur will result in immediate and very large reductions of in-use emissions.

Second, analyses of catalyst precious-metal loadings and cost are generally done without considering changes in fuel sulfur. Reducing gasoline sulfur will enable reductions in catalyst precious-metal loadings, further reducing the cost of compliance and offsetting much of the cost of reducing fuel sulfur.

I also want to emphasize that the impact of sulfur on older vehicles in grams per mile are fully as large as on Tier 3 vehicles, if not larger. And as most of the sulfur impacts are reversible, reducing the sulfur will result in immediate and very large end use emission reductions.

Commenter: PBF Energy Inc.

PBF has reviewed and evaluated the proposed rule to control Air pollution from Motor vehicles: Tier 3 Motor Vehicle Emission and Fuel Standards. PBF is concerned that this regulation will place a large economic burden on refiners who must modify facilities to meet the proposed new fuel standards.

Commenter: State of Utah

In moving forward, EPA must minimize disruption and costs to refineries, costs which likely will be passed on to consumers. Manufacturing Tier 3 gasoline will require significant investments by Utah’s petroleum refineries.

Our Response:

As shown in Sections V and VII of the preamble to the final rule, we believe that the costs imposed is reasonable in light of the environmental benefits the Tier 3 program provides and it is therefore a reasonable action for EPA to require under our statutory authority. As also discussed in Chapter 5.5 of this Summary and Analysis of Comments document, we designed the program with considerable flexibility to minimize the cost and burden of complying with the standards.

7.2.1. Impact of the Sulfur Standard (on Refinery Closures, Price Spikes, Fuel Shortages)

What Commenters Said:

Commenter: Advanced Engine Systems Institute (AESI)

During the Tier 2 rulemaking process, petroleum industry executives predicted dire outcomes if that rule were to go into effect, including refinery closures, price spikes, and fuel shortages. Some stated it melodramatically, 'For some refiners, EPA's proposed regulation will be the straw that broke the camel's back. Facilities will close and jobs will be lost.'

Since then, refining activity has remained fairly constant, while shortages and price spikes driven by de-sulfurization requirements failed to materialize. In fact, an analysis done in late 2007 by experts from the Federal Reserve Bank of Dallas found no discernible effect on gasoline prices of the fully phased in Tier 2 sulfur requirements. And studies show that Tier 2 benefits in ozone reduction alone far outweighed oil industry costs of implementation.

For the proposed Tier 3 rule, the oil industry is again claiming that their costs of making sulfur reductions do not justify the benefits to the public's health and the economy. Yet the oil industry's most recent study for the Tier 3 proposal shows that no refineries will be closed or become uneconomic to operate, and it fails to accurately model the actual rule as proposed.

Commenter: Environmental Defense Fund (EDF)

Furthermore, erroneous claims of high costs by API are all too familiar. API made similar claims about the Tier 2 program and opposed a national program to address sulfur from vehicles and instead advocated for a less protective regional approach, suggesting western states had good air quality and that there would be only modest benefits of a national program (115). Yet, in recent testimony to EPA, API acknowledged that the Tier 2 program, "yielded measurable environmental benefits. The air quality benefits of the Tier 2 program are still being realized' (116).

115 - Environmental Protection Agency, Tier 2 Motor Vehicle Emission Standards and Gasoline Sulfur Control Requirements: Response to Comments, December 1999: 13-5.
116 - American Petroleum Institute, Testimony by Patrick Kelly at the EPA Philadelphia Public Hearing (Apr. 24, 2013).

Our Response:

We received comments that disputed claims of the refinery industry on the impacts of the sulfur standards. We agree with the commenters that the oil industry has made very dramatic claims in the past regarding refinery closures and shortfalls in product availability, and the most dramatic claims occurred in response to nonroad and highway diesel fuel standards. After the first Baker and O'Brien cost study which made similar conclusions associated with low sulfur and low RVP standards prior to our Tier 3 NPRM, we compared what actually transpired to diesel fuel supply and refinery closures after 2006 when the highway diesel fuel sulfur standards took effect to the dramatic predictions made by Baker and O'Brien and provided our comparison in Chapter 5 of the draft RIA for the NPRM. Our findings were that none of the dire predictions made by Baker and O'Brien with respect to diesel fuel had occurred. We also note that the revised Baker and O'Brien cost study for Tier 3 gasoline, which solely evaluated the cost of lower sulfur gasoline, neither forecasted any refinery closures nor reductions in the supply of gasoline like the first Baker and O'Brien study.

7.2.2. Cost (Average Cost and Marginal Cost, Such as 6 – 9 c/gal)

7.2.2.1 Average Cost

What Commenters Said:

Commenter: Natural Resources Defense Council (NRDC)

API has a history of inflated cost claims. A review of several clean fuels regulations finds that API estimates have been 3.6 to 6.4 times higher than actual observed price changes.

The API high cost estimates have the potential to raise concerns of industry investors, and some refining companies are backing away from the API estimates to present more realistic figures. For example, Valero Energy, which is the largest independent refiner in the U.S., recently told a group of financial analysts that its Tier 3 compliance will cost to \$300 to \$400 million. A finance expert colleague of mine at NRDC used the EPA's marginal cost assumptions and found that the \$400 Valero cost claim would equate to a compliance cost of approximately .6 cents per gallon, more than 10 times less than the API high estimate.

For Valero, the .6 cent per gallon translates into annual costs of about \$95 million, or just two percent of the four and a half billion in pretax earnings that the company made on refining in 2012. While Valero and other companies point out the cost of compliance is minimal, API continues to inflate costs. Regulatory cost inflation is part of their history. By exaggerating costs, API has attempted to scare consumers into potential large gas price increases at the pump.

The reality is that these large increases don't appear. According to a peer review report by EPA, API's estimates of compliance costs for previous clean fuel regulations adopted in the 1990s have been 3.6 to 6.4 times higher than the actual observed price changes. Similarly, a recent study by Navigant Economics found that the Tier 2 gasoline sulfur regulations, which API estimated would cost about three cents a gallon, have had no discernible impact on retail prices.

Commenter: Navigant Economics

First, there are serious flaws in the approach employed by Baker and O'Brien on behalf of the American Petroleum Institute to estimate the compliance cost to refineries. Second, I've examined EPA's cost benefit analysis. It comports with economic logic and best practices, and it validates our conclusions. Third, we examined the effects of the Tier 2 sulfur rule on the price of gasoline and found little to no impact suggesting the Tier 3 effect will be negligible.

So going to my first point on the flaws in the Baker and O'Brien approach, there are several, but today I just want to address three. Baker and O'Brien failed to account for averaging and trading of credits, which reduces the compliance costs to refineries. As EPA explained, refineries with pre and post treaters are able to achieve further sulfur reductions below the 10 parts per million standard at a relatively low incremental cost, and sell credits to refineries who would otherwise be faced with grass roots investments.

Averaging and trading reduces EPA's estimated compliance cost from .97 cents per gallon to .79 cents per gallon, a reduction of nearly 20 percent with averaging in trading. Between eight and 25 high-cost refineries out of 11 would prefer to consume credits than to upgrade their facilities. Baker and O'Brien's mistaken assumption that those high-cost refineries reduce the sulfur content of their gasoline they produce to 10 parts per million severely inflates their compliance cost estimates.

Second, Baker and O'Brien assume without support that the refinery with the highest cost of compliance will set the price of gasoline. However, if this were true, then the profits of the refinery industry, defined as the difference between the marginal cost and the average cost per gallon, would be four to seven cents, at which point the refiners should endorse Tier 3. Given the refiners' opposition, it seems that Baker and O'Brien's logic is faulty.

Third, Baker and O'Brien's estimated capital cost for a grass roots FCC post treater is not reasonable according to companies that construct or install desulfurization units. Indeed, Baker and O'Brien's capital cost estimates are between two and four times higher than industry benchmarks. Baker and O'Brien states that their estimates were based on actual installation for the Tier 2 program, but as EPA explains, a grass roots FCC post treater installed for Tier 2 would remove about 10 times more sulfur than one installed for Tier 3, and, thus, would have significantly higher capital costs. Correcting this one defect in the Baker and O'Brien study causes their cost estimates to come into alignment with those of MathPro and of EPA.

Thank you for the, I guess, the support for our cost analysis. But if you could just spend just a moment, because you were cut a little short. So what are the main differences between, you know, our one cent a gallon and the six to nine cent estimate from Baker and O'Brien?

So I think the points that I rattled off were the main drivers. One is this conflation of the average and the marginal. I think that what -- when you actually saw for the average of the Baker and O'Brien, you don't get that big of a divergence. You get something like one versus two.

But even there, the difference can be entirely explained away with just one change, and that's this capital cost component of these treaters. And the way that we tried to ascertain that it was exaggerated was by interviewing actual providers of these equipments, these types of equipment and founding out whether their costs were reasonable. And they told us they weren't.

Commenter: Natural Resources Defense Council (NRDC)

API's cost estimates for Tier 3 are inconsistent with API's own members, which estimate costs as either immaterial to their business or less than a penny a gallon.

Commenter: Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

We recognize that reducing the sulfur content of fuel will have a cost. However, as EPA details in the proposed rule, these costs have been exaggerated by the petroleum industry (66). Indeed, as a general matter, petroleum product prices are due primarily to changing global crude oil prices. The compliance costs of the sulfur reductions contained in the proposed rule will not have an appreciable effect on the price of gasoline at the pump.

In the proposed rule EPA found that the cost of compliance with the fuel standards will be an average of 0.89 cents per gallon (67). The Baker and O'Brien study (API) found a 1.9 cent per gallon average increase from Tier 2 (6-9 cents marginal cost with no RVP change) (68). In contrast, the MathPro study for the International Council on Clean Transportation (ICCT) found a 0.8 to 1.4 cent per gallon increase from Tier 2 (69). In the proposed rule, EPA's analyses were closer to the MathPro estimates, and exposed the invalid assumptions of the Baker and O'Brien study (70). It is extremely unlikely that a small (1 cent or less) increase in refining costs would be passed on to consumers in an increased gasoline price (71).

In short, both EPA's data in the proposed rule and the Navigant study demonstrate that the overall cost impact of reduced sulfur will be very low on an average per-gallon basis, and significantly lower than the benefits of the rule. Navigant states that Tier 2 had no statistically significant impact on gas prices after controlling for cost of crude oil, refinery margins and other factors, and Tier 3 would impose only half the average cost of Tier 2 (approximately one cent per gallon versus 2 cents). Therefore, as noted above, it is very likely the retail pump impact of the reduced sulfur requirements will be close to or at zero. Even the Baker and O'Brien study, which both EPA and Navigant has discredited for a number of overestimates of cost, still found that no refinery shutdowns are projected from the reduction in sulfur proposed under the rule. The benefits of the rule far outweigh the costs, and the reductions in sulfur will be a crucial component of allowing the OEMs to achieve the required reductions in criteria pollutants.

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65 - The (octane) grade weighted (pool average for US (excluding California) would be closer to 27 ppm. Survey can be purchased from the Alliance website www.autoalliance.org.
66 - 78 Fed. Reg. 29908 at 29972-29979 (May 21, 2013).
67 - 78 Fed. Reg. 29908 at 29972 (May 21, 2013).
68 - See March 2012 addendum to the original July 2011 Baker and O'Brien study. This was analyzed by the Navigant study.

69 - Id.
70 - EPA cited to the Navigant study which found that Baker and O'Brien cost predictions have been inflated in the past (e.g., cost of reducing sulfur in diesel fuel was significantly less than predicted). 78 Fed. Reg. 29908 at 29978 (May 21, 2013). EPA also points to Navigant's data showing that the Baker and O'Brien study does not account for reductions in cost from averaging and trading. In addition, the Baker and O'Brien study also has other logical flaws, such as erroneously large capital cost assumptions and a lack of quality data about the individual U.S. refiners, both of which were noted by EPA. Navigant believes that the Baker and O'Brien study exaggerates the costs by a factor of 2 to 1. EPA and Navigant note that estimated capital cost for new FCC naphtha desulfurization unit used in the Baker & O'Brien study is not reasonable. 78 Fed. Reg. 29908 at 29978 (May 21, 2013). Navigant notes that differences in the refinery model methodologies (i.e. individual refinery versus PADD-based) between the Baker and O'Brien and Math Pro studies is not enough to account for their varying cost estimates. Instead, Navigant found that different assumptions about capital costs account for most of the difference in cost estimates.
71 - See also recent MathPro Tier 3 testimony at the EPA public meeting.

Commenter: American Fuel & Petrochemical Manufacturers (AFPM)

A Baker and O'Brien analysis estimates that a gasoline sulfur content reduction will cost refiners $10 billion in capital costs, and $2.4 billion per year in operating costs, increasing the cost of producing gasoline by six to nine cents per gallon.

Commenter: American Lung Association

Other Analyses Support EPA's Findings that Standards Have Very Low Cost for Consumers: Two independent studies support EPA's conclusions that the refining cost associated with Tier 3 sulfur standards will be very low compared to the benefits. In 2011, MathPro, a consulting firm specializing in economic analysis of petroleum refining and related industries, commissioned by the International Council for Clean Transportation, found that the per-gallon refining cost of a Tier 3 program with a 10 parts per million sulfur standard would be 1.4 cents (47).

In 2012, Navigant Economics, commissioned by the Emissions Control Technology Association, estimated the cost of low sulfur gasoline standard would be about one cent per gallon. This estimate is closer to EPA's and MathPro's estimates rather than the higher cost claims from the oil industry (48).

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47 - MathPro. Refining Economics of a National Low Sulfur, Low RVP Gasoline Standard: A study performed for The International Council for Clean Transportation. MathPro Inc: Maryland, 2011. Available at
http://www.theicct.org/sites/default/files/publications/ICCT04_Tier3_Report_Final_v4_All.pdf
48 - Schink GR, Singer HJ. Economic Analysis of the Implications of Implementing EPA's Tier 3 Rules: Prepared for the Emissions Control Technology Association. Navigant Economics: Washington D.C., 2012. Available at http://www.ectausa.com/061212-Economic-Analysis-of-the-Implications-of-Tier-3-Sulfur-Reduction-Finalembargoed.pdf

Commenter: American Petroleum Institute (API) and the Association of Fuel &

Petrochemical Manufacturers (AFPM)

Reducing gasoline sulfur to an average of 10 parts per million is expensive. Research API shared with the Agency shows nearly $10 billion in capital costs. The annual compliance cost is about $2.4 billion, or six to nine cents per gallon in marginal costs. EPA should not consider these costs in a vacuum. Refiners need to balance these expenses with the cumulative costs of other Federal and States regulations.

EPA: Did you say that the annual cost from your study was $2.4 billion?
API: The annual compliance costs. That includes the – it is the annual cost of compliance and includes capital recovery.
EPA: And so what is that in terms of cents per gallon then because that's the average cost then?
API: That's a total cost, the $2.4 billion. And it equates to a six to nine cent per gallon marginal cost in most markets. Does that answer your question?
EPA: I guess – well, what is the $2.4 equate to in terms of an annual – in terms of cent per gallon?
API: In marginal costs, it would be six to nine.
EPA: Do you have an average cost?
API: We didn't do an average cost. While average cost is an important factor, in commodity markets, when all of the demand is needed for that commodity, the marginal cost is very relevant in setting the market price. And so, therefore, we looked at the marginal cost because of its importance to the marketplace.

EPA uses a cost estimate based on average cost that ignores the important role that marginal cost plays in gauging the market response to the regulation. EPA should not consider these costs in a vacuum. Refiners need to balance these costs with the cumulative cost of other Federal and States regulations.

Commenter: Attorney General of Connecticut, et.al; Attorney General of New York, et.al

Indeed, EPA concluded that "[t]he proposed fuel standards are projected to cost on average less than one cent per gallon of gasoline." 78 Fed.Reg. at 29,827.

Commenter: Chevron Products Company

We believe that EPA has underestimated the cost and complexity of the changes which will be required in the refining industry to achieve this reduction. EPA's economic impact analysis relies entirely on the national average cost increase for gasoline production, instead of the marginal or incremental cost of supply as proposed by Baker and O'Brien (1). The incremental cost of supply is usually correlated with market price effects when demand must be met with more expensive sources of supply. Therefore, using the incremental value is more representative of the true societal cost than using the average. By using the national average cost increase, EPA is underestimating the true cost of the Tier 3 program.

1 - Baker & O'Brien, 'Potential Supply and Cost Impacts of Lower Sulfur, Lower RVP Gasoline', 2011

Commenter: Emissions Control Technology Association (ECTA)

We agree with EPA's methodology for estimating the cost that the refining industry will incur to comply with the sulfur content requirement of Tier 3. We also agree with EPA's estimate that the average cost of compliance for the refining industry is only 0.89 cents per gallon (16). We believe EPA's estimated costs are reasonable for two reasons as described below.

It is also noteworthy that EPA's average cost per gallon estimates comported with those of Mathpro (0.8 cents), further validating its cost model (20).

Based on a study by Baker O'Brien sponsored by the American Petroleum Institute, the refining industry cost estimates implies that the average cost of compliance would be 2.12 cents per gallon or more than double EPA's estimate of 0.89 cents per gallon (24). We believe that EPA's estimate is far more reliable than the refining industry's estimate for three reasons.

First, Baker & O'Brien assumed an after-tax ROI for capital invested for the hydrotreaters and hydrogen plants of 10%, which is unreasonably high. EPA assumed before-tax ROI of 7% (25). This before-tax ROI is equivalent to an after-tax rate of return of approximately 5.2 %, and it is consistent with the rates used by EPA in related matters (26). To be fair, Baker & O'Brien's higher rate of return may be closer to what refiners use when evaluating conventional refinery investment opportunities (27). However, EPA correctly uses a lower 7% ROI when estimating the social costs of regulations. In other words, the EPA's 7% before-tax rate of return is effectively a social discount rate; the same value is used by EPA to discount future benefits from environment regulations. Merely changing Baker & O'Brien's assumed ROI to reflect the perspective of society (rather than private industry) reduces its estimated average compliance costs from 2.12 to 1.58 cents per gallon.

20 - EPA Proposal, Fed. Reg. at 29977.
24 - Id. at 29977.
25 - Id. at 29978.
26 - See, e.g., EPA, Regulatory Impact Analysis: Heavy Duty Engine and Vehicle Standards and Highway Diesel Fuel Sulfur Control Requirements, EPA420-R-00-026, Dec. 2000.
27 - Mathpro, Refining Economics of National Low Sulfur, Low RVP Gasoline, Oct. 2011, at p. 13 (hereinafter Mathpro Study).

Commenter: Environmental Defense Fund (EDF)

The fuel standards in the Tier 3 proposal are cost-effective. EPA estimates that the cost to refiners of reducing the sulfur in gasoline to an average of 10 ppm will be 0.89 cents per gallon averaged over all gasoline.

Even if there were no ABT program, or no refiners decided to participate in the program, EPA estimates that the fuel costs would still only be 0.97 cents per gallon on average. Moreover, a study by Navigant Economics projects that these costs will not be passed on to consumers (106).

The International Council for Clean Transportation: The International Council for Clean Transportation (ICCT) commissioned a study by MathPro in 2011, building upon and updating a 2009 MathPro study commissioned by the Alliance of Automobile Manufacturers. The ICCT study analyzed the economic impact of a 10 ppm sulfur limit for all gasoline and found that the cost of lower sulfur standards to oil refiners would be 0.8–1.4 cents per gallon (107). MathPro estimates that $3.9 billion would need to be invested to meet low-sulfur standards and that the annual refining costs would be $1.5 billion. These estimated costs are very close to EPA's estimates.

Emissions Control Technology Association Study: A Navigant Economics study commissioned by the Emissions Control Technology Association (ECTA) in June 2012 found that the cost to oil refineries to produce 10 ppm sulfur gas would equate to approximately one cent per gallon (108). Furthermore, the study found that these small costs would likely not be passed on to consumers through higher retail gasoline prices.

Navigant also conducted a multiple regression analysis to test whether the increased cost to U.S. refiners of implementing the Tier 2 gasoline sulfur reductions from 300 ppm to 30 ppm were passed on to consumers in the form of higher retail gasoline prices. The analysis found that the increase in cost to U.S. refiners of about two cents per gallon were not passed on to consumers, suggesting that it is highly unlikely that the Tier 3 costs will be passed on to consumers.

American Petroleum Institute Study: The American Petroleum Institute (API) commissioned a study by Baker & O'Brien (B&O) in 2011, which estimated that the sulfur reduction requirement of Tier 3 would increase the marginal cost of refining by 6 to 9 cents per gallon (109). The marginal costs reflect the cost to the refineries that would experience the highest costs, not the average costs as estimated by EPA.

The API commissioned study also indicates that the fuel program would be economically beneficial to the refining industry. B&O do not anticipate any refinery shutdowns as a consequence of Tier 3 and the analysis indicates that all U.S. refineries would find it cost-effective to make the investments necessary to comply with these standards and that the capital required to make the investments will be available. According to EPA, API's analysis "would suggest that the oil industry would profit from 10 ppm low sulfur standard by roughly 4 to 7 cents per gallon, or roughly $4 to $8 billion dollars per year as a result of gasoline sulfur control."

Opponents to Tier 2 claimed the cost to consumers would be 5 cents per gallon (117). However, the ECTA study and other sources have found that Tier 2 did not have any impact on retail gasoline prices (118). Additionally, EPA projected that the monetized health benefits of reductions of PM and ozone under the Tier 2 program would outweigh the costs by about 5:1 (119).

106 - Navigant Economics, Economic Analysis of the Implications of Implementing EPA's Tier 3 Rules, prepared for the Emissions Control Technology Association (June 14, 2012).
107 - MathPro, Inc., Refining Economics of A Natural Low Sulfur, Low RVP Gasoline Standard, prepared for The International Council on Clean Transportation (Oct. 25, 2011).

108 - Navigant Economics, Economic Analysis of the Implications of Implementing EPA's Tier 3 Rules, prepared for the Emissions Control Technology Association (June 14, 2012).
109 - Baker & O'Brien, Incorporated, Potential Supply and Cost Impacts of Lower Sulfur, Lower RVP Gasoline, prepared for the American Petroleum Institute (July 2011).
117 - Environmental Protection Agency, Tier 2 Motor Vehicle Emission Standards and Gasoline Sulfur Control Requirements: Response to Comments, 23-20 (Dec. 1999).
118 - Navigant Economics, Economic Analysis of the Implications of Implementing EPA's Tier 3 Rules, prepared for the Emissions Control Technology Association (June 14, 2012).
119 - Environmental Protection Agency, Regulatory Announcement, EPA's Program for Cleaner Vehicles and Cleaner Gasoline (Dec. 1999), available at http://www.epa.gov/tier2/documents/f99051.pdf.

Commenter: Environmental Defense Fund (EDF)

While the B&O study did not report an estimate of the average U.S. refiner cost of reducing the sulfur content to 10 ppm, EPA calculated it from the information B&O provided as 2.12 cents per gallon. The Navigant study compared the B&O average cost estimates with the MathPro estimates and concluded that the approximately one cent per gallon difference in the two estimates is due almost entirely to the difference between MathPro's and B&O's estimates of the U.S. refiners' compliance-related investment costs.

Commenter: International Council on Clean Transportation (ICCT)

The cost of reducing gasoline sulfur from 30 ppm to 10 ppm is very modest. The ICCT contracted with MathPro in 2011 to evaluate the cost of reducing sulfur from 30 to 10 ppm. MathPro found that the cost would be 0.8 to 1.4 cents per gallon, and these results are likely to be conservative.

Gasoline Sulfur Reduction Cost

The cost of reducing gasoline sulfur from 30 ppm to 10 ppm is very modest. The ICCT contracted with MathPro in 2011 to evaluate the cost of reducing sulfur from 30 to 10 ppm. MathPro found that the cost would be 0.8 to 1.4 cents per gallon. The cost estimates include revamping the FCC naphtha hydrotreaters, historical rates of return on investment, supplying the additional hydrogen needed, replacing small losses in both gasoline volume and octane, and expanding sulfur recovery.

In fact, these cost estimates are likely overstated, as MathPro assumed that all existing FCC naphtha hydrotreating capacity would require revamping even though many hydrotreaters installed to meet the Tier 2 sulfur requirements are already capable of meeting the 10 ppm standard.

A separate study carried out by Baker and O'Brien for the American Petroleum institute (API) estimated that production of 10 ppm sulfur gasoline would increase the marginal refining cost by 6–9 cents/gallon. However, there are two main reasons why these marginal cost estimates in the API study are unrealistic and should not be used.

First, in the Baker and O'Brien methodology, the indicated marginal cost is the highest cost of sulfur control that would be incurred by the least efficient refinery or refineries in the US. The petroleum market in the US is regional, i.e., there is not a single market. It is possible that the least efficient and highest cost refinery may be in, for example, PADD 4 and have a particular market to itself. That refinery might be able to pass the marginal costs on to producers in that market but will not have any effects in the rest of the US. However, this is not the typical case, as most refineries are not so isolated. High cost refineries that are not isolated will not be able to pass the marginal costs onto consumers, due to competition from other efficient refineries. As a result, it is the average costs, not the marginal costs that represent the actual increase in the refining cost.

If the average refining costs are considered instead of marginal costs and Baker and O'Brien's investment costs for FCC naphtha hydrotreating are properly adjusted, Baker and O-Brien's estimated refining costs would be similar to those estimated by MathPro.

Commenter: Manufacturers of Emission Controls Association (MECA)

MECA agrees with EPA's assessment that the cost of lowering average gasoline sulfur levels from today's 30 ppm national average to the proposed 10 ppm national average is on the order of one penny per gallon of fuel. EPA's gasoline cost assessment is supported by gasoline cost studies commissioned by the National Association of Clean Air Agencies (NACAA) and the Emission Control Technology Association (ECTA) that also indicate that costs for reducing gasoline sulfur levels to a 10 ppm national average are approximately one penny per gallon.

Commenter: MathPro

In the summer of 2011, the International Council on Clean Transportation commissioned us to estimate the U.S. refining sector's investment requirements and average cost for reducing average sulfur content of the U.S. gasoline pool from 30 ppm, the current standard, to 10 ppm, the proposed Tier 3 standard, and also for reducing the summer re-vapor pressure standard of U.S. conventional gasoline. Our report from that study was submitted to EPA in October of 2011.

My testimony today deals exclusively with sulfur control.

And that corresponds to an average cost of eight-tenths of a percent to 1.4 cent per gallon of gasoline.

This range of estimated average cost reflects different assumptions regarding two economic factors: the rate of return on refinery investment and the capital cost of revamping FCC naphtha hydro treaters, a particular type of unit in U.S. refineries to enable those units to carry out the more severe de-sulfurization needed to meet the 10 ppm standard.

The higher estimate of 1.4 cents a gallon reflects a 10 percent after tax return on investment and a capital cost for revamping of about 50 percent, about half, of the capital costs for a grass roots unit of the same kind and size. The lower estimate of eight-tenths of a cent a gallon reflects a seven percent pre-tax return on investment, and about a 30 percent factor applied to the capital cost of revamping a grass roots unit.

Commenter: Medical Advocates for Healthy Air

By opponents of the Tier 3 standard, gasoline prices will increase by $.06 to $.09 per gallon. The EPA's estimate is a mere $.01 per gallon. It is important to remember that when the EPA introduced Tier 2 standards to reduce the sulfur content of gasoline from 300 to 30 ppm, the increased cost of gasoline was much lower than the EPA's estimate of $.02 cents per gallon. There is no reason to believe that the EPA's estimate this time is conservative, and the ultimate cost may turn out to be less than 1 cent per gallon.

Commenter: National Association of Clean Air Agencies (NACAA)

While the emission benefits of Tier 3 are very high, the costs of the program are very low. In our 2011 study, NACAA predicted an increase in the cost of gasoline of less than a penny a gallon and EPA has found the same (EPA's analysis estimated 0.89 cents per gallon).

Commenter: Natural Resources Defense Council (NRDC)

NRDC supports the EPA's assessment that the average costs to reduce gasoline sulfur to 10 parts per million is less than one cent per gallon. Recent estimates by the American Petroleum Institute (API) of 6 to 9 cents per gallon are not justified as average compliance costs. Further, the API estimates include per-gallon profits of 4 to 7 cents per gallon, which translates into $4 to $8 billion in windfall profits for the oil industry each year.

NRDC supports the EPA's assessment that the average costs to reduce gasoline sulfur to 10 parts per million is less than one cent per gallon. Recent estimates of 6 to 9 cents per gallon by the American Petroleum Institute (API), an association of oil companies, are not justified as average compliance costs and are inconsistent with figures by API's own members, which estimate costs as either immaterial to their business or less than a penny a gallon.

The 1.23 cents/gallon difference between the 2.12 cents/gallon average cost and EPA's 0.9 cents/gallon estimate can be explained by two factors. First, the API commissioned study assumes an additional 10 percent rate of return on investment (ROI) but ignores refiners' ability to depreciate their investments so implicitly assumes a higher ROI than normal. In contrast, EPA assumes that the industry requires a 10 percent ROI after tax deductions are considered which is equivalent to a before tax ROI of 7 percent. EPA finds that when the API estimate is adjusted to a 7 percent before tax ROI, the API cost would be 1.58 cents per gallon.

Second, the remaining 0.69 cents/gallon difference can be attributed to differences in annual costs to install and operate the desulfurization equipment. The API commissioned study estimated a total annual cost of $2.4 billion compared to the EPA estimate of about $1.3 billion due to differences in equipment costs. As EPA notes in the DRIA, API's claimed cost for a key piece of equipment to desulfurize oil, the fluidized catalytic cracker postreater, is 350 percent higher than EPA's estimate.

EPA has assessed the pre-regulation cost estimates by API to comply for clean fuel regulations with the actual impact seen in the marketplace. As shown in the figure below [Figure 1 can be found on p. 10 of Docket number EPA-HQ-OAR-2011-0135-4286-A1] from EPA's peer-reviewed report "Comparison of EPA and Other Estimates of Mobile Source Rule Costs to Actual Price Changes" (21) API's estimates for regulations adopted in the 1990s have been 3.6 to 6.4 times higher than actual observed price changes.

While the EPA report did not include the actual cost of the most recent gasoline sulfur reductions, a recent study by Navigant Economics (22) found that Tier 2 gasoline sulfur regulations, which API estimated would cost about 3 cents per gallon, (23) have had no discernible impact on retail prices.

Still, however, the oil industry claims that the Tier 3 sulfur reductions are too expensive. It appears that the industry believes that the public health protection should only be pursued if they can generate huge profit margins for the industry. API recently estimated the cost of complying with Tier 3 sulfur requirements at six to nine cents per gallon. EPA estimates the average cost at less than a penny, or .9 cents per gallon using the API assumptions. Most of the difference between the API and the EPA estimates is API's projected profit margin.

As EPA described in the draft regulatory impact analysis, API's cost estimate assumes a profit of four to seven cents per gallon, which translates into $4 to $8 billion in windfall profits for the oil industry each year. NRDC estimates that the oil industry is projecting an astounding rate of return on investment of 180 to 340 percent.

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18 - EPA, "Draft Regulatory Impact Analysis: Tier 3 Motor Vehicle Emission and Fuel Standards", EPA-420-D-13-002, March 2013.
19 - David C. Tamm and Kevin P. Milburn (Baker and O'Brien Incorporated), "Addendum to Potential Supply and Cost Impacts of Lower Sulfur, Lower RVP Gasoline," March 2012.
20 - EPA, op. cit. Figure 5-1.
21 - Anderson, John F. and Sherwood, Todd, "Comparison of EPA and Other Estimates of Mobile Source Rule Costs to Actual Price Changes", SAE Technical Paper 2002-01-1980, May 2002.
22 - Schink, George R., Ph.D. and Hal J. Singer, Hal J., Ph.D., Navigant Economics, "Economic Analysis of the Implications of Implementing EPA's Tier 3 Rules", Prepared for the Emissions Control Technology Association, June 14, 2012.
23 - Anderson, op. cit.

Commenter: Pennsylvania Department of Environmental Protection (DEP)

DEP recognizes that the proposed rules may increase costs for some refineries located in this region, and raise the cost of gasoline.

The EPA should reexamine the estimated increase in production and at-the-pump costs.

According to the results of a study performed by the energy consulting firm Baker and O'Brian, the American Petroleum Institute (API) estimates a cost increase to consumers of six to nine cents per gallon with the proposed Tier 3 low sulfur gasoline. The EPA estimates a cost increase of about one cent per gallon. EPA used the industry's cost models to model costs, and had the cost results reviewed by industry consultants. The EPA offers several reasons as to why the cost discrepancy exists, but never fully closes the gap in costs. Recently, refining companies, including the nation's largest, Valero, have disputed the API cost estimate. These refiners have indicated that the capital costs associated with complying with the Tier 3 standards will be lower than the $10 billion API estimate. EPA should consult directly with refining companies to close the gap between these cost estimates.

Commenter: Petroleum Marketers Association of America (PMAA)

PMAA represents over 8000 independent petroleum marketing companies who market liquid fuels at both wholesale and retail. We have examined the two cost related reports prepared by Mathpro and Baker/O'Brien. We are concerned that the penny per gallon cost identified by Mathpro is not accurate and consumers will be burdened with unjustified and burdensome higher gasoline costs.

If in fact EPA eventually concludes the cost burden will exceed a penny per gallon, we believe EPA should revise the final rule to keep the costs at that threshold.

Commenter: Refinery Automation Institute, LLC

To get an idea of costs, using DOE EIA June 3, 2013 price differential between New York gasoline and Los Angeles CARB gasoline of 13 cents/gallon, we are talking about a country-wide price burden increase of approximately 8.7 million bpd X 42 gal/bbl X $0.13/gal=$47.5 million/day, or an additional $17.3 billion a year that consumers have to pay. In the current economic environment with 23+ million unemployed, this seems to me unconscionable, even though 2017 seems far in the future.

Commenter: Sierra Club

In addition, EPA provides sufficient support that the 10 ppm sulfur level is economically feasible, including a refinery-specific cost of compliance study. On average, a 10 ppm sulfur level would cost refineries $0.97/gallon without the ABT program, and the costs decline with the inclusion of ABT and intra-company credit transfers. EPA further justifies the 10 ppm as a practical level because costs of further desulfurization would be costly at the present time.

While the American Petroleum Institute's scare tactics claim that these standards would cause gas prices to skyrocket, independent studies have shown that these standards can be achieved for less than a penny a gallon. This is a clear case where we can clean our air, protect our public health, and create jobs by reducing pollution from our cars and trucks.

Commenter: Sierra Club, Clean Air Watch, Respiratory Health Association

While the American Petroleum Institute's scare tactics claim that these standards would cause gas prices to skyrocket, independent studies have shown that these standards can be achieved for less than a penny a gallon. This is a clear case where we can clean our air, protect our public health and create jobs by reducing pollution from our cars and trucks.

Commenter: Private Citizen

If my math is correct, Americans consume around 64.3 billion gallons of gas annually. A one cent increase per gallon would equate to a cost of $64,300,000, plus applicable taxes. Over a 17 year period (2013 - 2030) the cost to US car owners would be over $109 trillion, and that's just at a cost of 1 penny more per gallon and excluding city, county, state and federal taxes.

Our Response:

We received comments in support of and against our costs assessments, which included average and marginal costs for the sulfur standards. Commenters that agreed with our costs assessments viewed them as reasonable in light of the benefits of the Tier 3 program. Several comments disagreed with the refinery industry's costs assessments that characterized our costs assessments as underestimating the average and marginal costs of sulfur controls.

As explained in Chapter 5 of the Final Regulatory Impact Analysis, we made a number of changes to the cost model since our proposal. Some of these changes are in response to comments we received on the proposed rulemaking, others are in response to the first round of peer reviewer comments and others were due to our own initiative to further improve the refinery model. Because of the number and scope of changes to the cost model, we conducted a second round of three independent peer reviews. We then addressed or incorporated the comments of the second round of peer reviews as appropriate. We also reviewed how credits are traded under the Tier 2 sulfur control program and found that sulfur credits are frequently traded between refining companies. Discovering that sulfur credits are widely traded, we changed the basis for the cost analysis to assume nationwide credit trading. The refinery cost model estimates that Tier 3 will cause refiners to make about $2 billion in capital investments and the program will cost 0.65 cents per gallon when the program costs are averaged over the entire U.S. gasoline pool. We believe that these costs are reasonable for achieving much lower sulfur gasoline and are far outweighed by the benefits due to lower emissions of environmental pollutants.

We also reviewed cost estimates derived by several commenters who conducted their own cost studies. The cost studies conducted to estimate sulfur control costs for Tier 3 gasoline sulfur control to a 10 ppm standard derived very similar costs. The principal differences in costs can be attributed in large part to the impact of the averaging banking and trading (ABT) program. In total, three cost studies were conducted which estimated the cost of a 10 ppm average sulfur standard. In addition to our cost study, the American Petroleum Institute (API) and the International Council for Clean Transportation (ICCT) conducted cost studies to estimate the cost of complying with the proposed 10 ppm average cost standard. The following table summarizes the cost estimates conducted by the various cost studies.

Summary of Average Per-Gallon Costs (7% before-tax ROI)

With Credit Trading	No Credit Trading		
EPA	EPA	API	ICCT
0.65	0.87	0.97	0.8

The above table shows that our estimated costs for a 10 ppm average gasoline sulfur standard which includes an ABT program is 0.65 cents per gallon. For the three cost studies which assessed the costs without allowing for credit generation and trading, estimate costs fall in the range of 0.8 to 1.0 cents per gallon.[1]

To derive the per-gallon costs by API shown above, we had to combine the results of two separate cost studies conducted by API. One API cost study conducted by Baker and O'Brien estimated the cost of a 10 ppm average sulfur standard with a 20 ppm cap standard, which is 1.58 cents per gallon (before-tax 7% ROI). The second API cost study conducted by Turner Mason and Co. estimated the cost of a 20 ppm cap standard relative to the current 80 ppm cap sulfur standard. The 1.58 cents per-gallon cost estimated by Baker and O'Brien study, which is based on an estimated capital cost of 9.6 billion dollars, is offset by removing API's estimated 6 billion capital cost for a 20 ppm cap standard, thus reducing API's per-gallon cost estimate from 1.58 cents per gallon to 0.97 cents per gallon. While we used the two API cost studies to estimate a per-gallon cost without a 20 ppm cap standard, we in no way endorse these cost studies as both studies have overestimated the capital costs. The result is nevertheless instructional. The costs of all three organizations looking at the same standards, but without assuming the ability for refineries to generate and trade sulfur credits result in very similar costs. This serves to support EPA's belief that had these studies also evaluated the impact of trading sulfur credits between refineries they would have also resulted in cost estimates similar to our 0.65 cent per gallon estimate.

One of the commenters suggested that EPA should consult directly with refining companies to estimate the costs. We did so extensively during the development of the rule, meeting individually with companies that represented more than 60% of the refining capacity in the US. In these discussions the input we received ranged broadly from general support for our estimates to general support for API's estimates or comparably high cost estimates. During the development of the rule we also consulted heavily with the contractors, technology firms, engineering firms, and vendors that service the refining industry, including submitting our modeling to two separate rounds of independent peer review by industry experts. This expertise was all utilized in our modeling and our assessments. The Natural Resources Defense Council (NRDC), in their comments on the proposal provided an overview of the public

[1] As summarized and discussed below in Chapter 7.2.5 of this Summary and Analysis of Comments document, the oil industry states that the LP refinery modeling cost analysis conducted by Mathpro for ICCT reflect some averaging, like a credit trading program, which is inherent in LP refinery models. In its cost analysis for ICCT, Mathpro assumed that each refinery would either add a grassroots unit or revamp an existing FCCpostreater and chose a representative unit size for the refineries in each PADD that it modeled, Thus, we believe that Mathpro avoided most all the potential overoptimization, and related underestimation in costs, which can occur using such refinery models.

statements made by some of the publicly traded refiner (see Chapter 7.2.3 below). While this could not be used in our modeling or analysis, it may provide some general perspective on expected Tier 3 compliance costs.

7.2.2.2. Marginal Cost

What Commenters Said:

Commenter: American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM)

Economic theory and discussion of average vs. marginal costs: Throughout EPA's analysis, and especially in Chapter 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 [See Figure 9 on p. 31 of Docket number EPA-HQ-OAR-2011-0135-4276-A2] (from the Baker & June 28, 2013 31 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.

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.

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.

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

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.

Commenter: American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM)

EPA's calculation errors: The costs that EPA reports on Figure 5-6 [of the DRIA] 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. 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.

Commenter: Marathon Petroleum Company LP (MPC)

EPA makes the assumption that mandated 10 ppm average sulfur level will result in refineries targeting exactly 10 ppm. Refinery operations do not always run exactly as planned 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 assumes that refineries operate with perfection 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 analysis based on an 8 ppm sulfur average.

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.

Economic theory and discussion of average vs. marginal costs: 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 7 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.

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.

Gasoline costs: To believe Navigant, refiners did not pass any Tier 2 costs, average or marginal, to the consumer and are therefore highly unlikely to pass the Tier 3 costs on to the consumer. One has to wonder what kind of economist would truly believe that businesses don't attempt to pass their costs on to consumers. If businesses can't pass any of their costs on to the consumer; how do they stay in business? Playing sleight of hand with multiple regression analysis does not change the economic tenant that businesses must recover their costs to stay in business. Using a European Brent spot price 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.

Commenter: United States Congress, House of Representatives, Pennsylvania, 7th District

Some estimates show that the proposed new rules will cost the American motorist an additional 6 to 9 cents per gallon. Additionally, the EPA should consider the example of California, where it already has imposed regulations similar to Tier 111 and its motorists pay 40 cents more per gallon than the national average.

Commenter: MathPro

Another difference is that our focus was on estimating average refining costs. This is sometimes called a social cost or a national cost. And we did not -- well, we did not return or publish a marginal cost, whereas the headline number in the Baker and O'Brien study was a marginal cost, you know, the economics of a high cost refiner. And we did not do that because we didn't think it was appropriate for this analysis.

Commenter: Emissions Control Technology Association (ECTA)

It should be noted that Baker and O'Brien's estimate implies that Tier 3 will generate profit for the refining industry. Baker & O'Brien estimated that the marginal cost of compliance—that is, the cost of compliance to the refinery that would incur the highest costs—would be 6 to 9 cents per gallon. Baker & O'Brien also assumed (without justification) that the highest cost refineries would set the price of gasoline. The difference between the average cost and marginal cost is the oil industry's profit. Thus, Baker & O'Brien's analysis suggests that the oil industry will profit from 10 ppm low sulfur standard by roughly 4 to 7 cents per gallon. If this were the case, then the oil industry would support Tier 3.

20 - EPA Proposal, Fed. Reg. at 29977.
24 - Id. at 29977.
25 - Id. at 29978.

26 - See, e.g., EPA, Regulatory Impact Analysis: Heavy Duty Engine and Vehicle Standards and Highway Diesel Fuel Sulfur Control Requirements, EPA420-R-00-026, Dec. 2000.
27 - Mathpro, Refining Economics of National Low Sulfur, Low RVP Gasoline, Oct. 2011, at p. 13 (hereinafter Mathpro Study).

Commenter: Natural Resources Defense Council (NRDC)

The main difference between the API 6 to 9 cents/gallon estimates and EPA's 0.9 cents/gallon estimate is expected profit for the oil industry. As EPA describes in the DRIA, API's cost estimate assumes a profit of 4 to 7 cents per gallon, which translates into $4 to $8 billion in windfall profits for the oil industry each year (18).

The API estimates are based on a study by consulting firm Baker and O'Brien (19) that finds 6-9 cents per gallon is the marginal cost of upgrades to refineries that need the highest cost upgrades. The study assumes that the market price for gasoline would be set by the small number of high upgrade-cost refineries. A more appropriate measure of gasoline price impact is the average industry cost of compliance because the market prices will be set by the majority of gasoline volume that is produced by refineries that do not need to make expensive upgrades. Based on EPA's assessment of refinery-by-refinery costs without a sulfur credit averaging, banking and trading (ABT) program, fewer than 10 refineries of the 111 U.S. refineries would incur costs above 3 cents per gallon and average refinery costs would be about 0.97 cents/gallon (20). With the proposed ABT program, the average cost is further lowered to 0.89 (or 0.9) cents/gallon.

Using data from the Baker and O'Brien study, EPA was able to assess average industry compliance costs for 10 ppm gasoline. Sensitivity Case 4 from the Baker and O'Brien study shows annual costs of $2.39 billion with an expected gasoline production of 7,343 thousand barrels per day, not including California refineries that already produce an average of 10 ppm gasoline. These industry assumptions result in an average cost of 2.12 cents/gallon. Compared to the average cost of 2.12 cents/gallon, API's gasoline price impacts of 6 to 9 cents/per gallon would result in windfall profits of 3.88 to 6.88 cents/gallon, or $4.3 billion to $7.7 billion in annual profits at their projected production rates. With these windfall profits, the oil industry is projecting an astounding rate of return on investments of 180 to over 330 percent.

Our Response:

We received comments in support of and against our costs assessments, which included average and marginal costs for the sulfur standards. Commenters that agreed with our costs assessments viewed them as reasonable in light of the benefits of the Tier 3 program. Several comments disagreed with the refinery industry's costs assessments that characterized our costs assessments as underestimating the average and marginal costs of sulfur controls.

API reports a cost estimate of 6 – 9 cents per gallon based on the refineries with the highest Tier 3 gasoline sulfur compliance costs in its cost analysis. API and commenters citing their study are trying to make the case that the refineries with the highest Tier 3 gasoline sulfur compliance costs will translate into the price increase for gasoline at retail and that this represents the true cost of the Tier 3 sulfur control program. This argument fails on both counts.

First, while economic theory would support that the marginal cost supplier of gasoline may in fact set the price of gasoline in its various submarkets, there are far more and larger factors that impact the marginal cost supplier of gasoline than the cost of gasoline sulfur control. These include crude oil costs, refining costs, refinery complexity, operating costs, distribution costs and on and on. There is no evidence to suggest, and no evidence provided by the commenters, that refineries with the highest marginal costs for Tier 3 gasoline desulfurization bear any relationship to the marginal cost suppliers of gasoline in a market. A simple example highlights this. According to the Pace refining margin report for the fourth quarter of 2013, the US refineries with the poorest margins are those refineries refining a light sweet crude oil (Bonny Light). Also, the refinery likely setting the marginal price is probably a non-conversion refinery (does not have an FCC unit) because the refinery is not realizing the cost benefit of upgrading the poorest quality, lowest value part of the crude oil barrel. However, because this refinery does not have an FCC unit, its gasoline sulfur level is likely already at 10 ppm or below, and thus, it would not be incurring any cost under Tier 3 (and it could actually earn credits if its gasoline sulfur is less than 10 ppm). The price setter refinery in this case will not incur a gasoline production cost increase under Tier 3, which could result in no impact on gasoline prices in the gasoline submarket.

’Second, even if the refineries with the highest marginal cost of gasoline production and the highest marginal Tier 3 gasoline desulfurization costs in each submarket were one and the same refineries, it may help inform potential market price impacts resulting from Tier 3, but it would not be appropriate to use this in assessing the cost of the Tier 3 program. The Office of Management and Budget (OMB) lays out the methodology to be used for estimating the costs and benefits of new regulatory programs.[2] OMB states that the estimated costs not include any transfer payments. API’s cost analysis (not adjusting for the 20 ppm cap standard that the API cost analysis assumed) estimates that the social cost of the Tier 3 sulfur control program is 1.58 c/gal (7% before-tax ROI), however the reported marginal costs is 6 – 9 cents per gallon. Thus, the amount of the transfer payment is 4.42 – 7.42 cents per gallon, which corresponds to 4 to 8 billion dollars per year. Thus, the marginal cost estimated by the API cost assessment would overestimate the social cost by a factor of 300 to 500 percent. It assumes that consumers would pay this additional cost, resulting in the oil industry realizing a substantial profit from Tier 3.

Furthermore, the marginal cost estimates assumed by the commenters are inflated. As discussed in Section VII.B of the preamble to the final rule and in Chapter 5 of the RIA, the cost analysis conducted by Baker and O’Brien modeled a more stringent sulfur control program than the one finalized by EPA. The Baker and O’Brien cost analysis assumed a 20 ppm cap, which precluded refineries from utilizing the trading flexibility inherent in the Tier 3 program. This caused every refinery to have to invest capital to comply rather than allowing them the flexibility to comply through the use of credits. This in turn drove up the marginal costs. In

[2] Economic Analysis of Federal Regulations under Executive Order 12866, Office of Management and Budget, January 11, 1996.

addition, as discussed in Chapter 7.2.3 below, the Baker and O'Brien study assumed capital costs well above what is reasonable, further driving up the marginal cost estimates. In contrast to the Baker and O'Brien marginal cost range of 6-9 cents per gallon, our final rule estimates marginal costs only as high as 2.8 cents per gallon, and that is only for a single refinery that very well may have other compliance options available to it that we were unable to model. The next several highest marginal cost refineries are in the 1.5-2.1 cent per gallon range, and only 15 refineries are projected to have costs higher than 1 cent per gallon.

What Commenters said:

Commenter: Marathon Petroleum Company LP (MPC)

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. 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, if EPA has adequate justification for this average cost, it must add a detailed explanatory footnote.

Our Response:

We changed the format of these figures in our final rule document to indicate the full range of costs across all the refineries. The relationship between the average costs and the range of refinery-specific costs is clearer to the reader.

7.2.3. Capital Cost

What Commenters Said:

Commenter: American Fuel & Petrochemical Manufacturers (AFPM)

A Baker and O'Brien analysis estimates that a gasoline sulfur content reduction will cost refiners $10 billion in capital costs, and $2.4 billion per year in operating costs, increasing the cost of producing gasoline by six to nine cents per gallon. [This comment can also be found in section 7.2.2 of this comment summary.]

Commenter: American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM)

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.

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.

Critique of Navigant study (16) – The Navigant study makes incorrect claims on:
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.

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

Commenter: Emissions Control Technology Association (ECTA)

Second, Baker and O'Brien's capital cost assumptions are inflated compared to those used by EPA. In particular, the grassroots FCC postreater costs used by Baker & O'Brien are much higher than what EPA used (28). EPA's capital costs are consistent with those estimated by both the National Petroleum Council and Jacobs. Baker & O'Brien based their capital cost estimates on the actual installation for the Tier 2 program. Because a grassroots FCC postreater installed for Tier 2 would typically remove ten times more sulfur than one installed for Tier 3, a grassroots FCC postreater installed for Tier 3 would be significantly less capital-intensive than a comparable Tier 2 FCC postreater. Yet Baker & O'Brien ignored this consideration entirely when relying on the Tier 2 benchmark. Moreover, interviews of experts at companies who sell and install desulfurization equipment to refiners also suggest that Baker & O'Brien's capital cost estimates are not aligned with industry norms. For example, Baker & O'Brien's cost assumption for naptha desulfurization is 257 percent higher than the experts' estimates. Correcting Baker & O'Brien's capital cost estimates (along with its ROI assumption) brings its average compliance cost estimates into alignment with those of EPA (29).

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28 - EPA Proposal, Fed. Reg. at 29978.
29 - Id.

Commenter: Environmental Defense Fund (EDF)

Navigant interviews with companies engaged in implementing the refinery upgrades required to reduce the sulfur content of gasoline confirm that the MathPro estimates are in the reasonable range and that the Baker & O'Brien estimates are too high. The B&O study also does not take into account the well-established flexibility provided in the program through averaging and trading.

In fact, several individual refiners have countered API's claims about Tier 3. For example, the Northern Tier Energy LP, a refining and retail gasoline company, states that "preliminary engineering assessments predict that no capital spending will be required to comply with the new standards' (111). CVR Refining, LP announced that "estimated costs to meet Tier 3 standards are less than $20 million' (112). Alon US Partners estimated Tier 3 will cost less than $30 million (113) and Calumet Specialty Products Partners also made a public statement that Tier 3 will not materially impact their business (114).

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111 - Northern Tier Energy, Northern Tier Energy LP comments on EPA's proposed Tier III standards (2013) [Press release], retrieved from http://finance.yahoo.com/news/northern-tier-energy-lp-comments-183900329.html.
112 - CVR Energy, CVR Energy subsidiary CVR refining reports minimal investment required to meet EPA proposed Tier III standards (2013) [Press release], retrieved from http://investors.cvrenergy.com/phoenix.zhtml?c=203637&p=irol-newsArticle&ID=1803055&highlight=.
113 - Alon USA Energy,. Alon USA Energy comments on EPA's proposed Tier III standards (2013) [Press release], retrieved from http://www.reuters.com/article/2013/04/08/tx-alon-epa-upgrades-idUSnPnDA90077+160+PRN20130408.
114 - Calumet Specialty Products Partners, Calumet Specialty Products Partners, L.P. comments on EPA's proposed Tier III standards (2013) [Press release], retrieved from http://markets.on.nytimes.com/research/stocks/news/press release.asp?docTag=201304100830PR NEWS USPRX DE91948&feedID=600&press symbol=4043615.

Commenter: International Council on Clean Transportation (ICCT)

Second, the API marginal costs are upwardly biased. Baker and O'Brien overestimated the investment costs for FCC naphtha hydrotreating, as indicated by MathPro's informal contacts with companies involved in refinery upgrading. Their survey showed that investment costs used by MathPro are in a reasonable range.

Commenter: Marathon Petroleum Company LP (MPC)

The Agency has significantly underestimated the costs for the required gasoline sulfur reductions, overestimated the benefits and failed to take into consideration the accuracy of the ozone and PM measurements used in their justification for this rule. Compliance with this Tier 3 proposal will cost the refining industry about $10 billion, which is approximately what compliance with the Tier 2 gasoline regulations cost the industry.

DRIA Cost/Benefit Analysis – 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" and a 2012 study "Addendum to Potential Supply and Cost Impacts of Lower Sulfur, Lower RVP Gasoline."

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.

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 a more thorough negotiations between refiners and vendors will engineering complexities that additional costs for specific technologies at specific refineries become fully acknowledged. Expertise in capital improvements at refineries is necessary to evaluate vendor estimates, and 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.

Critique of Navigant analysis (6): The Navigant study makes incorrect claims on: 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.

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

Commenter: MathPro

Our analysis indicated that the refinery investment for meeting the 10 ppm gasoline sulfur standard would be in the range of $3 to $4 billion per year, and that the corresponding total annual refining cost would be in the range of $.9 to $1.5 billion a year.

In turn, we estimated that the capital cost of a grass roots FCC naphtha hydro treater would be about $1,800 per barrel per day, which is a standard unit of capital cost measurement and refining, and that includes both on-site and offsite investments.

Meeting the 30 ppm standard, we posited that the method of choice for refiners would be to revamp their existing units rather than build grass units of another type. Refineries that now meet the 30 ppm standard with these units would add facilities, go through a revamp, and through that achieve the 10 ppm standard.

We understand that many of these units that are already in place already have the capability to meet a 10 ppm standard, but in our analysis, we assume that all units in the U.S. refining sector would require revamping.

The U.S. refining industry has already installed about 75 of these advanced units in order to comply with Tier 2, and many similar units have been installed in other countries as well. Hence, the range of capital costs and operating costs for these units is now reasonably well established.

EPA: Earlier today we heard some testimony about a study that was commissioned by the American Petroleum Institute. Are you familiar with that?
Mathpro: I am, Baker and O'Brien.
EPA: Would you care to comment on the primary differences that account for the cost range in your work versus the six to nine cents that was cited this morning?
Mathpro: Sure. There are several. One has to do with the estimated capital cost for building grass roots FCC post treaters and, hence, for revamping them. The estimate that we use, which I mentioned in my testimony, is about $1,800 of daily barrel. I believe the Baker and O'Brien study used a number that was about double that approximately. So that was one difference.

Commenter: National Association of Clean Air Agencies (NACAA)

In terms of impacts on refiners, EPA estimates that 111 refineries could potentially be affected by Tier 3. Of this total, 16 would need to install new equipment to comply with Tier 3. Of the remaining 95 refineries, 66 could meet the requirements by modifying their existing equipment and 29 already comply with Tier 3 or could do so by making operational changes.

Commenter: Natural Resources Defense Council (NRDC)

API's Estimates are Not Supported by Member Companies. Public statements by several refineries indicate that the expected cost of compliance with Tier 3 regulations will be lower than API's 6 to 9 cents/gallon estimate, if material at all. Valero Energy, which is the largest independent refiner in the U.S., recently told a group of financial analysts that its Tier 3 compliance will cost $300 to $400 million (24). Using Valero's high cost estimate of $400 million, with a 7 percent pre-tax return on capital and a 5 year depreciation, NRDC estimate that Valero's s marginal cost is approximately 0.6 cents per gallon, which is more than 10 times less than the API high estimate. For Valero, the 0.6 cents per gallon translates into annual costs of approximately $97 million or just 2 percent of the $4.45 billion in pre-tax earnings that the company made on refining in 2012.

- Northern Tier, which operates a refinery in Minnesota, stated in a press release that its "current assessment is that the proposed updated standard will not have a material financial impact to the Company. Preliminary engineering assessments predict that no capital spending will be required to comply with the new standards" (25).

- CVR Energy, operating refineries in both Oklahoma and Kansas, announced that "the proposed U.S. Environmental Protection Agency Tier III sulfur regulations will have no impact on the company's previously announced full year 2013 distribution guidance... The full amount of this upgrade was reserved as cash on the company's balance sheet at the close of its IPO on Jan. 23, 2013...Operating cost increases as a result of the higher desulfurization levels of gasoline are not expected to be material to the company's performance" (26).

- Calumet Specialty Products Partners, L.P., which is based in Indiana and operates eleven facilities located in Louisiana, Wisconsin Montana, Pennsylvania, Texas and Missouri, announced that its "current assessment is that the proposed updated standards are not expected to have a material financial impact to Calumet. Calumet's preliminary assessments of its operations indicate that capital spending requirements, if any, will be immaterial to comply with the proposed updated standards" (27).

- Alon USA Partners, which owns and operates a refinery in Texas, issued a press release stating that "[o]perating cost increases as a result of the higher desulfurization levels of gasoline are not expected to be material to the partnership's performance" (28).

24 - Siders, Alison, "Valero: EPA Gasoline Plan Would Cost Hundreds of Millions of Dollars," Wall Street Journal, April 2, 2013.
25 - http://www.reuters.com/article/2013/04/03/ct-northern-tier-epa-idUSnPnNY88352+160+PRN20130403.
26 - http://www.prnewswire.com/news-releases/cvr-energy-subsidiary-cvr-refining-reports-minimal-investment-required-to-meet-epa-proposed-tier-iii-standards-201264271.html.
27 - http://online.wsj.com/article/PR-CO-20130410-907218.html.
28 - http://www.alonpartners.com/phoenix.zhtml?c=251560&p=irol-newsArticle&ID=1803979&highlight.

Commenter: Phillips 66 Company

Project Costs in Excess of EPA Estimate:
Given the significant project scopes required, we believe EPA has significantly underestimated the cost to comply with the 10ppm proposal. In an independent study commissioned by API, consultants Baker and O'Brien determined that the capital cost required by industry will be about $10 billion in contrast to EPA's estimate of $2.1 billion.

Based on preliminary analysis of our potential refinery projects, Phillips 66 believes the investment costs required to comply with the proposed standard are well in excess of EPAs estimates. The high investment required for the rule continue to place competitive pressures on an already capital intensive industry.

Commenter: Union of Concerned Scientists (UCS)

Meeting the 10 ppm standard is estimated to cost the refiners less than a penny per gallon. An independent study by Navigant Economics confirms EPA's estimates, finding that the cost of complying with Tier 3 for U.S. refiners is "in the vicinity of 1 cent per gallon" (13). Additionally, Navigant states that "this expression of the compliance costs on a cents per gallon basis does not imply that these compliance costs will be passed through fully to consumers." According to analysis by the Center for American Progress, the oil industry is one of the world's most profitable industries. The five largest companies took home a combined $118 billion in profits in 2012 alone (15). It's time for the oil industry to stop blocking progress – and given their record profits, less than a penny a gallon is a small price to pay to protect the air we breathe.

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13 - Schink, George R. and Hal Singer. 2012. Economic Analysis of the Implications of Implementing EPA's Tier 3 Rules. Online at http://naviganteconomics.com/docs/061212%20Economic%20Analysis%20of%20the%20Implications%20of%20Tier %203%20Sulfur%20Reduction%20Final_embargoed%20copy.pdf, p.14, accessed on June 21, 2013.
15 - Center for American Progress. 2013. Speed Trap: Big Oil Profits from High Gasoline Prices. Online at http://www.americanprogress.org/issues/green/news/2013/02/06/51967/big-oil-profits-from-high-gasoline-prices/ accessed on June 28, 2013.

Commenter: United States Congress, House of Representatives, Pennsylvania, 7th District

Refiners, including in the 7th congressional district and the greater Philadelphia area, are currently meeting the Tier II vehicle standards that reduced sulfur in gasoline from 300 parts per million to 30 parts per million — a 90-percent reduction.

American refiners have already spent billions of dollars to achieve a 90 percent reduction in sulfur levels since 2004, and Tier III will require refiners to spend an estimated $10 billion in new infrastructure and another $2.4 billion per year in operating costs. These Washington requirements will further jeopardize our refining industry and workers, and increase the cost of end product fuels for consumers.

Commenter: Navigant Economic

First, there are serious flaws in the approach employed by Baker and O'Brien on behalf of the American Petroleum Institute to estimate the compliance cost to refineries. Second, I've examined EPA's cost benefit analysis. It comports with economic logic and best practices, and it validates our conclusions. Third, we examined the effects of the Tier 2 sulfur rule on the price of gasoline and found little to no impact suggesting the Tier 3 effect will be negligible.

So going to my first point on the flaws in the Baker and O'Brien approach, there are several, but today I just want to address three. Baker and O'Brien failed to account for averaging and trading of credits, which reduces the compliance costs to refineries. As EPA explained, refineries with pre and post treaters are able to achieve further sulfur reductions below the 10 parts per million standard at a relatively low incremental cost, and sell credits to refineries who would otherwise be faced with grass roots investments.

Averaging and trading reduces EPA's estimated compliance cost from .97 cents per gallon to .79 cents per gallon, a reduction of nearly 20 percent with averaging in trading. Between eight and 25 high-cost refineries out of 11 would prefer to consume credits than to upgrade their facilities. Baker and O'Brien's mistaken assumption that those high-cost refineries reduce the sulfur content of their gasoline they produce to 10 parts per million severely inflates their compliance cost estimates.

Second, Baker and O'Brien assume without support that the refinery with the highest cost of compliance will set the price of gasoline. However, if this were true, then the profits of the refinery industry, defined as the difference between the marginal cost and the average cost per gallon, would be four to seven cents, at which point the refiners should endorse Tier 3. Given the refiners' opposition, it seems that Baker and O'Brien's logic is faulty.

Third, Baker and O'Brien's estimated capital cost for a grass roots FCC post treater is not reasonable according to companies that construct or install desulfurization units. Indeed, Baker and O'Brien's capital cost estimates are between two and four times higher than industry benchmarks. Baker and O'Brien states that their estimates were based on actual installation for the Tier 2 program, but as EPA explains, a grass roots FCC post treater installed for Tier 2 would remove about 10 times more sulfur than one installed for Tier 3, and, thus, would have significantly higher capital costs. Correcting this one defect in the Baker and O'Brien study causes their cost estimates to come into alignment with those of MathPro and of EPA.

EPA: Thank you for the, I guess, the support for our cost analysis. But if you could just spend just a moment, because you were cut a little short. So what are the main differences between, you know, our one cent a gallon and the six to nine cent estimate from Baker and O'Brien?

Navagant: So I think the points that I rattled off were the main drivers. One is this conflation of the average and the marginal. I think that what – when you actually saw for the average of the Baker and O'Brien, you don't get that big of a divergence. You get something like one versus two.

But even there, the difference can be entirely explained away with just one change, and that's this capital cost component of these treaters. And the way that we tried to ascertain that it was exaggerated was by interviewing actual providers of these equipments, these types of equipment and founding out whether their costs were reasonable. And they told us they weren't.

Our Response:

We received many comments in support of and against our capital costs estimates. Commenters in support of our estimates viewed them as reasonable while other commenters from the oil industry argued that we had underestimated those costs. Specifically, API commented that EPA significantly underestimated Tier 3 refinery capital costs and compared the capital cost it used in its cost study for a grassroots postreater, which is $6800 per barrel per day, to EPA's capital cost which is $1,500 per barrel per day. Several commenters viewed the oil industry's cost as inflated.

'We disagree with the cost comparison made by API.[3] The total capital cost that we used for a grassroots postreater for the NPRM is higher than what API reported in its comments. The $1,500 per barrel per day value solely represents the inside battery limits costs (the direct costs associated with the hydrotreater), but when the offsite factor (representing the indirect costs of the hydrotreater) our capital costs total $1875 per barrel per day. When a separate overdesign factor that we applied is included (which was not included in the cost table in Chapter 5 of our Regulatory Impact Analysis document which summarized our capital cost, but was described in our description of our refinery-by-refinery model), our capital costs for a grassroots postreater increases to $2,015 per barrel per day.

Before discussing the methodology used in deriving two cost estimates and the final cost estimates, we will review the steps that EPA and API took to estimate the capital costs for installing a grassroots postreater.

EPA's Postreater Capital Costs

The cost estimates that we are making for refineries are made in two steps. The first step is to estimate the inside battery limits (ISBL) costs, which are the costs for the primary units (i.e., reactor, heater compressors) subunits (pumps, heat exchangers strippers) and the piping, electrical and control hardware. The vendors understand their technology very well and understand how to make such cost estimates because they know how their technologies are currently configured and are being operated in refineries today (are the hydrotreaters being operated severely or more mildly), and therefore understand how the grassroots and revamps would have to be configured to achieve the targeted lower sulfur standard.

The second step is estimating other costs called outside battery limit (OSBL) costs which include piping the new unit to other units, control building for control equipment and the operations personal, cooling towers, electrical switchgear laboratory facilities, etc. Vendor companies are generally not very good at estimating offsite costs because it requires experience installing such units in refineries, and the vendor companies rarely do that sort of work. For estimating the offsite costs for Tier 3 desulfurizing units we spoke to two engineering

[3] In Baker and O'Brien's report for API, the capital cost that they used is $6540 per barrel per day ($228.8 MM for a 35,000 barrel per day unit). However, when API submitted its comments to EPA, it reported a capital cost of $6800 per barrel per day. We believe that API adjusted its capital cost to be on the same basis as our costs which is 30,000 barrels per day instead of 35,000 barrels per day and this is why they report the value of 6800 instead of 6540.

companies (Foster Wheeler and Bechtel) which installed desulfurization units for Tier 2. In both cases, the engineering companies estimated that the offsite costs would be about 35% of the onsite costs and we used that offsite cost factor for our cost estimate (our offsite factor is within the range of 30% to 50% estimated by one vendor). Thus, we believe we are making a very good estimate for the ISBL and OSBL capital investments expected to be made for Tier 3. This has been corroborated by two rounds of independent peer review by knowledgeable experts in refining.

API's (Baker & O'Brien) Postreater Capital Costs

API's costs are based on Tier 2 compliance costs. API obtained either estimated installation costs or actual installation costs (API did not specify) for FCC postreaters for installation in 5 different refineries for complying with the Tier 2 30 ppm gasoline sulfur standard. The postreater capital cost information which reflected cost information from the years 2003 to 2005 was adjusted upward to reflect mid-year 2009 capital costs using the Nelson-Farrar index and normalized to reflect a 35 thousand barrel per day unit. This resulted in an average ISBL cost of $144.5 million for installing a Tier 2 compliant FCC postreater. After API discussed this capital cost estimate with several refiners who built several of the units in recent years, those refiners felt that the estimated capital costs that API had calculated were too low, and one refiner thought that the estimated capital costs should be doubled. Based on the opinion expressed by that one refiner, API doubled its estimated capital costs for a 35K bbl/day FCC postreater to $228.8 million. For estimating the capital cost for revamps of existing postreaters, API applied a generic 30% cost estimation factor as their means for estimating the revamp costs from the grassroots cost.

Discussion of EPA and API Estimated Postreater Capital Costs

EPA and API used two totally different cost estimation methodologies for estimating the capital costs. We estimated the FCC postreater costs using a bottom-up approach, while API used a top-down approach. Either approach is viable, although we favor our method for several reasons.

1) For complying with the Tier 2 gasoline sulfur standard, a typical refinery would have installed an FCC postreater to desulfurize the FCC naphtha from about 800 ppm down to about 75 ppm, a 725 ppm, or a 91 percent sulfur reduction. In the case of a grassroots postreater that would be installed for Tier 3, the postreater would treat FCC naphtha already low in sulfur due to the pretreater installed before the FCC unit (these refineries are currently complying with Tier 2 using an FCC pretreater). Thus, the new grassroots FCC postreater installed for Tier 3 would only have to reduce the FCC naphtha from 100 ppm to 25 ppm, a much smaller 75 ppm or 75 percent sulfur reduction. A grassroots FCC postreater installed for Tier 2 would typically remove 10 times more sulfur than one installed for Tier 3. This is important because a significant portion of the FCC postreater capital cost is devoted to avoiding the recombination reactions which occur when hydrogen sulfide concentrations are high and react with the olefins contained in the FCC naphtha. Thus, a grassroots FCC postreater installed for Tier 3 would be expected to be significantly lower in capital cost compared to a Tier 2

FCC postreater. API's costs are based solely on Tier 2 compliance costs, which is one reason why their costs are high (we believe about 30% higher).

2) Refiner project cost estimates for adding an FCC postreater for Tier 2 may have included additional costs for other subprojects that the refiner may have included with the Tier 2 project, even though they may be unrelated to the FCC postreater project or for reducing the sulfur level of gasoline. API would not be able to distinguish these other costs from the desulfurization costs and would have included their costs in their estimate for Tier 3.
3) In their project design cost estimates, engineering companies add on an additional contingency cost beyond the best estimate for completing the project. They do so to guarantee the project completion under budget. We asked an engineering company what a typical cost guarantee contingency factor would be for capital cost projects. The engineering company typically adds 15% above and beyond the estimated costs.
4) Based on an anecdotal comment by a refiner, API doubled the capital costs that it uses for an FCC postreater over the refinery installations cost estimates for Tier 2 which were adjusted to current year dollars.

We believe that these various factors associated with API's cost estimation methodology led to the overestimation of API's cost estimate for an FCC postreater. We know that API's cost estimate for an FCC postreater is high because their estimated capital costs for an FCC postreater are higher than that for an FCC pretreater sized the same, however, FCC pretreaters are a much higher pressure and are constructed of much more expensive metallurgy than FCC postreater units.

API commented that vendors are incentivized to provide the lowest possible costs and EPA failed to adjust them higher to reflect realistic capital costs. We believe that vendors can underestimate the cost of its costs when the vendors anticipate that its costs will be published and compared to other vendor costs. In this case, we wanted to avoid placing the vendors in that position, so we promised the vendors that we would not publish individual vendor cost estimates, but aggregate them together. For this reason, we believe that the vendors provided their best estimates for the capital costs of their grassroots units and revamps. In fact, we see no basis for this assertion when we look across the range and variety of data and sources made available to us. Conversely, these comments ignore the very real bias of the refining industry estimates themselves in estimating the costs of EPA fuel standards, which has been demonstrated in cost studies in the past. The only vendor that appeared to demonstrate a clear bias was the vendor that is also a refiner, and provided costs far out of line with other sources of information. This information proved unusable since it assumed Tier 2 was not in place, and not a valid estimate for the increment of sulfur control needed for Tier 3. We also believe that we are not overestimating capital costs based on the pitfalls inherent in the API capital cost estimation methodology.

While we have high confidence in our estimated costs, the peer review comments make a strong case for accounting for additional costs. Three peer reviewers on our cost analysis, as well as oil industry comments, pointed out that refiners may incur additional costs not covered by the ISBL and OSBL costs. For example, a refinery may need to add pilings to establish a solid foundation for its reactor and other major units if the soil is poor, the project planning and construction workers may require overtime pay, the refiner will incur some costs (termed owner costs) for planning and executing the project, and there are miscellaneous contingencies which must be addressed. Two of the peer reviewers suggested that we add an additional 30% contingency factor to capture such costs. One of the peer reviewers commented that one of the vendor's costs were very similar to the costs that they use for a two stage FCC postreater provided that a 30 percent contingency factor is applied. Another peer reviewer suggested that we add a 20% contingency factor while another peer reviewer supported the capital costs that we used, which did not include a contingency factor, as the costs are consistent with the capital costs that they used in their modeling and the capital costs estimated by Mathrpo for the ICCT. After considering the various comments, we chose to use a 20% contingency cost factor added to our capital costs to account for costs that may not otherwise have been fully accounted for.

What Commenters Said:

Commenter: Marathon Petroleum Company LP (MPC)

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.

Our Response:

While we agree with the comment that we did not use the vendor cost that estimates a higher cost, we disagree with the comment that we should have considered the higher cost. We used the vendor that provided the ISBL cost estimate for a grassroots postreater for Tier 3 that estimated the capital costs to be $1500 per barrel per day, for a 30 thousand barrel per day unit. We rejected the other vendor that provided an ISBL cost estimate for a Tier 2 postreater (desulfurizing FCC naphtha from 800 ppm down to 75 ppm) with estimated capital costs to be $2894 per barrel per day for a 10 thousand barrel per day unit. When we adjusted the second vendor's cost estimate to reflect a 30 thousand barrel per day unit size (to be on the same basis as the other estimate), the second vendor's capital cost decreased to $1970 per barrel per day. The difference between the two capital cost estimates reflects the cost of installing a Tier 2 grassroots FCC postreater ($1970 per barrel per day) compared to a grassroots Tier 3 FCC postreater ($1500 per barrel per day) as we described above. If we would have based our capital cost estimate on the second vendor that provided the capital cost for a grassroots Tier 2 postreater, we would have overestimated the capital cost for a grassroots FCC postreater installed for Tier 3 by about 30%.

7.2.4. Octane Cost

What Commenters Said:

Commenter: American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM); Marathon Petroleum Company LP (MPC)

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 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 [of EPA-HQ-OAR-2011-0135-4276] 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.

Our Response:

The oil industry commented that we should use the wholesale price difference between premium and regular gasoline grades to develop an octane cost. Using this method, they estimated that the cost of octane would be $1/octane number-barrel. To verify API's estimated octane cost using the wholesale price difference between premium and regular gasoline grades, we also evaluated what the octane cost would be based on bulk pricing data differences between premium and regular gasoline, divided by six. Based on actual data from 2008 to 2012, we estimated the average cost as $1.08/ octane number-barrel of gasoline.

We believe that the premium minus regular grade pricing method for estimating octane cost considerably overstates the cost of making up lost octane in the FCC naphtha pool. Premium grade gasoline is produced in smaller batches than regular grade and must be handled specially and separately to avoid compromising its octane content, and is transported in smaller batches. For example, when shipping premium gasoline in pipelines, the interface between premium and regular grades of gasoline must be downgraded into the regular grade gasoline to ensure that premium gasoline's high octane content is not compromised – this downgrading increases the production cost of premium gasoline. Furthermore, the pricing between regular and premium grades of gasoline tends to reflect higher profit margins on premium fuel. Thus, if we used the wholesale price difference between premium and regular grade gasolines, we would be estimating the cost of not only producing the premium gasoline, but also include the cost for special handling of premium gasoline relative to regular grade gasoline, plus some profit, which is irrelevant to the cost of making up lost octane at the refinery due to Tier 3 sulfur control.

Instead, we estimated the cost of making up the lost octane in the FCC naphtha. To do this we ran a control case using the Haverly LP refinery model which was run to model the octane loss associated with desulfurizing gasoline in the year 2018. To only capture the cost of the octane loss we reduced the octane value of the FCC naphtha by one octane number, and this was the sole change relative to the reference case. The control case was run with capital costs evaluated at a 15 percent rate of return on investment (ROI) after taxes.[4] Unlike for the NPRM where commenters criticized us for assuming E15 for the FRM analysis, this case was run with E10 (no E15) and a small volume of E85, and we substituted 2013 natural gas liquid prices (ethane, propane and butane) which are much lower compared to the historical price relationship from previous years (the lower natural gas prices increases the octane cost provided by the reformer since the reformer produces natural gas liquids as byproducts). The octane cost estimated by the LP cost model is $0.31/octane number-barrel (0.74 c/octane number-gallon). Because the octane loss associated with a specific sulfur control technology may be lower or higher than 1 octane number, we scaled the octane cost based on the relative estimated octane loss on the FCC naphtha (i.e., a ½ octane loss of the FCC naphtha was estimated to cost $0.155/octane number-barrel.

[4] Normally we conduct the refinery modeling assuming an after-tax 15% ROI and adjust the costs to reflect a before-tax 7% ROI to report the costs. However, in this case because the new capital investments were so minimal, we omitted the capital cost amortization adjustment because its effect on costs was judged to be negligible.

However, it was further analysis of our LP refinery modeling work which further explained why the price differentials between premium and regular grade gasoline overstates the cost of octane when the octane loss is occurring in the FCC naphtha. While the octane cost for making up octane loss in the FCC naphtha is $31/octane number-barrel from the LP model, the octane cost determined by the premium-regular grade differential using the LP model is $0.50/octane number-barrel, which is 60 percent higher. We believe that the LP refinery model is estimating a higher octane cost for the premium-regular grade differential because of the cost of producing premium gasoline, which is typically 6 octane numbers higher than the regular grade. And yet, the LP model is not capturing the additional cost inflating factors mentioned above such as smaller tankage, special handling and distribution and profit. Our conclusion from this analysis is that the premium-regular grade price differential is a poor indicator of the cost of making up the small amount of lost octane in FCC naphtha due to desulfurization and by using it would overstate the cost. Despite our confidence in the octane cost that we generated, we recognize the need to quantify the impacts on our costs if octane costs are indeed higher than what we estimated, so where we present the Tier 3 fuel cost in the Chapter 5.2 of the RIA for the FRM, we provide a sensitivity cost estimate assuming that octane costs $0.50/octane number-barrel.

When we had our cost model peer reviewed the first time, one of the peer reviewers also evaluated octane cost and concluded that while recent octane costs using premium minus regular grade price differences were in the $1/octane number barrel range, modeled future octane costs for 2015 and 2020 were appreciably lower. This peer reviewer's estimate for future octane costs could be much lower and provided a range of $0.25 - $0.5/octane number-barrel. The octane cost that we are using is well within the projected octane cost range projected by this peer reviewer and our octane cost sensitivity case is at the high end of this range.

Based partially on the oil industry comments as well as our own understanding of the hurdles that E15 is facing for widespread implementation, we elected to base our LP refinery modeling octane cost case assuming E10 and a small volume of E85, but no assumed E15 penetration.

What Commenters Said:

Commenter: Small Business Refiners (SBR)

In addition to capital costs and increased operating expenses incurred through additional hydrotreating, we expect the refinery yield to decrease as a result of this change. As a result of desulfurization through hydrotreating, the resultant fuel octane is lower. To compensate for a lower octane blend component, the catalytic reformer severity must be increased to improve blend component octane. The net effect of this process change is a one to two percent yield loss on the products.

Our Response:

We agree that to the extent that refiners rely on reformers to make up for the octane loss due to desulfurization (instead, refiners could use alkylation units, isomerization units or blend in isooctane or more ethanol to make up for the lost octane), that there will be some yield loss. This occurs because some of the reformer feed is cracked to lighter hydrocarbons. The cost impact of this is reflected in our estimated octane cost. Because the reformate (the product from the reformer unit) is higher in energy density than the feed, the volume loss that occurs with reformers is somewhat offset by the higher energy density of the higher octane reformate. The U.S. fuels market is now in a mode of slacking gasoline demand relative to increasing diesel fuel demand, thus, the small reduction in gasoline yield associated with Tier 3 will have no perceived impact on gasoline supply.

What Commenters Said:

Commenter: Marathon Petroleum Company LP (MPC)

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 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.

Our Response:

We recognized after we completed the cost analysis for the NPRM that we were not capturing the range of desulfurization costs experienced at refineries that had higher and lower levels of sulfur reduction than what the vendor data estimates (although on an average basis, our method of using typical desulfurization amounts is still valid). In response to comments, a change we made in our cost analysis for the final rulemaking is to scale the sulfur reduction costs based on the amount of sulfur reduction in the FCC naphtha. If the actual sulfur reduction was 60 ppm instead of 50 ppm that the vendor data was based on, we increased the octane loss and hydrogen consumption by 20 percent (60 ppm is 20% greater than 50 ppm). We also created a cost factor for exponentially increasing desulfurization costs above a certain desulfurization percentage (96% desulfurization for single stage units and 99% desulfurization for two stage units), which reduced the potential for underestimating desulfurization costs for cases of deep desulfurization.

The inclusion of additional vendor data coupled with our adjustments increased the volume-weighted average octane loss for a revamp of an existing FCC postreater to produce 25 ppm FCC naphtha (to produce 10 ppm gasoline) from 0.49 (R+M)/2 to 0.77 (R+M)/2.

One reason why the octane cost number we are estimating seems “astonishing low” to API is API is overestimating the cost of recouping octane by basing their octane cost on the price differential between regular and premium grade gasoline as discussed above.

7.2.5. Modeling Techniques

What Commenters Said:

Commenter: American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM); Marathon Petroleum Company LP (MPC)

DRIA Cost/Benefit Analysis: 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.

Our Response:

We acknowledge that refiners could target a lower sulfur level than 10 ppm to generate credits for use within the company or for sale to other refining companies. However, we believe our assumptions are reasonable because if a refiner thought that it would not be able to sell the credits it generated, it would not continue to produce gasoline with less than 10 ppm sulfur since they would be overcomplying at a cost to the refiner. Since FCC postreaters do not provide any economic return, we believe that across the entire refining industry, refiners will target 10 ppm on average. If they were overcomplying, they would adjust their operations and average 10 ppm going forward to avoid the excess cost.

What Commenters Said:

Commenter: American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM)

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.

Commenter: American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM); Marathon Petroleum Company LP (MPC)

DRIA Cost/Benefit Analysis – Underestimated Costs: 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.

Our Response:

Consistent with our normal refinery modeling practice which is also responsive to these comments, we updated our cost analysis to more recent 2011 refinery gasoline quality and volume data. Since all refineries were required to comply with Tier 2 in 2011 (all the small refiner and geographic phase-in delays had expired at the end of 2010), we were able to use refinery data for each refinery's gasoline sulfur level and not use estimates.

What Commenters Said:

Commenter: American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM); Marathon Petroleum Company LP (MPC)

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.

Our Response:

We do not agree with the comment that we should not be using average crude oil qualities since this could affect compliance with the Tier 3 sulfur standard. These comments may have some relevance if we were finalizing a 10 ppm cap standard that applies in other countries around the world. However, because the Tier 3 sulfur standard is an averaging standard, it is entirely appropriate to use average crude oil qualities. If, for example, a refiner refined a crude oil containing 2.0 weight percent (wt%) sulfur for half the year and 1.0 wt% sulfur for the other half the year, the refiner could assess how to comply with Tier 3 assuming 1.5% sulfur, which is the average between the two. Assuming that the refiner had targeted a sulfur level of 10 ppm in its gasoline pool based on the average crude oil sulfur level, when refining the 1.0 wt% sulfur crude oil, the refinery will likely average about 7 ppm gasoline, and when refining 2.0wt% sulfur crude oil the refinery will likely average about 15 ppm gasoline. However, since the Tier 3 sulfur standard is an annual average standard, it would be fine for the refinery to average 7 ppm sulfur gasoline for half the year and 15 ppm sulfur gasoline for the other half of the year. The very high 80 ppm cap standard allows the refinery this flexibility.

There may be situations where the crude oil refined by an individual refinery will result in higher amounts of sulfur in gasoline than what we modeled and in that case we may have underestimated the cost of compliance. However, our cost analysis is also most likely overestimating the desulfurization cost at another refinery which is refining a different crude oil which tends to produce gasoline with lower amounts of sulfur in the gasoline pool than what we modeled. Since we are estimating costs on an industry wide basis, these sorts of issues tend to average out across our analysis.

What Commenters Said:

Commenter: American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM); Marathon Petroleum Company LP (MPC)

DRIA Cost/Benefit Analysis – Underestimated Costs – 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.

Our Response:

The oil industry commented that the methods used for amortizing capital costs do not correctly represent a refiner's investment cost.

'In OMB circular A-94, OMB directs federal departments and agencies to assess capital costs using a before-tax 7% ROI because it approximates the opportunity cost of capital. Also, OMB circular A-94 instructs federal departments and agencies to assess costs at a different ROI as a sensitivity analysis of another discount rate. In the RIA, we provide a cost estimate for the final Tier 3 gasoline sulfur standard based on an after-tax 10% ROI. An important reason for using the discount rate based on a before-tax 7% ROI is that all cost analysis conducted by

EPA are conducted on the same basis, which allows comparison of different environmental programs on the same basis.

What Commenters Said:

Commenter: American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM); Marathon Petroleum Company LP (MPC)

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 Figure 9 [of EPA-HQ-OAR-2011-0135-4276]. 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 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.

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

Commenter: Emissions Control Technology Association (ECTA)

First, EPA's methodology is sound because it appropriately used a refinery-by-refinery cost model that permitted each refinery to embrace a different sulfur-reduction strategy based on its particular circumstances. EPA's cost model was peer-reviewed by two refinery industry consultants, (17) and it was built off the model developed by Mathpro to estimate the cost of benzene control under MSAT2 (18). The EPA notes that the peer-review process "suggested that there would be little to no change in [its] desulfurization cost estimate," indicating that EPA's model complied with best practices in the profession (19).

Commenter: MathPro

These investment estimates and refining cost estimates cover de-sulfurizing the refinery streams needed to meet the 10 ppm average, supplying the additional hydrogen needed for de-sulfurization, replacing the small losses in both gasoline volume and gasoline octane that accompany tight de-sulfurization, and expanding refineries' sulfur recovery in offsites is needed to support additional sulfur control.

We conducted our analysis using four regional refinery LP models representing projected aggregated refining capacity in pads one through four, with all major regulatory programs affecting fuel quality in place. We have used similar refinery LP models in many previous analyses of the refining costs of new fuel standards, including Tier 3 gasoline sulfur, ULSD, Federal and California RFG programs, and Arizona CBG.

In this study, our models represented the U.S. refining sector maintaining regional and total U.S. gasoline production at the volumes projected by EIA for 2015, meaning the refineries would adjust operations to replace the small losses in volume that would accompany tighter sulfur control. Our projected product volumes, crude oil, and natural gas prices for 2015 were developed from EIA's AEO 2011.

Our Response:

We received comments in support of and against the LP refinery model. The oil industry commented that it was over-optimized resulting in underestimates of refinery costs. We also received comments in support of the model.

We disagree with the oil industry comment that EPA LP refinery modeling case was over optimized. The most important LP refinery modeling case that we ran for the Tier 3 rulemaking was the octane cost case. When we analyzed that case post modeling, the refinery model simply increased the charge volume of heavy naphtha to reformers which were underutilized. This means that the refinery model only needed to estimate operational changes in octane level and cost which are not impacted by refinery size because capital investments in reforming capacity were not necessary. Thus there was no risk of the refinery model overoptimizing costs due to oversized assumed refinery unit (reformer) size. The second way that the refinery model protected against overoptimization of octane costs was by pooling refinery streams together, such as the light and heavy FCC catalytic naphtha. Although many refineries (but not all) separate the light cat (FCC) naptha from the heavy FCC cat naphtha for hydrotreating which allows those refineries to optimize their blending by blending them separately, in our refinery cost model we choose a more conservative approach by pooling the light and heavy cat naphtha together and blending the pooled FCC naphtha stream. This results in the underoptimizion of gasoline blending of FCC naphtha. Also, "That a model is limited or imperfect is not, in itself a reason to remand agency decisions based upon it." *Id.* "It is only when the model bears no rational relationship to the characteristics of the data to which it is applied that [courts] will hold that the use of the model is arbitrary and capricious." Appalachian Power Company v. EPA, 135 F.3d 791, 802 (D.C. Cir. 1998)(internal citations omitted).

Moreover, the oil industry failed to provide any information or data to support the comment that Mathpro's LP cost analysis for ICCT, which is based on a PADD- average LP refinery models, over optimized costs. LP refinery models do average the costs over many refineries to estimate costs, but whether any LP refinery model over or under-optimizes capital costs depends on what unit size is chosen in the refinery modeling. If the unit size being modeled represents a smaller size than that of the refineries in the PADD the refinery model would tend to underoptimize costs. However, if the unit size modeled is larger than average, then the refinery model would tend to overoptimize costs. Why we say that the commenter did not verify whether the Mathpro refinery model overoptimized capital costs is because the commenter did not compare the unit size modeled to the unit sizes of the modeled refineries in each PADD to verify that the unit size selected was too large. Reading through the refinery modeling report, Mathpro discussed overoptimization of capital costs and did model a higher capital cost for PADD 4 refineries to capture the poorer economies of scale for those smaller refineries. This suggests that Mathpro did assume an FCC postreater unit size to avoid overoptimization.

The Mathpro refinery modeling study did not model an ABT program as the oil industry comment suggested because in the LP refinery model study Mathpro assumed either grassroots installation or revamps of FCC postreaters at each refinery. If the Mathpro cost analysis was modeling an ABT program, the model would have been set up to allow some refineries to reduce their gasoline sulfur further than required and generate credits to show compliance for other refineries through credit transfers to the refineries which do not take action. In this regard, the Mathpro refinery model explicitly did not model an ABT program.

Regardless, these comments appear directed at the Mathpro study, not at EPA's cost analysis. Linear program models such as the one used by Mathpro have several advantages and several disadvantages compared to other modeling techniques. We have chosen for our analysis to develop and use a refinery-by-refinery model for our cost analysis, but which is still informed and aided by a refinery LP model when necessary and appropriate that is also widely used by industry.

7.2.6. ABT Program Impacts on Cost

What Commenters Said:

Commenter: Emissions Control Technology Association (ECTA)

EPA accommodates an averaging, banking, and trading (ABT) mechanism that reduces the compliance costs by permitting "high cost" firms to meet the sulfur requirement via consuming credits. EPA found that many refineries with both pre- and postreaters are able to achieve sulfur reductions beyond the 10 ppm standard at a relatively low incremental cost and then sell the credits to those refineries that would otherwise be faced with grassroots FCC postreater investments (21). Assuming counterfactually that each refinery were required to produce at exactly 10 ppm—that is, without the benefit of trading—EPA estimated the average compliance cost across all refineries to be 0.97 cents per gallon (22). With a credit-trading system in place, EPA estimated the average compliance cost would fall to 0.79 cents per gallon, with 25 refineries consuming credits. Under a more limited trading program, in which credits could only be exchanged within companies that owned multiple refineries, EPA estimated that the average cost of compliance would be 0.89 cents per gallon, with only eight refineries consuming credits.

EPA conservatively chose to use the estimate from this restricted, intra-firm trading regime for its proposal (23). Yet we believe that firms would have strong incentives to trade credits with other firms under Tier 3. In particular, so long as the cost of consuming a credit plus the transaction costs associated with inter-firm trading was less than the cost of reducing sulfur at a given refinery, that refinery would consume a credit from another firm. Accordingly, we expect the true average compliance cost to be closer to 0.79 cents per gallon. EPA's analysis was also conservative in the sense that it restricted refineries that sought to reduce sulfur to achieve sulfur levels of precisely 10 ppm or 5 ppm, when in reality, some of those refineries could reduce sulfur to levels above 10 ppm (say 20 ppm) and consume credits, expanding the opportunities for further trading and further average cost reductions.

Baker and O'Brien failed to properly consider the average, banking, and trading (ABT) provisions of EPA's Tier 3 proposal. In particular, API imposed a rigid 20 ppm cap for each refinery, which eliminates many of the opportunities for trading credits (30). In contrast, EPA imposed a more flexible cap of 80 ppm, which permits additional gains from trading and thereby reduces average compliance costs (31).

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20 - EPA Proposal, Fed. Reg. at 29977.
21 - Id. at 29973.
22 - Id. at 29974.
23 - Id. at 29975.
28 - EPA Proposal, Fed. Reg. at 29978.
29 - Id.
30 - Id. at 29977. 31Id. at 29972.

Commenter: Environmental Defense Fund (EDF)

The averaging, banking, and trading (ABT) program will help achieve these low costs by allowing refiners to optimize their investments. And that low cost estimate assumes that less than a quarter of the 111 existing refiners will participate in the ABT program. [This statement also cross-referenced with section 5.5.1]

Commenter: National Association of Clean Air Agencies (NACAA)

Opponents of Tier 3 contend that the cost of low-sulfur fuel will be not less than a penny a gallon, but between 6 cents and 9 cents per gallon. However, in making this estimate they did not account for the mitigating impacts of EPA's proposed set of flexibilities, all of which have proven successful in prior fuel programs adopted by the agency (e.g., lowering gasoline vapor pressure).

These include 1) an annual average sulfur standard with an ability to use a higher per-gallon cap; 2) an averaging, banking and trading program that would allow refiners six years — January 1, 2014 through December 31, 2019 — over which to spread out their investment and receive credit for early compliance by over complying with the current 30-ppm average sulfur standard from 2014 through 2016; 3) relief for small refiners and refineries — those producing fewer than 75,000 barrels a day — in the form of a three-year delay in compliance until December 31, 2019; and 4) relief for economic and technical hardship, available to all refiners.

Our Response:

We agree with the comments that the flexibilities inherent in the ABT program lowers the cost of complying with Tier 3 and will ease compliance with the Tier 3 program start date. As summarized above in Chapter 7.2.2.1 of this Summary and Analysis of Comments document, the ABT program is estimated to reduce the cost of the Tier 3 sulfur program by about 25%. As we discuss in Chapter 5.1.4.3 of this document, the flexibilities offered by the ABT program will enable refiners to earn early sulfur reduction credits prior to the program start date which will provide refiners the flexibility to start up their grassroots or revamped FCC postreaters that fits best in the schedule for installing and tying in the capital additions at each refinery.

7.2.7. Other Issues

What Commenters Said:

Commenter: Pennsylvania Department of Environmental Protection (DEP)

The EPA should examine whether damage will occur to seals on gas station equipment or other equipment. It is always a risk that equipment will be affected when fuel specifications change. These risks do not appear to have been considered in the proposed rulemaking. Lower levels of sulfur could cause some older gaskets in engines and equipment to leak. Additionally, although EPA does not address the 15 percent volume content of ethanol fuel directly in this proposed rule, the agency does indicate that it believes that 15 volume percent ethanol will eventually be in widespread use. EPA should factor in the potential cost from damage that could occur as a result of increasing ethanol content to 15 volume percent. EPA has failed in this proposed Tier 3 rule and in its earlier ethanol rule to address potential costs and emissions that will result if the higher ethanol content fuel causes damage to gasoline storage and dispensing equipment or other types of highway and nonroad equipment. Alcohol can degrade plastic, rubber and some types of metals.

Our Response:

Tier 3 sulfur control is not expected to cause other fuel changes that might have any impacts on vehicles and engines. The only expected impact of the sulfur control is the benefits to the operation of the catalytic aftertreatment systems that are intended by the sulfur standard. Concerns with respect to E15 ethanol blends or other fuels are outside the scope of this rulemaking.

7.3. Cost Effectiveness of the Tier 3 Standards

What Commenters Said:

Commenter: American Petroleum Institute and American Fuel and Petrochemical Manufacturers

In their comments, API and AFPM argued EPA's cost-effectiveness analysis is fundamentally flawed. They state that, "in assessing cost-effectiveness, EPA simply computes the costs incurred in the years 2017 and 2030 and divides those costs by the emission reductions it estimates will occur in those years. This approach is simply incorrect." They go on to say that, "under the approach used by EPA in the RIA, the compliance cost for a given year represents only the costs for new vehicles sold in that year; those costs are then divided by the cumulative emission reductions achieved by the regulation, which include benefits from previous model-year vehicles."

Commenter: Marathon Petroleum Company LP (MPC)

In their comments, Marathon argues that the proposal's cost effectiveness analysis was inconsistent with OMB guidelines. Marathon notes that 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 draft RIA does not include an examination of alternative approaches and fails to meet the above basic criteria.

Marathon notes that, 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). Marathon argues that, even though Tier 3 is a major rule, EPA did not provide a CEA that addresses alternative measures to reduce PM2.5 and ozone air pollution, costs of alternate measures, and cost comparisons and, without a CEA, EPA cannot determine if the Tier 3 rule is the most cost effective way to reduce PM2.5 or ozone air pollution.

Our Response:

We acknowledge that the analysis presented in the proposal as a cost-effectiveness analysis was not a "cost-effectiveness" analysis in the way the commenter is using the term and should have been described as a "cost per ton-reduction" analysis. The numbers in proposed preamble Table VII-9 (see 78 FR 29979) are, in fact, the annual costs of the program in the indicated year divided by the tons reduced by the program in that given year.

That being said, a cost-effectiveness analysis is not a requirement of the Clean Air Act sections under which our Tier 3 regulatory authority resides. We are required to give appropriate consideration to cost, among other factors, when issuing vehicle standards under section 202(a) of the Clean Air Act, but the statute does not prescribe a cost-effectiveness analysis. Similarly, section 211(c)(1) of the Clean Air Act, which is our statutory authority to issue fuel standards makes no mention of a need to demonstrate the cost-effectiveness of the fuel standards. While a cost-effectiveness analysis is not a statutory requirement, we nonetheless have sometimes presented cost/ton-reduced numbers in the supporting analyses for regulations that we issue. “Because section 213 does not mandate a specific method of cost analysis, we find reasonable the EPA's choice to consider costs on the per ton of emissions removed basis.” Husqvarna AB v. EPA, 254 F. 3d 195 at 200 (D.C. Cir. 2001)).

What Commenters Said:

Commenter: American Petroleum Institute and American Fuel and Petrochemical Manufacturers:

In their comments, API and AFPM claim that EPA has not performed the incremental cost-effectiveness analysis required to establish that individual portions of the Tier 3 Proposal are cost effective. They state that, “the vehicle standards and sulfur reduction elements of the Tier 3 program are severable, as either could be implemented by EPA without the implementation of the other. Given this, EPA should have assessed the costs and benefits of each element individually so that the need for each element could be assessed based on its relative contribution to the overall benefits expected from the Tier 3 proposal and in light of its relative contribution to the overall costs.”

They also claim that the fuel sulfur control provisions of the Tier 3 proposal provide only a small portion of the total expected health benefits and are therefore “expected to be much less cost effective than the proposed vehicle standards.”

Commenter: Chevron Products Company

In their comments, Chevron states that they do not believe that the reduction in annual average gasoline sulfur from 30 ppm to 10 ppm is warranted based on tailpipe emissions and cost effectiveness. Chevron states their belief that that the reduction in annual average gasoline sulfur from 30 ppm to 10 ppm is not warranted based on tailpipe emissions and cost effectiveness.

Chevron also states that EPA’s cost-benefit analysis is based on an assumption that a sulfur level of 10 ppm is necessary to obtain the claimed benefits. Since EPA did not test at an intermediate sulfur level, there was insufficient data available at the time the NPRM was written to properly determine whether to set the new standard at 10 ppm or some intermediate level between 10 and 30 ppm.

Chevron also states that the NPRM does not discuss the cost-effectiveness of the program as a whole (vehicles and fuels) with a sulfur level between 10 and 30 ppm and that there is no compelling argument for why the sulfur level should be 10 ppm and not somewhere in between.

Commenter: Countrymark

In their comments, Countrymark argues that the Tier 3 reduction in gasoline sulfur will be significantly more expensive per pound of sulfur removal, than previous regulations. They state that the Tier 2 sulfur reductions cost approximately $100,000 per ppm of sulfur, while Tier 3 sulfur reductions are expected to cost $900,000 to $1,000,000 per ppm of sulfur.

Our Response:

EPA disagrees with the commenters' claim that the vehicle and fuel programs are "severable, as either could be implemented by EPA without the implementation of the other." For both the proposal and the final rulemaking, EPA analyzed the combined fuel and vehicle program, in keeping with the fundamental principles of the Tier 3 program: that vehicles and fuels should be treated as an integrated system, as has been successfully done in the mobile source emission control program for over a decade.

As described in detail in Sections I.A and IV.A.6 of the preamble to the final rule, there is a first-order relationship between fuel sulfur content and the efficiency of modern three-way catalytic converters. The Tier 3 final rulemaking addresses the stringency of exhaust gas standards and fuel sulfur level as a system because, as documented in the scientific literature and more fully described in Section IV.A.6 of the preamble to the final rule, the two are strongly linked. For this reason, it is not possible to ascribe emission reductions, air quality and human health benefits to the vehicle program independent of the sulfur program (or vice versa), because the new vehicle program depends on the reduced sulfur level of the fuel program.

While it is not possible to identify the air quality impacts, health effects, or benefits of a fuel sulfur program independent of a vehicle program, the final rulemaking contains a significant amount of analysis that distinguishes between the emission reductions associated with the fuel program on the existing fleet (pre-Tier 3 vehicles) and the emission reductions associated with the vehicle and fuel programs on the new fleet (Tier 3 vehicles). See preamble Section III.B of the preamble for these emission impacts.

In addition to the impacts of fuel sulfur standards alone on the pre-Tier 3 fleet and the impacts of fuel sulfur standards and vehicle standards combined on the Tier 3 fleet presented in Tables III-2 through III-4 of the preamble, EPA has also conducted air quality modeling for 2018 in order to understand the immediate impacts of the Tier 3 standards. The air quality impacts in 2018 are mostly due to the impact of the fuel sulfur program on the existing fleet, reflecting the corresponding reduction in emissions. These air quality modeling results are presented in detail in Section III.C of the preamble to the final rule and RIA Chapter 7. Finally, we performed an illustrative analysis of monetized impacts associated with the final rulemaking in 2018 (See Section VIII.E of the preamble to the final rule and RIA Chapter 8.1.4). Total benefits in 2018 are estimated to be between $1.9 and $5.6 billion, depending on the suite of health impact studies and discount rates used. Total benefits in 2030 are estimated to be between \$6.7 and \$19 billion.

The final rulemaking analysis also estimates the costs of the vehicle and sulfur programs both separately and combined, for both 2018 and 2030.

The Tier 3 final rulemaking presents substantial and transparent analysis of the impacts of the vehicle and sulfur standards, and the results of this analysis demonstrate the estimated benefits of the final standards clearly outweigh the projected costs.

Further, as described in Section IV of the preamble, we believe that 10 ppm sulfur is required to enable the Tier 3 standards. We see no reason to have analyzed the costs and emission reductions of sulfur levels between 10 and 30 ppm, as suggested by Chevron, given that the vehicle program would not be feasible at those intermediate sulfur levels. We received similar comments – that EPA should have considered sulfur levels between 10 and 30 ppm – and summarize them and respond to them in Chapter 4.1.4.3 of this Summary and Analysis of Comments document.

Lastly, we do not see the relevance of comparisons between the Tier 2 and Tier 3 programs in terms of costs per ppm of sulfur reduction. Both programs are feasible, provide significant public health benefits and do so at reasonable costs.

8. Estimated Benefits of the Proposed Rule

What We Proposed:

The comments in this chapter correspond to Section VIII of the preamble to the proposed rule and address the estimated benefits of the Tier 3 program. A summary of the comments received and our response to those comments are located below.

8.1. Comments on Benefits Methods and Assumptions

What Commenters Said:

Commenter: Institute for Energy Research (IER)

Second, EPA is required to publish key pieces of information when it proposes a new rule. Specifically, EPA shall provide a summary of "the factual data on which the proposed rule is based" and "the methodology used in obtaining the data and in analyzing the data."3 EPA has failed to comply with this requirement. For example, the vast majority of benefits from this rule come from reductions in particulate matter, but EPA has consistently refused to release the data upon which it relies for these benefits calculations to the public. This failure is in clear violation of President Obama's claim that his administration is "the most transparent administration in history'.

Our Response:

The Tier 3 final rulemaking presents substantial and transparent analysis of the impacts of the vehicle and sulfur standards, and the results of this analysis demonstrate the estimated benefits of the final standards clearly outweigh the projected costs. For both the proposal and the final rulemaking, we provide factual data on which the rulemaking is based, both in the preamble and Regulatory Impact Analysis. We also provide extensive documentation of our data, methods, and underlying assumptions in the docket that accompanies this rule (EPA-HQ- OAR–2011–0135).

We also reject the commenter's claim that EPA has consistently refused to release the underlying data that supports the $PM_{2.5}$ benefits analysis. The peer-reviewed scientific evidence that particulate matter (and ozone) are associated with significant public health impacts is robust, well-understood, and has been documented extensively in the rulemaking package (for example, see Chapter 6 and Chapter 8 of the RIA).

Questions have been raised in specific regard to the underlying data associated with the PM-related mortality studies EPA uses in its risk and benefits analyses (the American Cancer Society and Harvard Six Cities cohort studies). The data are held by the outside research institutions that conducted these large-scale epidemiological studies, not the EPA, and the Agency has released all of the data that we have received thus far from those institutions. The Agency is also engaged with the relevant research institutions to get access to additional data.

We emphasize, however, that the fact that some of the data is not currently public in no way undermines the validity of the studies' results. Nor does it call into question the EPA's reliance on those studies, along with thousands of other peer-reviewed studies, when the agency considers the scientific foundation regarding methods used in risk and benefits assessments. In fact, the original studies based on these cohorts already have been subject to reanalysis and validation by the Health Effects Institute (HEI). HEI entered into confidentiality agreements with the owners of the data to have access to the data in order to conduct a reanalysis of the study cohorts. The reanalysis confirmed the validity of the findings and methodology.

What Commenters Said:

Commenter: American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM); Marathon Petroleum Company LP (MPC)

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 [EPA-HQ-OAR-2011-0135-4276].

Our Response:

We base our analysis of the program's impact on human health and the environment on peer-reviewed studies of air quality and human health effects.[1,2,3] Our benefits methods are consistent with the Regulatory Impact Analyses (RIAs) that accompanied the final revisions to the National Ambient Air Quality Standards (NAAQS) for Particulate Matter, the 2008 final ozone NAAQS, and the 2010 ozone NAAQS reconsideration.

These benefits methods are fully consistent with Circular A-4[4] and EPA guidance.[5] However, we note that Circular A-4 provides guidance to Federal agencies on the development of regulatory analyses under Executive Orders 12866 and 13563 and does not establish legally enforceable requirements.

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[1] U.S. Environmental Protection Agency. (2012). *Regulatory Impact Analysis for the Final Revisions to the National Ambient Air Quality Standards for Particulate Matter*. Prepared by: Office of Air and Radiation, EPA-452/R-12-005. Retrieved November 22, 2013 at http://www.epa.gov/ttn/ecas/ria.html

[2] U.S. Environmental Protection Agency. (2008). *Final Ozone NAAQS Regulatory Impact Analysis*. Prepared by: Office of Air and Radiation, Office of Air Quality Planning and Standards. Retrieved November 22, 2013 at http://www.epa.gov/ttn/ecas/ria.html. EPA-HQ-OAR-2009-0472-0238

[3] U.S. Environmental Protection Agency. (2010). Summary of the updated Regulatory Impact Analysis (RIA) for the Reconsideration of the 2008 Ozone National Ambient Air Quality Standard (NAAQS). Prepared by: Office of Air and Radiation, Office of Air Quality Planning and Standards. Retrieved November 22, 2013 at http://www.epa.gov/ttnecas1/regdata/RIAs/s1-supplemental_analysis_full.pdf.

[4] Office of Management and Budget (OMB). 2003. Circular A-4: Regulatory Analysis. Washington, DC. Available on the Internet at <http://www.whitehouse.gov/omb/circulars/a004/a-4.html.>

[5] U.S. Environmental Protection Agency (U.S. EPA). 2010. Guidelines for Preparing Economic Analyses. EPA 240-R-10-001. National Center for Environmental Economics, Office of Policy Economics and Innovation. Washington, DC. December. Available on the Internet at <http://yosemite.epa.gov/ee/epa/eerm.nsf/vwAN/EE-0568-50.pdf/$file/EE-0568- 50.pdf>.

What Commenters Said:

Commenter: American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM); Marathon Petroleum Company LP (MPC)

Inflated economic benefits based on "avoided or premature mortality":
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.

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

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 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: … 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.

Our Response:

Regarding the application of a Value of Statistical Life (VSL) versus a Value of Statistical Life Year (VSLY) approach as an appropriate metric, OMB Circular A-4 suggests that agencies consider quantifying life years, but it does not require an agency to do so. The EPA has explored the issue of remaining life expectancy and its potential effect on WTP in the past and has received guidance from the Science Advisory Board (SAB) on the matter.[6] To summarize, the SAB concluded that economic theory is ambiguous on how people's willingness to pay to reduce mortality risks should change over their lifetime, leaving it therefore as an empirical matter. The judgment of the SAB, however, is that the empirical literature is not advanced enough to provide clear guidance on how age and health status affect willingness to pay to reduce mortality risks and that "…the use of a constant Value of a Statistical Life Year (VSLY), which assumes that the VSL is strictly proportional to remaining life expectancy, is unwarranted." (p. ii) Instead, the SAB recommended that EPA use an age-independent valuation of mortality risk reductions (an age-independent VSL), which the EPA has done here. This is also consistent with EPA's Economic Guidelines, which conclude that, for the present time, the appropriate default approach for valuing the benefits of reductions in mortality risk is provided by a central VSL estimate.

EPA's VSL approach for monetizing benefits from reductions in mortality risk (including sources of estimates and methods for adjustment over time) has been peer reviewed by the SAB. The 26 estimates underlying EPA's guidance for Willingness to Pay (WTP) for mortality risk reductions come from Viscusi (1992),[7] which describes the selection criteria for the studies that EPA originally used in *The Benefits and Costs of the Clean Air Act: 1970 to 1990*.[8] Most of the estimates in this set of literature are based on wage differentials for workplace risks. While these estimates cannot be taken as precise values for mortality risk reductions from environmental policies, their usefulness for informing environmental policy analysis has been recognized repeatedly by the Environmental Economics Advisory Committee of the SAB (SAB-EEAC).[9,10]

In the context of re-evaluating Agency guidance on this issue, EPA examined multiple meta-analyses published in the economics literature and consulted with the SAB-EEAC on how to evaluate and apply meta-analyses of mortality risk valuation studies in a policy context. Specifically, when asked whether EPA guidance on the issue should rely on stated preference or

[6] U.S. Environmental Protection Agency—Science Advisory Board (U.S. EPA-SAB). 2007. SAB Advisory on EPA's Issues in Valuing Mortality Risk Reduction. EPA-SAB-08-001. October. Available on the Internet at <http://yosemite.epa.gov/sab/sabproduct.nsf/4128007E7876B8F0852573760058A978/$File/sab-08-001.pdf>.

[7] Viscusi, W.K. 1992. Fatal Tradeoffs: Public and Private Responsibilities for Risk. New York, NY: Oxford University Press.

[8] U.S. Environmental Protection Agency (EPA). 1997. The Benefits and Costs of the Clean Air Act, 1970 to 1990. Prepared for U.S. Congress by U.S. EPA, Office of Air and Radiation/Office of Policy Analysis and Review, Washington, DC.

[9] U.S. Environmental Protection Agency—Science Advisory Board (U.S. EPA-SAB). 2000. An SAB Report on EPA's White Paper Valuing the Benefits of Fatal Cancer Risk Reduction. EPA-SAB-EEAC-00-013. July. Available on the Internet at <http://yosemite.epa.gov/sab%5CSABPRODUCT.NSF/41334524148BCCD6852571A700516498/$File/eeacf013.pdf>.

[10] U.S. Environmental Protection Agency (U.S. EPA). 2010. Guidelines for Preparing Economic Analyses. EPA 240-R-10-001. National Center for Environmental Economics, Office of Policy Economics and Innovation. Washington, DC. December. Available on the Internet at <http://yosemite.epa.gov/ee/epa/eerm.nsf/vwAN/EE-0568-50.pdf/$file/EE-0568- 50.pdf>.

hedonic wage studies, the SAB-EEAC responded, "[t]he SAB believes that both stated preference and revealed preference studies should be considered in valuing mortality risks … Both approaches have strengths and weaknesses in a particular context, and, as a result, we do not believe that the Agency should rely exclusively on one or the other in all contexts."[11]

More recently, in the context of reviewing EPA's strategy for updating mortality risk valuation estimates in the future, the SAB supported combining the two streams of literature to arrive at estimates for use in regulatory analysis, stating "…to the extent that each literature provides useful information about the VRR [Value of a Risk Reduction] in a particular context, or the variation of VRR between contexts, it is important to combine their results."[12]

Regarding the comment that EPA should examine the impact of using a high end versus a more central VSL, we do indeed examine this impact in our probabilistic uncertainty analysis. The EPA currently recommends a central VSL of $8.3m (1990$, 1990 income) based on a Weibull distribution fitted to 26 published VSL estimates (5 contingent valuation and 21 labor market studies). The underlying studies, the distribution parameters, and other useful information are available in Appendix B of the EPA's Guidelines for Preparing Economic Analyses.

What Commenters Said:

Commenter: American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM); Marathon Petroleum Company LP (MPC)

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.

Our Response:

Our analysis accounts for expected growth in real income over time. This is a distinct concept from inflation and currency year. Economic theory argues that Willingness to Pay (WTP) for most goods (such as environmental protection) will increase if real incomes increase.

[11] U.S. Environmental Protection Agency—Science Advisory Board (U.S. EPA-SAB). 2007. SAB Advisory on EPA's Issues in Valuing Mortality Risk Reduction. EPA-SAB-08-001. October. Available on the Internet at <http://yosemite.epa.gov/sab/sabproduct.nsf/4128007E7876B8F0852573760058A978/$File/sab-08-001.pdf>.

[12] U.S. Environmental Protection Agency—Science Advisory Board (U.S. EPA-SAB). 2011. Review of Valuing Mortality Risk Reductions for Environmental Policy: A White Paper (December 10, 2010). EPA-SAB-11-011 July. Available on the Internet at <http://yosemite.epa.gov/sab/sabproduct.nsf/298E1F50F844BC23852578DC0059A616/$File/EPA-SAB-11-011-unsigned.pdf>.

There is substantial empirical evidence that the income elasticity[13] of WTP for health risk reductions is positive, although there is uncertainty about its exact value. Thus, as real income increases, the WTP for environmental improvements also increases. Although many analyses assume that the income elasticity of WTP is unit elastic (i.e., a 10% higher real income level implies a 10% higher WTP to reduce risk changes), empirical evidence suggests that income elasticity is substantially less than one and thus relatively inelastic. As real income rises, the WTP value also rises but at a slower rate than real income.

The effects of real income changes on WTP estimates can influence benefits estimates in two different ways: through real (national average) income growth between the year a WTP study was conducted and the year for which benefits are estimated, and through differences in income between study populations and the affected populations at a particular time. The SAB-EEAC advised the EPA to adjust WTP for increases in real income over time but not to adjust WTP to account for cross-sectional income differences "because of the sensitivity of making such distinctions and because of insufficient evidence available at present."[14] An advisory by another committee associated with the SAB, the Advisory Council on Clean Air Compliance Analysis (SAB-Council), has provided conflicting advice. While agreeing with "the general principle that the willingness to pay to reduce mortality risks is likely to increase with growth in real income" and that "[t]he same increase should be assumed for the WTP for serious nonfatal health effects," they note that "given the limitations and uncertainties in the available empirical evidence, the Council does not support the use of the proposed adjustments for aggregate income growth as part of the primary analysis."[15] Until these conflicting advisories have been reconciled, the EPA will continue to adjust valuation estimates to reflect income growth.

The agency continues to update its income elasticity and income growth estimates using the available projections in growth, including GDP growth.

What Commenters Said:

Commenter: Marathon Petroleum Company LP (MPC)

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

[13] Income elasticity is a common economic measure equal to the percentage change in WTP for a 1% change in income.

[14] U.S. Environmental Protection Agency—Science Advisory Board (U.S. EPA-SAB). 2000. An SAB Report on EPA's White Paper Valuing the Benefits of Fatal Cancer Risk Reduction. EPA-SAB-EEAC-00-013. July. Available on the Internet at <http://yosemite.epa.gov/sab%5CSABPRODUCT.NSF/41334524148BCCD6852571A700516498/$File/eeacf013.pdf>.

[15] U.S. Environmental Protection Agency—Science Advisory Board (U.S. EPA-SAB). 2004. Review of the Draft Analytical Plan for EPA's Second Prospective Analysis—Benefits and Costs of the Clean Air Act, 1990-2020: An Advisory by the Advisory Council for Clean Air Compliance Analysis. EPA-SAB-COUNCIL-ADV-04-004. May. Available on the Internet at <http://yosemite.epa.gov/sab/sabproduct.nsf/7CCBBFE15CD4C8B185256F17005E3079/$File/council_adv_04004.pdf>.

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.

Our Response:

As we note in Chapter 7.3 of this document, a cost-effectiveness analysis is not a requirement of the Clean Air Act sections under which our Tier 3 regulatory authority resides. We are required to give appropriate consideration to cost, among other factors, when issuing vehicle standards under section 202(a) of the Clean Air Act, but the statute does not prescribe a cost-effectiveness analysis. Similarly, our statutory authority to issue fuel standards makes no mention of a need to demonstrate the cost-effectiveness of the fuel standards (see section 211(c)(1) of the Clean Air Act). We do, however, conduct a Cost Benefit Analysis (CBA), which is entirely consistent with OMB guidance.

Furthermore, Circular A-4 does not require agencies to conduct a cost-effectiveness analysis: "…you should prepare a cost-effectiveness analysis … to the extent that a valid effectiveness measure can be developed to represent expected health and safety outcomes [p. 9]."[16] According to EPA's economic guidelines:

> "The fields of health economics and public health often account for health status through the use of quality-adjusted life years (QALYs) or disability adjusted life years (DALYs). These measures have their place in evaluating the cost-effectiveness of medical interventions and other policy contexts, but have not been fully integrated into the welfare economic literature on risk valuation."[17]

In conclusion, EPA's use of the VSL to monetize the reductions in premature mortality is fully consistent with Circular A-4 and EPA guidance.

What Commenters Said:

Commenter: American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM); Marathon Petroleum Company LP (MPC)

Inappropriately monetized health effects not caused by PM2.5:
In the 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 PM2.5.

[16] Office of Management and Budget (OMB). 2003. Circular A-4: Regulatory Analysis. Washington, DC. Available on the Internet at <http://www.whitehouse.gov/omb/circulars/a004/a-4.html.>

[17] U.S. Environmental Protection Agency (U.S. EPA). 2010. Guidelines for Preparing Economic Analyses. EPA 240-R-10-001. National Center for Environmental Economics, Office of Policy Economics and Innovation. Washington, DC. December. Available on the Internet at <http://yosemite.epa.gov/ee/epa/eerm.nsf/vwAN/EE-0568-50.pdf/$file/EE-0568- 50.pdf>.

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.

Our Response:

We base our analysis of the program's impact on human health and the environment on peer-reviewed studies of air quality and human health effects.[18,19] Our benefits methods are consistent with the RIA that accompanied the final revisions to the National Ambient Air Quality Standards (NAAQS) for Particulate Matter and the final ozone NAAQS. As a result of this update to be consistent with the PM NAAQS analysis, we have removed the quantification of chronic bronchitis from our main analysis. This change is consistent with the findings of the PM Integrated Science Assessment (ISA) that the evidence for an association between long-term exposure to $PM_{2.5}$ and respiratory effects is more tenuous.[20]

What Commenters Said:

Commenter: American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM); Marathon Petroleum Company LP (MPC)

No estimates of Tier 3 impacts on urban populations.

Our Response:

This is an incorrect statement, since EPA's impacts analysis – including emissions, air quality, and health benefits – cover the national impacts of the final rulemaking, including both urban and rural areas (the contiguous 48 state area for the air quality modeling and benefits analysis).

[18] U.S. Environmental Protection Agency. (2012). *Regulatory Impact Analysis for the Final Revisions to the National Ambient Air Quality Standards for Particulate Matter*. Prepared by: Office of Air and Radiation, EPA-452/R-12-005. Retrieved August 14, 2013 at http://www.epa.gov/ttn/ecas/ria.html

[19] U.S. Environmental Protection Agency. (2008). *Final Ozone NAAQS Regulatory Impact Analysis*. Prepared by: Office of Air and Radiation, Office of Air Quality Planning and Standards. Retrieved March, 26, 2009 at http://www.epa.gov/ttn/ecas/ria.html. EPA-HQ-OAR-2009-0472-0238

[20] U.S. Environmental Protection Agency (U.S. EPA). 2009b. Integrated Science Assessment for Particulate Matter (Final Report). EPA-600-R-08-139F. National Center for Environmental Assessment—RTP Division. December. Available on the Internet at <http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=216546>.

What Commenters Said:

Commenter: American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM); Marathon Petroleum Company LP (MPC)

Insufficient quantification of key uncertainties in claimed benefits:
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 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.

Commenter: Mercatus Center at George Mason University

We find that the EPA has failed to acknowledge the high degree of uncertainty surrounding its estimates of benefits from this regulation.

Additionally, there is a high degree of uncertainty, which the EPA itself acknowledges, surrounding the EPA's benefits estimates. For example, the EPA describes criticisms related to its uncertainty analysis made by the National Resource Council in a 2002 report (1). Despite the EPA's acknowledgement of these criticisms, the EPA continues to evaluate uncertainty in a similar manner (2).

Our Response:

The EPA disagrees that it has not sufficiently quantified uncertainty in the Tier 3 benefits analysis. Our analysis contains a complex uncertainty characterization for the estimated benefits including a suite of quantitative and qualitative uncertainty analyses organized within a tiered uncertainty framework. The quantitative uncertainty analyses include Monte Carlo and probabilistic assessments, as well as sensitivity analyses using alternate assumptions. The EPA's uncertainty analyses for benefits examine the effects of the most important methodological choices on results. For example, the EPA estimates mortality impacts using health effect estimates garnered from an EPA-sponsored expert elicitation,[21] which provide a range of effect estimates that span from smaller than the effect coefficient in the American Cancer Society cohort studies (Pope et al., 2002; Krewski et al, 2009)[22,23] and larger than the effect coefficient in the Harvard Six Cities cohort studies (Laden et al., 2006; Lepeule et al., 2012).[24,25]

Furthermore, we characterize ozone mortality using a range across six studies, not only the two cited by the commenter – three multi-city studies (Bell et al., 2004; Huang et al., 2005; Schwartz, 2005) and three meta-analyses (Bell et al., 2005; Ito et al., 2005; Levy et al., 2005).[26,27,28,29,30,31] This approach is consistent with recommendations provided by the National Research Council (NRC, 2008)[32] and the studies were reviewed as part of the last ozone Integrated Science Assessment (ISA) prepared for the ozone NAAQS.[33]

These approaches are fully consistent with Circular A-4 and EPA guidance.

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[21] Roman, Henry A., Katherine D. Walker, Tyra L. Walsh, Lisa Conner, Harvey M. Richmond, Bryan J. Hubbell, and Patrick L. Kinney. 2008. "Expert Judgment Assessment of the Mortality Impact of Changes in Ambient Fine Particulate Matter in the U.S." Environ. Sci. Technol., 42(7):2268-2274.

[22] Pope, C.A., III, R.T. Burnett, M.J. Thun, E.E. Calle, D. Krewski, K. Ito, and G.D. Thurston. 2002. "Lung Cancer, Cardiopulmonary Mortality, and Long-term Exposure to Fine Particulate Air Pollution." Journal of the American Medical Association 287:1132-1141.

[23] Krewski D, Jerrett M, Burnett RT, Ma R, Hughes E, Shi, Y, et al. 2009. "Extended follow-up and spatial analysis of the American Cancer Society study linking particulate air pollution and mortality." HEI Research Report, 140, Health Effects Institute, Boston, MA.

[24] Laden, F., J. Schwartz, F.E. Speizer, and D.W. Dockery. 2006. "Reduction in Fine Particulate Air Pollution and Mortality." American Journal of Respiratory and Critical Care Medicine 173:667-672.

[25] Lepeule J, Laden F, Dockery D, Schwartz J 2012. "Chronic Exposure to Fine Particles and Mortality: An Extended Follow-Up of the Harvard Six Cities Study from 1974 to 2009." Environ Health Perspect. Jul;120(7):965-70.

[26] Bell, M.L., et al. (2004). Ozone and short-term mortality in 95 U.S. urban communities, 1987-2000. JAMA, 2004. 292(19): p. 2372-8. EPA-HQ-OAR-2009-0472-1662

[27] Huang, Y.; Dominici, F.; Bell, M. L. (2005) Bayesian hierarchical distributed lag models for summer ozone exposure and cardio-respiratory mortality. Environmetrics. 16: 547-562. EPA-HQ-OAR-2009-0472-0233

[28] Schwartz, J. (2005) How sensitive is the association between ozone and daily deaths to control for temperature? Am. J. Respir. Crit. Care Med. 171: 627-631. EPA-HQ-OAR-2009-0472-1678

[29] Bell, M.L., F. Dominici, and J.M. Samet. (2005). A meta-analysis of time-series studies of ozone and mortality with comparison to the national morbidity, mortality, and air pollution study. Epidemiology. 16(4): p. 436-45. EPA-HQ-OAR-2009-0472-0222

[30] Ito, K., S.F. De Leon, and M. Lippmann (2005). Associations between ozone and daily mortality: analysis and meta-analysis. Epidemiology. 16(4): p. 446-57. EPA-HQ-OAR-2009-0472-0231

[31] Levy, J.I., S.M. Chemerynski, and J.A. Sarnat. (2005). Ozone exposure and mortality: an empiric bayes metaregression analysis. Epidemiology. 16(4): p. 458-68. EPA-HQ-OAR-2009-0472-0236

[32] National Research Council (NRC). 2008. Estimating Mortality Risk Reduction and Economic Benefits from Controlling Ozone Air Pollution. National Academies Press. Washington, DC.

[33] U.S. EPA. Integrated Science Assessment of Ozone and Related Photochemical Oxidants (Final Report). U.S. Environmental Protection Agency, Washington, DC, EPA/600/R-10/076F, 2013.

Since the publication of NRC (2002),[34] the EPA has continued work to improve the characterization of uncertainty in both health incidence and benefits estimates. In response to these recommendations, the EPA expanded our previous analyses to incorporate additional quantitative and qualitative characterizations of uncertainty. While we have not yet been able to make as much progress towards the full, probabilistic uncertainty assessment envisioned by the NAS as we had hoped, we have added a number of additional quantitative and qualitative analyses to highlight the impact that uncertain assumptions may have on the benefits estimates. In addition, for some inputs into the benefits analysis, such as the air quality data, it is difficult to address uncertainty probabilistically due to the complexity of the underlying air quality models and emission inputs. In cases where there is insufficient scientific evidence to support alternative assumptions about key uncertain parameters, we provide qualitative assessments and do not simply speculate for the purposes of generating probabilistic uncertainty distributions.

What Commenters Said:

Commenter: American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM); Marathon Petroleum Company LP (MPC)

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 μg/m3 in PM2.5 when the NAAQS standard is 12 μg/m3. 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.

Over-estimated mortality attributed to small changes in PM2.5:
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 PM2.5 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-

[34] National Research Council (NRC). 2002. Estimating the Public Health Benefits of Proposed Air Pollution Regulations. Washington, DC: The National Academies Press. Washington, DC.

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 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 PM2.5 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 PM2.5 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).

In the draft DRIA, over two-thirds of the economic benefits are attributed to a small (0.05 μg/m3) reduction in PM2.5 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 PM2.5 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 PM2.5 well below the NAAQS level [See Figure 12 on p. 39 of Docket number EPA-HQ-OAR-2011-0135-4276-A2]. Since a large fraction of the U.S. population lives in areas where the PM2.5 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.

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.

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: 4) the impact of extrapolating mortality and other health effects to far below levels deemed safe by EPA to near or below background/

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 μg/m3. 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 μg/m3 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.

Commenter: Mercatus Center at George Mason University

A growing literature calls into question the causal link between the total concentration of ambient particulate matter and mortality levels, especially at the low doses that exist today in many parts of the United States.

First, over 50 percent of the quantified benefits from the regulation are due to reductions in total particulate matter. However, a growing literature raises doubts about the causal link between ambient PM2.5 levels and increases in mortality.

The EPA also acknowledges uncertainty with regards to its benefits analysis, including these points from table 8-16 of the Regulatory Impact Analysis for the rule:

The extrapolation of effect estimates is beyond the range of ozone or PM concentrations observed in the source epidemiological study.

Each point is important. First, the EPA states that its estimates go beyond those confirmed in the epidemiological study upon which it bases its findings. This means benefits of the regulation are based primarily upon model selection, not empirical evidence. The EPA assumes a linear-dose response down to the origin, resulting in large benefits estimates. Selecting another model, such as a threshold- or hormetic-dose response at low doses, would produce vastly lower benefits estimates. Recent academic literature has suggested there may be reason to believe PM exhibits a hormetic-dose response at low doses.

Points 1…above imply that a benefits estimate of zero is within the realm of possibility for benefits resulting from reductions in particulate matter. Acknowledging this uncertainty should be a part of the Regulatory Impact Analysis (RIA). Elsewhere in the RIA, the EPA acknowledges that the "EPA estimated PM-related mortality without applying an assumed concentration threshold (section 8-9 of RIA)." Thus, the EPA assumes PM-related health benefits continue all the way down to very low levels. However, Cox has shown that there may be a hormetic-, or J-shaped-, dose-response curve for PM at low dose levels. If true, this implies there may be no negative health effects and potentially even health benefits to PM exposure at low-dose levels, rather than the harm the EPA assumes by model selection. Elsewhere, Cox has argued that the causal link between PM and human health benefits has not been adequately demonstrated at low doses. The EPA appears to be pointing to correlations without assessing whether causation is present. Fortunately, there are tests that can be done to demonstrate causation. The EPA would benefit from running these tests with the data available and presenting these results to the public.

Additionally, Lutter and Fraas show that uncertainties surrounding benefits estimates from PM reductions may greatly exceed those that the EPA acknowledges in previous analyses for PM-related rules. Lutter and Fraas give the EPA the benefit of the doubt and assume a causal relationship exists between PM and increases in mortality. They go on to demonstrate that benefits estimates vary greatly by modifying assumptions such as the value of reducing mortality risk or whether the toxicity is above or below the average for fine particles.

Other experts in the field of environmental risk assessment have shown similar skepticism about the benefits of PM-related regulations. For example, the number of lives saved may be vastly overstated.

The EPA's methodology appears to be at odds with the very standards it applied to its own analyses prior to 2009. The EPA even acknowledges this methodological problem in point 1 above.

Our Response:

The EPA disagrees with the commenters regarding the evidence for health impacts at low concentrations, disagrees with the commenters' recommendations regarding the assumptions and magnitude of benefits results that the EPA should apply in the RIA, and disagrees with the commenters' erroneous interpretation of the NRC guidance with regard to the American Cancer Society (ACS) and Harvard Six Cities (H6C) studies. We also disagree that zero is within the realm of possibility for benefits resulting from reductions in particulate matter. The EPA's methods for quantifying health benefits of emission reductions are based on the best available peer-reviewed science and methods that have withstood scrutiny from EPA's independent Science Advisory Board (SAB), the National Academy of Sciences (NRC, 2002), and continuous interagency review.

Regarding the NRC guidance, the citation provided is taken out of context. The NRC commented that the EPA should not rely on the Harvard Six Cities cohort and American Cancer Society cohort alone to the exclusion of a "new generation of cohort studies." In formulating the decisions that informed the PM NAAQS (and also inform the Tier 3 analysis), the EPA considered all of the available scientific evidence, including studies of new cohorts. In addition, two separate panels of EPA's independent Science Advisory Board (SAB) recently recommended that the EPA use these two cohorts to quantify $PM_{2.5}$-related mortality risks and benefits (i.e., CASAC (2009, 2010) and Council (2010)).[35,36,37] Despite some inherent limitations, these cohorts continue to have several advantages over other currently available cohorts, including age and gender representativeness, geographic representativeness, study size, consideration of confounders, and length of follow-up. EPA's approach is consistent with the advice from NRC and SAB.

The EPA has also carefully considered the epidemiological, toxicological and clinical evidence linking exposure to fine particles and the onset of adverse health outcomes. When estimating PM-related risks, we rely upon studies and conclusions considered in the *Integrated Science Assessment for Particulate Matter* (PM ISA)(U.S. EPA, 2009) and the *Provisional Assessment* (U.S. EPA, 2012).[38,39] These two comprehensive documents have assessed the entire body of scientific evidence regarding particles, including thousands of new studies (and include the studies mentioned by the commenter). The PM ISA received two rigorous rounds of peer review by the independent Clean Air Scientific Advisory Committee (CASAC) and concluded that the no-threshold model is best supported by the available data. Specifically, the PM ISA concluded that "[o]verall, the studies evaluated further support the use of a no-threshold log-

[35] U.S. Environmental Protection Agency—Science Advisory Board (U.S. EPA-SAB). 2009. Review of Integrated Science Assessment for Particulate Matter (Second External Review Draft, July 2009). EPA-CASAC-10-001. November. Available on the Internet at <http://yosemite.epa.gov/sab/SABPRODUCT.NSF/81e39f4c09954fcb85256ead006be86e/151B1F83B02314558 5257678006836B9/$File/EPA-CASAC-10-001-unsigned.pdf>.

[36] U.S. Environmental Protection Agency Science Advisory Board (U.S. EPA-SAB). 2010. CASAC Review of Quantitative Health Risk Assessment for Particulate Matter—Second External Review Draft (February 2010). EPA-CASAC-10-008. Available on the Internet at <http://yosemite.epa.gov/sab/sabproduct.nsf/264cb1227d55e02c85257402007446a4/BC4F6E77B638515585257 7070002F09F/$File/EPA-CASAC-10-008-unsigned.pdf>.

[37] U.S. Environmental Protection Agency Science Advisory Board (U.S. EPA-SAB). 2010. Review of EPA's DRAFT Health Benefits of the Second Section 812 Prospective Study of the Clean Air Act. EPA-COUNCIL-10-001. June. Available on the Internet at <http://yosemite.epa.gov/sab/sabproduct.nsf/9288428b8eeea4c885257242006935a3/59e06b6c5ca66597852575e 7006c5d09!OpenDocument&TableRow=2.3#2.>.

[38] U.S. Environmental Protection Agency (U.S. EPA). 2009. Integrated Science Assessment for Particulate Matter (Final Report). EPA-600-R-08-139F. National Center for Environmental Assessment—RTP Division. December. Available on the Internet at <http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=216546>.

[39] U.S. Environmental Protection Agency (U.S. EPA). 2012. Provisional Assessment of Recent Studies on Health Effects of Particulate Matter Exposure. EPA/600/R-12/056A. National Center for Environmental Assessment—RTP Division. December.

linear model." In 2010, the Health Effects Subcommittee of the EPA's independent Advisory Council on Clean Air Compliance Analysis (Council) "fully supports EPA's decision to use a no-threshold model to estimate mortality reductions. This decision is supported by the data, which are quite consistent in showing effects down to the lowest measured levels. Analyses of cohorts using data from more recent years, during which time PM concentrations have fallen, continue to report strong associations with mortality. Therefore, there is no evidence to support a truncation of the CRF [concentration-response function]."[40] A summary of the scientific review statements regarding the lack of a threshold in the $PM_{2.5}$-mortality relationship is documented in a technical support document.[41]

Our approach to estimating PM-related health impacts below the lowest measured level (LML) is consistent with this advice. In general, we are more confident in the magnitude of the risks we estimate from simulated $PM_{2.5}$ concentrations that coincide with the bulk of the observed PM concentrations in the epidemiological studies that form the basis of those estimates. Likewise, we are less confident in the risk we estimate from simulated $PM_{2.5}$ concentrations that fall below the bulk of the observed data in these studies. For this reason, the EPA includes statistics in the final RIA showing the percentage of health impacts occurring above these levels for readers to understand the effect of this methodological decision. While this assessment provides some insight into the level of uncertainty in the estimated PM mortality benefits, EPA does not view the LML as a threshold and continues to quantify the PM-related mortality impacts using the full range of modeled air quality concentrations as the best estimate of the benefits.

We disagree with the comment that the RIA is deficient because the analysis does not address the issue that the benefits in various regions of the country differ widely, even though significant regional heterogeneity has been reported in recent studies.

With respect to understanding the nature and magnitude of $PM_{2.5}$-related risks, the EPA agrees that epidemiological studies evaluating health effects associated with long-term $PM_{2.5}$ exposures have reported heterogeneity in responses between cities and effect estimates across geographic regions of the U.S. (U.S. EPA, 2009, sections 6.2.12.1, 6.3.8.1, 6.5.2, and 7.6.1; U.S. EPA, 2011, p. 2-25).[42,43] However, the rationale that heterogeneity in risk estimates presents a potential bias as posed by the commenters is simplistic and does not account for a number of

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[40] U.S. Environmental Protection Agency Science Advisory Board (U.S. EPA-SAB). 2010. Review of EPA's DRAFT Health Benefits of the Second Section 812 Prospective Study of the Clean Air Act. EPA-COUNCIL-10-001. June. Available on the Internet at <http://yosemite.epa.gov/sab/sabproduct.nsf/9288428b8eeea4c885257242006935a3/59e06b6c5ca66597852575e7006c5d09!OpenDocument&TableRow=2.3#2.>.

[41] U.S. Environmental Protection Agency (U.S. EPA). 2010. Technical Support Document: Summary of Expert Opinions on the Existence of a Threshold in the Concentration-Response Function for PM2.5-related Mortality. Research Triangle Park, NC. June. Available on the Internet at <www.epa.gov/ttn/ecas/regdata/Benefits/thresholdstsd.pdf>.

[42] U.S. Environmental Protection Agency (U.S. EPA). 2009. Integrated Science Assessment for Particulate Matter (Final Report). EPA-600-R-08-139F. National Center for Environmental Assessment—RTP Division. December. Available on the Internet at <http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=216546>.

[43] U.S. Environmental Protection Agency (U.S. EPA). 2011. Policy Assessment for the Review of the Particulate Matter National Ambient Air Quality Standards. EPA-452/D-11-003. April. Available on the Internet at <http://www.epa.gov/ttnnaaqs/standards/pm/s_pm_2007_pa.html>.

factors that have been shown to influence city-specific risk estimates in epidemiologic studies. As discussed in the ISA, the EPA recognizes that there are compositional differences in $PM_{2.5}$ across the country and that the county-level air quality data used in epidemiological studies may result in exposure error, which could in part account for variability in city-specific risk estimates (U.S. EPA, 2009, section 2.3.2).

Overall, the EPA recognizes that uncertainties still remain regarding various factors that contribute to heterogeneity observed in epidemiological studies. Nonetheless, the EPA recognizes that this heterogeneity could be attributed, at least in part, to differences in $PM_{2.5}$ composition across the U.S., as well as to exposure differences that vary regionally such as personal activity patterns, microenvironmental characteristics, and the spatial variability of $PM_{2.5}$ concentrations in urban areas (U.S. EPA, 2009, section 2.3.2; 77 FR 38910).

The current epidemiological evidence and the limited amount of city-specific speciated $PM_{2.5}$ data does not allow conclusions to be drawn that specifically differentiate effects of PM in different locations (U.S. EPA, 2011, p. 2-25). Furthermore, the PM ISA concluded, "that many constituents of $PM_{2.5}$ can be linked with multiple health effects, and the evidence is not yet sufficient to allow differentiation of those constituents or sources that are more closely related to specific health outcomes" (U.S. EPA, 2009, p. 2- 17). CASAC thoroughly reviewed the EPA's presentation of the scientific evidence indicating heterogeneity in $PM_{2.5}$ effect estimates in epidemiological studies and concurred with the overall conclusions presented in the ISA.

For all of the reasons listed above, the EPA believes that the approach used to estimate and present the human health benefits of the Tier 3 rule is appropriate and consistent with the currently accepted best practices for conducting national-level health impacts and benefits analyses.

What Commenters Said:

Commenter: American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM); Marathon Petroleum Company LP (MPC)

Dismissed chemistry differences in PM toxicity potential:
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 PM2.5 whereas in another section 7.1.3.2.2, EPA predicts the rule will produce an increase in directly emitted PM2.5. In either case, the rule will have little impact on ambient levels of directly emitted PM2.5 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 PM2.5, the form of PM evaluated in the underlying health studies that EPA relied on.

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: … 3) the quantitative impact of varying particle chemistry on the PM mortality risk functions and benefits.

Commenter: Mercatus Center at George Mason University

The EPA also acknowledges uncertainty with regards to its benefits analysis, including these points from table 8-16 of the Regulatory Impact Analysis for the rule:

Direct causal agents within the complex mixture of PM have not been identified.

Next, the EPA fails to address whether the concentration of total particulate mass or the composition of those particulates are the cause of the health effects found in the cited studies. Moreover, because the composition of rural particulates is different from urban particulates, the health effects are likely to be different than those estimated. In order to provide a causal link, the EPA should be able to determine which components of particulate matter are the sources of the higher morbidity and mortality rates. For instance, Bell finds that higher concentrations of PM2.5 Nickel are associated with higher rates of cardiovascular or respiratory hospitalizations.

As Bell et al. conclude: Because of these limitations, health risks could be associated with the true concentrations of a component or set of components that co-varies with PM2.5 total mass, even if measured concentrations in this data set do not co-vary with PM2.5 total mass because of measurement error. Further, we did not investigate the possibility that observed PM2.5 health effects could result from a set of components with a collective concentration that co-varies with PM2.5 total mass, although individual component concentrations do not.

Without a clear link between the chemical components of PM2.5 that are associated with health effects, the EPA is left to assume that the overall level of PM2.5 is the source of health risks, rather than particular components of the total PM2.5. If the health effects are due to a particular component, a more targeted, lower-cost, and potentially higher-benefit air pollution regulation might be warranted. The EPA does acknowledge that the causal connection between PM and human health outcomes is uncertain, as point 2 above demonstrates.

Our Response:

While there remain uncertainties about the role and relative toxicity of various components of fine PM, the current evidence continues to support the view that fine particles should be addressed as a group for purposes of public health protection and that “many constituents of PM can be linked with differencing health effects and the evidence is not yet sufficient to allow differentiation of those constituents or sources that are more closely related to specific health outcomes” such that it is inappropriate to remove any constituent of $PM_{2.5}$ from the standard (U.S. EPA, 2009, 2-17; U.S. EPA, 2011, p. 2-25).[44,45] EPA therefore disagrees that uncertainty in this assumption would eliminate almost all of the benefits associated with the Tier 3 standards.

While most epidemiological studies continue to be indexed by $PM_{2.5}$ mass, several recent epidemiological studies included in the ISA have used $PM_{2.5}$ speciation data to evaluate health effects associated with fine particle exposures. In the ISA, the EPA thoroughly evaluated the scientific evidence that examined the effect of different $PM_{2.5}$ components and sources on a variety of health outcomes (U.S. EPA, 2009, section 6.6) and observed that the available information continues to suggest that many different chemical components of fine particles and a variety of different types of source categories are all associated with, and probably contribute to, effects associated with $PM_{2.5}$. The ISA concluded that the current body of scientific evidence indicated that "many constituents of PM can be linked with differing health effects and the evidence is not yet sufficient to allow differentiation of those constituents or sources that are more closely related to specific health outcomes" (U.S. EPA, 2009, p. 2-26 and 6-212). Furthermore, the ISA concluded that the evidence is not sufficient to support eliminating any component or group of components associated with any specific source categories from the mix of fine particles included in the $PM_{2.5}$ indicator (U.S. EPA, 2009, p. 2-56). The Clean Air Science Advisory Committee (CASAC) agreed that it was reasonable to retain $PM_{2.5}$ as an indicator for fine particles, as "[t]here was insufficient peer-reviewed literature to support any other indicator at this time" (p. 12).[46]

What Commenters Said:

Commenter: American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM); Marathon Petroleum Company LP (MPC)

Over-estimated mortality assumptions from small changes in ozone:
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

[44] U.S. Environmental Protection Agency (U.S. EPA). 2009. Integrated Science Assessment for Particulate Matter (Final Report). EPA-600-R-08-139F. National Center for Environmental Assessment—RTP Division. December. Available on the Internet at <http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=216546>.
[45] U.S. Environmental Protection Agency (U.S. EPA). 2011. Policy Assessment for the Review of the Particulate Matter National Ambient Air Quality Standards. EPA-452/D-11-003. April. Available on the Internet at <http://www.epa.gov/ttnnaaqs/standards/pm/s_pm_2007_pa.html>.
[46] U.S. Environmental Protection Agency Science Advisory Board (U.S. EPA-SAB). 2010. CASAC Review of Quantitative Health Risk Assessment for Particulate Matter—Second External Review Draft (February 2010). EPA-CASAC-10-008. Available on the Internet at <http://yosemite.epa.gov/sab/sabproduct.nsf/264cb1227d55e02c85257402007446a4/BC4F6E77B6385155852577070002F09F/$File/EPA-CASAC-10-008-unsigned.pdf>.

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.

Our Response:

The range of ozone benefits associated with the final Tier 3 rule is estimated based on risk reductions derived from several sources of ozone-related mortality effect estimates. This analysis presents six alternative estimates for the association based upon different functions reported in the scientific literature. We use three multi-city studies,[47,48,49] including the Bell, 2004 National Morbidity, Mortality, and Air Pollution Study (NMMAPS) that was used as the primary basis for the risk analysis in the ozone Staff Paper[50] and reviewed by the Clean Air Science Advisory Committee (CASAC).[51] We also use three studies that synthesize ozone mortality data across a large number of individual studies.[52,53,54] This approach is consistent with recommendations provided by the NRC in their ozone mortality report (NRC, 2008),[55] "The committee recommends that the greatest emphasis be placed on estimates from new systematic multicity analyses that use national databases of air pollution and mortality, such as in the NMMAPS, without excluding consideration of meta-analyses of previously published studies." The NRC goes on to note that there are uncertainties within each study that are not fully captured by this range of estimates, but that analyses should "give little or no weight to the assumption that there is no causal association between estimated reductions in premature mortality and reduced ozone exposure."

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[47] Bell, M.L., et al. (2004). Ozone and short-term mortality in 95 US urban communities, 1987-2000. Jama, 2004. 292(19): p. 2372-8.

[48] Huang, Y.; Dominici, F.; Bell, M. L. (2005) Bayesian hierarchical distributed lag models for summer ozone exposure and cardio-respiratory mortality. Environmetrics 16: 547-562.

[49] Schwartz, J. (2005) How sensitive is the association between ozone and daily deaths to control for temperature? Am. J. Respir. Crit. Care Med. 171: 627-631.

[50] U.S. EPA (2007) Review of the National Ambient Air Quality Standards for Ozone, Policy Assessment of Scientific and Technical Information. OAQPS Staff Paper.EPA-452/R-07-003. This document is available in Docket EPA-HQ-OAR-2003-0190. Retrieved on April 10, 2009, from http:www.epa.gov/ttn/naaqs/standards/ozone/s_o3_cr_sp.html

[51] CASAC (2007). Clean Air Scientific Advisory Committee's (CASAC) Review of the Agency's Final Ozone Staff Paper. EPA-CASAC-07-002. March 26.

[52] Bell, M.L., F. Dominici, and J.M. Samet. (2005). A meta-analysis of time-series studies of ozone and mortality with comparison to the national morbidity, mortality, and air pollution study. *Epidemiology*, 16(4): p. 436-45.

[53] Ito, K., S.F. De Leon, and M. Lippmann. (2005). Associations between ozone and daily mortality: analysis and meta-analysis. *Epidemiology*. 16(4): p. 446-57.

[54] Levy, J.I., S.M. Chemerynski, and J.A. Sarnat. (2005). Ozone exposure and mortality: an empiric bayes metaregression analysis. *Epidemiology*. 16(4): p. 458-68.

[55] National Research Council (NRC), 2008. Estimating Mortality Risk Reduction and Economic Benefits from Controlling Ozone Air Pollution. The National Academies Press: Washington, D.C.

The point raised by the commenters that the Smith *et al.* 2009, Franklin *et al.* 2007; and Katsouyianni *et al.* 2009 studies do not provide evidence of a clear association with ozone and mortality is incorrect. It is important to note that the scientific evidence available at the time of the 2008 Ozone NAAQS review forms the basis of this analysis. As such, these studies mentioned by the commenter were not considered in this analysis. However, these studies were thoroughly evaluated in the recently completed Ozone (O_3) ISA, which will form the scientific basis of the ongoing O_3 NAAQS review.[56] Overall, these studies add to the growing body of scientific evidence for short-term O_3 exposures and mortality and contributed to the ISA concluding that there is "likely to be causal relationship between short-term O_3 exposures and mortality."

Finally, regarding the comment about thresholds, the conclusions in EPA's recently completed ozone Integrated Science Assessment summarizes our position:

> "Overall, the studies evaluated support a linear O_3-mortality C-R relationship and continue to support the conclusions from the 2006 O3 Air Quality Criteria Document (AQCD), which stated that "if a population threshold level exists in O_3 health effects, it is likely near the lower limit of ambient O_3 concentrations in the United States" (U.S. EPA, 2006)."[57]

What Commenters Said:

Commenter: American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM); Marathon Petroleum Company LP (MPC)

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.

Our Response:

It is unclear what the commenters are referring to because the Levy study was not re-evaluated in the 2013 ISA.[58] It is possible the commenters are referring to the 2006 Ozone Air

[56] U.S. EPA. Integrated Science Assessment of Ozone and Related Photochemical Oxidants (Final Report). U.S. Environmental Protection Agency, Washington, DC, EPA/600/R-10/076F, 2013.
[57] U.S. EPA. Air Quality Criteria for Ozone and Related Photochemical Oxidants (2006 Final). U.S. Environmental Protection Agency, Washington, DC, EPA/600/R-05/004aF-cF, 2006.
[58] U.S. EPA. Integrated Science Assessment of Ozone and Related Photochemical Oxidants (Final Report). U.S. Environmental Protection Agency, Washington, DC, EPA/600/R-10/076F, 2013.

Quality Criteria Document (AQCD).[59] In the AQCD, EPA never states that the Levy et al. results are biased high. In fact, we state they are consistent with the Bell and Ito meta-analyses:

> "As stated earlier, the combined O_3 excess mortality risk estimates from the meta-analyses by Bell et al. (2005), Ito et al. (2005), and Levy et al. (2005) were all very consistent. Although the analyses were conducted independently, there was considerable overlap among the risk estimates used in the three meta-analyses; thus, the agreement in the combined risk estimates was not unexpected… The positive O_3 effect estimates, along with the sensitivity analyses in these three meta-analyses provide evidence of a robust association between ambient O_3 and mortality. The combined effect estimates from the various meta-analyses ranged from 1.5 to 2.5% excess risk in all-cause mortality (p. 7-96 to 7-97; 2006 O3 AQCD)."

What Commenters Said:

Commenter: American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM); Marathon Petroleum Company LP (MPC)

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 (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).

Our Response:

The EPA recognizes that various individual- and community-level factors may influence regional heterogeneity (see p. 2-34 to 2-35 of the 2013 Ozone Integrated Science Assessment).[60] We also recognize that there is currently no one currently agreed upon national risk coefficient to estimate ozone-related premature mortality. Instead, we present risk reductions derived from several sources of ozone-related mortality effect estimates, each with its own within-study probabilistic distribution of uncertainty. This approach is consistent with other measures of health impacts where multiple mortality effect estimates are available in the literature (e.g., PM-related mortality risk). We therefore disagree that we did not conform to OMB guidelines when assessing the national-level health impacts associated with the Tier 3 rulemaking.

Furthermore, the OMB A-4 guidelines cited by the commenter (pg. 8, "Different Requirements for Different Geographic Regions) are not applicable to the methods cited in the

[59] U.S. EPA. Air Quality Criteria for Ozone and Related Photochemical Oxidants (2006 Final). U.S. Environmental Protection Agency, Washington, DC, EPA/600/R-05/004aF-cF, 2006.

[60] U.S. EPA. Integrated Science Assessment of Ozone and Related Photochemical Oxidants (Final Report). U.S. Environmental Protection Agency, Washington, DC, EPA/600/R-10/076F, 2013.

comment. The guidelines cited by the commenter refer to alternative regulatory approaches (or the form of the standard), not to national-level health impact assessment methods.

As mentioned earlier in this comments section, the range of ozone benefits associated with the final Tier 3 rule is estimated based on risk reductions derived from several sources of ozone-related mortality effect estimates. This analysis presents six alternative estimates for the association based upon different functions reported in the scientific literature. We use three multi-city studies,[61,62,63] including the Bell, 2004 National Morbidity, Mortality, and Air Pollution Study (NMMAPS) that was used as the primary basis for the risk analysis in the ozone Staff Paper[64] and reviewed by the Clean Air Science Advisory Committee (CASAC).[65] We also use three studies that synthesize ozone mortality data across a large number of individual studies.[66,67,68] This approach is consistent with recommendations provided by the NRC in their ozone mortality report (NRC, 2008),[69] "The committee recommends that the greatest emphasis be placed on estimates from new systematic multicity analyses that use national databases of air pollution and mortality, such as in the NMMAPS, without excluding consideration of meta-analyses of previously published studies." The NRC goes on to note that there are uncertainties within each study that are not fully captured by this range of estimates, but that analyses should "give little or no weight to the assumption that there is no causal association between estimated reductions in premature mortality and reduced ozone exposure."

At this time, as noted in the 2013 Ozone ISA (p. 2-35), "studies have not consistently identified specific community characteristics that explain the observed heterogeneity," making it difficult to isolate and account for regional heterogeneity in a national-level rulemaking analysis. EPA continues to review the literature and will update our analyses as appropriate.

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[61] Bell, M.L., et al. (2004). Ozone and short-term mortality in 95 US urban communities, 1987-2000. Jama, 2004. 292(19): p. 2372-8.

[62] Huang, Y.; Dominici, F.; Bell, M. L. (2005) Bayesian hierarchical distributed lag models for summer ozone exposure and cardio-respiratory mortality. Environmetrics 16: 547-562.

[63] Schwartz, J. (2005) How sensitive is the association between ozone and daily deaths to control for temperature? Am. J. Respir. Crit. Care Med. 171: 627-631.

[64] U.S. EPA (2007) Review of the National Ambient Air Quality Standards for Ozone, Policy Assessment of Scientific and Technical Information. OAQPS Staff Paper.EPA-452/R-07-003. This document is available in Docket EPA-HQ-OAR-2003-0190. Retrieved on April 10, 2009, from http:www.epa.gov/ttn/naaqs/standards/ozone/s_o3_cr_sp.html

[65] CASAC (2007). Clean Air Scientific Advisory Committee's (CASAC) Review of the Agency's Final Ozone Staff Paper. EPA-CASAC-07-002. March 26.

[66] Bell, M.L., F. Dominici, and J.M. Samet. (2005). A meta-analysis of time-series studies of ozone and mortality with comparison to the national morbidity, mortality, and air pollution study. *Epidemiology*, 16(4): p. 436-45.

[67] Ito, K., S.F. De Leon, and M. Lippmann. (2005). Associations between ozone and daily mortality: analysis and meta-analysis. *Epidemiology*. 16(4): p. 446-57.

[68] Levy, J.I., S.M. Chemerynski, and J.A. Sarnat. (2005). Ozone exposure and mortality: an empiric bayes metaregression analysis. *Epidemiology*. 16(4): p. 458-68.

[69] National Research Council (NRC), 2008. Estimating Mortality Risk Reduction and Economic Benefits from Controlling Ozone Air Pollution. The National Academies Press: Washington, D.C.

What Commenters Said:

Commenter: Mercatus Center at George Mason University

Additionally, the EPA failed to consider other adverse effects of its rules, such as impacts on low-income individuals and adverse employment effects that were overlooked in the EPA's scant employment impact analysis.

Finally, the EPA should go further to estimate unintended effects of its rules on employment and on low-income populations.

Our Response:

As discussed in Preamble Section X.D and RIA Chapters 9.2.2 and 9.3.2, we expect the Tier 3 standards will have little effect on both the economy and jobs. Some commenters argue that the standards may increase, rather than decrease, employment (see Chapter 9.3 of this Response to Comments). In both the vehicle and the refinery sectors, reduced sales will tend to reduce employment, but the cost of the program is only about $72 per vehicle and less than a penny per gallon of gasoline. At the same time, the technologies required to comply with the standards will tend to contribute to increased employment, for example creating jobs at refineries and at high-tech companies developing and deploying emission control equipment for vehicles. EPA does not quantify most of the employment impacts of the standards and thus does not evaluate these countervailing impacts. However, because these two effects are likely to be small and counterbalance each other, we expect net employment impacts to be small.

Regarding impacts on low-income individuals, we note that the costs of these standards are estimated to be small – about $72 per vehicle, and less than one cent per gallon of gasoline. Because low-income households rarely buy new vehicles, we expect the impacts of the vehicle standards on low-income households to be very small.

What Commenters Said:

Commenter: Chevron Products Company

There is more uncertainty around the non-economic components of the modeling used in the rule. This uncertainty stems from uncontrolled or poorly controlled confounding by co-pollutants and other risk factors when estimating an individual pollutant's effect which likely overestimates the risk. Thus, in many studies, the data are likely compatible with a risk estimate of zero, particularly when reference is made to ozone mortality at ambient levels.

Our Response:

It is important to note for studies that examine the relationship between health effects and short-term air pollution exposures the only potential confounders are those variables that can also fluctuate on a day-to-day basis, such as other air pollutants, temporal trends, and weather. Within the 2006 O_3 AQCD,[70] specifically sections 7.1.3 and 7.6.4, the EPA thoroughly reviewed issues related to confounding and the evidence of potential confounding by copollutants. EPA recognizes that a major methodological issue affecting O_3 epidemiologic studies concerns the evaluation of the extent to which other air pollutants may confound or modify O_3-related effect estimates, and that the changing relationship between O_3 and copollutants across seasons further complicates the issue. The use of multipollutant regression models is the prevailing approach for controlling potential confounding by copollutants in O_3 health effects studies (2006 Criteria Document, p.7-24). In section 7.6.4.2, the 2006 Criteria Document reviews the evidence from studies that use multipollutant models to evaluate confounding by copollutants for effects ranging from mortality and respiratory hospitalizations to lung function measures and symptoms. EPA concluded in the 2006 Criteria Document that multipollutant regression analyses indicated that O_3 risk estimates, in general, were not sensitive to the inclusion of copollutants, including $PM_{2.5}$ and sulfate. As can be seen in Figure 1 below (Figure 7-22 from the 2006 Criteria Document) the O_3 effect estimates for mortality are generally unchanged upon inclusion of PM in the models. These results suggest that the effect of O_3 on respiratory health outcomes appears to be robust and independent of the effects of other copollutants (2006 Criteria Document, p.7-154). Additionally, though the O_3 effect was shown to be slightly diminished and did not retain statistical significance in multipollutant models with NO_2, SO_2 and PM_{10}, there was considerable overlap in the 95% confidence intervals between the single-pollutant and multipollutant model results, leading EPA to conclude that the association was generally robust.

[70] U.S. EPA. Air Quality Criteria for Ozone and Related Photochemical Oxidants (2006 Final). U.S. Environmental Protection Agency, Washington, DC, EPA/600/R-05/004aF-cF, 2006.

Attachment 2 - Associations between acute O_3 exposure and mortality robust in multi-pollutant models including PM

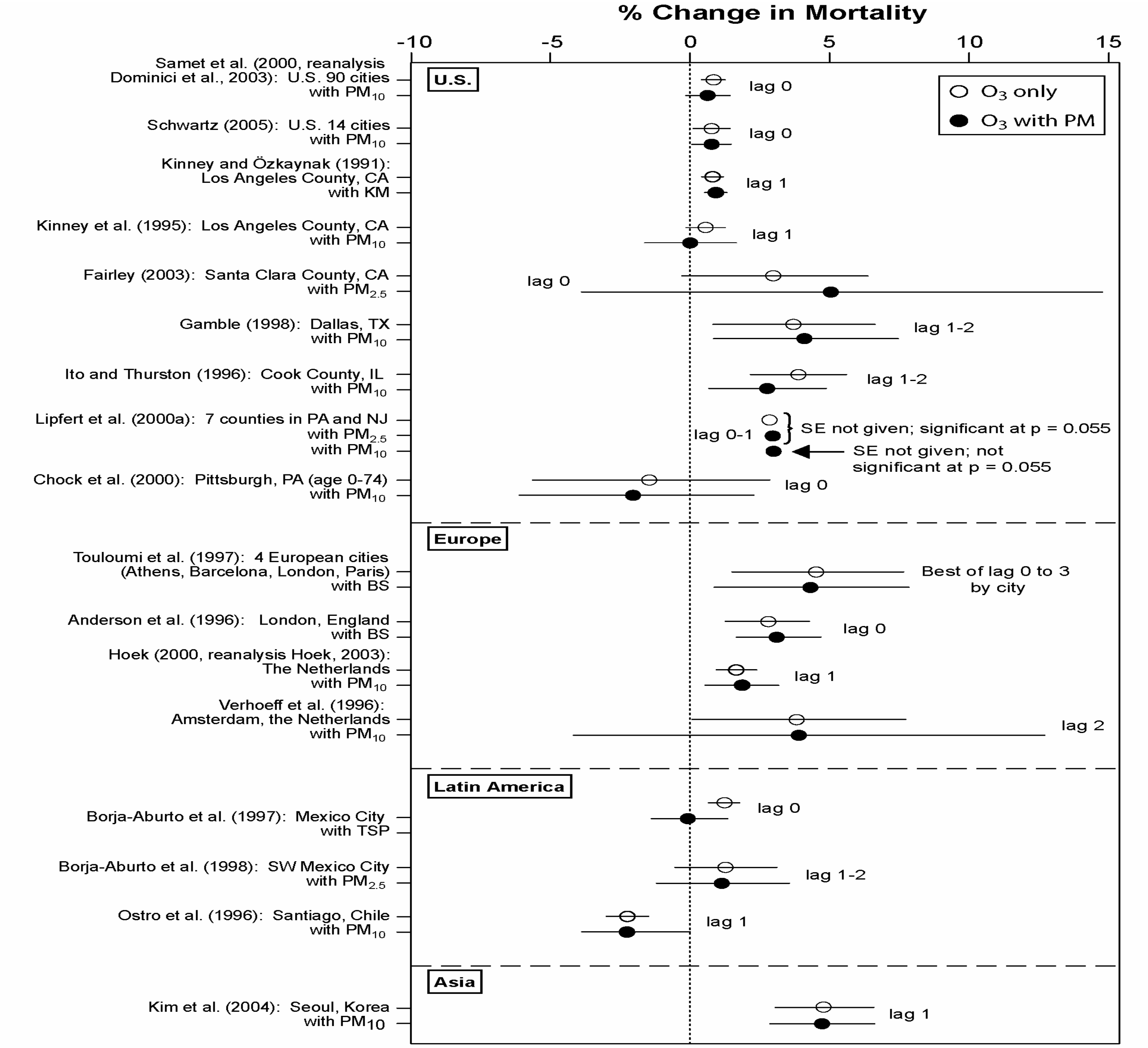

Figure 1. All-cause (nonaccidental) O_3 excess mortality risk estimates (95% CI) with adjustment for PM indices for all-year analyses per standardized increment (see Section 7.1.3.2, 2006 Criteria Document). Analyses include all ages unless otherwise noted.

Figure 7-22. All-cause (nonaccidental) O_3 excess mortality risk estimates (95% CI) with adjustment for PM indices for all-year analyses per standardized increment. Analyses include all ages unless otherwise noted.

Additional epidemiologic studies that examine the relationship between short-term O_3 exposures and mortality, published since the completion of the 2006 O_3 AQCD, were evaluated in the 2013 O_3 Integrated Science Assessment (ISA) (Section 6.6.2.1).[71] Unlike previous studies that were limited to primarily examining the confounding effects of PM_{10}, the newer O_3-mortality studies expanded their analyses to include multiple PM indices (e.g., PM_{10}, $PM_{2.5}$, and

[71] U.S. EPA. Integrated Science Assessment of Ozone and Related Photochemical Oxidants (Final Report). U.S. Environmental Protection Agency, Washington, DC, EPA/600/R-10/076F, 2013.

PM components). An examination of copollutant models reported evidence that associations between O_3 and all-cause mortality were robust to the inclusion of PM_{10} or $PM_{2.5}$ (Stafoggia et al., 2010; Katsouyanni et al., 2009; Bell et al., 2007),[72,73,74] while other studies reported evidence of a modest reduction (~20-30%) when examining PM_{10} (Smith et al., 2009).[75] An additional study that examined PM components, specifically sulfate, reported evidence for reductions in O_3-mortality risk estimates in copollutant models (Franklin and Schwartz, 2008).[76] However, those studies that reported evidence of reductions in the O_3-mortality associations had limited PM or PM component datasets as a result of the every-3rd- and 6th-day PM sampling schedule instituted in most cities, limiting the overall sample size employed to examine whether PM or one of its components confounds the O_3-mortality relationship. Overall, the results from copollutant models in studies evaluated in the 2013 O_3 ISA are consistent with and generally support the total body of epidemiologic evidence indicating that the O_3-mortality risk estimates remain positive in copollutant models.

In addition to examining copollutant confounding, the 2006 O_3 AQCD evaluated sensitivity to model specification and concluded that O_3 effect estimates "were generally more sensitive to alternative weather models than to varying degrees of freedom for temporal trend adjustment" (2006 Criteria Document, p.7-176). Model specification was further assessed in the 2013 O_3 ISA, specifically for mortality, within the Air Pollution and Health: a European and North American Approach (APHENA) study. In APHENA the authors examined the influence of the extent of temporal smoothing on O_3-mortality risk estimates. Katsouyanni et al. (2009) found that the extent of smoothing or the methods used for adjustment can influence O_3 risk estimates when not applying enough degrees of freedom to control for temporal/season trends. This is because of the opposing seasonal trends between O_3 and mortality. Overall, the results of the APHENA study are consistent with and support the conclusions of the 2006 O_3 AQCD.

What Commenters Said:

Commenters: American Fuel & Petrochemical Manufacturers (AFPM), American Petroleum Institute (API), Marathon Petroleum Company LP (MPC), Chevron and Mercatus Center at George Mason University

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[72] Stafoggia, M; Forastiere, F; Faustini, A; Biggeri, A; Bisanti, L; Cadum, E; Cernigliaro, A; Mallone, S; Pandolfi, P; Serinelli, M; Tessari, R; Vigotti, MA; Perucci, CA. (2010). Susceptibility factors to ozonerelated mortality: A population-based case-crossover analysis. Am J Respir Crit Care Med 182: 376-384. http://dx.doi.org/10.1164/rccm.200908-1269OC

[73] Katsouyanni, K; Samet, JM; Anderson, HR; Atkinson, R; Le Tertre, A; Medina, S; Samoli, E; Touloumi, G; Burnett, RT; Krewski, D; Ramsay, T; Dominici, F; Peng, RD; Schwartz, J; Zanobetti, A. (2009). Air pollution and health: A European and North American approach (APHENA). (Research Report 142). Boston, MA: Health Effects Institute. http://pubs.healtheffects.org/view.php?id=327

[74] Bell, ML; Kim, JY; Dominici, F. (2007). Potential confounding of particulate matter on the short-term association between ozone and mortality in multisite time-series studies. Environ Health Perspect 115: 1591-1595. http://dx.doi.org/10.1289/ehp.10108

[75] Smith, RL; Xu, B; Switzer, P. (2009). Reassessing the relationship between ozone and short-term mortality in U.S. urban communities. Inhal Toxicol 21: 37-61. http://dx.doi.org/10.1080/08958370903161612

[76] Franklin, M; Schwartz, J. (2008). The impact of secondary particles on the association between ambient ozone and mortality. Environ Health Perspect 116: 453-458. http://dx.doi.org/10.1289/ehp.10777

EPA Overstates Air Quality Benefits by Citing Benefits for Reducing Pollutants for Areas that are Already in Attainment**:**

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.

Estimated Air Quality Benefits – The Clean Air Act requires EPA to set NAAQS at a level that protects public health with an adequate margin of safety. Therefore, there is no basis to look for or estimate possible effects below the level of the standard. The analysis should be a comparison of effects between the reference situation (i.e., no Tier 3) and the control situation (with Tier 3 in place) for counties not in attainment for a given standard at the onset of the Tier 3 program.

EPA cites benefits for reducing pollutants for areas that are already in attainment—like reducing CO in a CO attainment area. Monetizing these reductions and attributing the economic benefit to Tier 3 is overstating the true value of the program. The Tier 3 program should not claim additional economic benefits for pollutant reductions when the base pollutant level is already in attainment with an existing standard. Only PM and ozone reductions are relevant for the proposed Tier 3 rule—all other criteria species are either attainment nationwide or attainment practically everywhere.

We have identified several examples where we believe air quality benefits have been overstated:
- Ozone benefits are stated for counties that are already in attainment. Out of 676 nationwide counties modeled by EPA, only 11 non-California counties are forecast to exceed the 2008 ozone NAAQS in 2030 and therefore benefit from ozone precursor reductions. EPA included benefits for all counties modeled.
- Similarly, annual Average Particulate Matter air quality levels are not significantly impacted by the Tier 3 rulemaking. Of 864 counties modeled, only 12 counties require PM2.5 precursor controls. By 2030, the Tier 3 rulemaking will actually increase PM2.5 levels in 10 nonattainment counties. This 'disbenefit' effect is due to reductions in reactive precursor species (like NOx) which can often result in increases in the secondary pollutants ozone and PM.
- Carbon monoxide reductions in emissions are not needed since all counties experience healthy air concentration levels--monetized benefits attributed to CO reductions are therefore inappropriate, except perhaps as an ozone or PM precursor.
- Mobile Source Air Toxics reductions are appropriately described but EPA is precluded by the Clean Air Scientific Advisory Committee from using current tools to monetize or justify benefits because human health data and ambient measurements are not credible. Therefore, MSAT emissions reductions can be acknowledged but not as a quantifiable benefit.

Based on these observations, we conclude that EPA has overstated the monetary value of the Tier 3 air quality benefits.

It is also odd that the EPA would seek to reduce PM levels beyond those the EPA just finalized in new NAAQS standards for PM in January. If there are so many unclaimed benefits from reducing PM, why not make the NAAQS standards even lower when the EPA had the chance?

Our Response:

EPA does not agree that it has overstated the monetary value of the Tier 3 air quality benefits. Chapter 8 of the RIA describes the methodology for quantifying and monetizing benefits. The quantified benefits associated with this rule are based on reductions in emissions, for the entire contiguous United States, that affect ambient concentrations of ozone and $PM_{2.5}$. EPA does not quantify or monetize health benefits associated with CO or mobile source air toxics. To be consistent and transparent in its assessment of Tier 3 impacts, EPA presents changes in emissions and ambient concentrations for all criteria pollutants (including CO) and some mobile source air toxics. EPA also presents changes in all modeled ozone and $PM_{2.5}$ design values due to the Tier 3 standards. Design values are projected only for counties with monitored data available.

EPA disagrees with the statement that "reductions of pollutants below the established NAAQS safe levels do not count as benefits." The NAAQS are not set at levels that eliminate the risk from air pollution. Instead, EPA sets the NAAQS at a level requisite to protect public health with an adequate margin of safety, taking into consideration effects on susceptible populations found in the scientific literature. For instance, the risk analysis prepared in support of the PM NAAQS reported risks below these levels, while acknowledging that the confidence in those effect estimates is higher at levels closer to the standard (U.S. EPA, 2010).[77] Furthermore, both the PM and Ozone Integrated Science Assessments (U.S. EPA, 2009 and U.S. EPA, 2013)[78,79] have determined that there is no evidence of a population-level threshold (i.e., a level below which there is no risk for adverse health effects) in PM- and ozone-related health effects in the epidemiological literature. While estimates of PM- and ozone-related health impacts that occur below the standards are more uncertain than those occurring above the standards, the EPA considers these to be legitimate components of measures of criteria pollutant health risk.

EPA also states in Section II of the preamble that as of September 27, 2010 all CO nonattainment areas were redesignated to maintenance areas.

What Commenters Said:

[77] U.S. Environmental Protection Agency (U.S. EPA). 2010. Quantitative Health Risk Assessment for Particulate Matter—Final Report. EPA-452/R-10-005. Office of Air Quality Planning and Standards, Research Triangle Park, NC. September. Available on the Internet at <http://www.epa.gov/ttnnaaqs/standards/pm/data/PM_RA_FINAL_June_2010.pdf>.

[78] U.S. Environmental Protection Agency (U.S. EPA). 2009. Integrated Science Assessment for Particulate Matter (Final Report). EPA-600-R-08-139F. National Center for Environmental Assessment—RTP Division. December. Available on the Internet at <http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=216546>.

[79] U.S. Environmental Protection Agency (U.S. EPA). 2013. Integrated Science Assessment for Ozone and Related Photochemical Oxidants (Final Report). EPA 600/R-10/076F. National Center for Environmental Assessment—RTP Division. December. Available on the Internet at <http://cfpub.epa.gov/ncea/isa/recordisplay.cfm?deid=247492>.

Commenter: Chevron Products Company

As noted by Environ in their assessment of the impacts of nationwide adoption of the LEV III program and a 10 ppm sulfur standard, (1) the Tier 2 program is estimated to result in substantial emission reductions. In 2022, Environ estimated that the Tier 2 program would result in a 66% reduction in NOx (11,342 Mg/day) and a 55% reduction in VOC (3787 Mg/day) for the on-road motor vehicle fleet relative to the Tier 1 program. On the other hand, the LEV III/10 ppm S controls (similar to EPA's Tier 3 proposal) would result in a 6% reduction from both NOx (628 Mg/day) and VOC (179 Mg/day)relative to Tier 2 in 2022 (greater reductions would accrue as the vehicle standards are fully implemented). EPA should also report the benefits attributable to the Tier 2 program to allow an assessment of the incremental benefits of the Tier 3 proposal relative to the Tier 2 program.

It is not clear exactly how EPA estimated the health and economic benefits. Without a better understanding, it is difficult to understand how the extremely modest estimated impact of the Tier 3 programs had on pollutant levels by 2030 translated into the EPA reported health and economic benefits. For example, Chapter 7.2.4 of the draft RIA estimates that, in 2030, Tier 3 will result in a reduction of the weighted annual average values for ozone and PM2.5 that are each less than l percent of the current annual standards.

Our Response:

The benefits presented in the RIA are based on the incremental reduction in PM- and ozone-related pollutant emissions related to the final Tier 3 standards compared to a world without the Tier 3 standards in place. This baseline, or reference case, includes all finalized regulations at the time of the analysis. The baseline therefore includes Tier 2 emission controls; the benefits of the Tier 3 rule are incremental to those related to the Tier 2 rule. We refer the commenter to the Tier 2 RIA for information about the estimated impacts of that rulemaking (http://www.epa.gov/tier2/).

Chapter 8 of the RIA describes the methodology involved in quantifying and monetizing the benefits of the Tier 3 rule. We base our analysis of the program's impact on human health and the environment on peer-reviewed studies of air quality and human health effects.[80,81,82] Our benefits methods are consistent with the Regulatory Impact Analyses (RIAs) that accompanied the final revisions to the National Ambient Air Quality Standards (NAAQS) for Particulate Matter, the 2008 final ozone NAAQS, and the 2010 ozone NAAQS reconsideration.

[80] U.S. Environmental Protection Agency. (2012). *Regulatory Impact Analysis for the Final Revisions to the National Ambient Air Quality Standards for Particulate Matter*. Prepared by: Office of Air and Radiation, EPA-452/R-12-005. Retrieved November 22, 2013 at http://www.epa.gov/ttn/ecas/ria.html

[81] U.S. Environmental Protection Agency. (2008). *Final Ozone NAAQS Regulatory Impact Analysis*. Prepared by: Office of Air and Radiation, Office of Air Quality Planning and Standards. Retrieved November 22, 2013 at http://www.epa.gov/ttn/ecas/ria.html. EPA-HQ-OAR-2009-0472-0238

[82] U.S. Environmental Protection Agency. (2010). Summary of the updated Regulatory Impact Analysis (RIA) for the Reconsideration of the 2008 Ozone National Ambient Air Quality Standard (NAAQS). Prepared by: Office of Air and Radiation, Office of Air Quality Plannin and Standards. Retrieved November 22, 2013 at http://www.epa.gov/ttnecas1/regdata/RIAs/s1-supplemental_analysis_full.pdf.

What Commenters Said:

Commenter: Private Citizen

It is my belief that the supposed cost savings in health costs will never materialize as suggested by proponents of the bill. What we do know from past experience is that 1) the government always under estimates the cost of everything they foist upon the public 2) that the performance of light and medium vehicles will diminish 3) the cost to implement and comply with these regulations will be much greater than proposed 4) this is but another attack on the free enterprise system. Those in favor of this regulation point out that a large number of people in this country have asthma and apparently it is caused by the exhaust from automobiles. Is that true? If automobile exhaust is the cause of asthma why doesn't everyone suffer from asthma? If this regulation is implemented how many asthma suffers will be cured? How many will be prevented from becoming asthmatics? I see this as another unneeded intrusion by government into the free enterprise system.

Our Response:

Chapter 7 of the RIA that accompanies this rulemaking describes the methods and assumptions that inform our cost analysis. Our cost estimates reflect the most up-to-date and scientifically sound data available, and we believe our estimates are therefore accurate predictions of future costs associated with the final Tier 3 rulemaking. Furthermore, as presented in Chapter 8 of the RIA, the final Tier 3 rulemaking will provide the public with very significant health benefits that clearly outweigh the costs. For the final rulemaking, we estimate that by 2030, the annual emission reductions of the Tier 3 standards will annually prevent between 660 and 1,500 PM-related premature deaths, between 110 and 500 ozone-related premature deaths, 2,200 hospital admissions and asthma-related emergency room visits, 19,000 asthma exacerbations, 30,000 upper and lower respiratory symptoms in children, and 1.3 million lost school days, work days, and minor restricted activity days.

Asthma prevalence in the United States is widespread and well-documented, but there is currently no cure for asthma. Asthma symptoms can be triggered by a number of different causes, including air pollution emitted from vehicles. The health impact assessment (HIA) in the Tier 3 RIA quantifies the changes in the incidence of adverse health impacts resulting from changes in human exposure to both $PM_{2.5}$ and ozone air quality. HIAs are a well-established approach for estimating the change in adverse health impacts expected to result from population-level changes in exposure to pollutants. They rely on the published scientific literature to ascertain the relationship between $PM_{2.5}$, ozone, and adverse human health effects. For asthma-related endpoints included in this analysis, we estimate the number of exacerbated asthma attacks and the number of asthma-related emergency room visits that will be avoided as a result of the $PM_{2.5}$ and ozone reductions associated with the final Tier 3 rulemaking. Please refer to Chapter 8 of the RIA for more information.

9 Economic Impact Analysis

What We Proposed:

The comments in this chapter correspond to Section X of the preamble to the proposed rule and address the economic impacts of the program. A summary of the comments received and our response to those comments are located below.

What Commenters Said:

Commenter: BlueGreen Alliance

The Tier 3 standard will only bolster the auto industry's ability to meet a strong fuel efficiency standard and generate these net positive economic outcomes. Implementation of Tier 3 will also have a positive economic impact in other sectors as well.

Additionally, the program includes critical elements that will allow refiners to deliver cleaner fuels to the market in an economical and timely manner, as well as provisions that ensure smaller manufacturers and refiners can reach compliance without unfair burden. It is critical to provide a mechanism like this to help industries transition to a cleaner regulatory framework. For example, the advanced technology vehicle manufacturing loan program has created or sustained more than 40,000 jobs in the auto sector advancing fuel saving technologies.

As we have seen in the automobile and other industries, investment in pollution reduction technologies leads to gains in efficiency and job creation.

Commenter: Boulder County Board of Commissioners and Boulder County Board of Health

Boulder County applauds the EPA for proposing the Tier 3 package and reiterates its strong support for this program because it will directly benefit the air quality in our community and across the nation. These are substantial, cost-effective emission reductions from proven technologies that will create jobs and improve public health and the environment.

Commenter: Business for Innovative Climate and Energy Policy (BICEP)

In sum, the proposed Tier 3 standards represent a unique opportunity for the United States to strengthen the economy and create jobs, as well as prevent illness and reduce healthcare expenditures.

Commenter: California Air Resources Board (CARB)

CARB staff supports the approach used to evaluate the economic impacts of U.S. EPA's Tier 3 proposal.

Due to the differences in regulatory scope, timeframes, and geography, a direct comparison to CARB's LEV III economic impact analysis is incompatible. However, given that the proposal's compliance costs and cost-effectiveness metrics are on the same order of magnitude as those estimated by CARB in previous related rulemakings, CARB staff concurs with U.S. EPA's overall conclusions on the direction and magnitude of economic impacts to the auto and refinery sectors. However, some time has passed since the initial evaluation of technology costs detailed in the draft Regulatory Impact Analysis. Therefore, it may be appropriate for U.S. EPA to revisit those costs estimates to determine if any revisions are warranted.

Commenter: Ceres Investor Network on Climate Risk

Furthermore, Tier 3 will result in net economic gains and job growth, and help ensure the United States' leadership position in vehicle and emission control technology. As widely diversified investors with exposure across virtually all industries, sectors and markets the performance of member portfolios is linked in no small part to overall economic performance. Consequently, we believe the economic benefits described in this letter will also be beneficial to the performance of our investments.

Further, Tier 3 also presents an opportunity to ensure the United States continues to be a globally competitive leader in the auto and emission control industries. The standards will send a clear regulatory signal to suppliers and manufacturers, encouraging technological innovation and investment.

Commenter: Emissions Control Technology Association (ECTA)

ECTA has long supported the adoption of emission control standards reflected in EPA's Tier 3 proposal, but opponents have continuously tried to undermine Tier 3 by making claims that it would have negative economic consequences. It has been claimed that the sulfur content requirement of Tier 3 will dramatically increase the cost of refining gasoline, increase the price of gasoline at the pump, cause job loss, and reduce economic activity. To address these criticisms, ECTA engaged Navigant Economics [See Docket number EPA-HQ-OAR-2011-0135-4293-A2] to evaluate the economic impact of the pending rule (1). The study concluded that the pending rule would increase the average cost of refining by about one cent per gallon, in all likelihood not affect gasoline prices, increase employment, and generate economic activity. A copy of the study is attached with this comment.

The rule had not been published when this study was completed in June, 2012. But, it was well known in June, 2012 that the substance of the proposal would be similar to LEV III, which was adopted by California in 2012.

Commenter: Kentucky Division for Air Quality

EPA's documents state that the increase in gas and Vehicle prices would cause an initial decrease in the sales of gas and vehicles. Historically, the reduced travel was determined to be negligible; therefore, it would have little impact. It is also for this reason, we do not see EPA's Tier 3 proposed rule affecting KYTC in an adverse way.

Commenter: Manufacturers of Emission Controls Association (MECA)

EPA's proposed Tier 3 emissions and fuel standards will provide additional support for the continued development of a thriving U.S. industry focused on a wide range of technologies that can reduce vehicle criteria emissions.

Commenter: Motor & Equipment Manufacturers Association (MEMA)

As the process moves forward, the EPA must maintain regulatory clarity and a coherent national pathway that affords the vehicle manufacturers and vehicle parts suppliers with critical planning and investment certainty. MEMA recognizes the need for appropriate, sensible regulation. On the other hand, regulations should not place an undue burden on free enterprise, should not be arbitrary and capricious in their requirements or implementation, and should not hinder the global competitiveness of the industry. Rather, the regulations should be based on sound science and data and balance the public interest objectives with economic realities of manufacturers. The effectiveness of the proposed regulations are projected figures and should be periodically evaluated and reviewed with recorded, real-world data to see if the cost/benefit projections are being realized.

Commenter: PennFuture

In addition, Tier 3 will drive the advances in emissions control technology developed here in the U.S. and exported globally.

Commenter: United Steelworkers Union (USW)

The USW has a diverse membership that will, in several cases, benefit from the proposed rule. For example, USW members employed at Corning Inc. who produce advanced catalytic converters will see the benefits of high tech jobs building pollution-reducing vehicle components.

Commenter: Wespath Investment Management

Wespath has reviewed positions on both sides of Tier 3, and has considered the potential long-term financial implications to our investments, which is material to fulfill our promises to our stakeholders. In our view, Tier 3 standards will be beneficial to several sectors where we hold investments, including the auto manufacturers, auto parts manufacturers, trucking companies, health care providers, and health insurance companies. We also invest in many oil refining companies, which have expressed concern over the impact of Tier 3 on their operations. Overall, we believe the potential for negative impact in the oil sector is limited, and outweighed by the collective benefit to other sectors.

Job creation: The fact that a wide range of stakeholders have spoken in favor of the proposed standards speaks to the broad economic benefits. The standards are supported by trade associations such as the Alliance of Automobile Manufacturers, Global Automakers, the

American Trucking Association, and the Manufacturers of Emission Controls Association. Public companies whose shares we hold that have also made supportive statements include General Motors, Honda, Toyota, Daimler Chrysler, Ford, Donaldson Company, Tenneco, BorgWarner, and Corning. These companies believe that the standards are in their long-term best interests and will promote their future growth, and we agree.

Many companies have told us that without clear policy signals from Washington, innovation stalls and capital sits on the sidelines. Setting strong standards will be the signal companies are looking for to begin production that incorporates new technologies. This will ripple throughout the supply chain, allowing manufacturers to bring new and more efficient products to market. Further, many in the industry have said that the Tier 3 standards are necessary to enable auto companies to meet the new fuel economy and greenhouse gas standards, which will spur innovation and growth in the auto industry.

Our Response:

Some of these comments express support for the Tier 3 standards based on the positive impacts and innovation that these standards will spur; others provide statements of caution about the tradeoffs between "public interest objectives [and] economic realities of manufacturers." Some comments suggest that the standards will increase economic activity and employment, while others suggest that the effects will be small. Chapters 9.1, 9.2, and 9.3 below provide more detailed responses related to the impacts on vehicle sales, oil production, and employment. As discussed in Section X. of the Preamble and Chapter 9 of the RIA, EPA has concluded that the effects of the standards on sales in both the auto and refinery sectors are likely to be small, because the cost impacts to consumers are expected to be small. These small impacts imply small effects on employment as well.

We agree, as several commenters note, that the standards are likely to encourage firms to innovate in order to find less expensive ways to achieve the standards. The certainty provided by the standards is expected to encourage investment both to achieve the standards and to find less expensive ways to meet them.

We agree with MEMA that "the regulations should be based on sound science and data and balance the public interest objectives with economic realities of manufacturers." The Preamble and RIA provide our full discussion of these tradeoffs. RIA Chapter 8.1.3 provides a comparison of the benefits and costs, and finds that the benefits in 2030 (the year in which air quality benefits are monetized) are expected to outweigh the costs: for a 3% discount rate, benefits less costs are estimated to be $5.9-$18 billion; for a 7% discount rate, benefits less costs are estimated to be $5.2-$17 billion. EPA follows trends in the auto and fuels industries relating to costs, and it monitors compliance with the standards and the impacts on air quality.

9.1. Vehicle Sales Impacts

What Commenters Said:

Commenter: Attorney General of Connecticut, et.al

The Tier 3 standards would also benefit our economy. Automakers strongly support the standards, which would enable them to sell vehicles meeting California's Low Emission Vehicle III standards in all 50 states and at the same time achieve EPA greenhouse gas emission standards for the model years 2017-25.

Commenter: Attorney General of New York, et.al:

The Tier 3 standards would also benefit our economy. Automakers strongly support the standards, which would enable them to sell vehicles meeting California's Low Emission Vehicle III standards in all 50 states and at the same time achieve EPA greenhouse gas emission standards for the model years 2017-25.

Commenter: Consumers Union

New car buyers will also benefit. Starting in 2017, new cars will have tighter limits on tailpipe emissions, including carbon monoxide and benzene, which can linger in garages and even attached residential living space (4). The proposed rule also offers automakers an incentive to go beyond the minimum 8-year/ 80,000-mile warranty currently required for emissions control systems, and extend it to 15-years/150,000 miles for new vehicles. This move could improve reliability and lower costs to maintain emissions control systems.

Low sulfur gasoline also enables auto makers to develop a greater array of technology, such as lean burn, to meet emissions and fuel economy standards more creatively and at a lower cost.

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4 - International Journal of Ventilation Volume 2 No 3 , "Air and Pollutant Transport from Attached Garages to Residential Living Spaces – Literature Review and Field Tests,", National Institute of Standards and Technology, available at: http://fire.nist.gov/bfrlpubs/build03/PDF/b03067.pdf.

Commenter: Manufacturers of Emission Controls Association (MECA)

MECA agrees with EPA staff's assessment that achieving the proposed Tier 3 exhaust and evaporative emission standards and associated emission reductions are both technically feasible and cost-effective. This fact is clearly demonstrated by the more than two million SULEV- and PZEV-compliant light-duty vehicles that have been sold in the U.S. market since these near-zero emission, gasoline vehicles were first introduced more than ten years ago.

Commenter: Consumers Union

New car buyers will also benefit. Starting in 2017, new cars will have tighter limits on tailpipe emissions, including carbon monoxide and benzene, which can linger in garages and even attached residential living space.[4] The proposed rule also offers automakers an incentive to go beyond the minimum 8-year/ 80,000-mile warranty currently required for emissions control systems, and extend it to 15-years/150,000 miles for new vehicles. This move could improve reliability and lower costs to maintain emissions control systems.

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[4] International Journal of Ventilation Volume 2 No 3 , "Air and Pollutant Transport from Attached Garages to Residential Living Spaces – Literature Review and Field Tests,", National Institute of Standards and Technology, available at: http://fire.nist.gov/bfrlpubs/build03/PDF/b03067.pdf.

Commenter: U.S. Coalition for Advanced Diesel Cars

The standards will also encourage the development of innovative new technologies and provide American consumers with more and cleaner vehicle choices.

Our Response:

These comments express support for the standards based on their impacts on vehicle sales and innovation. The auto industry is expected to take advantage of having one set of standards for the U.S.; this program contributes to that goal. We agree with MECA that the new standards are feasible. We agree as well that new vehicle owners as well as the general public will benefit from reduced tailpipe and evaporative emissions. And, as discussed in the introductory part of Chapter 9 (above) of this S&A, we agree that the standards will encourage innovation in technologies.

9.2. Impacts on Petroleum Industry

What Commenters Said:

Commenter: Clean Air Watch

I'll just note that they're wrong. You're going to hear today, I believe, from Navigant, who's going to critique some of the oil industry's current cost projections on this study, so I will hope that you'll listen carefully and then leave it to them. But I'd like to look at some of the past examples of what I would call crying wolf by the oil industry. Let's consider a few examples where they've been wrong.

When EPA proposed a phase out of lead in gasoline in the 1970s, the oil industry claimed there was no public health advantage to be gained, and that this would cause supply shortages. Not only was this sky is falling prediction dead wrong, we know now it was one of the best steps for public health ever made by the EPA. Taking lead out of gas reduced the risk of lead toxicity for hundreds of thousands of children. It also decreased the risk of heart attack and stroke. Oh, and we didn't have those supply shortages.

In 1999, when EPA proposed the so-called Tier 2 standards in allied sulfur and gas reductions, once again the oil industry claimed that clean up wasn't needed, and it would cause shut downs and supply shortages. In fact, in this case they even said it would threaten national security. Well, of course these problems didn't happen either. It was sheer nonsense.

Let's take a third example. In the year 2000 after EPA proposed clean diesel fuel standards, the oil industry again claimed – now, can you guess – that the cleanup wasn't needed, and it was cause refinery shutdowns and supply shortages. Guess what? The exact opposite happened. The U.S. now exports clean diesel fuel because EPA stuck to its guns.

So I would just like to say let's learn from the past. This is not the United States of Amnesia, I hope. Let's remember the oil industry has cried wolf so many times in the past, always been wrong. It's doing it again here. Let's consider the massive health benefits of this plan that a lot of other witnesses have already talked about. We know that they dwarf the very modest costs.

Commenter: Emissions Control Technology Association (ECTA)

Tier 3 is Unlikely to Increase Retail Gasoline Prices. We disagree with EPA's conclusion that the proposed rule would increase the cost of gasoline to consumers.

EPA concludes that:
"We do not estimate the price increase that consumers are likely to face, though we note that it should be positive and up to the increase in manufacturer's cost of gasoline production" (2).
This conclusion is drawn from: (1) the observation that in a perfectly competitive industry the increased cost of refining would be passed along to consumers; and (2) the assumption, based upon a report published by the Federal Trade Commission, that the refining industry is relatively competitive (3).
While we do not comment on the competitiveness of the U.S. refining industry, we believe that the proposed rule is unlikely to result in an increase in the price of gasoline to consumers. We draw this conclusion from an empirical analysis previously prepared by Navigant Economics (4), which examined the effect of EPA sulfur content regulation on the monthly average price of gasoline during the period from January 2001 to January 2012.
This statistical evidence leads one to conclude that, in all probability, the sulfur-content regulation of Tier 2 did not increase gas prices. Given this conclusion, it is unlikely that the sulfur content regulation of Tier 3 would result in higher gas prices for two reasons.
First, relative to Tier 2, Tier 3 requires a much smaller reduction in the average sulfur of content of the fuel. Tier 3 requires a reduction of 20 ppm (from an average of 30 ppm to 10 ppm), while Tier 2 required a reduction of 270 ppm (from 300 ppm to 30ppm). Tier 3 requires a reduction in sulfur that is 93% lower than that required of Tier 2.
Second, relative to Tier 2, Tier 3 imposes a much smaller cost of compliance on refiners. EPA estimates that the sulfur requirement of Tier 3 will increase the cost of refining by 0.89 cents per gallon, which is considerably less than the agency's prior cost estimate of Tier 2 (1.7 to 1.9 cents per gallon). From the perspective of the refiners, Tier 3 will impose half the costs of Tier 2.
It has been noted by some commenters in this proceeding that Tier 3 would "...increase the price for gasoline paid at the pump by 6 to 9 cents per gallon (5). These comments cite a study prepared by Baker and O'Brien for the American Petroleum Institute (6). Although Baker & O'Brien concluded that Tier 3 would increase the marginal cost of refining by 6 to 9 cents per gallon, their study was silent on the associated retail price effect. Advocates for the refining industry often characterize the Baker and O'Brien study as concluding that Tier 3 will increase gasoline prices, but even the study's authors were not willing to embrace this position.

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2 - EPA, Control of Air Pollution From Motor Vehicles: Tier 3 Motor Vehicle Emission and Fuel Standards, May 21, 2013, Proposed Rules (hereafter EPA Proposal). Fed Register pp. 29988-29989.
3 - Id. at footnote: 499, p. 29989.

4 - See Navigant Economics, Economic Analysis of the Implications of Implementing EPA's Tier 3 Rules, prepared for The Emissions Control Technology Association, June 14, 2012, p. 17-23 and Technical Annex (hereinafter "Navigant Study").
5 - May 23, 2013 letter to Gina McCarthy from the Institute For Energy Research, p. 2.
6 - See Baker & O'Brien, Inc. Potential Supply and Cost Impacts of Lower Sulfur, Lower RVP Gasoline, prepared for the American Petroleum Institute, July 2011 (hereinafter "Baker & O'Brien 2011 Study"), and The Baker & O'Brien, Inc., Addendum to Potential Supply and Cost Impacts of Lower Sulfur, Lower RVP Gasoline, prepared for the American Petroleum Institute, March 2012 (hereinafter "Baker & O'Brien 2012 Study").

Commenter: Mercatus Center at George Mason University

REGRESSIVE EFFECTS
While the EPA estimates that that this regulation will have a minimal impact (approximately one penny) on fuel costs, others have estimated the impact to be significantly greater, perhaps as much as 9 cents per gallon (18). Exactly how much gasoline prices may rise is difficult to say, but given that energy costs consume a higher proportion of low-income individuals' income relative to high-income individuals, it is worth acknowledging that this regulation may impose a disproportionate impact on low-income individuals. Similarly, recent academic research has shown that regulations, such as the proposed regulation, are often more in line with risk preferences of wealthy households (19). It is unlikely that poor households are worried about the risks posed from PM2.5 and ozone when they face much larger risks elsewhere in their lives. The income they lose to comply with this regulation may be better utilized toward other risk mitigation.

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18 - David Tamm and Kevin Milburn, "Addendum to Potential Supply and Cost Impacts of Lower Sulfur, Lower RVP Gasoline," (American Petroleum Institute, Houston, TX, March 2012).
19 - Diana Thomas, "Regressive Effects of Regulation." (Working Paper No. 12-35, Mercatus Center at George Mason University, Arlington, VA, November 2012), http://mercatus.org/publication/regressive-effects-regulation.

Commenter: Northeast States for Coordinated Air Use Management (NESCAUM)

To put the Tier 3 low sulfur impacts on the petroleum refining industry into perspective, it is instructive to summarize what has been previously required in other fuel programs. Over the past 13 years, EPA undertook three rulemakings, requiring significant reductions in the sulfur content of petroleum fuels. The Tier 2 regulation, promulgated in 2000, reduced the sulfur content of gasoline from a pre-regulation average of about 330 ppm down to 30 ppm and included an interim 120 ppm step. The highway diesel regulation, promulgated in 2001, reduced the sulfur content of diesel from 500 ppm down to 15 ppm. The non-road diesel regulation, promulgated in 2004, reduced the sulfur content of non-road fuel from a pre-regulation average of 3000 ppm down to 15 ppm, with an interim 500 ppm step. Compared to what is now proposed under Tier 3, these previous initiatives required very ambitious reductions. The refining industry met these challenges, supplying the market with compliant fuel while continuing to prosper economically. EPA's structuring of these regulations played a critical role in facilitating the transition from high to low sulfur fuels in each case.

Specifically, EPA built several very important regulatory flexibilities for refiners into the gasoline and diesel fuel sulfur standards, including 1) providing several years of lead time for all refiners to add and/or enhance desulfurization capabilities, 2) ABT programs to encourage early compliance where possible and provide means for extending compliance dates where needed, 3) provisions for smaller refiners to further extend compliance deadlines and credit generation opportunities, 4) opportunities for refiners to integrate their desulfurization infrastructure planning processes across all three fuels programs, 5) interim sulfur limits to allow refiners to phase their operations into compliance with the final standards, and 6) various hardship waiver provisions to provide a means to address unexpected circumstances. Most of these same flexibilities are built into the proposed Tier 3 program structure and in conjunction with comparatively modest requirements for reduction in sulfur will make for a relatively smooth transition from a 30 ppm average down to a 10 ppm average sulfur content.

Some in the refining sector have made projections that the Tier 3 sulfur standards will force a number of refineries to close because the costs of compliance will be too high and/or the deadlines are too soon to make the necessary equipment and operational changes at the refinery. Consequently, the U.S. fuel markets allegedly will become increasingly more dependent on competitive foreign imports of products. Similar projections were made during promulgation of the previous rulemakings for low sulfur fuels. It is instructive to briefly review what actually occurred in the U.S. refining sector over the phase-in period of these regulations in order to gain a sense of what the likely outcomes will be under this more modest Tier 3 scenario.

Refining activity in the U.S. increased over the same period as indicated in Table 2 [p. 10 of EPA-HQ-OAR-2011-0135-4283-A1]. Particularly noteworthy is the fact that desulfurization capacity increased by 40 percent from 2000 to 2010, indicating that the domestic refining industry responded positively to the regulatory challenge and succeeded in dramatically reducing the sulfur content of fuels.

Refiners' original projections of very high compliance costs were principally based on the assumption that conventional energy-intensive hydrotreating technology would have to be deployed almost exclusively to achieve the low sulfur levels in the final products. In actual practice, refiners opted for a combination of technologies and facility efficiency improvements to cost-effectively remove fuel sulfur. At around the time of the first of the three rulemakings (Tier 2 gasoline), the National Petroleum Council issued a report (16) identifying several more cost-effective desulfurization technology improvements, classified either as "demonstrated" or "near commercial status." By the time refiners had to select equipment for meeting Tier 2 gasoline standards, there were several additional, less energy-intensive technology choices available to them (17). Despite industry predictions of insufficient lead time and manufacturing resources for timely compliance with the standards for all three rulemakings, early compliance was widespread, as evidenced by the surplus of credits under the ABT programs (18,19).

[T]here are strong economic incentives for refiners to design and purchase the most energy-efficient process equipment to minimize the cost of production. For example, most of the new or modified units expected to be involved in refinery projects designed to meet the proposed Tier 3 standards are fuel combustion units (e.g., process heaters). Because fuel cost (direct cost in the case of purchased natural gas and opportunity cost in the case of refinery-generated fuel gas) represents a significant component of total operating cost for such units, refineries will strive to maximize energy efficiency based on available technologies as part of their project design (20).

Regarding the issue of foreign imports of fuels, the discussion in the proposed rule points out that “despite refining industry projections that previously imposed diesel rules would lead to greater U.S. reliance on imports through major negative impacts on domestic refining, the reverse has actually occurred. Over the last 8 years, imports of gasoline and diesel fuel have continued to be the marginal supply, and have even dropped precipitously so that the U.S. is now a net exporter of diesel fuel and is importing half the gasoline that it did at its peak in 2006. With the projected decline in future gasoline demand in the U.S. as vehicle fuel efficiency improves, gasoline imports are expected to continue to decline' (21). According to the U.S. Energy Information Administration’s 2013 Annual Energy Outlook, the U.S. is projected to be a net exporter of petroleum products at least through 2040.

In response to favorable long-term economic outlooks, the North American refining industry is taking the initiative to make significant new investments in its capacity to increase the supply of petroleum products, including low sulfur products. Several refineries in the Northeast that recently were in danger of permanently closing have reopened or remained in business due to ownership changes and favorable developments related to petroleum and product supply. In 2010, PBF Energy purchased the Valero refinery in Delaware City, DE. In conjunction with the purchase of the Delaware City facility, PBF Energy announced plans to invest $500 million to enhance its desulfurization capacity (22). In 2011, PBF Energy announced plans to invest $1 billion at the Delaware City refinery to boost distillate output and heavy crude capacity.

In 2010, Marathon Petroleum completed a $3.9 billion expansion, nearly doubling the capacity of its Garyville, LA refinery (23). This refinery is now the fourth largest in the U.S. and increases the ability of Gulf Coast refiners to augment the petroleum product needs in the Northeast. In 2009, Irving Oil Refinery (Saint John, New Brunswick) completed a $220 million upgrade. The majority of the work focused on improving its yield of ultra-low sulfur products. The Saint John Refinery is Canada’s largest and exports more than 80 percent of its products to the U.S. (24).

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16 - U.S. DOE. 2000. U.S. Petroleum Refining: Assuring the Adequacy and Affordability of Cleaner Fuels, June 2000.
17 - MathPro Inc. 2003. Evolution of Process Technology for FCC Naphtha Desulfurization: 1997-2003; An Example of Technical Progress Induced by Environmental Regulation, March 2003.
18 - U.S. EPA, Summary and Analysis of the 2005 Highway and Nonroad Diesel Fuel Pre-Compliance Reports, EPA 420-R-06-012, June 2006.
19 - U.S. EPA. 2010. Summary and Analysis of the 2010 Nonroad Diesel Fuel Pre-Compliance Reports, EPA 420-R¬10-028, December 2010.
20 - 78 FR 29934, May 21, 2013
21 - 78 FR 29992, May 21, 2013.
22 - heatingoil.com. Delaware Refinery to Reopen with Plans to Produce Low-Sulfur Heating Oil and Biofuels, Posted June 2, 2010.
23 - The Times-Picayune, Marathon Completes $3.9 Billion Expansion in Garyville, March 25, 2010.

24 - Irving Oil Company. 2009. Press Release: Irving Oil Refinery Completes $220 Million Investment Project, November 17, 2009.

Commenter: Pennsylvania Department of Environmental Protection (DEP)

DEP recognizes the important health benefits and cost-effectiveness of this proposed rule. Nevertheless, DEP has concerns about the impacts of costs to refiners of gasoline, projected gasoline cost increases to be passed along to the consumer.

Commenter: United States Congress, House of Representatives, Pennsylvania, 7th District

High gas prices have stretched Pennsylvania families thin already, and in the Philadelphia area, the refining industry is showing new promise after weathering a very tough economy for the sector. Adding new regulations without appropriate consultation with stakeholders— including the oil workers whose jobs could be put at risk through new mandates — and a thorough evaluation of the regulation's economic and consumer consequences is the wrong approach.

Our Response:

These comments reflect two views: one, that the standards will have significant adverse effects; the other, that the standards will have negligible or no effects.

EPA estimates that the national average refinery costs incurred to comply with the fully phased-in Tier 3 sulfur control program with ABT program will be 0.65 cents per gallon, averaged over all gasoline. Section VII.B of the Preamble, Chapter 5 of the RIA, and Chapter 7.2 of this document discuss EPA's fuel cost estimates in detail. As discussed in Preamble Section X.C. and RIA Chapter 9.3, EPA considers this impact to be small, and thus to be a barely measurable contributor to gasoline prices. We do not consider this view to contradict the study by Navigant (cited by ECTA) that was not able to find any impacts from the larger Tier 2 standards; in that case, and likely in the case of Tier 3 as well, the small increases may be swamped by the general variability in fuel prices. We agree with NESCAUM that the refinery sector on the whole has weathered the Tier 2 standards and is likely to face less additional difficulty with the Tier 3 standards. Because the impact of the standards on gasoline prices is expected to be small, we do not believe that the standards will contribute in a measurable way to household fuel costs. We expect this impact to be small even for low-income households. An increase of 0.65 cents per gallon for gasoline is less than 0.2 percent. The lowest quintile of U.S. households in 2012 spent $1,222 on gasoline and motor oil (Bureau of Labor Statistics, Consumer Expenditure Survey, Quintiles of income before taxes, http://www.bls.gov/cex/#tables); an increase of 0.2 percent is under $3 per year, an amount that is unlikely to cause significant additional hardship to low-income households.

Households will, in addition, receive the benefits of cleaner air. As stated in Preamble Section XII.J, "This final rule will reduce emissions from vehicles across the nation, both new vehicles (beginning in model year 2017, when the vehicle standards start to apply) and existing vehicles (as soon as the lower-sulfur gasoline becomes available in 2017). As such, this rule increases the level of environmental protection for all populations. As discussed in Section

III.C.7, there is evidence that minority populations and low-income populations live disproportionately near high-traffic roadways, where concentrations of many air pollutants are elevated. We expect this final rule to increase the level of environmental protection for these populations."

In addition to receiving many public comments, both in public hearings and submitted in writing, EPA has conducted significant consultation with stakeholders in developing these standards; see Preamble Section XI. Section V.L of the Preamble, Chapter 4 of the RIA, and Chapter 5 of this document discuss the feasibility for refineries to meet these standards. As discussed in those, we believe that refineries will not be put at undue risk. We agree with Clean Air Watch that previous rulemakings have not led to significant adverse impacts in the refining sector, nor do we expect these standards to have significant adverse impacts. EPA agrees that the Tier 3 standards, as well as the other standards cited by Clean Air Watch, have produced significant public health benefits. The benefits of Tier 3 are discussed in Preamble Section VIII and RIA Chapters 6-8.

Preamble Section X.D, RIA Chapter 9.3.2, and Chapter 9.3.2 of this document provide EPA's examination of employment impacts on refineries. EPA does not quantify most of the employment impacts of the standards. Most likely, employment will be gained in some sectors or locations, and it may be reduced in other sectors or locations; the net effect is expected to be small. We note that the United Steel, Paper and Forestry, Rubber, Manufacturing, Energy, Allied Industrial and Service Workers International Union (USW) and the International Union, United Automobile, Aerospace & Agricultural Implement Workers of America (UAW) provided comments supportive of Tier 3, including mention of expected positive job impacts from the standards.

9.3. Employment Impacts

What Commenters Said:

Commenters: American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM)

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.

Commenter: Marathon Petroleum Company LP (MPC)

Jobs. An objective economist would be aware that mandatory government regulations requiring significant capital expenditures and the creation of jobs to perform unnecessary gasoline sulfur reductions is an inefficient use of market financial resources, pulling capital from more efficient uses. As such it makes little sense for Navigant or EPA to count the mandated costs of a regulation as benefits when in reality economic growth is slowed from what it could have been with more efficient use of capital.

Commenter: Care 2 (comment campaign)

The new standards will also create jobs as automakers apply advanced technologies and refineries upgrade their equipment.

Commenter: Union of Concerned Scientists (comment campaign)

I support Tier 3 standards that will: create new jobs at refineries, installing and operating sulfur reduction equipment, and in the automotive sector, developing and manufacturing cleaner vehicles.

Commenter: Medical Advocates for Healthy Air

Financial Benefits**:** In purely economic terms, the implementation of cleaner fuel standards will create 5,300 permanent jobs in the operation and maintenance of new refining equipment as well as over 24,000 new jobs, over a three year period, for equipment installation at the nation's refineries. The industry which manufactures emissions control technology generated $12 billion of economic activity and accounted for 65,000 US jobs in 2010. Lower traffic pollution will lead to improved health outcomes and greatly reduce absenteeism from work and school, thus increasing productivity.

Commenter: Mercatus Center at George Mason University

EMPLOYMENT EFFECTS
The EPA cites three different ways in which regulations may impact employment: demand effects, cost effects, and factor-shift effects. The first method reduces employment in a regulated industry, the second increases it, and the last effect is ambiguous. However, the EPA should be careful to acknowledge that both jobs gained and jobs destroyed are costs of the proposed regulation. Ideally, compliance jobs should be minimized, not viewed as a benefit of a regulation (15).

The EPA should consider some of the long-term effects of its rules on those who lose their jobs at this unusual moment in time, with unemployment at a level that exceeds historical norms. The literature shows that these effects can be significant. For example, recent estimates of earning losses resulting from job loss range from 1.4 years of earnings in times of low unemployment to 2.8 years during times of high unemployment (16). Similarly, research shows that after reemployment it can take as long as 20 years for workers to catch up on lost earnings, largely due to skill mismatches between the jobs lost and the new jobs created in the economy (17). Additionally, the EPA should acknowledge that those who lose jobs and those who gain them are not in fact the same individuals; vastly different skill sets may be required in one type of employment relative to the other. Moving from one area of employment to the other may require significant skills retraining if those laid off are to be reemployed in the new line of compliance work.

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15 - See for example Keith Hall, 'Goodbye to Green Jobs, You Won't Be Missed," Forbes, April 4, 2013, http://www.forbes.com/sites /realspin/2013/04/04/goodbye-to-green-jobs-you-wont-be-missed/.
16 - Keith Hall, 'The Employment Costs of Regulation." (Working Paper No. 13-06, Mercatus Center at George Mason University, Arlington, VA, March 2013), http://mercatus.org/publication/employment-costs-regulation.
17 - Ibid.

Commenter: Natural Resources Defense Council (NRDC)

The Tier 3 new vehicle and fuel standards will add thousands of jobs to the U.S. economy by requiring new technologies to clean up gasoline and clean vehicle exhaust.

New Vehicle and Fuel Standards will Create Thousands of Jobs. The Tier 3 standards will add thousands of jobs to the U.S. economy by requiring new technologies to clean up gasoline and clean vehicle exhaust. Importantly, Baker and O'Brien found that the Tier 3 regulations would not result in refinery closures. With continued operation, some refineries will have to deploy new technologies. Similarly, jobs will be created in the automobile manufacturing and automobile parts sectors to add new technologies. Total long-term job estimates in both the refining and automotive sectors range from at least about 2,000 jobs in EPA's low-end assessment to nearly 5,300 jobs estimated by Navigant Economics (29). In the short-term, EPA and Navigant agree that thousands of workers are expected be employed to design and build the needed modifications to refineries.

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29 - Schink, op. cit.

Commenter: Northeast States for Coordinated Air Use Management (NESCAUM)

In addition to critical air quality, public health, and environmental benefits, Tier 3 would promote economic growth and create jobs throughout the U.S. According to the Manufacturers of Emission Controls Association, the emission control technology industry provides 65,000 domestic jobs and accounted for $12 billion in economic activity in the U.S. in 2010 (7).

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7 - Manufacturers of Emission Controls Association. 2011. Press release: MECA Highlights Economic Benefits of Mobile Source Emissions Control Industry. Available online at http://www.meca.org/galleries/default-file/MECA%20economic%20benefits%20press%20release%20031111.pdf.

Commenter: Sierra Club, Clean Air Watch, Respiratory Health Association

Further, the new standards will bring more American jobs as parts suppliers develop and build new technology and refiners and automakers install it. According to a study by Navigant Economics, implementation of cleaner tailpipe standards would create nearly 5,300 permanent jobs in the operation and maintenance of new refining equipment, as well as more than 24,000 new jobs over a three-year period as refineries install new equipment.[3] [EPA-HQ-OAR-2011-0135-4308-A1

p. 2-3]

[3] Navigant Economics. Economic Analysis of the Implications of Implementing EPA's Tier 3 Rules. June 2012. http://www.ectausa.com/061212-Economic-Analysis-of-the-Implications-of-Tier-3-Sulfur-Reduction-Final embargoed.pdf

Commenter: United Steelworkers Union (USW)

In fact U.S. refiners who currently export to 10ppm sulfur standard countries have already made efforts to upgrade assets to compete. As indicated on the April second 2013 tier three call organized by EPA, out of the one hundred and eleven (111) U.S. refineries impacted by the proposed rule, twenty-nine (29) can already meet the new standards or need to make operational changes. Sixty-six (66) will need to make equipment modifications and sixteen (16) will need to acquire additional equipment. These modifications will improve the health and welfare of the communities our members live and work in and provide economic development in the areas where the refineries operate.

The modifications and upgrades required under the proposed rule will also provide sustained employment for our members employed at refineries as well as create additional jobs. The Emissions Control Technology Association (ECTA) contracted with Navigant Economics to review the impacts of the EPA Tier 3 standards and found installation of the refinery modifications produces almost 24,500 jobs for full-time equivalent employees in the upgrading of facilities to comply with the rule and the continuing annual operation of the refinery modifications produces almost 5,300 jobs for full time equivalent employees (1).
As stated above, the proposed rules will allow domestic refining capacity to remain globally competitive and will provide significant employment opportunities for workers who manufacture, install, and operate the necessary refinery equipment to produce 10ppm sulfur gasoline.

1 - http://www.ectausa.com/061212-Economic-Analysis-of-the-Implications-of-Tier-3-Sulfur-Reduction-Final embargoed.pdf

Our Response:

Most of these commenters cite estimates of job increases associated with the Tier 3 standards. As discussed in Preamble Section X.D and RIA Chapters 9.2.2 and 9.3.2, EPA does not quantify most of the employment impacts of the standards and thus does not evaluate these estimates. Most likely, employment will be gained in some sectors or locations, and it may be reduced in other sectors or locations; the net effect is expected to be small.

The Mercatus Center recommends that "the EPA should be careful to acknowledge that both jobs gained and jobs destroyed are costs of the proposed regulation. Ideally, compliance jobs should be minimized, not viewed as a benefit of a regulation." This assertion is confusing, in that it implies that any effect on employment, positive or negative, is costly. MPC and API and AFPM argue that employment impacts should not be counted as benefits. The discussion in Preamble Section X.D of the employment impacts of the standards is intended to identify additional ways that these standards will affect the public. Employment clearly provides benefits to the people who are employed, and reducing unemployment is considered a desirable outcome in times of high unemployment. EPA disagrees that minimizing compliance jobs should be an independent objective of this rulemaking. The objective of the program is to improve air quality through reductions in vehicle emissions; we provide information concerning employment impacts as part of our overall analysis of economic impacts from the rule.

The Mercatus Center also requests that we consider the long-term effects of unemployment on workers who may lose jobs, and that we acknowledge that those who lose jobs may not be the same people who gain jobs. We recognize there are costs to workers who shift from one job to another,[1] but we also note, as discussed in Preamble Section X.D., that we expect very small employment impacts from the standards.

We disagree with API and AFPM that the standards are "unjustified," and with MPC that these standards are "unnecessary;" see Preamble Section VIII and RIA Chapter 8 for an assessment of the benefits of the standards and the benefit-cost analysis, which show significantly positive net benefits. In sum, as earlier explained in Chapter 2.1 of this document, we believe that the final rule implements the Tier 3 program in a manner consistent with our legal obligations, with sound science, and with sound environmental, energy, and economic policy, and we disagree with comments suggesting that the Tier 3 rule is not justified. The Tier 3 program, including the gasoline sulfur standards, will reduce ambient levels of air pollution that endanger public health and welfare and will provide important benefits to the public such as preventing PM- and ozone-related premature deaths. The Tier 3 Preamble very clearly explains the need for the Tier 3 standards in Section II, our technical justification for the vehicle emission controls in Section IV, and technical justification for the fuel standards in Section V. A vast body of underlying technical analyses supporting the Tier 3 standards can be found in our Regulatory Impact Analysis, which reflects the best methods, data and assumptions available at the time of the rulemaking analysis. We thus disagree that investments to meet the standards are an inefficient use of resources.

[1] E.g., Jacobson, Louis S., Robert J. LaLonde, and Daniel G. Sullivan, "Earnings Losses of Displaced Workers." American Economic Review 83(4) (1993): 685-709.

9.3.1. Employment Impacts in the Auto Sector

What Commenters Said:

Commenter: BlueGreen Alliance

The automotive industry has added more than 200,000 jobs since 2009, and the U.S. auto market has had three consecutive years of double digit growth due in large part to rising demand for these cleaner cars in the market. 'Gearing Up,' our report last year by the BlueGreen Alliance and the American Council for an Energy Efficient Economy, estimated that meeting the 54.5 mile per gallon rule will create more than 500,000 jobs through the U.S. economy by 2030. Building cleaner, more efficient cars creates jobs by sending money otherwise spent on fuel back into the U.S. economy, and also through the development and production of new, more efficient vehicle components.

Americans are working in a variety of industrial sectors in the Midwest and across the country. Members of the auto workers and steel workers will manufacture vehicle emission control technologies to meet these standards. As the BlueGreen Alliance's Regional Program Manager for Illinois and Indiana, I am frequently in contact with people working in the automotive industry.

Indiana ranks third in the country and Illinois seventh for jobs in the automotive parts industry, and they are also both in the top 10 for States with jobs in automotive assembly. The Tier 3 standard will bolster the auto industry's ability to meet a strong fuel efficiency standard and generate net positive economic outcomes.

Commenter: Business for Innovative Climate and Energy Policy (BICEP)

Additional benefits and jobs in the auto and emission control industries, which are significant drivers of the economy, will result from the development and production of Tier 3 technology.

Commenter: California Air Resources Board (CARB)

Additionally, we believe that given the magnitude of compliance costs relative to the size of the domestic economy, U.S. EPA's more qualitative approach for estimating employment effects using the Morgenstern et al. framework instead of relying on economy-wide modeling is reasonable.

Commenter: Ceres Investor Network on Climate Risk

Additional benefits and jobs in the auto and emission control industries, which are significant drivers of the economy, will result from the development and production of Tier 3 technology.

Commenter: Emissions Control Technology Association (ECTA)

Although Navigant did not estimate the impact of the rule on the auto and parts industries, we disagree with EPA’s conclusion that the associated employment effect would be negligible. We draw two conclusions from the RIMS model. The model shows that for every $1 million investment in new automotive parts, the RIMS multipliers imply 5.9 jobs (14).

We believe that these positive short-term employment effects are quite important as a matter of policy. The U.S. economy is currently operating under its full potential as witnessed by the high unemployment rate of 7.6 percent, as well as testimony by the Congressional Budget Office (CBO) that the rate will stay above 7.5 percent through 2014. CBO also stated in its testimony that economic output will stay below its potential level until 2017 (15). The simulative effect of new investment is most pronounced during periods of less-than-full employment. In the case of Tier 3, labor and other resources that are currently underutilized will be utilized by the refining and automobile makers as they comply with the new rule. This will increase economic activity and employment at a time when the nation desperately needs it.

14 - http://www.cityofventura.net/files/file/commdevelop/Economic%20Development/Economic%20Information-Data%20Book/18-Regional%20Input-Output%20Modeling%20System.pdf
15 - CBO Testimony, CBO Budget and Economic Outlook, February 15, 2013, http://www.cbo.gov/publication/4394.

Commenter: Sierra Club (comment campaign)

The new standards will also create jobs as automakers apply advanced technologies and refineries upgrade their equipment.

Commenter: Sierra Club

The new standards will not only reduce air pollution, they will create jobs as auto part suppliers manufacturer the technologies that reduce vehicle emissions. Auto makers apply advanced vehicle technologies and refineries upgrade their equipment. This is a win-win for public health and the economy, and EPA should move forward to finalize these standards without delay.

Commenter: United Automobile Workers

These proposed rules are part of a comprehensive approach to creating the next generation of clean vehicles. They go hand-in-hand with the new CAFE standards that were passed to regulate the fuel efficiency of our nation's vehicles over the next twelve years. Automakers are investing billions of dollars in retooling and expanding to produce the cleaner cars that consumers are demanding. Manufacturing advanced vehicles and their fuel-efficient components here in the United States is a crucial opportunity to develop domestic jobs that are sustainable in the long-term.

Commenter: Wespath Investment Management

It is also anticipated that the development and production of Tier 3 technology will result in additional jobs in the auto and emission control industries.

Our Response:

All these comments suggest that these standards will increase employment in the auto sector. EPA believes that this outcome is possible, though we do not expect a large effect, because the standards are not expected to have a large effect on auto production or costs. ECTA argues that job impacts will be not only positive in the auto and auto parts sectors, but substantially more positive than EPA states, based on Regional Input-Output Modeling System (RIMS) multipliers that find increases of 5.9 jobs for every $1 million investment in new auto parts. Multiplier impacts trace the entire chain of job impacts associated with an expenditure, including factors such as changes in employment in retail establishments due to changes in workers in the auto sector. Because the expenditures will occur when unemployment is still high, ECTA argues, it is important to consider the multiplier effects of the expenditures that are embedded in the RIMS multipliers. As discussed in Preamble Section X.D, the multiplier impacts of expenditures depend heavily on the state of the macroeconomy. Because of uncertainty over the state of the economy when the increased expenditures will occur, EPA has not quantified the multiplier impacts due to changes in employment associated with these standards. As discussed again below, some expenditures, perhaps especially in the refinery sector, will occur before the standards take effect, to get the manufacturing processes in place to meet the standards. These near-term expenditures may have some multiplier effects, because they are more likely to have their impacts during the current period of above-average unemployment. In contrast, the ongoing costs of complying with the standards, which contribute most directly to price increases, are likely to come in future years, when it is expected that unemployment rates will be lower.

9.3.2. Petroleum Industry Employment Impacts

What Commenters Said:

Commenters: Attorney General of Connecticut, et.al; Attorney General of New York, et.al; BlueGreen Alliance; Business for Innovative Climate and Energy Policy (BICEP); Ceres Investor Network on Climate Risk; Clean Air Council; League of Conservation Voters (comment campaign); Sierra Club; Wespath Investment Management

The refinery upgrades necessary to meet the lower sulfur gasoline standards are expected to generate 24,500 installation jobs during the first three years of the program and 5,300 permanent jobs.

Commenter: Emissions Control Technology Association (ECTA)

Tier 3 Is Likely to Have a Positive Impact on Employment and the Economy: We disagree with EPA's conclusion that the proposed rule would have an ambiguous effect on employment in the refining sector. We find that the employment effect will be positive and significant.

EPA concludes that:
"...it is not evident whether the proposed rule would increase or decrease employment in the refining sector. However, given the small anticipated reduction in quantities sold, it appears that the rule would not have major employment consequences for [the refining] sector" (7).

We disagree with this conclusion and believe that the employment impact on the refining industry will be positive and potentially quite significant. It could result in the creation of 24,500 jobs (i.e., full time equivalents or FTEs) over the three years during the installation of desulfurization equipment and 5,300 jobs for the operation and maintenance of the equipment over the longer term. We draw this conclusion from a study by Navigant Economics on the job impact of Tier 3 on the refining industry (8).

We agree with EPA's use of the "demand effect," the "cost effect," and the "factor shift effect" in analyzing the impact of the rule on employment in the refining and auto sectors (9). But, we draw a sharply different conclusion when applying this analytical approach to the refining sector.

First, EPA concludes that the demand effect is expected to be negative; that is, the cost of Tier 3 to refiners will be passed on to consumers in the form of higher gasoline prices, which will reduce the demand for gasoline and hence output by the refining sector. As explained in detail in Section I of this submission, we find that the increased cost to refiners is unlikely to be passed on to consumers; accordingly, we do not expect any negative demand effect arising from the rule. Even if a portion of the rather small costs to refiners were passed along, the demand effect would be minimal because the demand for gasoline is relatively inelastic as consumers have no close substitutes for gasoline.

Second, EPA concludes that in the short-term the "cost effect" is likely to be positive; that is, the increased investment by the refining industry to comply with Tier 3 will generate increased employment over the short-run. We agree with this conclusion, but we find that the cost effect will be much larger than EPA's estimate.

EPA expects that refiners will invest $2.2 billion between 2014 and 2019, which will increase employment by 7,000 jobs for design, engineering, and construction of the desulfurization equipment (10). We conclude from the Navigant study that the refining industry's initial investment of $3.9 billion (relating to installation expenditures) will create 24,500 FTEs for the first three years of implementation. The Navigant estimate is generated through the use of the RIMS II input-output model developed and maintained by the Bureau of Economic Analysis. In addition to a significant positive employment effect, this model also projects that the increased investment by the refining industry will generate over $2 billion in economic value-added per year over three years, $1.2 billion annually in increased employment compensation, and $0.5 billion per year in tax revenue for federal, state, and local government (11).

We also conclude from the Navigant study that a further 5,300 jobs will be created from the $0.5 billion per year in operation and maintenance costs associated with the desulfurization equipment after it is installed. This will generate $0.6 billion per year in economic value added, $0.3 billion in employment compensation annually, and $0.1 billion in increased tax revenue per year (12). EPA gave no consideration to the economic impact of the expenditures that are related to the operation and maintenance of the new equipment.

Finally, like EPA, we did not analyze the "factor shift effect"; that is, the changes in labor intensity associated with a regulation that drives demand for new technology that is more or less labor intensive than the "old technology." Because Tier 3 would not require refineries to deploy a new technology— instead, the same technology used to reduce sulfur would be intensified—we think the concept of factor shift effect is not applicable here.

EPA concludes:

"...while we do not have an estimate of the direction of the overall effect of the proposed rule on auto-sector employment, we expect it to be imperceptible (13).

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7 - EPA Proposal, Fed. Reg. at p. 29992.
8 - Navigant Study at pp. 25-27.
9 - EPA Proposal, Fed. Reg. at p. 29991.
10 - EPA Proposal, Fed. Reg. at p. 29999.
11 - Navigant Study, pp. 25-27 and footnote 42.
12 - Navigant Study, pp. 25-27.
13 - EPA Proposal, Fed. Reg. at 29991.

Commenter: National Association of Clean Air Agencies (NACAA)

Tier 3 will also provide new employment opportunities. In its draft RIA, EPA projects that the work refineries will need to undertake to satisfy the Tier 3 requirements will create about 1,000 front-end design and engineering jobs and 6,000 construction jobs for a total of 7,000 new jobs.

The agency notes that the petroleum sector employed about 65,000 workers in 2009. Therefore, the new jobs to be created as a result of Tier 3 would increase employment in the petroleum sector by over 10 percent compared to 2009 levels.

Our Response:

Most of these comments cite Navigant Economics for positive and substantial job impacts; NACAA cites EPA's estimates from the NPRM.

As discussed in Chapter 9.3.1 of this Summary and Analysis of Comments document, EPA is not using multiplier effects for its estimates of employment impacts here, as does the Navigant Economics study, because of uncertainty over the state of the macroeconomy at the time that these expenditures will occur. As discussed in Chapter 9.2 of this document, we do not consider our finding of a small demand or output effect to contradict Navigant Economics' finding of no demand effect; it is possible that the effect of the standards on price, and thus on fuel sales, is too small to measure.

EPA has revised its employment estimates for refineries for this final rule. As discussed in Preamble Sections V.L.3.e and X.D.2, to meet the Tier 3 sulfur standards, EPA now estimates that refiners are expected to invest $2 billion between 2012 and 2019 and utilize approximately 250 front-end design and engineering jobs and 1,500 construction jobs. As the petroleum sector employed approximately 71,000 workers in 2011, this temporary increase in employment will be small when compared to 2011 levels.

Commenters: American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM); Marathon Petroleum Company LP (MPC)

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.

Commenter: Chevron Products Company

EPA does not account for the economic hardship and resulting impact on local and regional economies incurred as a result of the above average cost of production for some of the refineries. This analysis also alludes to increases in employment in the refining sector resulting from past regulations without any reference to the economic context of that time or the global competitive forces. This leads the reader to conclusions without any fact or basis. EPA makes the argument that 'While closing refineries has a negative effect on industry employment, it is likely that the increased refining capacity at many of the remaining plants had a positive effect on industry employment.' Increases in production may not result in any significant increases in employment to offset the impact of closing refineries.' If throughput is increased without the addition of new equipment trains to manage, the labor needed to keep the refinery running would be about the same.

Our Response:

In the NPRM, EPA presented the Morgenstern et al.-based estimate, not as a conclusive estimate, but rather as one estimate that we too consider of unclear applicability to the standards. As discussed in Section X.D of this final rule, we are now using estimates from Berman and Bui ("Environmental Regulation and Labor Demand: Evidence from the South Coast Air Basin." *Journal of Public Economics 79*(2) (2001): 265-295) that "employment effects are very small, generally positive, but not significantly different from zero." As discussed above, to meet the Tier 3 sulfur standards, EPA now estimates that refiners are expected to invest $2 billion between 2012 and 2019 and utilize approximately 250 front-end design and engineering jobs and 1,500 construction jobs. As the petroleum sector employed approximately 71,000 workers in 2011, this temporary increase in employment will be small when compared to 2011 levels.

Chevron Products Company states that we do not account for the hardship on local and regional economies due to the increase in refinery costs. Because we do not consider employment impacts to be large, even at local and regional scale, we do not expect large impacts on the economies at that scale. Chevron also states that our employment analysis does not account for economic context or global competitive forces. These are both considered in Preamble Section X.D and RIA Chapter 9.3. As discussed there, we recognize that employment impacts depend on the overall state of the macroeconomy. We also discuss the effects of Tier 3 in a global context: Canadian and Caribbean refineries are expected to have costs similar to those of U.S. refineries, while European refineries are already producing gasoline to a 10-ppm sulfur cap for Europe. EPA and Chevron appear to agree that minor changes in production are not expected to lead to significant changes in employment.

10. Statutory Process and Executive Orders

What We Proposed:

The comments in this chapter correspond to Section XII of the preamble to the proposed rule and address statutory process and executive orders as they relate to the Tier 3 rule. A summary of the comments received and our responses to those comments are located below (and in Section XII of the preamble to the final rule).

10.1. Administrative Procedure

What Commenters Said:

Commenter: American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM)

EPA is pursuing a flawed process in developing this rule. It is outrageous for EPA to hold public hearings as the docket continues to be populated with supporting information. It is invalid for EPA to hold these hearings in advance of publishing the rule in the Federal Register.

EPA must follow the Clean Air Act's procedural requirements. Section 307 sets clear requirements for the rulemaking process that begins with EPA first publishing a proposed rule in the Federal Register. In this publication, EPA shall specify the comment period. EPA cannot set a deadline for public comments on a proposal that has not yet been published, and the supplemental publication that merely identifies the hearing dates and locations is a clear attempt to circumvent public participation in the rulemaking process.

Clean Air Act Section 307 also requires EPA must include with the Federal Register publication factual data on which the proposed rule is based, the methodology used in obtaining the data and in analyzing the data, and the major legal interpretations and policy considerations underlying the proposed rule. In short, this means all the information EPA uses as the basis for the rule must be available. As of last week, over 700 new documents had been added to the docket, leaving not time to analyze the information to provide meaningful input.

Once the proposed rule is published, the comment deadline needs to be revised. Another public hearing should be scheduled, and it must be held long enough after publication to allow for public review of all of EPA's data and analysis. The availability of a pre-publication rule cannot be used as a reason to truncate the review period.

Commenter: Chevron Products Company

Chevron does not agree with the notice and comment process that EPA followed for publishing the Tier 3 NPRM. The delayed publication of the NPRM and the accelerated timeline for review and comment establishes a poor precedent for future rulemakings. A proposal of this importance deserves to be presented with a transparent administrative process and sufficient time for review and comment.

Regarding the administrative process for the Tier 3 NPRM, Chevron is disappointed by the procedure that EPA has followed for publishing the proposal and soliciting comments. The NPRM was published in the Federal Register on May 21, 2013, and EPA established a comment submittal deadline of July 1, 2013. This is a 41 day comment period for a proposal that comprises several thousand pages of regulatory text, analysis, test data, and various other docket submissions. A proposal of this length and complexity deserves to be presented with a transparent administrative process and sufficient time for review and comment.

We understand from prior discussion with EPA that the Tier 3 NPRM has been under development and was largely completed for perhaps a year or more prior to its release. There has been ample time to inform the public of the proposal and conduct the notice and comment process without resorting to an unrealistic, accelerated schedule. We are concerned by the precedent that this establishes for future rulemakings. EPA owes it to all Tier 3 stakeholders and the American public to conduct these proceedings with the highest regard for transparency, fairness, and due diligence.

Commenter: Chrysler Group LLC

EPA's Procedural Obligations Under the Clean Air Act:
Chrysler observes that EPA failed to comply with its procedural obligations under the Clean Air Act (CAA) in issuing the proposed rule. Specifically, CAA section 307(d)(3) states that a "notice of proposed rulemaking [must] be published in the Federal Register" and must "specify the period available for public comment" (40). The CAA further requires EPA to "ensure a reasonable period for public participation of at least 30 days" (41). Here, EPA published a Federal Register notice on April 8, 2013, announcing not the rule, but that public hearings for the proposed Tier 3 rule would be conducted on April 24, 2013 and April 29, 2013. Without having published the actual rule, that federal register notice also announced that the comment period for the proposed Tier 3 rulemaking would end on June 13, 2013. Curiously, then, the proposed Tier 3 rule itself was not published in the Federal Register until May 21, 2013, less than 30 days prior to June 13, 2013, and EPA did not "refresh" the comment period in the proposal in order to comply with the CAA.

EPA cannot, consistent with the CAA, establish a public comment period prior to publishing the actual proposed rule on which the public is to participate/comment, especially where the resultant comment period does not comport with the CAA. As such, EPA's initial decision to close the public comment period on June 13, 2013—24 days after the proposed rule was issued—violated the CAA's minimum 30-day public comment requirement. Only after EPA received correspondence pointing out these procedural flaws did the agency extend the comment deadline to July 1, 2013. Chrysler commends EPA for extending the comment period and complying with the statutory obligation and urges the Agency to refrain from taking such an approach in future notice-and-comment rulemaking actions.

40 - 42 U.S.C. § 7607(d)(3).

41 - 42 U.S.C. § 7607(h).

Commenter: Marathon Petroleum Company LP (MPC)

EPA has also taken several questionable steps in the process that it has followed for this proposed rulemaking. Most notably, EPA conducted field hearings for this proposal prior to official publication of the proposal in the Federal Register. EPA also failed to provide the affected stakeholders with sufficient time to comment on a rulemaking of this magnitude. And on June 25, 2013 (less than one week before comments were due) the Agency was still adding large supporting documents to the docket.

As a result of the overall lack of justification for these fuel changes and the significant time needed for review of EPA documents, MPC asserts that finalizing this proposal would be arbitrary and capricious and unlawful. EPA should either drop the current proposal or restart the proposal process in a manner that allows all stakeholders to have sufficient time to analyze and understand all the documents and issues involved in this complex rulemaking and to make appropriate comments. EPA must strictly re-examine the purported benefits of this rule and its real costs.

My comments today aren't really on the rule – the proposal itself, but the process that EPA is using in this rulemaking, and the fact that they've created a very unusual and unacceptably shortened comment period, which won't allow adequate public comment on the rule. And it's a rule that has significant impact on both my industry and the consumer.

It's taken EPA at least two years to get to this point, and the administrative record right now reflects a very complex set of documents consisting of thousands of pages of text. EPA has chosen to hold only two field hearings on this proposal, one today and one last week, and unless they actually printed the proposal in the Federal Register today, we haven't got an official copy of the proposal yet.

The two field hearings are occurring way too early, and simply stated, EPA has provided the stakeholders with insufficient time to analyze the overwhelming quantity of data and documents offered in support of the Agency's proposed action. We are still searching the docket trying to find several key documents that EPA references in the draft Regulatory Impact Analysis, and we have no assurance that the proposal we're working from is going to be the final proposal since each page has got a memo attached to it that says this is not an official version.

The public and the regulated community should be allowed at least the typical 90 days to review and comment on any proposal, especially this proposal. And the EPA shouldn't shorten the process that it has historically used in developing the proposed rules.

Affected parties deserve and should be granted adequate time to review the hundreds of documents that the Agency has placed in the docket in the last two weeks, and those that EPA is still placing in the docket. According to EPA – or according to us, we recommend that EPA schedule a third hearing that's a minimum of 30 days after the publication of the Proposed Notice of Rulemaking in the Federal Register, and after all the documents are put in the docket.

This would allow all the interested parties to have time to review the entire proposal and documentation before combining their comments.

Additionally, the comment period should not close sooner than 90 days after the rule is published in the Federal Register and all the documents are put in the docket. This is a significant rule, and it warrants and complete and thoughtful input from all the affected parties.

We in our industry have gone to great lengths to try to understand the implications for our industry and for consumers in lowering sulfur levels to 10 ppm. As of last week, despite requests over the last two-year period, the Agency still hasn't given us sufficient justification for lowering sulfur levels. We're now facing a forced march to comment based on a pre-publication announcement that simply references sources of justification that have just started to be placed in the docket.

This absence of information and a truncated comment period basically fly in the face of the Administration's promise to have regulatory transparency. Proceeding in this fashion may even be unlawful under the Administrative Procedures Act and the Clean Air Act.

In summary, it's not reasonable, fair, or lawful for EPA to expect us to come up with an intelligible set of comments in such a short period of time to the complicated and incomplete regulatory package that EPA has provided. We ask that EPA proceed fairly, lawfully, and issue the entire proposal, all the background documents, publish the proposal in the Federal Register, and put all the other documents in the docket, and all stakeholders 30 days to prepare for a public hearing, and 90 days to enter all their comments.

Commenter: Environmental Defense Fund (EDF)

EPA's Public Participation Procedures for the Tier 3 Proposal Met All Legal Requirements:
In a letter to EPA dated May 7, 2013, API alleged that the Agency did not follow the Clean Air Act's procedural requirements in proposing Tier 3. As EPA set forth in its May 23, 2013 response to API, however, the Agency's Tier 3 procedures met all legal requirements, including requirements for publication of the proposed rule in the Federal Register and public participation opportunities such as the period for written and oral comments. As EPA noted, the Tier 3 proposal was prominently posted and available for public review upon signature, on March 29, 2013. In addition, EPA widely disseminated notice of the proposal's availability at that time and specifically notified stakeholders, including API and the American Fuel & Petrochemical Manufacturers. With the extension of the comment period until July 1, 2013, this means that commenters have had, as a practical matter, over 90 days to review the proposed rulemaking. In addition, EPA provided notice in the Federal Register on April 8, 2013 of the location of the docket, the dates for the public hearings, and the duration of the comment period. In summary, EDF believes that the Agency met all legal requirements in proposing Tier 3, and strongly urges the Agency to move expeditiously to finalize the Tier 3 standards by December 31, 2013.

Commenter: Union of Concerned Scientists (UCS)

Finally, the procedures that EPA followed for the Tier 3 proposal met, and exceeded, all legal requirements, including requirements in the Clean Air Act for publication of the proposed rule in the Federal Register and public participation activities such as the public comment period and the public hearings. The rule was prominently posted and available for public review when it was signed on March 29th. With comments due on July 1st, commenters will have had more than 90 days to comment on the rule, including more than 30 days after the proposal was published in the Federal Register.

Commenter: Flint Hills Resources, LP (FHR)

Proposed Rules for Fuel Used in Flexible-Fuel Vehicles Should Be Published in the Federal Register:
EPA's preamble to the proposed Tier 3 regulations references a separate memorandum (1) 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 FHR 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) (2) 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 (3). 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.'

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.

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 the 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.

1- 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.
2 - United States Code, Title 5, Chapter 5

Our Response:

With regard to the public comment period, EPA met all legal requirements, including requirements in the Clean Air Act for publication of the proposed rule and notice of hearings and the public comment period in the Federal Register. EPA provided early notice of the Tier 3 proposal by posting it on EPA's website upon signature (March 29, 2013), and the docket was opened early to allow the public access to materials in the docket. Further, EPA held two public hearings for the Tier 3 rulemaking, and also provided an extension of the comment period. All of these items were announced in Federal Register notices—and posted on EPA's website—going beyond the procedural steps required by law, to promote transparency and public participation.

As explained in Section V.H of the preamble to the final rule, we are deferring final action on our proposed requirements for E51-83 at this time. We appreciate the valuable input provided by commenters and will take this into consideration in our final actions on these standards. We will continue to work with stakeholders in developing in-use fuel quality standards for higher level ethanol blends. We may issue a supplementary proposal prior to issuing a final rule if the additional information we receive from stakeholders warrants such an action.

10.2. Other Executive Orders

Environmental Justice

What Commenters Said:

Commenter: Concerned Citizens Around Murphy
The U.S. Environmental Protection Agency has made good changes to the gasoline we use in our vehicles.

One of the first changes was to mandate unleaded gasoline, which has provided a healthier environment for us and our children. Then came low-sulfur gasoline, which also introduced ethanol into the product. Then, the EPA required a low-benzene gasoline. The Tier 3 proposal will require reductions once again in the sulfur content of gasoline. The reduction of volatile organic compounds and sulfur from our vehicles is an important goal to which we should all do our part to be part of the solution, but it should not come at the cost of the little good air that is left in our neighborhoods around refineries.

The air quality in fenceline neighborhoods can be so poor at times that residents shelter themselves in place or hold their noses when they are on the roads that pass through the refinery facilities.

Clean fuel shouldn't cost air quality. The EPA should do more to control emissions from the refineries that make the lower sulfur content gasoline. Lowering vehicle emissions is important, but too much emphasis has been placed on achieving that goal through manufacturing and refining of lower sulfur content fuels and not enough enforcement and compliance at the refineries that make the gasoline.

EPA's Tier 3 proposal fails to consider that the reductions at the tailpipe will be offset by the by the increased emissions in the neighborhoods around those refineries that do not simultaneously install upgraded pollution controls.

EPA's Tier 3 proposal fails to consider the increased emissions at the processing plants (the refineries). At a recent St Bernard Parish Quality of Life Commission meeting, representatives from Louisiana DEQ made a presentation on the non-attainment status for the 2010 sulfur dioxide standard. They were asked how the anticipated State SIP for SO2 attainment would address Tier 3 mandates. Officials were asked if the refineries lower sulfur in gasoline (for EPA Tier 3 mandates), if they take more SO2 out of the gasoline, where will it go? Louisiana DEQ responded to assure residents that 'certainly we will not let it go into the air." Yet, neither EPA nor LDEQ have the authority to require zero sulfur emissions from Tier 3 projects. That sulfur is going to go somewhere. That somewhere is our neighborhoods. Whether it happens from everyday processing emissions or from switching to a higher content sulfur crude oil or sand oil or from emergency flaring or shutdown and startup emissions, the sulfur emissions at the plants will offset the reductions at the tailpipes.

While EPA's proposed Tier 3 is said to prevent up to 2,400 premature deaths, 23,000 cases of childhood respiratory ailments, and 1.8 million lost school days, work days, and days when activities would be restricted due to air pollution, the proposal does not account for the health, air quality, and quality of life in the refinery fenceline neighborhoods. Those sacrifice zones, areas that are overburdened and underserved, where residents are mainly low income people of color, will be traded for improvements in other areas that do not have refineries. Air quality in fenceline communities will be sacrificed for lower emissions at the tailpipe.

While EPA's proposed Tier 3 is said to prevent up to 2,400 premature deaths, 23,000 cases of childhood respiratory ailments, and 1.8 million lost school days, work days, and days when activities would be restricted due to air pollution, the proposal does not account for the health, air quality, and quality of life in the refinery fenceline neighborhoods. Those sacrifice zones, areas that are overburdened and underserved, where residents are mainly low income people of color, will be traded for improvements in other areas that do not have refineries. Air quality in fenceline communities will be sacrificed for lower emissions at the tailpipe.

We urge EPA to reconsider how the emissions at the refinery(s) will offset the emissions from the tailpipes. We urge EPA to require simultaneous installation of state-of-the-art control technology at the refineries that manufacture Tier 3 gasoline products. Our health is depending on it.

Commenter: Mercatus Center at George Mason University

While the EPA estimates that that this regulation will have a minimal impact (approximately one penny) on fuel costs, others have estimated the impact to be significantly greater, perhaps as much as 9 cents per gallon (18). Exactly how much gasoline prices may rise is difficult to say, but given that energy costs consume a higher proportion of low-income individuals' income relative to high-income individuals, it is worth acknowledging that this regulation may impose a disproportionate impact on low-income individuals. Similarly, recent academic research has shown that regulations, such as the proposed regulation, are often more in line with risk preferences of wealthy households (19). It is unlikely that poor households are worried about the risks posed from PM2.5 and ozone when they face much larger risks elsewhere in their lives. The income they lose to comply with this regulation may be better utilized toward other risk mitigation.

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18 - David Tamm and Kevin Milburn, "Addendum to Potential Supply and Cost Impacts of Lower Sulfur, Lower RVP Gasoline," (American Petroleum Institute, Houston, TX, March 2012).
19 - Diana Thomas, "Regressive Effects of Regulation." (Working Paper No. 12-35, Mercatus Center at George Mason University, Arlington, VA, November 2012), http://mercatus.org/publication/regressive-effects-regulation.

Commenter: WE ACT for Environmental Justice

Thank you for the opportunity to provide comments on the proposed Tier 3 Motor Vehicle Emission and Fuel Standards. My name is Dr. Jalonne L. White-Newsome and I am a federal policy analyst with WE ACT for Environmental Justice, a 25-year old environmental justice organization with offices in Harlem, New York and Washington, DC. WE ACT's mission is to build healthy communities by assuring that people of color and/or low income participate meaningfully in the creation of sound and fair environmental health and protection policies and practices. The inception of our organization, in fact, was fueled by the battle for clean, healthy air in Northern Manhattan. In an effort to protect and address the health concerns related to air emissions from a sewage treatment plant that was plopped into the Harlem community, as well as the 6 diesel bus depots, 4 garbage truck depots and many other sources of pollution...WE ACT continues to educate, engage community residents, academic and health partners to demand that the protection of human health and welfare be afforded to all – despite the hue of your skin, the amount of money and resources in your pockets, and the zip code you happen to live in. Since 1988, we have had the opportunity to be that voice, not only in Harlem, but on the national stage to help influence the conversation around several domains of environmental work, with clean air always being a priority concern.

I'm sure you know that the residents of Harlem, NY and many other similar cities and towns across our great nation are not breathing the same air – some of clean, and some is pretty dirty. So as many organizations across the country are wrapping up their Earth Day celebrations, just yesterday, I was reminded of why we do the work we do.

I went to pick up my 4 and 6 year old from school yesterday, going through the usual motions of signing out my girls, saying HI to other Moms and Dads, when I noticed something different this time. As I peered behind the secretary's desk, a cute little girl, with two little pig-tails and beautiful bright eyes, caught my attention – first because she reminded me of my little one, but, more importantly in addition to her school uniform, she was wearing a breathing mask, connected to a small machine, receiving a breathing treatment. I think the secretary saw me looking with a concerned look on my face and I gave the little girl a slight smile. I walked to my car, thinking about this young lady, and the many other children that I know that have to receive breathing treatments, or take medications, miss school, etc. to survive and try and live a kid's life. Due to no fault of their own – other than playing outside, going to school and living – their quality of life is compromised because of the state of the air they breathe. A child.

And then I thought about some of the senior citizens I have worked with, specifically in Detroit, Michigan, a part of Wayne County and one of the areas discussed in the rule documentation and I thought about my great Aunt, who is in her mid-80s that suffers with severe asthma, constantly having to be hospitalized because she has lived the majority of her life in various neighborhoods in Detroit, my hometown – unfortunately in areas that continue to be overwhelmed with multiple social stressors – crime, poverty, etc. – but also air toxins from both stationary and mobile sources that continue to negatively impact her health status.

You know, cumulative risk assessment or cumulative impact assessment, however you want to phrase it, is a way of understanding the real and total impacts on communities. We know that environmental pollution doesn't act in silos, and that's what we really need to consider as we look at these different rules.

When you look at EJ communities, they're hot spots. They're areas where there's a lot of things going on, and most of the time the rules and the things that we use to frame these rules don't capture everything that's happening. And so, what I would suggest is that, I guess, really offer a competent suggestion is that keep in mind that having these more stringent standards will work towards minimizing the burden on communities that are already compromised.

So if we focus on really the most vulnerable, I truly believe that more people will benefit overall, and having the rules, like the soot rule, Tier 3, and others, work in parallel is great. And so my suggestion, however, is that in future analyses, a cumulative impact strategy be employed.
I know that several of your colleagues in the EPA are working towards this as well as developing an environmental justice guidance that will be incorporated throughout the Agency. But I hope that this is something that you will strongly consider in future assessments to make sure that we get a real glimpse of the impacts and the benefits that come from these proposed rules.

I'm sure you are aware of the Urban Air Toxics report that is supposed to be prepared for Congress per Section 112(k) of the Clean Air Act. Briefly, the purpose of this report was to provide an update on the strategies taken on by the EPA to address the cumulative health risks in urban areas, specifically around urban toxics. Unfortunately, the first report was issued back in 2000 but there has not been an update since then. From what I have heard, the EPA is working on getting this report out in the near future. I bring this report up because the Tier 3 rules proposed will work to address – over time – some of the air toxins identified in the urban air toxics strategy. It is so critical that we can document the levels of air toxins in our urban neighborhoods, but also quantify the health impacts of potential carcinogens in our EJ communities. Having the data is the only way we can understand the present levels in our most compromised communities, and evaluate, over time, if the variety of programs and other mitigation efforts are actually working. So I hope, that in addition to these proposed standards, that the proper and adequate monitoring of our roadways, as well as refining the specificity of urban air toxics monitoring and urban communities will be an issue that is addressed, so we can truly understand the exposure and, hopefully, the decrease in urban air toxins in the communities that are already disproportionately impacted.

Urban air toxics are a significant factor in cumulative risk assessment or 'Cumulative impacts' as those in the environmental justice community like to capture this ideal. Because pollution – whether it be air, waste, water - does not act in a silo. Consequently, we believe that in order to properly characterize and environmental justice community, the SUM of the exposures must be considered – together, and not just individual pollutants. I do believe that the word 'cumulative impacts' was mentioned in the proposed rule. And I simply want to offer a comment and suggestion. Keep in mind that the more stringent standards will work towards minimizing that burden on communities that are already compromised. So, if we can focus on making life better for the "most vulnerable", I truly believe that more people will benefit, overall. Having the rules – soot rule, Tier 3 and others – work in parallel is great. My suggestion, however, is that in future analysis, a cumulative impacts strategy is employed. I know several of your colleagues are working to develop environmental justice guidance as well as guidance for preparing a cumulative risk assessment strategy so I would encourage you to potentially look into that work and how it can be integrated this time or in the next iteration of proposed rules.

Our Response:

Regarding the Mercatus Center comment, please see Chapter 9.2 of this Summary and Analysis of Comments document.

Regarding the comments from Concerned Citizens Around Murphy, please see Chapter 3.3.1 of this Summary and Analysis of Comments document.

Regarding WE ACT for Environmental Justice's comments, we acknowledge the concerns expressed and agree that these standards will help to reduce the burden on communities affected by multiple stressors. While the air quality improvements associated with this final rule affect the nation as a whole, locations in close proximity to major roadways will experience the most direct changes in a way that reduces their exposures. With regard to the comment urging analysis of cumulative impacts, EPA notes that the quantitative air quality analyses used to evaluate the health impacts of this rule include multiple air pollutants, including PM2.5, ozone, and air toxics. Furthermore, the RIA reviews available literature on the health effects associated with living or attending school in close proximity of traffic. In describing how this rule affects environmental justice, the RIA summarizes studies that evaluate the cumulative impacts of air pollution and social stressors such as neighborhood violence. EPA agrees that consideration of the full range of impacts of the rule is important. We acknowledge the comments concerning updating the Urban Air Toxics report and urging proper monitoring of air quality, but they are beyond the scope of this rulemaking.

10.3. Comment Period

What Commenters Said:

Commenter: American Fuel & Petrochemical Manufacturers (AFPM)

As you know, the Agency released a proposal for Tier 3 motor vehicle and fuel standards on March 29, 2013. This proposal has not yet been published in the Federal Register.

In a hearing notice published in the Federal Register on April 8, 2013, EPA announced that the public comment period would end on June 13, 2013. The length of this comment period is inadequate for a broad technical rulemaking such as this, especially one that includes diverse topics of vehicle emissions standards, fuel standards and the distinct unrelated issue of Performance Based Measurement System. Each of these issues requires different technical expertise to analyze.

The docket was opened on April 15. There are over 600 documents now in the Tier 3 docket in the Supporting and Related Material category. It is virtually impossible to review and analyze this volume of supporting technical information in the time allotted for public comment. Accordingly, we request additional time to prepare informed comments on the proposal.

AFPM requests that the public comment period be extended to 90 days after publication of the proposal in the Federal Register.

The AFPM has requested that the public comment period for the Tier 3 rulemaking be extended beyond June 13. There are hundreds of documents in the docket, and additional time is necessary for a comprehensive review. AFPM recommends 90 days after publication of this proposal in the Federal Register.

Commenter: Institute for Energy Research (IER)

The Institute for Energy Research is deeply concerned about EPA's proposed Tier 3 rulemaking. The public comment period deadline has been set for June 13th, and yet EPA only published the proposed rule in the Federal Register on May 21st. This allows the public less than a month's time examine the significant economic implications of the rule. Moreover, questions remain about the data used by EPA to derive the costs and benefits of the Tier 3 proposal, and the rule has also included several non-germane regulations such as the E15 certification fuel. Given these complexities and unanswered questions, we request at least a 90-day extension for the comment period.

Closing the public comment period on June 13, 2013 is likely in violation of the Clean Air Act that requires "notice of proposed rulemaking shall be published in the Federal Register" and that "[the Administrator] shall ensure a reasonable period for public participation of at least 30 days." The abbreviated period of 24 days does not give the American people sufficient time to comment on this complex and expensive regulation, which will impact each and every American.

Third, the impact of Tier 3 will be widespread and detrimental to the U.S. economy, and as such, the rule warrants greater consideration. A study by Baker & O'Brien Inc., prepared for the American Petroleum Institute, estimated that Tier 3 would impose initial compliance costs to oil refineries of $9.7 billion dollars. The ongoing costs associated with this rule would also increase the price paid for gasoline at the pump by 6–9 cents per gallon, which does not capture what the full “ripple effect” would be on the greater economy (6). Given the large costs, and the fact that EPA has failed to conduct whole-economy modeling for the rule, an extension of 90 days does not seem unreasonable.

We appreciate EPA’s concern and actions to ensure legal and transparent public participation in the rulemaking process. Strict legal compliance with rulemaking procedures as outlined in the Clean Air Act will ensure this rule is fully evaluated and given proper consideration by all concerned parties in an effort to identify and craft legislation that best serves the public interest of this country. It is therefore critical that EPA extend the comment period and release all of the data upon which it relies. Such an action would be in keeping with the President’s pledge to foster openness and transparency in the workings of the federal government, particularly when they affect the public so profoundly.

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6 - Tamm, David C. and Milburn, Kevin P. (2012) Addendum to Potential Supply and Cost Impacts of Lower Sulfur, Lower RVP Gasoline. Houston, TX. Retrieved May 17th, 2013 from http://api.org/news-and-media/news/newsitems/2012/mar-2012/~/media/Files/News/2012/12-March/Addendum-Potential-Impacts-of-Lower-Sulfur-Lower-RVP-Gasoline-Report.ashx

Commenter: National Propane Gas Association (NPGA)

NPGA urges the Agency to extend the comment period beyond the stated June 13, 2013 deadline.

The current 23 day comment period (based on the May 21, 2013 publication in the Federal Register) simply does not grant adequate time to complete a detailed analysis of this complex, 377-page proposed rule. The additional time is needed to develop the substantive comments sought by EPA.

NPGA believes a 60-day comment period should be established, based on the Federal Register publication date, which is standard for a proposal of this complexity. This would extend the deadline to July 21, 2013, and NPGA strongly urges EPA to take the action of extending the comment period.

Our Response:

EPA’s procedures for the Tier 3 rulemaking have met and exceeded all legal requirements, including requirements in the Clean Air Act for publication of the proposed rule in the Federal Register and opportunities for public participation. In addition to holding two public hearings on the proposed rule, we provided early public notice of the proposal (prominently posted on EPA’s website and available for public review immediately after signature on March 29, 2013) as well as early public access to the Tier 3 rulemaking docket.

In response to requests, we also extended the comment deadline from June 13, as originally set, to July 1, 2013 to provide the public with more time to prepare and submit comments. With the extension, we provided over 90 days to review and submit comments on the proposed rule, including more than 30 days after the May 21, 2013 publication of the proposed rule in the Federal Register. We concluded that the extension to July 1 was sufficient in light of the time period provided to review and submit comments on the proposal. We were also mindful that additional delay could affect the timely finalization and implementation of the Tier 3 program and its close harmonization with the California LEV III program, the need to provide adequate compliance lead time for regulated parties, and the importance of assisting states by achieving emission reductions to help attain and maintain the existing National Ambient Air Quality Standards (NAAQS).

We continue to believe that these actions complied with and went beyond the procedural steps required by law, to promote transparency and public participation in the Tier 3 rulemaking.

11. Comments on Proposed Regulatory Text

What We Proposed:

The comments in this chapter correspond to the proposed regulations, and are specific edits to the regulatory text that were suggested by commenters. As described below, many of these regulatory comments (such as those that were editorial or otherwise very specific) do not fit well within the structure of this document and are addressed elsewhere. This is because the majority of the comments received on this rule were comments on the proposed *policy* rather than the proposed *regulatory text.* Thus, the other chapters of this Summary and Analysis of Comments document were structured to address such policy comments rather than the type of comments addressed by this Chapter. While summaries of the regulatory comments received and our responses to those comments are discussed briefly below, readers are referred to other documents in the public docket for this rulemaking for a more complete analysis of these comments.

11.1. Engine and Vehicle Testing Regulations (40 CFR Parts 86, 1065, and 1066)

What Commenters Said:

We received detailed comments from manufacturers and the State of California on the regulatory text describing the test procedures. These comments and our responses to them have been summarized in detail in 5 memoranda to the docket,[1] and are not repeated here. The comments addressed issues such as temperature tolerances for testing, design specifications for laboratory cooling fans, and preconditioning sample systems prior to testing, along with dozens of similar comments.

Commenters:
Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)
BMW
California Air Resources Board (CARB)
Emissions Control Technology Association (ECTA)
Manufacturers of Emission Controls Association (MECA)
Truck and Engine Manufacturers Association (EMA)
Volkswagen Group of America, Inc.
Volvo Car Group

11.2. Fuels Regulations (40 CFR Parts 78 and 80)

What Commenters Said:

[1] EPA-HQ-OAR-2011-0135.

We received comments from several parties in the fuel industry with detailed edits on the proposed regulatory text in 40 CFR parts 79 and 80. These edits, which are not repeated or summarized here, addressed various areas of the regulations including suggested changes to definitions, deadlines, and additions/deletion of text to add clarity to the regulations.

Commenters:
American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM)
Chevron Products Company
Growth Energy
Magellan Midstream Partners, L.P.
Marathon Petroleum Company LP (MPC)
POET, LLC
Renewable Fuels Association (RFA)
Shell Oil Products for Shell and Motiva
Weaver and Tidwell LLP

Our Response:

We have responded to some of the issues raised by the edits to the fuel-related regulatory text in Chapters 5.3, 5.5, 5.6, and 6.1 of this Summary and Analysis of Comments document. Further, we have made changes to the regulations, where appropriate, based on these suggested edits or new information received. A summary of our responses to these comments is contained in a memorandum to the docket entitled "Summary of Responses to Comments Regarding Detailed Edits of the Proposed Fuel Regulations in the Tier 3 NPRM".

12. Comments Unrelated to the Proposed Rule

What We Proposed:

The comments in this chapter do not necessarily correspond to a specific section of the preamble to the proposed rule, but rather are comments that span various areas and issues. A summary of the comments received and our responses to those comments are located below.

12.1. Boutique Fuels

Organizations: National Association of Clean Air Agencies (NACAA)
Mid-Atlantic Regional Air Management Association Inc. (MARAMA)

When promulgating this final rule, EPA should provide a clear path forward for state and local agencies with respect to transitioning from current boutique fuel programs to the federal Tier 3 program including a streamlined SIP process and related guidance.

Our Response:

This comment appears to request that the Agency work with them to develop a streamlined process whereby States may end their current State-run fuel programs without interfering with their SIP compliance. The commenters appear to believe that the emission reductions resulting from Tier 3 may obviate the need for their existing "boutique fuel programs" which are almost all State or Local RVP control standards. The EPA would be willing to discuss options for doing so, but this comment is otherwise outside the scope of this rulemaking.

12.2. Comments Related to the Renewable Fuels Standard

What Commenters Said:

Commenter: Pennsylvania Department of Environmental Protection (DEP)

The EPA should explore opportunities and implement program changes for relieving the burden placed on refiners to meet the Tier 3 requirements.

A practical way to relieve the burden on refiners to meet the Tier 3 standards would be for EPA to reduce or stop increasing the national quota for biofuel production. The EPA sets this increasing biofuel mandate or Renewable Portfolio Standard which costs refiners resources that refiners could use to meet the Tier 3 standards. While reduced sulfur in gasoline, which will occur as a result of Tier 3, allows for better catalytic converter performance for reducing NOx emissions, the annually increasing Renewable Fuel Portfolio standard, which relies heavily on ethanol use, increases NOx emissions from automobiles. Given the huge health benefits associated with lowering NOx emissions and ozone levels as stated in this proposed rulemaking, ail EPA priority should be to reduce NOx emissions from all programs, and correspondingly, ozone levels across the nation.

Commenter: Clean Fuels Development Coalition (CFDC)

We also applaud EPA for recognizing its key role in the implementation of the federal Renewable Fuel Standard. EPA identified in its Regulatory Impact Analysis that accompanied the final rule governing the RFS, there are substantial benefits that can result from full implementation of the RFS and specific and quantifiable positive health impacts. Because of our broad base of membership and interests as well as our longevity in working on these issues, both our organizations regularly communicate with other stakeholders and like-minded organizations.

Commenter: American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM); Marathon Petroleum Company LP (MPC)

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).

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.

Our Response:

These comments are related to specific elements of the RFS program, and are thus outside of the scope of the Tier 3 program.

The issue involving exports and RVOs is outside the scope of this proposed rulemaking. However, it was initially addressed in the RFS Renewable Identification Number (RIN) Quality Assurance Program proposed rule (78 FR 12158 (February 21, 2013)). It will be fully addressed in the final rule for the RIN Quality Assurance Program which is expected to be finalized in the coming months.

12.3. Vapor Pressure Reduction of In-Use Fuels

What Commenters Said:

Commenter: Ford Motor Company (Ford)

Meeting the more stringent evaporative emissions standards of Tier 3 is made possible through the promotion of the "fuels and vehicle are a system" messaging communicated in the Tier 3 NPRM. The reduction in market fuel vapor pressure affects the entire fleet of vehicles on the road, giving benefits immediately after introduction of the new fuel. Additionally, any gasoline powered off-road vehicle or machinery would also immediately benefit from reduced evaporative emissions due to an appropriate reduction in vapor pressure.

Our Response:

A reduction in the vapor pressure of in-use fuels as discussed by the commenter was not part of the proposed or final Tier 3 evaporative emission standards.

12.4. Comments Related to Ethanol and Aromatics Control

What Commenters Said:

Commenter: POET, LLC

As noted above, ethanol cost-effectively provides a high-octane, clean-burning fuel that is important for meeting recently-tightened CAFE and EPA greenhouse gas emissions standards. Ethanol, including from cellulosic and other next generation biofuel sources, can dramatically reduce GHG emissions and even further increase the environmental benefits of ethanol. In 2012 renewable fuel use reduced greenhouse gas emissions by over 33 million metric tons. (9) Furthermore, EPA estimates that by 2022, the RFS will reduce greenhouse gas emissions by 138 million metric tons or the equivalent of taking 27 million passenger vehicles off the road. (10) Numerous companies, including POET and DSM, have made significant investments in cellulosic ethanol production that can provide particularly significant greenhouse gas reductions. (11)

Regarding emissions, clean-burning ethanol is key to Tier 3 emission reduction goals for sulfur and particulate matter, two pollutants around which the Tier 3 rule is anchored. Ethanol contains sulfur in de minimis amounts, so increasing ethanol blends in gasoline can help bring about the sulfur-related benefits that Tier 3 seeks to accomplish. Ethanol can also reduce highly harmful particulate matter emissions, particularly in next-generation engines. (5)

Clean burning ethanol is also critical to reducing air toxics, a subset of particularly harmful substances. The Clean Air Act fuel 'air toxics' regulations in Section 202(1) specifically identify three pollutants including benzene, 1,3 butadiene, and formaldehyde, and Section 211(k)(10) further identifies as ‘toxic air pollutants’ polycyclic organic matter (which includes polycyclic aromatic hydrocarbons known as PAHs), and acetaldehyde. In contrast to gasoline, ethanol does not contain benzene, a key air toxic. Increased ethanol use can also reduce PAHs (6) and 1,3-butadiene. (7) The Harvard Center for Risk Analysis has found that gasoline aromatic hydrocarbons, including benzene, lead to ‘approximately 3800 predicted premature mortalities nationwide.’ (8) Clean-burning ethanol provides a ready means of reducing toxic aromatics, including benzene and others.

Oddly, EPA in the Proposed Rule mischaracterizes (without clear explanation) ethanol as an air toxic; EPA must avoid this mischaracterization. As noted above, ethanol is not listed as one of the specifically enumerated air toxics of concern in Sections 202(1) or 211(k)(10). Furthermore, the Agency did not include ethanol among the 177 air toxics compounds that were evaluated in the most recent National-Scale Air Toxics Assessment. (12) Nor does the Proposed Rule provide any reasoned grounds for its passing reference to ethanol as an air toxic.

It should also be recognized that the Tier 3 rule and the RFS are mutually-reinforcing. In particular, EPA recognizes that the RFS ‘will result in significant amounts of ethanol-blended gasoline in the implementation timeframe of the proposed Tier 3 program.’ (18) Ethanol can help to obtain Tier 3’s emissions reduction goals, while a properly-designed Tier 3 rulemaking can help to provide a market for, and enable the deployment of, clean-burning biofuels to ensure that Congress’ biofuels use targets in the RFS are met.

In summary, clean-burning ethanol is key to Tier 3 emission reduction goals for sulfur, particulate matter, air toxics, and other key pollutants, and improves our nation’s economy and energy security. However, to achieve these emissions reductions, appropriate regulations are necessary for the widespread use of low-emitting, domestically-sourced biofuels.

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5 - See e.g., M. Maricq et al., The Impact of Ethanol Fuel Blends on PM emissions from a Light-Duty GDI Vehicle, 46 Aerosol Science & Technology 576 (January 2012), available at http://www.tandfonline.com/doi/pdf/10.1080/02786826.2011.648780; see also, Robert A. Stein et al., An Overview of the Effects of Ethanol-Gasoline Blends on SI Engine Performance, Fuel Efficiency, and Emissions, AVL Powertrain Engineering Inc. and Ford Motor Company (April 8, 2013), regarding the ability of increased ethanol blends to improve engine efficiency and reduce a variety of pollutants, including particulate matter.
6 - See, e.g., M.A. Costagliola et al., Combustion efficiency and engine out emissions of a S.I. engine fueled with alcohol/gasoline blends, Applied Energy (2012), available at http://www.sciencedirect.comjscience/article/pii/S0306261912006836.
7 - While ethanol may increase emissions of acetaldehyde and formaldehyde, due to the much higher toxicity weighting of benzene and 1,3-butadiene, ethanol nevertheless results in significant health benefits due to reductions in these pollutants. See Stein et al., An Overview of the Effects of Ethanol-Gasoline Blends on SI Engine Performance, Fuel Efficiency, and Emissions, supra.
8 - See Katherine von Stackelberg, et al., Public health impacts of secondary particulate formation from aromatic hydrocarbons in gasoline, 12 Environmental Health 19 (February 20, 2013), available at http://www.ehjournal.net/content/12/1/19 -/abstract.
9 - Renewable Fuels Association, Battling for the Barrel: 2013 Ethanol Industry Outlook (February 2013), p.18, available at http://ethanolrfa.org/page/-/PDFs/2013%2ORFA%200utlook.pdf?nocdn=1.

10 - EPA final rule, Regulation of Fuels and Fuel Additives: Changes to Renewable Fuel Standard Program, 75 Fed. Reg. 14,670, 14,683 (March 26, 2010).
11 - POET-DSM's first commercial ethanol production facility, slated to begin operating in early 2014, has been predicted by a third-party analysis to reduce GHGs by 111% compared to gasoline—i.e., the cellulosic ethanol will more than offset the GHG emissions of gasoline. See Air, Inc., Lifecycle Emissions of POET's LIBERTY Cellulosic Ethanol Plant, available at http://poet.com/media/LCA-exec-summary.pdf. These significant GHG reductions are achieved by eliminating the need for fossil fuel both at the cellulosic plant and at an adjacent, grain-based ethanol facility.
12 - See, e.g., the list of Air Toxics in the 2005 NATA Assessment released March 11, 2011, available at http://www.epa.govittn/atwinata2005.
18 - 78 Fed. Reg. 29,820.

Commenter: American Coalition for Ethanol (ACE)

The combination of the Renewable Fuel Standard (RFS), 2017-2025 GHG/CAFE standards, and Tier 3 proposal by EPA make up the best option for substantially further reducing GHG emissions from the transportation sector because collectively these programs will result in the use of higher blends of ethanol. These higher ethanol blends will replace the marginal gallon of petroleum (that has significantly higher GHG emissions) and are much more practical in the near term than electric cars (powered by coal and natural gas) and LNG vehicles that also have significant infrastructure issues. Taken in combination, the RFS and proposed Tier 3 standards should help signal to oil companies and automakers that future vehicle technologies will need to be capable of taking advantage of ethanol's clean octane and the many other benefits that ethanol-blended fuels have to offer.

ACE believes it is proper for EPA to use the Tier 3 rule to limit sulfur and harmful gasoline-based aromatics and for public health reasons, but we also take this opportunity to encourage the Agency to address other public health concerns stemming from petroleum as well.

First, EPA needs to revisit its models with respect to data on emissions from today's petroleum. We encourage the Agency to place a priority on making certain that the Community Multiscale Air Quality (CMAQ) model recognizes the dominant role gasoline aromatics play in urban particulate matter (PM2.5) secondary aerosol (SOA) emissions. A recent Harvard study confirms that EPA's models under-predict SOA emissions by at least a factor of two to four times, and that they are responsible for tens of billions of dollars worth of avoidable public health impacts.[2]

Second, EPA should be more transparent about the air and water pollution health risks from highly toxic polycyclic aromatic hydrocarbons (PAHs), which the Agency acknowledges in its regulatory impact analysis, but for some reason does not currently regulate for mobile sources. Recent studies by automakers show that midlevel blends of ethanol (such as E30) are able to reduce these particle-borne PAH emissions by 45 — 60 percent or more, and we encourage the Agency to include these findings in the final rule.[3]

Finally, it is critically important that EPA recognize it unfairly penalizes ethanol's field-to-wheel carbon footprint. We encourage the Agency to correct deficiencies in the GHG rule regarding ethanol's significantly smaller carbon footprint compared to gasoline. Doing so would help provide more sufficient incentives for automakers to manufacture additional FFVs and future vehicle technologies which can take greater advantage of the high and clean octane benefits of midlevel ethanol blends.

Fully valuing the impacts of petroleum and advantages of higher ethanol blends as discussed above will significantly underscore the benefit in EPA's implementation of Tier 3, CAFE-GHG, and the RFS and further motivate more rapid expansion of higher octane ethanol blends in the United States.

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[2] Katherine von Stackelberg, et al., 12 Public Health Impacts of Secondary Particulate Formation from Aromatic Hydrocarbons in Gasoline, Environmental Health (2013), available at http://www.ehjournal.net/content/12/1/19.

[3] See Koichiro Aikawa, et al., Development of a Predictive Model for Gasoline Vehicle Particulate Matter Emissions, SAE International (Oct. 25, 2010); M.A. Costagliola, et al., Combustion Efficiency and Engine Out Emissions of a S.I. Engine Fueled with Alcohol/Gasoline Blends, Applied Energy (2012); M. Matti Maricq, et al., The Impact of Ethanol Fuel Blends on PM Emissions from a Light-Duty GDI Vehicle, 4 6 Aerosol Sci. & Tech. 57 (2012).

Commenter: American Council on Renewable Energy (ACORE)

There is a major policy option that will significantly reduce our dependence on oil, and improve the nation's health and economy. In Section 202 of the 1990 Clean Air Act Amendments, EPA was required to reduce aromatics in gasoline to the maximum extent possible. EPA designed questionable models (and still relies on these out-of-date computer models). Consequently the EPA determined the most cost-effective approach, and then established a 25% ceiling on benzene, toluene, and xylene and continues to reduce the benzene level, with little mention of other chemicals in the aromatics group. It soon became clear that aromatic levels could be appreciably lowered, providing important economic and human health benefits; and at the same time boosting the market share in the light-duty transportation sector for sustainable alcohols. But, EPA has not taken action, even though there is a plethora of information to fully justify this action. This information is available to the Committee, and in some cases has already been or being supplied by several forces, specifically now in the Coalition/Urban Air Initiative (EFC/UAI) comments.

Commenter: Clean Fuels Development Coalition (CFDC)

In particular we had an opportunity to review and contribute to comments submitted to you on this Rule by the Urban Air Initiative and the Energy Future Coalition. CFDC and 25 x 25 have been studying the impacts of aromatic hydrocarbons for several years now and completely agree with the UAI/EFC comments with regard to calling on EPA to recognize and quantify the public health benefits that can be achieved by reducing toxic aromatic compounds in gasoline. The UAI comments and supporting documentation does, in our view provide an excellent case for reducing the use of aromatics in transportation fuels and importantly ties it to numerous other public policy initiatives EPA is grappling with ranging from overall CO2 greenhouse gas emissions to black carbon and particulates. Therefore, we urge EPA to focus on the UAII/EFC comments as they are representative of the views of our organizations as well.

The other huge impediment to getting more high-ethanol capable vehicles on the road was created through the Corporate Average Fuel Economy/Greenhouse Gas Rule last year. In that Rule vehicles operating on blends even as high 85% receive a paltry 1% GHG Credit due to outdated and inaccurate modeling. We believe ethanol's GHG advantages over petroleum are severely under estimated and when combined with some of these other initiatives could provide a pathway to increased biofuel use, successfully implementing the RFS.

Commenter: E.I. du Pont de Nemours and Company

In enacting the RFS, the Congress set a forward looking 15-year policy intended to incent the large scale development of renewable fuels in the U.S. It succeeded ahead of schedule for grain ethanol, and has to date met its overall volume targets successfully. The existing suite of biofuels policies, of which the RFS is a significant component, has been very successful in standing up a U.S. biofuels industry that is making a material contribution to U.S. energy security and reducing the environmental footprint of transportation.

Specifically, biofuels have made significant contributions to reducing GHG emissions but also provide a low sulfur, aromatic-free, olefin-free gasoline volume which assists in meeting criteria pollutant goals.

We have to remember that we started down the road of alternative transportation fuels because of the variety of security, environmental and economic ramifications of our dependence on petroleum. Those challenges have only grown more acute and we are making solid progress. Today, biofuels production in the U.S. offsets over 10 billion gallons of petroleum demand each year.

Commenter: Energy Future Coalition and Urban Air Initiative

Air quality and public health: Aromatic hydrocarbons—which are air toxics in their own right—make up approximately 20%-30% of standard motor vehicle fuel in the United States. On combustion, these compounds produce emissions of benzene, toluene, ethylbenzene, xylene, 1,3-butadiene, polycyclic aromatic hydrocarbons (PAHs), and a host of other hazardous air pollutants, including dangerous levels of fine and ultra-fine particulate matter (PM2.5 and UFPs). Ethanol is a substitute for octane-enhancing aromatics; the average aromatics content in gasoline has dropped 16 percent over the past decade due to ethanol blending. (2)

PM2.5 is widely viewed as the most lethal air pollutant in the United States. It causes thousands of deaths every year, as well as a range of other health and environmental effects. (54) As EPA noted in its 2007 MSAT rule, "[h]ealth effects associated with short-term exposures (e.g., hours to days) in ambient PM2.5 include mortality, increased hospital admissions, heart and lung diseases, increased cough, adverse lower-respiratory symptoms, decrements in lung function and changes in heart rate rhythm and other cardiac effects." (55) Studies also show associations between long-term exposure to PM2.5 and cardiorespiratory and lung-cancer mortality. (56)

54 - See C. Arden Pope III, Epidemiology of Fine Particulate Air Pollution and Human Health: Biologic Mechanisms and Who's at Risk?, 108 Environ. Health Perspectives Supplements (2000); Pope, et al.,

Lung Cancer, Cardiopulmonary Mortality, and Long-term Exposure to Fine Particulate Air Pollution, 287 JAMA 1132 (2002), available at http://www.epw.senate.gov/107th/Levy_1.pdf.
55 - 2007 MSAT Rule, 72 Fed. Reg. at 8443; accord Regulation of Fuels and Fuel Additives: Changes to Renewable Fuel Standard Program, 75 Fed. Reg. 14670, 14808-09 (March 26, 2010) [hereinafter "RFS2"] ("Health effects associated with short-term exposures (hours to days) to ambient PM include premature mortality, aggravation of cardiovascular and lung disease (as indicated by increased hospital admissions and emergency department visits), increased respiratory symptoms including cough and difficulty breathing, decrements in lung function, altered heart rate rhythm, and other more subtle changes in blood markers related to cardiovascular health.").
56 - See RFS2, 75 Fed. Reg. at 14808-09 ("Long-term exposure to PM2.5 and sulfates has also been associated with mortality from cardiopulmonary disease and lung cancer, and effects on the respiratory system such as reduced lung function growth or development of respiratory disease. A new analysis shows an association between long-term PM2.5 exposure and a subclinical measure of atherosclerosis.").

A recent study led by the Harvard Center for Risk Analysis, with participation by EPA, estimated the public health impacts from exposure to only one of these hazards—PM2.5 originating from aromatic hydrocarbons in gasoline—at approximately 3800 premature mortalities nationwide and total social costs of $28.2 billion. (3) A straight-line extrapolation of aromatics reduction from ethanol replacement suggests that a 30% ethanol blend would save on the order of $9 billion annually for just this one of many public health benefits—more than the low end of the total monetized health benefits of the Proposed Rule. (4) Of particular concern, emission reduction technology in newer vehicles may worsen PM2.5 pollution if aromatics are not reduced in fuel. (5) Reduction of mobile source air toxics, required by the Clean Air Act Amendments of 1990, has been too long neglected by EPA.

Achieving reductions in PM2.5 from mobile sources would also reduce regulatory pressure on stationary sources to find ever more costly ways to meet the National Ambient Air Quality Standard for concentrations of PM2.5 in the air. Electric utilities already face annual costs of $9.6 billion to reduce such hazardous air pollutants. (6)

We also recommend that EPA take this opportunity to lead a nationwide transition to cleaner fuel in order to meet the requirements of the Clean Air Act Amendments of 1990 and ensure "the greatest degree of [air toxic] emissions reduction achievable" from motor vehicle exhaust. (15) Shifting to a mid-level ethanol blend is achievable with currently available technology and a sensible plan of action; however, the regulatory regime currently governing certification fuel and fuel marketability has thus far prevented automobile manufacturers and fuel refiners from initiating such a change. As EPA recognized in the Proposed Rule, meaningful emissions reductions can only come about "as part of a systems approach in addressing the impacts of motor vehicles and fuels on air quality and public health." (16) EPA has both the power and legal authority to craft such an approach. With time—and the removal of regulatory disincentives for alternative fuels—the nation's motor vehicles could all be running on cleaner, safer fuel and benefiting from the performance enhancement that a higher-octane blend would make possible.

Accordingly, we respectfully request that EPA take the following steps to facilitate a nationwide transition to a cleaner, safer mid-level ethanol blend vehicle fuel:
- Approve a splash-blended, mid-level ethanol blend as a certification fuel;

- Adjust the greenhouse gas emissions calculation for all vehicles certifying on this fuel to account for ethanol's life-cycle carbon advantage over gasoline;
- Extend to this fuel the one-pound waiver for Reid vapor pressure (RVP) that currently applies to E10;
- Beginning with a future model year, require all new gasoline vehicles to be certified on this fuel; and
- Consistent with the pace of adoption of both fuel and vehicles, limit the aromatic content of all light-duty motor vehicle fuel to the greatest degree achievable.

EPA Must Reduce Mobile Source Air Toxics in Motor Vehicle Fuel: What goes into motor vehicle fuel directly affects the emissions that come out the tailpipe. By transitioning to a mid-level ethanol blend, EPA would fulfill its statutory duty to regulate air toxics from mobile sources. In the 1990 Clean Air Act Amendments, Congress gave EPA the duty to "promulgate (and from time to time revise)" regulations governing emissions of "hazardous air pollutants from motor vehicles and motor vehicle fuels." (25) Furthermore, Congress required that these regulations "reflect the greatest degree of emission reduction achievable through the application of technology which will be available" (26); in other words, the mandate is strict and technology-forcing. "Hazardous air pollutants," as that term is used in section 202(l) of the Act, are synonymous with "mobile source air toxics" (MSATs) and include the aromatic compounds which currently make up approximately 20%-30% of light-duty motor vehicle fuel in the United States. On combustion, these aromatic hydrocarbons—which are air toxics in their own right—produce benzene, toluene, ethylbenzene, xylene, 1,3-butadiene, polycyclic aromatic hydrocarbons (PAHs), and a host of other hazardous air pollutants. (27) In addition, the combustion of aromatics in motor vehicle engines produces dangerous levels of fine and ultra-fine particulate matter (PM2.5 and UFPs), causing a range of environmental and human health effects, including thousands of deaths every year. (28) Finally, the combustion of aromatics in motor vehicle engines produces emissions of black carbon, one of the most powerful agents of climate change. Perhaps counterintuitively, in gasoline direct injection (GDI) engines (which are likely to become standard equipment in response to stricter fuel economy and greenhouse gas standards in the recent CAFE rule), emissions of black carbon and ultra-fine particles (UFPs) will increase if the level of aromatics in gasoline is not reduced. (29)

EPA Has Not Met its Obligation to Regulate MSATs: EPA has acknowledged that the "hazardous air pollutants" that must be regulated under section 202(l) of the Clean Air Act include aromatics, yet, apart from requiring a small decrease in benzene content in 2007, (30) the Agency has not yet substantially reduced aromatics in motor vehicle fuel. In a study required by section 202(l)(1), EPA discussed aromatics, including "benzene, formaldehyde, and 1,3-butadiene," as well as the "gasoline particulate" that they produce. (31) In its 2001 MSAT Rule, the Agency included in its list of MSATs the aromatics benzene, toluene, xylene, 1,3-butadiene, naphthalene, and polycyclic organic matter (POM), a subclass of air toxics that includes all PAHs. (32) Nevertheless, EPA did not require any reductions in emissions beyond those already required by other existing or proposed mobile source regulations. (33) In its 2007 MSAT rule, EPA required a slight reduction in benzene content in vehicle fuel, but—based on several factual predicates that have since changed, (34) the Agency declined to regulate aromatics further. (35)

Today, EPA has an opportunity to correct this deficiency and reduce the dangers of motor vehicle exhaust to public health. As noted in the Proposed Rule, more than 158 million Americans are currently experiencing unhealthy levels of air pollution, which are linked with respiratory and cardiovascular problems and other adverse health impacts that lead to increased medication use, hospital admissions, emergency department visits, and premature mortality. Motor vehicles are a particularly important source of exposure to air pollution, especially in urban areas. (36)

Because current motor vehicle fuel is a major contributor to air toxics and particulate matter in the atmosphere, (37) and because benzene, toluene, ethylbenzene, and xylene (BTEX) (the class of aromatics added in the highest quantities to motor vehicle fuel) all produce benzene on combustion, EPA has the authority, and indeed the obligation, to reduce the aromatic content of motor vehicle fuel under sections 202(l) and 211 of the Clean Air Act. EPA must promulgate regulations that “reflect the greatest degree of emissions reduction achievable through the application of technology which will be available, taking into consideration the availability and costs of the technology, and noise, energy, and safety factors, and lead time.” (38) While declining to regulate aromatics in 2007 because of cost and other factual predicates that are no longer applicable, the Agency acknowledged that “[t]here may be compelling reasons to consider aromatics control in the future, especially regarding reduction in secondary PM2.5 emissions, to the extent that evidence supports a role for aromatics in secondary PM2.5 formation.” (39) The Agency now acknowledges the important role of aromatics in PM2.5 formation, (40) and the time for cleaner gasoline has come; indeed, it is long overdue. EPA leadership to initiate a nationwide switch to a cleaner, less aromatics-intensive, mid-level ethanol blend would constitute a great stride toward a cleaner energy future and produce widespread environmental and health benefits.

MSATs Have a Significant Impact on Human and Environmental Health, Especially in Urban Areas: Regulation of gasoline aromatics under Clean Air Act sections 211 and 202(l) is urgently needed because aromatics cause thousands of deaths each year, along with a host of other serious health and environmental problems. All of these problems would be greatly ameliorated through the use of a cleaner, mid-level ethanol blend.

Benzene, toluene, ethylbenzene, and xylene, known collectively as “BTEX,” are all aromatic compounds included in gasoline to increase its octane rating. These air toxics, which belong to a class known as volatile organic compounds (VOCs), are emitted in tailpipe exhaust. Recent studies show that the majority of BTEX (83%-100%) on and near roadways is the result of gasoline tailpipe emissions. (41) As a result, BTEX from gasoline exhaust has significant health and developmental implications, especially for urban populations (42)—pertinent to EPA’s environmental justice criterion in the Proposed Rule. (43)

On their own, VOCs cause many harmful effects on the human nervous system and can contaminate soil and groundwater with lasting effects. (44) Benzene, for example, is a known human carcinogen and causes a range of health effects, including blood disorders and immunotoxicity. (45) Furthermore, once in the ambient air, VOCs combine through complex chemical pathways to produce significant amounts of fine particle pollution, including particularly dangerous ultra-fine particles (UFPs), which can become coated by toxic polycyclic aromatic compounds (PAHs), allowing these harmful cytotoxic and mutagenic chemicals to penetrate deep inside the human body. Each of these dangerous forms of pollution caused by aromatics is discussed below.

Fine Particle Pollution (PM2.5): Aromatics in gasoline are among the most efficient anthropogenic precursors of secondary organic aerosol (SOA), (46) a species of fine particulate matter (PM2.5)—i.e., particles less than 2.5 micrometers in diameter. It is widely acknowledged that EPA’s current models do not adequately capture the SOA-forming potential of gasoline aromatics, (47) nor do motor vehicle emissions tests capture the formation of SOA. (48) However, aromatics’ SOA formation potential is of deadly import, because SOA is a major contributor to the PM2.5 burden throughout the United States, particularly in urban areas. (49) In addition to SOA, gasoline aromatics produce direct PM in the form of black carbon and PAHs, both discussed below. (50) In fact, the entire PM2.5 formation potential of gasoline comes from aromatics. (51) Ethanol, by contrast, does not produce PM2.5, as EPA’s own investigations have concluded. (52) Thus, a reduction in the aromatic content of motor vehicle fuel would significantly reduce PM2.5 levels in urban areas and near roadways. (53)

Because PM2.5 is particularly lethal, power plants and other stationary sources are strictly regulated to reduce emissions, and States must meet a National Ambient Air Quality Standard (NAAQS) that limits concentrations of PM2.5 in the air.

Nevertheless, States are currently unable to obtain routine State Implementation Plan credit toward meeting the NAAQS by reducing SOA from motor vehicles, (57) and EPA’s own PM2.5 regulations focus mainly on stationary sources such as power plants. As a result, costly reductions are required in remote areas, while relatively little is done to reduce PM2.5—particularly SOA—from motor vehicles, even in densely populated areas, where the benefits of reducing mobile source PM would be significantly higher on a per-ton basis. (58) This anomaly is particularly perverse considering that, unlike stationary source reductions, which cost billions of dollars per year to implement, (59) reducing SOA from motor vehicle fuel could save consumers billions of dollars per year at the pump. (60) Focusing exclusively on stationary sources thus places an unnecessary burden on state regulators, who must require unnecessarily costly ways to reduce PM pollution in order to meet their NAAQS obligations. This regulatory disparity between mobile and stationary sources effectively grants refiners a “hidden subsidy,” since aromatics’ considerable health costs are both borne directly by affected citizens, taxpayers, and health providers and transferred indirectly to other businesses by state environmental authorities—even though aromatics could be significantly reduced by ethanol at far lower cost than other means of control.

When it comes to fine particulate pollution, size and type matter. Because of their small size, ultra-fine particles (UFPs)—that is, particles less than 100 nanometers in diameter—are an especially dangerous byproduct of high-distillate aromatics, (61) including naphthalene, in gasoline. Unlike larger particles, which can sometimes deposit in the mouth and throat after inhalation, UFPs are likely to travel deep into the alveolar region of the lungs, (62) which allows them to function as vehicles on which dangerous toxic compounds such as PAHs (63) (also present in large quantities in gasoline exhaust as a result of aromatics combustion) can enter bodily tissues and wreak havoc on a cellular level. (64) Once in the alveolar tissue, UFP-borne

PAHs (and the particulate matter itself) can be absorbed into the bloodstream and enter other bodily organs, such as the liver. (65) UFPs in gasoline exhaust exhibit a relatively high number of these so-called "redox-active" compounds. Paired with greater bioavailability and lung retention than other forms of particulate, this makes UFPs highly pathogenic. (66) Studies have linked UFPs to myriad adverse health effects, including asthma and other respiratory conditions; cardiovascular disease; preterm births; a wide range of cancers; DNA damage; even autism and brain disorders. (67) Furthermore, the small size of UFPs means that—beyond the added danger posed by particle type—each ton of UFPs is more dangerous than a ton of PM2.5 because UFP pollution contains many more particles per unit mass (this property is known as "particle number," or "PN"). (68) However, because EPA currently regulates only mass, but not particle number or type, of particulate pollution, (69) the Agency has yet to separately measure or regulate these highly pathogenic UFPs. Of particular concern, emission reduction technology in newer vehicles tends to produce more high-particle-number emissions, even as it reduces particulate emissions by mass. (70) Thus, the health impact of UFP pollution will only grow as the next generation of direct injection vehicles replaces older port injection vehicles. Perhaps counterintuitively, newer vehicles tend to emit more UFPs than legacy vehicles by as much as fourfold. (71)

PAHs are a chemical subset of polycyclic organic matter (POM) and are a particularly dangerous, yet largely unregulated, air toxic largely attributable to mobile sources generally, (72) and gasoline-fueled vehicles in particular. (73) As with UFPs, PAHs are produced by aromatics in gasoline, (74) particularly high-distillate aromatics. (75) PAHs can exist in both gaseous and particle form. They are oxidative derivatives of gasoline aromatics and result from incomplete combustion of fused aromatic rings. Many aromatics are themselves PAHs. Naphthalene, for instance, is a dangerous aromatic in motor vehicle fuel—and it is the simplest of the PAHs. However, the most harmful PAHs are the high-molecular-weight PAHs that coat UFPs. (76) Urban UFPs disproportionately carry PAHs. (77) As EPA noted in its 2007 MSAT rule, "[r]ecent studies have found that maternal exposures to PAHs in a population of pregnant women were associated with several adverse birth outcomes, including low birth weight and reduced length at birth, as well as impaired cognitive development at age three." (78) Laboratory experiments show that fetal nervous systems may be particularly sensitive to PAHs, (79) which can cross the placenta and blood-brain barrier from mother to child. (80) PAHs have been linked to a range of adverse health outcomes in infants and children, including developmental delay, reduced IQ, anxiety/depression, and possible endocrine disruption. (81) Motor vehicle emissions are a major source of PAHs found to contaminate groundwater and aquatic organisms. (82) As with other hazardous air toxics from gasoline, the worst effects of PAHs are found in urban areas. (83) Although PAHs and their associated health risks are better understood today than in the recent past, EPA restates verbatim its six-year-old statement of uncertainty about their prevalence. (84)

The temperature at which a given percentage of fuel, by volume, will evaporate is an important characteristic from a pollution perspective. Gasoline contains a wide range of components, including aromatics of various molecular weights and chemical properties, which boil at different temperatures. High-distillate aromatics evaporate only at very high temperatures and often do not vaporize during gasoline combustion. (85) "T50," "T90," and "endpoint" numbers for a given fuel refer to the temperatures at which 50%, 90%, and 100% of the fuel will evaporate, respectively. Since compounds that do not evaporate during engine combustion are often emitted from the tailpipe in the form of dangerous pollution, the more high boilers present in a fuel blend (and thus the higher the T50, T90, and endpoint numbers of the fuel), the more pollution the fuel will cause. If T50, T90, and endpoint numbers are reduced, on the other hand, pollution will decrease.

High-distillate aromatics raise the T50, T90, and endpoint numbers of a fuel blend because they evaporate only at very high temperatures. As discussed above, these “heavy” aromatics, including naphthalene, are the primary source for dangerous UFPs and the PAHs that bind to them. (86) It is no surprise, then, that fuel blends with higher levels of high-distillate aromatics produce more of nearly every type of pollution. In a 2010 SAE paper, Honda reports that predictive modeling indicated that aromatics with a high boiling point and a high double bond equivalent (DBE) value tended to produce more PM emissions. . . . [A]ll of the additional PM is considered a PAH . . . with a high boiling point or soot. The higher the boiling point hydrocarbon added, the more the PM increases. This trend is particularly notable with aromatic substances. (87)

EPA’s EPAct model corroborates this observation. To produce the fuels used in the EPAct study, modelers created new types of gasoline “blendstock” to mix with ethanol, so that the final blends would maintain the same T50 and T90 numbers as the non-ethanol fuels used in the study. Because ethanol has a relatively low boiling point, mixing ethanol with standard gasoline (i.e., “splash blending”) results in final blends with significantly lower T50 and T90 numbers. Therefore, in order to maintain the original T50 and T90 numbers, modelers had to increase the high boiler components of the gasoline blendstock when adding ethanol—resulting in blends with a much larger proportion of high-distillate aromatics than would be permitted in market gasoline. (For a discussion of the significance of this methodology, see the comments at Part IV.A.).

Adding high-distillate aromatics caused nearly every type of tailpipe pollution to increase. For example, the EPAct study found hot-running NOx emissions to be “dominated by the effect of . . . ethanol, followed closely by aromatics.” (88) This result can only be explained by the addition of high-distillate aromatics to compensate for ethanol’s favorable effect on the T50 and T90 numbers of blended fuel. (89) Not surprisingly, these harmful aromatics increased NOx emissions. That effect cannot be attributed to ethanol. When ethanol is simply splash-blended into ordinary gasoline, it has the opposite effect—it lowers NOx emissions. (90)

In addition to producing traditional air pollutants, aromatics in motor vehicle fuel contribute to global climate change.

Black carbon (BC), commonly referred to as “soot,” is the “carbonaceous component of PM that absorbs all wavelengths of solar radiation.” (91) The term “BC” is often used interchangeably with elemental carbon (EC), but the two terms refer to different measurement techniques that capture roughly the same substance. (92) BC emissions result from incomplete engine combustion, which is worsened by the presence of high-distillate aromatics in motor vehicle fuel. (93) BC is considered either PM2.5 or UFP, depending on its size. Apart from being a form of direct PM with various health and environmental effects described above, BC has an established impact on climate change. (94)

After CO2, BC is considered the second largest contributor to global warming, and it causes net radiative forcing through a number of processes. (95) For instance, its "high capacity for light absorption and its role in key atmospheric processes link it to a range of climate impacts, including increased temperatures, accelerated ice and snow melt, and disruptions in precipitation patterns." (96) When deposited on snow and ice, BC darkens the surface, thereby decreasing reflectivity and increasing absorption; this raises surface temperatures and accelerates melting. (97) BC deposits have been linked to accelerated snow and ice melting in certain areas, (98) including Himalayan glaciers (99) and in the Western United States, where BC deposition on mountain glaciers causes early spring melting and impacts freshwater resources. (100) EPA, in the Regulatory Impact Assessment accompanying last year's proposed PM implementation rule, cites research showing that "[p]er unit of mass in the atmosphere, BC can absorb a million times more energy than CO2." (101) Because BC is such a powerful agent of climate change, and yet is relatively short-lived, controlling its emission from fossil fuel has been identified as one of the most effective and immediate ways of slowing global climate change. (102)

Mobile sources are "the dominant contributor to total BC emissions in the United States." (103) Indeed, EPA estimates that mobile sources are responsible for a majority—52.3%— of BC emissions in the USA. (104) Although heavy-duty diesel vehicles have been thought to be the main contributor of BC emissions, recent studies show that light-duty gasoline emissions form a very significant part of the overall BC burden and that past research seriously underestimated this contribution. (105) In fact, recent tests performed by the California Air Resources Board (CARB) estimate that—in stark contrast to prior understanding—EC accounts for approximately 70% of PM mass emissions from gasoline-powered light duty vehicles. (106) What is worse, newer, gasoline direct injection (GDI) engines emit significantly more black carbon than legacy port fuel injection (PFI) engines, (107) so the contribution of gasoline vehicles to ambient soot is likely to significantly worsen in future years as auto manufacturers gravitate to GDI technology in order to meet more stringent fuel economy and CO2 emissions standards in years 2017 and beyond.

In sum, soot formed by aromatics in motor vehicle fuel has a significant impact on climate change, putting it at direct odds with EPA's goal in the recent 2017 and Later Model Year Light Duty Vehicle Greenhouse Gas Emissions and Corporate Average Fuel Economy Standards (108) and with the Administration's strong commitment to slowing and preventing global climate change. As noted above, black carbon, like all gasoline PM, is attributable solely to the aromatic content of the fuel. (109)

Beyond black carbon, current motor vehicle fuel negatively impacts climate change in several additional ways. SOA, produced in significant quantities by gasoline aromatics, has a direct climate forcing effect. (110) In addition, current motor vehicle fuel blends, and aromatics in particular, produce significant greenhouse gas pollution that would be mitigated in mid-level ethanol blends. (111)

Splash blending ethanol with gasoline blendstock, at a level between 20% and 45% on a volumetric basis, would produce a high-octane, clean fuel with significantly less aromatic content, thereby reducing numerous forms of tailpipe pollution, including BTEX, (112) UFPs, (113) PAHs, (114) SOA, (115) and black carbon, (116) in accordance with EPA's statutory

MSAT obligation. (117) In addition, because of ethanol's oxygenate quality, a mid-level ethanol blend would reduce pollution, particularly carbon monoxide (CO), beyond what could be achieved by simple reduction of toxic aromatics. (118) Other significant co-benefits would include increased U.S. energy security, decreased retail fuel prices, and—as discussed below—reduced CO2 emissions on a life-cycle basis.

Ethanol is a motor vehicle fuel derived from renewable biomass, which removes carbon dioxide from the air as it grows. As a result, tailpipe CO2 emissions from ethanol are offset by upstream reductions. The majority of ethanol in the U.S. market is so-called "conventional biofuel," derived from corn starch. (119) However, the Renewable Fuel Standard (RFS) requires significant increases in the use of advanced and cellulosic biofuels in coming years. (120) "Advanced biofuel," often made from sugar cane, must be at least 50% less carbon-intensive than gasoline, while ethanol qualifying as "cellulosic" must be at least 60% less carbon-intensive.

According to EPA's indirect land use analyses, corn-based ethanol is responsible for 21% less greenhouse gas pollution than gasoline on a life-cycle basis. (121) However, recent studies show that EPA models may significantly underestimate the carbon sequestration effects of corn, and one study estimates that corn ethanol is actually 48% to 59% less carbon-intensive than gasoline. (122) Similarly, a 2007 study by Argonne National Laboratory found life-cycle greenhouse gas reductions of 19% to 52% from the use of corn ethanol over gasoline, depending on the source of energy used during ethanol production. (123) This result is almost certainly conservative, as a nine-year USDA study of no-till corn (124) subsequently found that over half the increase in soil organic carbon (SOC) (used in the Argonne study to measure the carbon-sequestration effect of corn) occurs more than 30 cm below the surface, and that the model used in the Argonne study—which relied on samples near the soil surface—significantly underestimated corn's carbon-sequestration benefits. (125)

Corn is part of a small subset of plants known as C4 plants, meaning that the first product of carbon fixation in corn is a molecule with four carbon atoms, in contrast to most other plants, which produce a molecule having three carbon atoms (C3). The C4 pathway was discovered in the 1960s, (126) and it represents a major evolutionary efficiency gain over the more common C3 photosynthesis pathway. (127) Because C4 plants such as corn more efficiently absorb CO2 in photosynthesis, they sequester more greenhouse gases proportionally than the more common C3 plants: In fact, although only 3% of plants use C4 photosynthesis, these plants are responsible for roughly 20% to 30% of total soil-based carbon fixation. (128) Corn's carbon sequestration characteristics give ethanol a significant environmental advantage over fossil fuels, whose extraction and refinement result in significant carbon dioxide emissions, in addition to that produced when gasoline is burned as fuel.

Ethanol's carbon sequestration advantage over gasoline will only grow as higher levels of next-generation and cellulosic biofuels enter the market, in response to RFS requirements, while the increasing share of tar sands, oil shale, and fracking technologies will result in substantially larger carbon footprints for the same amount of gasoline.

Finally, EPA should use its authority under sections 202 (l) and 211 to require a phase-down in the aromatic content of all gasoline blends, thereby ensuring that a cleaner, mid-level ethanol blend becomes widely available in the marketplace. As described above, (164) EPA is not currently meeting its statutory obligation to reduce air toxics in motor vehicle exhaust to the greatest extent achievable. However, no practical barrier remains, and a high-octane mid-level ethanol blend offers a ready alternative. Meanwhile, the extensive body of credible science detailing the serious environmental and health effects of aromatics in motor vehicle fuel makes the problem one of deadly import. EPA should require all new gasoline vehicles to certify on this new, cleaner fuel blend and then use its statutory authority to reduce the allowable aromatics content in gasoline blends—thus cutting both air toxics-related pollution and greenhouse gas pollution.

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2 - Proposed Tier 3 Rule, 78 Fed. Reg. at 29909.

3 - Katherine von Stackelberg, et al., Public Health Impacts of Secondary Particulate Formation from Aromatic Hydrocarbons in Gasoline, Environmental Health 2013 12:19, Feb. 20, 2013, http://www.ehjournal.net/content/pdf/1476-069X-12-19.pdf.

4 - Proposed Tier 3 Rule, 78 Fed. Reg. at 29827.

5 - See infra Part III.B.3 & note 71.

6 - National Emission Standards for Hazardous Air Pollutants from Coal- and Oil-Fired Electric Utility Steam Generating Units and Standards of Performance for Fossil-Fuel-Fired Electric Utility, Industrial-Commercial-Institutional, and Small Industrial-Commercial-Institutional Steam Generating Units, 77 Fed. Reg. 9306 (Feb. 16, 2012), http://www.gpo.gov/fdsys/pkg/FR-2012-02-16/pdf/2012-806.pdf.

15 - 42 U.S.C. § 7521(l)(2).

16 - Proposed Tier 3 Rule, 78 Fed. Reg. at 29995.

25 - Clean Air Act § 202(l), 42 U.S.C. § 7521(l).

26 - Id.

27 - Elsewhere, the Clean Air Act provides that regulation of emissions of "toxic air pollutants" includes regulation of the "aromatic hydrocarbon content" of that fuel. 42 U.S.C. § 7545(k)(1)(A), (3)(A)(ii) (pertaining to reformulated gasoline); see also 42 U.S.C. § 7547(k)(10)(c) (defining "toxic air pollutants" to include benzene, 1,3 butadiene, and polycyclic organic matter (POM) [a term which includes PAHs such as naphthalene]). Another section of the Act explicitly includes the aromatics benzene "including benzene from gasoline," toluene, and xylenes-in a list of "hazardous air pollutants" subject to regulation. Clean Air Act § 112, 49 U.S.C. § 7412 (pertaining to emissions from stationary sources).

28 - See von Stackelberg, et al., supra note 3, at 1 (estimating a "baseline" of up to 4,700 deaths per year due to secondary organic aerosol (SOA) from gasoline, or over 6,300 deaths per year assuming 100% of aromatic-produced SOA in urban areas is from motor vehicles. These estimates did not take into account deaths from direct PM, the enhanced pathogenic qualities of UFPs, or PAH-related deaths); see infra Part III.B.6.a, III.B.3, III.B.4.

29 - See infra notes 71, 107.

30 - Control of Hazardous Air Pollutants from Mobile Sources, 72 Fed. Reg. 8428, 8477 (Feb. 26, 2007) [hereinafter "2007 MSAT Rule"].

31 - Control of Emissions of Hazardous Air Pollutants from Mobile Sources, 66 Fed. Reg. 17230, 17234 (Mar. 29, 2001) [hereinafter "2001 MSAT Rule"].

32 - Id. at 17235.

33 - Id.

34 - See Appendix II.

35 - 2007 MSAT Rule, 72 Fed. Reg. at 8478-79; see Appendix II for a complete discussion of the changes in factual predicate since 2007.

36 - Proposed Tier 3 Rule, 78 Fed. Reg. at 29819.

37 - See California Office of Health Hazard Assessment, Summary of Scientific Meeting Held June, 2000 on Approaches to Assessing Health Impacts of Gasoline-Related Exposures in California, 5 [hereinafter "2000 Assessment of Gasoline-Related Health Impacts"], available at http://www.oehha.ca.gov/public_info/pdf/GasOEHHA.pdf.
38 - 42 U.S.C. § 7521(l)(2).
39 - 2007 MSAT Rule, 72 Fed. Reg. at 8479.
40 - Clean Air Fine Particle Implementation Rule, 72 Fed. Reg. 20,586, 20,593 (Apr. 25, 2007) [hereinafter "PM Implementation Rule"].
41 - See, e.g., Eric M. Fujita, et al., Concentrations of Air Toxics in Motor Vehicle-Dominated Environments, Health Effects Institute Research. Rep. No. 156, at 2 (2011); see also 2000 Assessment of Gasoline-Related Health Impacts, supra note 37, at 5 ("[I]t appears that light-duty gasoline vehicle particulate matter emissions are significantly underestimated in current inventories. Light-duty gasoline vehicles are the major source of 1,3-butadiene and BTEX.").
42 - K.P. Wyche, et al., Gas Phase Precursors to Anthropogenic Secondary Organic Aerosol: Detailed Observations of 1,3,5-Trimethylbenzene Photooxidation, 9 Atmos. Chem. Phys. 635 (2009) ("[Aromatic VOCs] make up as much as 40% of the total mass of anthropogenic hydrocarbon emissions in the city environment."), available at http://www.atmos-chem-phys.net/9/635/2009/acp-9-635-2009.pdf; see also Frederica P. Perera, Prenatal Polycyclic Aromatic Hydrocarbon (PAH) Exposure and Child Behavior at Age 6-7 Years, 120 Environ. Health Perspectives 921, 921 (2012) ("Urban, minority populations in the United States often have disproportionate exposure to air pollution and are at greater risk for adverse health and developmental outcomes.").
43 - Proposed Tier 3 Rule, 78 Fed. Reg. at 29849.
44 - See John S. Zogorski, et al., The Quality of Our Nation's Waters: Volatile Organic Compounds in the Nation's Ground Water and Drinking-Water Supply Wells, U.S. Department of the Interior, U.S. Geological Survey, Circular 1292, at 8, 9 (2006), available at http://pubs.usgs.gov/circ/circ1292/pdf/circular1292.pdf.
45 - 2007 MSAT Rule, 72 Fed. Reg. at 8435 (citing EPA, Integrated Risk Information System File:Benzene (2000), http://www.epa.gov/iris/subst/0276.htm); see generally EPA National Center for Environmental Assessment, Rep. No. EPA/635/R-02/001F, Toxicological Review of Benzene (Noncancer Effects) (2002), available at http://www.epa.gov/iris/toxreviews/0276tr.pdf.
46 - E.Z. Nordin, et al., Secondary Organic Aerosol Formation from Gasoline Passenger Vehicle Emissions Investigated in a Smog Chamber, 12 Atmos. Chem. & Phys. Discussions 31,725, 31,749 (2012) ("As shown in this study gasoline exhaust readily forms secondary organic aerosol with a signature aerosol mass spectrum with similarities to the oxidized organic aerosol that commonly dominates the OA mass spectra in and downwind urban areas. This substantiates recent claims that gasoline SOA is a dominating source to SOA in and downwind large metropolitan areas."), available at http://www.atmos-chem-phys-discuss.net/12/31725/2012/acpd-12-31725-2012-print.pdf; L. Hildebrandt, et al., High Formation of Secondary Organic Aerosol from the Photo-oxidation of Toluene, 9 Atmos. Chem. Phys. 2973, 2973 (2009), available at http://www.atmos-chem-phys.net/9/2973/2009/acp-9-2973-2009.pdf ("Toluene and other aromatics have long been viewed as the dominant anthropogenic secondary organic aerosol precursors."); id. at 2984 ("The SOA yields from the photo-oxidation of toluene are higher than previously reported values."); J.A. de Gouw, et al., Sources of Particulate Matter in the Northeastern United States in Summer: 1. Direct Emissions and Secondary Formation of Organic Matter in Urban Plumes, 113 J. Geophys. Research D08301, at 8 (2008) ("Particulate yields [of OM] . . . are . . . highest for aromatic compounds." (citation omitted)); see also id. at 1 ("Approximately 37% of the secondary formation [of aerosol organic matter] can be accounted for by the removal of aromatic precursors.").
47 - One recent study found that EPA's CMAQ v5.0 model underestimates gasoline's PM2.5 contribution by a factor of 3.8. Stackelberg, et al., supra note 3, at 5; see also Kenneth S. Docherty, et al., Apportionment of Primary and Secondary Organic Aerosols in Southern California During the 2005 Study of Organic Aerosols in Riverside (SOAR-1), 42 Environ. Sci. Tech. 7655, 7660 (2008) ("With

regard to SOA yields, it has been shown that model predictions based on simulation chamber yields dramatically underestimate SOA formation in the polluted atmosphere.” (citing R. Volkamer, et al., Secondary Organic Aerosol Formation from Anthropogenic Air Pollution: Rapid and Higher than Expected, 33 Geophys. Research Letters 17 (2006))); Draft Regulatory Impact Analysis: Tier 3 Motor Vehicle Emission and Fuel Standards, at 7-66 (March 2013) [hereinafter “Tier 3 DRIA”] (“Studies have indicated that ambient OC levels may be underestimated by current model parameterizations. While the treatment of new precursors has likely reduced the model/measurement bias, underestimates can persist.”); Q. Zhang, et al, Ubiquity and Dominance of Oxygenated Species in Organic Aerosols in Anthropogenically-Influenced Northern Hemisphere Midlatitudes, 34 Geophys. Research Letters L13801, at 1 (2007) (“[S]econdary organic aerosols (SOA), formed by chemical transformation and condensation of volatile and semivolatile species, are underestimated by an order of magnitude or more by current models when applied in and downwind of urban areas/polluted regions.”).

48 - See generally Nordin, et al., supra note 46, at 31726 (“[T]here is a lack of laboratory studies to systematically investigate SOA formation in real-world exhaust.”).

49 - See sources cited supra note 46; see also Nordin, et al., supra note 46, at 31726 (“Gasoline vehicles have elevated emissions of volatile organic compounds during cold starts and idling and have recently been pointed out as potentially the main source of anthropogenic secondary organic aerosol (SOA) in megacities.”); PM Implementation Rule, 72 Fed. Reg. at 20593 (“Aromatic compounds such as toluene, xylene, and trimethyl benzene are considered to be the most significant anthropogenic SOA precursors and have been estimated to be responsible for 50 to 70 percent of total SOA in some airsheds.”); Wyche, et al., supra note 42, at 635; see also Elizabeth A. Stone, et al., A Comparison of Summertime Secondary Organic Aerosol Source Contributions at Contrasting Urban Locations, 43 Environ. Sci. Technol. 3448, 3454 (2009) (finding spatial differences in the primary and secondary sources of OC between cities and noting that they “demonstrate the need to treat geographically distinct source regions individually in the study of source contributions to SOA”).

50 - See infra Parts III.B.6.a, III.B.4.

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

52 - See Tier 3 DRIA, supra note 47, at 7-64.

53 - See, e.g., R. Bahreini, et al., Gasoline Emissions Dominate Over Diesel in Formation of Secondary Organic Aerosol Mass, 39 Geophys. Research Letters L06805, at 1 (2012) (“[S]ubstantial reductions of SOA mass on local to global scales will be achieved by reducing gasoline vehicle emissions.”); Michael J. Kleeman, et al., Source Apportionment of Secondary Organic Aerosol During a Severe Photochemical Smog Episode, 41 Atmos. Environ. 576 (2007) (finding that gasoline engines represented the greatest anthropogenic contributor of SOA in Los Angeles during a smog event); 2000 Assessment of Gasoline-Related Health Impacts, supra note 37, at 18 (“For some of the high molecular weight PAH, gasoline appears to be the dominant source. Naphthalene levels are higher in gasoline than in diesel.”); id. at 26 (“Data from the Northern Front Range Study showed that even moderately clean vehicles emitted a lot more or comparable or higher emission rates of both gas phase and particle phase PAHs-than diesel vehicles.”); Shang Liu, et al., Secondary Organic Aerosol Formation from Fossil Fuel Sources Contribute Majority of Summertime Organic Mass at Bakersfield, 117 J. Geophys. Research D00V26, at 1 (2012) (“In urban areas, the major source [of the organic fraction of atmospheric particles] is fossil fuel combustion from gasoline- and diesel-powered vehicles and other industrial activities (e.g., oil burning).”), available at http://onlinelibrary.wiley.com/doi/10.1029/2012JD018170/pdf.

57 - In order to obtain SIP credit for mobile source reductions, States would have to undertake costly studies to, in effect, prove to EPA that credit is warranted, and even then credit would not be ensured. See PM Implementation Rule, 72 Fed. Reg. at 20594.

58 - EPA, Environmental Benefits Mapping and Analysis Program (BenMAP): RSM-based Benefit Per Ton Estimates, (estimating the national average benefit in per ton reduction of PM at $630,000 for mobile

sources and only $520,000 for point sources such as EGUs), http://www.epa.gov/airquality/benmap/bpt.html; see also Neal Fann, et al., The Influence of Location, Source, and Emission Type in Estimates of the Human Health Benefits of Reducing a Ton of Air Pollution, 2 Air Qual. Atmos. Health 169, 170, 173-74 (2009) (finding that "the size of the population exposed to PM2.5 and the susceptibility of that population to adverse health outcomes" is an important factor in calculating the benefit of pollution reduction, and that "area source and mobile source [as opposed to 'point source'/EGU] carbonaceous particle emissions, in particular, show the highest [benefit per ton]—suggesting that the emissions and population centers exposed are colocated").

59 - See, e.g., National Emission Standards for Hazardous Air Pollutants from Coal- and Oil-Fired Electric Utility Steam Generating Units and Standards of Performance for Fossil-Fuel-Fired Electric Utility, Industrial-Commercial-Institutional, and Small Industrial-Commercial-Institutional Steam Generating Units, 77 Fed. Reg. 9304, 9305-06 & table 2 n.b (Feb. 16, 2012) [hereinafter "Utility MACT"], (estimating annual social costs of $9.6 billion to implement, with over 90% of monetized benefits coming from reduction in premature fatalities due to PM), http://www.gpo.gov/fdsys/pkg/FR-2012-02-16/pdf/2012-806.pdf.

60 - A recent study at Louisiana State University found that "each additional billion gallons of ethanol reduces gasoline prices as much as $0.06 per gallon. Considering U.S. ethanol production in 2010, which was more than 13 billion gallons, ethanol production could result in having lower gasoline prices of up to $0.78 per gallon." Hassan Marzoughi, The Impact of Ethanol Production on the U.S. Gasoline Market 16 (presented Feb. 4-7, 2012), http://www.ethanol.org/pdf/contentmgmt/The_Impact_of_Ethanol_Production_on_the_US_Gasoline_Market.pdf. Likewise, a study at Iowa State University suggests "that increases in ethanol production over the last decade have reduced overall blended fuel prices." Notice of Decision Regarding Requests for a Waiver of the Renewable Fuel Standard, 77 Fed. Reg. 70752, 70766 (Nov. 27, 2012) [hereinafter RFS Waiver Denial] (citing Xiaodong Du & Dermot J. Hayes, The Impact of Ethanol Production on U.S. and Regional Gasoline Markets: An Update to 2012 (May 2012), available at http://www.card.iastate.edu/publications/synopsis.aspx?id=1166)).

61 - See infra Part III.B.5.

62 - See, e.g., Morton Lippmann & Roy E. Albert, The Effect of Particle Size on the Regional Deposition of Inhaled Aerosols in the Human Respiratory Tract, 30 Am. Indus. Hyg. Ass'n J. 257 (1969), available at http://legacy.library.ucsf.edu/documentStore/b/p/e/bpe89c00/Sbpe89c00.pdf.

63 - See infra Part III.B.4.

64 - Gwami Shrestha, et al., Black Carbon's Properties and Role in the Environment: A Comprehensive Review, 2 Sustainability 294, 307 (2010), available at http://www.mdpi.com/2071-1050/2/1/294/pdf ; 2000 Assessment of Gasoline-Related Health Impacts, supra note 37, at 4 (Because of their small size, UFPs "can serve as an important vehicle for carrying other toxicants into the lung.").

65 - Shrestha, et al., supra note 64, at 307-08; 2000 Assessment of Gasoline-Related Health Impacts, supra note 37, at 4.

66 - Jesus A. Araujo & Andre E. Nel, Particulate Matter and Atherosclerosis: Role of Particle Size, Composition and Oxidative Stress, 6 Particle & Fibre Toxicology (2009), available at http://www.particleandfibretoxicology.com/content/6/1/24/ref (also noting that "[i]t will be important to determine whether all these factors confer greater toxicity to UFP in human subjects since they may imply the need for adjusting the metrics of exposure to take account of particle number, surface area, and oxidant potential").

67 - Lee Hotz, The Hidden Toll of Traffic Jams, The Wall Street. Journal, Nov. 8, 2011, at D1, available at http://online.wsj.com/article/SB10001424052970203733504577024000381790904.html.

68 - See Araujo & Nel, supra note 66 ("[P]articles 85-90% of the total PM2.5 particle number. Therefore, it is conceivable that larger particle numbers in UFP atmospheres, despite a smaller mass, could result in larger biological effects. In our study, development of larger atherosclerotic lesions in the UFP exposures correlated with increased particle numbers rather than with PM mass." (footnote call omitted)); Zhi Ning & Constantinos Sioutas, Atmospheric Processes Influencing Aerosols Generated by Combustion and the

Inference of Their Impact on Public Exposure: A Review, 10 Aerosol & Air Quality 43, 54-55 (2010) ("The emission of these smaller particles in the atmosphere may pose a greater threat to public health, since they deposit deeper in the human respiratory systems and their chemical composition appears to be intrinsically more toxic than the non-labile PM. . . . Given the increased toxicity of these semi-volatile species [e.g., PAHs], efforts should be made to reduce their emissions from newer vehicles, including reductions in their gas-phase precursors formed during the combustion process."), available at http://aaqr.org/VOL10_No1_February2010/6_AAQR-09-05-IR-0036_43-58.pdf.
69 - See 40 C.F.R. § 86.096-8(a)(1) (setting emissions standards in grams per mile).
70 - See Ning & Sioutas, supra note 68, at 54 ("Advanced vehicle emission control technologies are effective in reducing solid, non-labile PM emissions by means of filtration. However, recent investigations have shown substantial increases (by one order of magnitude and often more) of particle number emissions from retrofitted-vehicles due to the formation of nucleation mode particles from organic vapors in the exhaust."); Walter Piock, et al., Strategies Toward Meeting Future Particulate Matter Emission Requirements in Homogeneous Gasoline Direct Injection Engines, SAE International (2011), available at http://delphi.com/pdf/techpapers/2011-01-1212.pdf.
71 - See Health Effects Institute Special Committee on Emerging Technologies, The Future of Vehicle Fuels and Technologies: Anticipating Health Benefits and Challenges 3 (2011) ("Because of the less complete mixing of fuel vapor and air [in a direct-injection engine] . . . , the particulate emissions of the engine increase, including the number of ultrafine particles."); Felix Leach, et al., The Effect of Fuel Volatility and Aromatic Content on Particulate Emissions from GDI Engines (presented at 16th Combustion Generated Nanoparticles, Zurich, 2012), available at http://www.lav.ethz.ch/nanoparticle_conf/Former/Posters_I-L.pdf; Constantinos Sioutas, et al., Final Technical Report: Physical and Chemical Characteristics of PM in the LAB (Source Receptor Study): Topic C: Studies of the Effects of Varying Spatial and Temporal Patterns of Ambient Particulate Matter (PM) and Co-pollutants and Resulting Health Effects with Emphasis on the Role of Atmospheric Chemistry (Mar. 30, 2005) ("Compared to previous studies at the Caldecott tunnel, less particle mass but more particle numbers (by factors of 2-4 fold) are emitted by vehicles than was the case 7 years ago. As the emissions of carbonaceous PM of newer engines decreases, the formation of nucleation mode particles is favored due to the reduction of the available surface for adsorption of the semi-volatile material. The resulting supersaturation of the mostly organic vapor increases the production of nano-particles by nucleation."), available at http://www.epa.gov/ncer/reports/r827352C014fr.pdf; see also infra note 107 & accompanying text (discussing increased black carbon emission from direct injection engines).
72 - See Control of Hazardous Air Pollutants from Mobile Sources, Regulatory Impact Analysis, at 3-112 (2007) [hereinafter "2007 MSAT RIA"] ("Major sources of PAHs include mobile sources."); Ning & Sioutas, supra note 68, at 50 ("PAH concentrations were consistently higher when the nearby freeway was busy with traffic during morning rush hours.").
73 - 2000 Assessment of Gasoline-Related Health Impacts, supra note 37, at 5 ("Light-duty gasoline vehicles emit particulate matter containing higher fractions of particulate PAHs [than heavy-duty diesel vehicles]. Light-duty gasoline vehicles are significant sources of gas phase PAHs. Cold starts, high accelerations, and high emitters account for most of the [LDV] particulate matter emissions. . . . [I]t appears that [LDV] particulate matter emissions are significantly underestimated in current inventories. Light-duty gasoline vehicles are the major source of 1,3-butadiene and BTEX.").
74 - See generally id.; Memorandum from Robert Harley, Department of Civil and Environmental Engineering, U.C. Berkeley, to Steve Brisby, Stationary Source Division, California Air Resources Board (Apr. 26, 2007) ("[L]owering heavy aromatics in gasoline could help to reduce polycyclic aromatic hydrocarbons (PAH), another class of toxic compounds that are not included currently in the predictive model's definition of toxic pollutant emissions.").
75 - See infra Part III.B.5.
76 - See Yuling Jia, et al., Estimated Reduction in Cancer Risk due to PAH Exposures If Source Control Measures during the 2008 Beijing Olympics Were Sustained, 119 Environ. Health Perspect. 815, 820

(2011) (noting the importance of including high-molecular-weight PAHs in pollution studies despite their low environmental concentrations because of the disproportionately high cancer risk associated with them), available at http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3114816/; see also supra Part III.B.3 (discussing UFPs).
77 - Araujo & Nel, supra note 66 ("Urban UFP contain a higher content per unit mass of polycyclic aromatic hydrocarbons (PAH).").
78 - 72 Fed. Reg. at 8439.
79 - Perera, supra note 42, at 921 (citing L.A. Brown, et al., Down-Regulation of Early Ionotrophic Glutamate Receptor Subunit Developmental Expression as a Mechanism for Observed Plasticity Deficits Following Gestational Exposure to Benzo(a)pyrene, 28 Neurotoxicology 965 (2007); M.M. McCallister, et al., Prenatal Exposure to Benzo(a)pyrene Impairs Later-Life Cortical Neuronal Function, 29 Neurotoxicology 946 (2008); D.D. Wormley, Environmental Contaminant-Mixture Effects on CNS Development, Plasticity, and Behavior, 197 Toxicol. Appl. Pharmacol. 49 (2004)).
80 - Perera, supra note 42, at 921 (citing Brown, supra note 79).
81 - Id.
82 - See EPA, Technical Factsheet on Polycyclic Aromatic Hydrocarbons (PAHs) ("If released to soil [benzo(a)pyrene] will be expected to adsorb very strongly and will not be expected to leach to the groundwater. However, its presence in some groundwater samples indicates that it can be transported there by some mechanism."), available at http://www.epa.gov/ogwdw/pdfs/factsheets/soc/tech/pahs.pdf; 2007 MSAT Rule, 72 Fed. Reg. at 8444 ("[R]ecent studies have reported gasoline and diesel vehicles as major contributors in the atmospheric deposition of PAHs to [various watersheds].").
83 - Kanae Bekki, et al., Evaluation of Toxic Activities of Polycyclic Aromatic Hydrocarbon Derivatives Using In Vitro Bioassay, 55 J. Health Sci. 601, 606-07 (2009) ("PAH ketones and quinines originating from gasoline and diesel engine exhausts are present at comparatively high concentrations . . . in urban air."), available at http://dspace.lib.kanazawa-u.ac.jp/dspace/bitstream/2297/19415/1/PH-PR-BEKKI-K-601.pdf.
84 - Tier 3 DRIA, supra note 47, at 6-25 ("Trends in PAH deposition levels are difficult to discern because of highly variable ambient air concentrations, lack of consistency in monitoring methods, and the significant influence of local sources on deposition levels."); 2007 MSAT RIA, supra note 72, at 3-112 (same). Despite EPA's recognition of the dangers of PAHs, the Agency excludes PAHs from the performance evaluation of its CMAQ model. See Tier 3 DRIA, supra note 47, at 7-58.
85 - See Tier 3 DRIA, supra note 47, at 3-11 ("[G]asoline containing a large fraction of heavier aromatics compounds with high [double bond equivalent] values result in greater vehicle PM emissions.").
86 - See supra Parts III.B.3 and III.B.4; see also generally 2000 Assessment of Gasoline-Related Health Impacts, supra note 37, at 5 ("Light-duty gasoline and heavy-duty diesel vehicles emit significant numbers of ultrafine particles.").
87 - Koichiro Aikawa, et al., Development of a Predictive Model for Gasoline Vehicle Particulate Matter Emissions, 3 SAE Int'l J. Fuels & Lubricants, 610, 610-11 (Oct. 25, 2010).
88 - EPAct/V2/E-89: Assessing the Effect of Five Gasoline Properties on Exhaust Emissions from Light-Duty Vehicles Certified to Tier 2 Standards: Final Report 221, Rep. No. EPA-420-R-13-002 (2013) [hereinafter "EPAct Results Report"], available at http://www.epa.gov/otaq/models/moves/documents/420r13002.pdf; but see id. at 221 (finding that aromatics—not ethanol—"is the single most important effect [on cold-start NOx emissions] by a wide margin"); id. (finding RVP to be the most important term for hot-start NOx emissions, but suggesting measurement error); EPAct/V2/E-89: Assessing the Effect of Five Gasoline Properties on Exhaust Emissions from Light-Duty Vehicles Certified to Tier 2 Standards: Final Report on Program Design and Data Collection 76, Rep. No. EPA-420¬R-13-004 (2013) [hereinafter "EPAct Design Report"], available at http://www.epa.gov/otaq/models/moves/documents/420r13004.pdf (noting as one "source of measurement error and variability" that "dilute gaseous emission measurements such as NOx may have sample concentrations similar in magnitude to background for some portions of the test").

89 - EPA has acknowledged that the increased NOx emissions it has predicted for some ethanol blends "depend[] on how other fuel properties change." Partial Grant of Clean Air Act Waiver Application Submitted by Growth Energy To Increase the Allowable Ethanol Content of Gasoline to 15 Percent, 76 Fed. Reg. 4662, 4672 (Jan. 26, 2011) [hereinafter "2011 E15 Waiver"].
90 - See M. Matti Maricq, et al., The Impact of Ethanol Fuel Blends on PM Emissions from a Light-Duty GDI Vehicle, 46 Aerosol Sci. & Tech. 580 (2011) (finding decreases in NOx emissions of "about 20%"when the ethanol content of fuel is increased from 0% to 17% or higher).
91 - California Ai

Commenter: Governors' Biofuels Coalition

EPA must ensure that its fuel models are updated to reflect new science and the realistic emissions from the combustion of commercial gasoline (as opposed to unrealistic certification fuels).

One of the top priorities should be for EPA to make sure that its Community Multiscale Air Quality (CMAQ) model recognizes the dominant role gasoline aromatics play in urban PM2.5 secondary organic aerosol (SOA) emissions. A recent Harvard study has confirmed that EPA's models under-predict SOA emissions by at least a factor of two to four times, and that they are responsible for tens of billions of dollars worth of avoidable public health impacts.[3]

EPA's final rule should recognize the air and water pollution health risks from highly toxic polycyclic aromatic hydrocarbons (PAHs), which EPA acknowledges in its regulatory impact analysis, but for some reason does not currently regulate for mobile sources. We are surprised and disappointed that EPA has failed to consider recent studies by automakers which show that E30+ blends are able to reduce these particle-borne PAH emissions by 45 to 60 percent or more, and we urge the EPA to include these findings in the final rule.[4]

EPA should take this opportunity to correct the deficiencies in last year's GHG-CAFE rule, and recognize ethanol's carbon reduction benefits. Proper recognition of ethanol's lower carbon footprint compared to gasoline — and especially gasoline aromatic compounds —would lead EPA to incentivize automakers' post-2016 model years to manufacture E30 capable and optimized vehicles able to take full advantage of the high octane, high performance, ultra-low emissions of E30 blends.

A final rule that fails to improve U.S. transportation fuel standards by reducing aromatic compounds is the wrong policy for America. On behalf of the Coalition, I respectfully urge you to modify the proposed rule so as to provide market-based incentives and encourage the cost-effective substitution of domestic clean octane alternatives for toxic aromatic compounds derived largely from imported crude oil.

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[3] Katherine von Stackelberg, et al., 12 *Public Health Impacts ofSecondary Particulate Formation from Aromatic Hydrocarbons in Gasoline*, Environmental Health (2013), available at http://www.ehjournal.net/content/12/1/19
[4] See Koichiro Aikawa, et al., *Development of a Predictive Model for Gasoline Vehicle Particulate Matter Emissions,*SAE International (Oct. 25, 2010); M.A. Costagliola, et al., *Combustion Efficiency and Engine Out Emissions of a S.I. Engine Fueled with Alcohol/Gasoline Blends*, Applied Energy (2012); M.

Matti Maricq, et al., *The Impact ofEthanol Fuel Blends on PM Emissions from a Light-Duty GDI Vehicle*, 46 Aerosol Sci. & Tech. 576 (2012).

Commenter: Growth Energy

While Aromatic Gasoline Components Substantially Increase PM Emissions, Ethanol Improves Air Quality: As we noted in previous comments to the Agency, numerous studies have looked at the impact of fuel quality on emissions from vehicles. These studies have found that the heavier gasoline components-aromatics - substantially increase particulate matter (PM) emissions (Iizuka, M., Kirii, A., Takeda, H., Watanabe, H. (2007). Effect of Fuel Properties on Particulate Matter Emissions from a Direct Injection Gasoline Vehicle. *JSAE Technical Paper* 20074414, 2007, http://www.pecj.or.jp/japanese/overseas/asian/asia_symp_5th/pdf_5th/15-MasashiIizuka.pdf; Jetter, J. (2010). Effect of Fuel Composition on PM Emissions, LEV III Workshop, May 18, 2010, El Monte, California; Aikawa, K., Sakurai, T., Jetter, J.J. (2010). Development of a Predictive Model for Gasoline Vehicle Particulate Matter Emissions. *SAE Technical Paper* 2010-01-2115. DOI: 10.4271/2010-01-2115; Khalek I.A., Bougher T., Jetter, J. (2010). Particle Emissions from a 2009 Gasoline Direct Injection Engine Using Different Commercially Available Fuels. *SAE Technical Paper* 2010-01-2117. DOI: 10.4271/2010-01-2117.)

Alternatively, there is substantial evidence that increased ethanol will actually reduce particulate matter mass and number emissions (PM and PN) from the vehicle fleet. Szybist et al.,(J. Szybist, A. Youngquist, T. Barone, J. Storey, W. Moore, M. Foster, and K. Confer, Ethanol Blends and Engine Operating Strategy Effects on Light-Duty Spark Ignition Engine Particle Emissions, *Energy and Fuels*, vol. 25, pp. 4977-4985, 2011) also summarize recent literature on how ethanol affects production engines:

A number of investigations have examined the effect of ethanol content on particle emissions in vehicles. Storey et al. found that blends of 10 and 20% ethanol in gasoline (E10 and E20) decreased particle number emissions during vehicle drive cycles, with the 20% blend decreasing particles by about 40% during the high-load US06 vehicle drive cycle. In comparison to gasoline, He et al. found a 20% reduction in particle emissions with E20 but no change with E10. Khalek and Bougher showed that E10 increased particle emissions compared to two different gasoline formulations, both with higher volatility than the E10. This works showed the importance of the hydrocarbon fraction of the E10 blend and suggests that the heavier hydrocarbons used to control vapor pressure of E10 may also increase particulate emissions. Aakko and Nylund found that the particle mass emissions from 85% ethanol (E85) were comparable to those with gasoline in a PFI vehicle but that DI (direct injection) fueling with gasoline produced particle emissions that were an order of magnitude higher.

The Szybist et al. study investigated the effects of fuel type, fueling strategy, and engine breathing strategy on particle emissions in a flexible spark ignited engine that was designed for optimization with ethanol. They report:

When DI fueling is used for gasoline and E20, the particle number emissions are increased by 1 to 2 orders of magnitude compared to PFI fueling, depending upon the fuel injection timing. In contrast, when DI fueling is used with E85, the particle number emissions remain low and comparable to PFI fueling. Thus, by using E85, the efficiency and power advantages of DI fueling can be gained without generating the increase in particle emissions observed with gasoline and E20. The main finding of the study is that use of E85 results in 1 to 2 orders of magnitude reduction in particle emissions relative to sDI (spray-guided DI) fueling with gasoline and E20. Furthermore, sDI particle emissions with E85 are similar to that for PFI fueling with gasoline. Thus, an increase in particle emissions beyond that of PFI engines can be prevented while gaining the efficiency of DI engines using E85.

Storey et al., 2010 (J. Storey, T. Barone, K. Norman, and S. Lewis, Ethanol Blend Effects On Direct Injection Spark-Ignition Gasoline Vehicle Particulate Matter Emissions, SAE publication 2010-01-2129) characterized the emissions, including PM and aldehydes, from a U.S. legal stoichiometric direct injected spark-ignited (DISI) vehicle operating on E0, E10, and E20. The PM emissions were characterized for mass, size, number concentration and OC-EC (organic carbon-elemental carbon) content. The DISI particle number-size distribution curves were similar in shape to light-duty diesel vehicles without Diesel Particle Filters, but had lower overall particle number and mass emissions. The aggressive US06 transient cycle had much higher PM mass emissions in comparison to the PM mass emission observed for the FTP. With respect to added ethanol, Storey et al. concluded:

Ethanol blends reduced the PM mass and number concentration emissions for both transient and steady-state cycles. By increasing the ethanol blend level from E0 to E20, the average mass emissions declined 30% and 42% over the FTP and US06, respectively. Measurements during hot cycle transient operation demonstrated that E20 also lowered particle number concentrations. The adoption of small displacement, turbocharged DISI engines into the U.S. fleet is likely to continue in the future, and the results of this study suggest that increasing ethanol blend levels in gasoline will lower DISI PM emissions. In addition, increasing ethanol content significantly reduced the number concentration of 50 and 100 nm particles during gradual and wide open throttle (WOT) accelerations.

Maricq et al., 2012 (M. Maricq, J. Szente, and K. Jahr: The Impact of Ethanol Fuel Blends on PM Emissions from a Light Duty GDI Vehicle, Aerosol Science and Technology, 465, 576-583) tested a light-duty truck equipped with a 3.5-L V6 gasoline turbocharged direct injection engine that is representative of current GDI products, but contained prototype elements that allowed changes in engine calibrations. Because PM formation in GDI engines is sensitive to a number of operating parameters, two engine calibrations were examined to gauge the robustness of the results. The study used four fuels: certification test gasoline (E0), a commercial E10 fuel similar to that expected for future certification, a commercial pump grade E10, and a commercial E100 fuel used for blending. E100 and E0 were splash-blended to produce E17, E32, and E45 fuels. Maricq et al. report:

As the ethanol level in gasoline increases from 0% to 20%, there is possibly a small (<20%) benefit in PM mass and particle number emissions, but this is within test variability. When the ethanol content increases to >30%, there is a statistically significant 20%-45% reduction in PM mass and number emissions observed for both engine calibrations.

The results reported by Zhang (Zhang et al, "A Comparison of Total Mass, Particle size Distribution and Particle Number Emissions of Light Duty Vehicles tested at Haagen-Smit Laboratory from 2009 to 2010," In Proceedings of 21st CRC Real World Emissions Workshop, San Diego, CA, USA, 20-23 March 2011) are also particularly informative. In this testing, a 2008 FFV was tested on a hot Unified Cycle on E6, E35, E65, and E85. Ethanol appears to have caused a large reduction in PM emissions (and particularly PN) from E6 to E35, with further PM reductions as ethanol concentration increased. However, the most significant PM and PN reductions are between E6 and E35.

EPA's analysis of EPACT data shows the possibility of slightly higher PM emissions with increasing ethanol concentration. However, the EPACT test fleet was all Tier 2 vehicles, with few if any vehicles with direct injection. Direct injection vehicles can experience higher baseline PM emissions than ported fuel injected vehicles, which is the predominate fuel system technology utilized for Tier 2 vehicles. It is likely that increasing ethanol content would reduce PM on DI vehicles, as shown in the previously referenced studies in these comments. Also, the fuels used in the EPACT testing program were match-blended. The higher ethanol blend used in the EPACT study - an E20 fuel - is not likely to be representative of a higher ethanol blend that would have higher octane. Therefore, the EPACT testing results are not applicable with respect to PM emissions for the 2017 and later Tier 3 fleet.

Thus, there are now a substantial number of studies showing that ethanol blends of 20 percent and higher reduce PM mass and number emissions in a variety of engines and vehicles. EPA should review these studies in detail and give serious consideration to further regulate the harmful components of gasoline as well as to encourage the use of additional ethanol as a means to improve the nation's air quality.

Commenter: INEOS Bio

Aromatics and Toxics: INEOS Bio urges the EPA to reconsider the potential health effect benefits associated with these higher ethanol blends. Ethanol is a high octane, low cost and non-toxic alternative fuel that can be used to displace the aromatics in gasoline. These are highly toxic chemicals that are the subject of multiple regulatory constraints under the CAA. EPA's own discussion of air toxics makes clear that auto exhaust remains the primary source of air toxic exposure for individuals, especially those living near roadways. In fact it is estimated that 1 in 3 people still live in areas that exceed at least one of the health-based National Ambient Air Quality Standards (NAAQS), and residing where ozone (also known as smog) levels exceed the federal standard.

EPA is required to set pollution standards for new light-duty vehicles under section 202 of the Clean Air Act. They are also required to set standards at a level that protects public health and welfare. The original CAA covered mobile source pollution standards for smog-forming, toxics, and other emissions for decades. Following the Supreme Court's decision in Massachusetts v. EPA that ruled that greenhouse gas emissions are pollutants under the CAA and that those gases do endanger public health, the agency was required to set global warming pollution standards for vehicles under the CAA. Another provision of the 1990 CAA - the mobile source air toxics (MSAT) provision, requires EPA to reduce toxics as far as technology will permit. EPA has not enforced this section except to reduce benzene by only small amounts in 2007, notwithstanding that the US is abundant in non-toxic alternatives such as ethanol. It seems that it would be appropriate to consider enforcing this section as increased volumes of ethanol become available.

Biofuels and Their Supportive Policies Are Important to the U.S. Fuel Supply: The federal RFS, enacted in 2005 and updated in 2007, is an important tool in achieving the objectives of energy independence and pollution reduction. The RFS is the single most important federal policy driving investment and commercialization of conventional and advanced biofuels. Biofuel production under the RFS has already displaced nearly 10 percent of gasoline consumption and will account for more than 20 percent of U.S. transportation fuel by 2022. Biofuel production under the RFS reduced the need for imported oil by more than 462 million barrels in 2012.

Investment in biofuels, largely spurred by the RFS, has led to the development of facilities like our 1st commercial biorefinery in Vero Beach, Florida, and KiOR's in Columbus, Mississippi, which represent several hundred million dollars of investment in the United States and are poised to begin production of the next generation of renewable fuel from non-food feedstocks this year. Dozens more advanced biofuel projects are planned or under construction, illustrating the visible success the RFS has had in driving development of highly skilled, well-paying jobs in rural America.

The "Blend Wall": INEOS Bio firmly believes that the limits to market access for biofuels commonly referred to collectively as the "blend wall" represent a series of barriers contrived by obligated parties (4) to prevent biofuels from gaining access to the marketplace. (5) Multiple avenues exist for blending additional volumes of biofuel into the nation's fuel supply. For instance, as the proposed rule recognizes, E15 blends are approved and ready for use, and production of flex fuel vehicles continues to increase. These options provide a suite of opportunities for the growth of the entire biofuels industry and RFS compliance.

The Agency should encourage the development of biofuels, including E15 and higher octane blends of ethanol, and the engines and infrastructure to support them. In addition, EPA should allow the 1# RVP waiver to apply to E15 to be consistent with its current proposal for ethanol and butanol blends and that it currently allows for E10. This development can readily grow the supply of biofuels in the market and overcome the blend wall by allowing Renewable Identification Numbers (RINs) to truly reflect their market value. It will also help drive the market and encourage retailers to adopt new infrastructure. INEOS Bio is supportive of the proposed rule and believes the final Tier 3 rule has the potential to continue the progress of the biofuels industry and help alleviate the "blend wall" as described above.

EPA should also seek to identify opportunities to grow biofuel markets, including adoption of a higher-octane blend as the gasoline base fuel. Reconsideration of the gasoline base fuel would enable engine manufacturers to optimize beneficial characteristics of higher ethanol blends in engine design.

Commenter: National Corn Growers Association (NCGA)

We also commend the agency on its recognition of the benefits of ethanol in transportation fuel, and its continued support for the Renewable Fuel Standard regulation, which is significantly reducing GHG emissions and improving energy security in the United States through the use of domestically produced ethanol.

Our Response:

The emission analyses in this rule take into account impacts of the ethanol mandate in the Energy Independence and Security Act (EISA), on both emissions from vehicles and upstream sources. Impacts of ethanol on criteria pollutant and toxic emissions, as well as air quality, were previously addressed in EPA's Renewable Fuel Standard (RFS2) rule. The Tier 3 standards will result in significant reductions in air toxics, including aromatic compounds, as indicated in Chapter 7 of the RIA.

Several commenters urge EPA to use its authority under Section 202(l)(2) of the Clean Air Act to reduce aromatics in gasoline. Those comments are beyond the scope of the current rule. Further, comments related to comparison of air quality impacts of different ethanol blends is beyond the scope of the Tier 3 rule.

A commenter states that EPA mischaracterized ethanol as an air toxic. In EPA's 2007 mobile source air toxics rule (72 FR 8428, February 26, 2007) the term "mobile source air toxics" was used to define compounds that are emitted by mobile sources and have the potential to cause serious adverse health effects. The RIA makes no statements about whether ethanol is an air toxic of concern at environmental exposure levels.

A number of comments state that aromatics in gasoline create higher emissions of numerous pollutants, including PAHs and other toxics, BC, and precursors of SOA and UFPs. The Agency continues to research how various fuel properties and combustion processes affect emissions of PAHs, other toxics, BC, UFPs, and SOA precursors. A number of commenters urged EPA to improve the modeling of SOA in CMAQ. Commenters also stated that current emission measurements and models do not account for the full contribution to SOA from gasoline exhaust. EPA continues to improve the modeling capabilities of CMAQ. Many factors affect formation of secondary organic aerosols, including emissions of PAHs and other aromatic compounds from diesel and gasoline motor engines, as well as other SOA precursors, such as isoprene and α-pinene. NOx also plays an important role in SOA formation. EPA is conducting ongoing research to better understand relationships between fuel properties and emissions of aromatics and other SOA precursors, as well as their reactions in the atmosphere under different conditions.

Some commenters also urged EPA to encourage the use of ethanol, including by revisiting the greenhouse gas emissions standards and fuel efficiency standards, by extending the 1-psi RVP waiver for E10 to E15 and butanol blends, or specifying different certification fuels. Discussion of similar comments can be found in Chapter 4.5.1.5 of this Summary and Analysis of Comments document, and are otherwise outside the scope of this rulemaking.

12.5. Nonroad Diesel Engines

What Commenters Said:

Commenter: Dresser Trap Rock, Inc.

The most fuel efficient engines we have operated since 1979 were the pre-Tier 1 engines. As we had to transition to Tier 1 engines, none of our operators wanted to ruin the new loaders as they were too slow, particularly at loading railcars and off road haul trucks.

With the advent of Tier 2 engines, it was exactly the same story all over again; the operators could not load off road haul trucks and particularly railcars with rock as quickly as they did with the Tier 1 engines.

Again, with the advent of Tier 3 engines, we found through observation of Tier 1 powered end loaders and Tier 3 powered loaders that a Tier 1 loader could make 4 passes to the Tier 3 powered loader's 3.

Now, you may say that there is more fuel economy and less emissions with Tier 3 engines relative to the Tier 1 engines, but if the operator has to run the loader at full throttle 25% longer to accomplish the identical task as a Tier 1, there cannot possibly be a reduction fuel consumption or emissions.

Our Response:

This Tier 3 motor vehicle emissions rulemaking does not pertain to the nonroad engines of concern to the commenter (nonroad diesel engines are, coincidentally, also regulated by EPA in tiers—Tiers 1,2, 3, and 4).

12.6. Anti-backsliding Study

What Commenters Said:

Commenter: American Petroleum Institute (API) and the Association of Fuel & Petrochemical Manufacturers (AFPM); Marathon Petroleum Company LP (MPC)

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.

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.

Our Response:

The anti-backsliding study is required by Clean Air Act sections 211(q) and (v) and is outside the scope of this rulemaking. EPA's analysis and modeling to support the Clean Air Act section 211(q) and 211(v) "anti-backsliding" study is still underway. As required by Clean Air Act section 211(q), EPA will release a draft report for public comment before publishing it in final form. Thus, there will be an opportunity to review and comment on EPA's analysis and conclusions.

12.7. Alternative Fuels

What Commenters Said:

Commenter: Advanced Biofuels USA (ABFUSA)

Allow Optional Renewable Higher Octane Additives: While biomass, cellulose/hemicellulose/pectin, ("cellulosic ethanol" in RFS2) derived ethanol is the current primary octane enhancing component foreseen for Higher Octane, Higher Ethanol Fuel, final Tier 3 regulations should provide flexibility for other biofuel derived additives provided the following four criteria are met:
1. Life Cycle GHGs of the alternative additives are within 110% of industry wide life-cycle GHG emissions of the biomass ethanol used at the time of the introduction of the alternative additives.
2. The composition of the biofuel derived fuel components do not exceed EPA or CARB, whichever is lower, aromatic or other fuel composition standards in effect at the time of their introduction.
3. The use of such fuel components would not materially effect the cost of vehicle certification testing procedures.
4. The use of such fuel components would not materially effect any fuel system or engine components of the vehicles it was used in.

Commenter: Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global); General Motors LLC (GM)

While OEMs discussed the interconnection of fuels and vehicle issues with EPA during the negotiations leading to the 2017 CAFE/GHG requirements, EPA declined to include fuel issues in that rulemaking. However, at that time EPA gave the industry assurance that these issues would be addressed promptly within the Tier 3 rulemaking in order to facilitate the needed product changes to support the CAFE/GHG standards, as well as Tier 3 requirements. The OEMs are spending billions of dollars (34) on compliance with the CAFE/GHG rules and require the cleanest fuels possible to meet these obligations. We urge EPA to support the progress toward cleaner vehicles by ensuring that the proper fuels are widely available.

To date, EPA has only agreed to propose changes to the existing sulfur market fuel standards. The Alliance and Global note that there are a number of other time-sensitive market gasoline changes that warrant federal standards and that should be addressed by EPA in a supplemental rulemaking. We reiterate that the regulations for engines and fuels must be integrated to ensure environmental progress, and to ensure that new engine designs, vehicle exhaust and evaporative after-treatment systems do not become stranded investments or opportunities, from a lack of commitment to improve fuel quality to achieve cleaner, more efficient vehicle operation.

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34 - As noted in Alliance testimony for this rulemaking, according to EPA, automakers will spend about \$15 billion in just ten years to meet the requirements of this proposed rule, and effectively remove tailpipe emissions from the environmental equation. As EPA further states, combined with the fuel economy and greenhouse gas program, this rule would bring auto investment in the vehicle emission reduction programs through 2025 to more than \$216 billion –about 100 times the investment that the oil industry is being asked to make under the NPRM.

Our Response:

These comments are outside the scope of the Tier 3 rulemaking. There are already in place a set of regulations associated with the introduction into commerce of new fuels and fuel additives in keeping with our CAA responsibilities. Any other fuel standards would have to go through a 211(c) rulemaking process similar to Tier 3.

12.8. Detergency Requirements

What Commenters Said:

Commenter: Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

Detergency Requirements Need Improvement: Our members support EPA's proposed requirements that clarify the treatment of gasoline additives (82). However, additional regulatory improvements are needed with regard to detergency additives for motor vehicle fuel.

Lowest Additive Concentration (LAC) Detergency: Due to the ability of detergents to inhibit the formation of engine deposits (83) and decrease emissions, the addition of detergents is required in the U.S. under the CAA (84). The implementing regulations (40 C.F.R. Part 80, Subpart G) allow refiners and marketers to meet the requirements by adding the lowest additive concentration (LAC) that minimizes deposits, based on tests conducted by the additive supplier using an EPA-defined fuel that reflects a (one-time) determination of the 65th percentile highest value for four fuel properties (sulfur, aromatics, olefins, and T90).85 This additive concentration can then be used by any fuel supplier. The shortcoming of this practice is that there are fuels in the marketplace that produce more deposits than the 65th percentile fuel, and therefore will not be adequately treated to control deposits.

Automaker experience has shown that the required evaluations for fuels meeting LAC are insufficient to assure consistency and efficacy across the fuels marketplace for today's nearly 250 million vehicles. The LAC principle has resulted in gasoline refiners and marketers reducing the concentrations of detergent additives in their fuels by as much as half of levels observed in the 1990s. This degradation of detergency is shown in Figure 3 [Figure 3 can be found on p. 91 of Docket number EPA-HQ-OAR-2011-0135-4461-A1]. The trending downward of unwashed gum levels (a marker for the amount of detergent additive present) suggests lower detergent additive doses and downgraded quality (albeit that in some newer products, lower concentrations can produce the same effect). At the same time, vehicle emissions and durability requirements have become increasingly more stringent.

Recommendation: Auto manufacturers remain concerned about induction system deposits in U.S. marketed vehicles. These concerns have been raised on multiple occasions with EPA. In the past, the EPA was provided with data which demonstrated on-going problems with U.S. gasoline detergency compliance showing that the program was not effective at retail. We urge EPA to refocus on this issue, which has emissions impacts and should be a Tier 3-related market fuel issue. Because of these adverse trends, as apparent in Figure 3, EPA must assure that all fuels include sufficient detergent concentration. We would be happy to work with the Agency and the other stakeholders on a regulatory solution.

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82 - 78 Fed. Reg. 29908 at 29929 (May 21, 2013).
83 - Deposits are formed within the engine and/or fuel system during normal vehicle operation over a period of time. Certain gasoline components such as di-olefins are relatively unstable and they thermally break down during engine operation, leading to formation of deposits on fuel injectors, inlet valves, and within the combustion chamber. Combustion chamber deposits (CCD) can result in a higher effective compression ratio, which then increases the need for a higher octane rated fuel. Additionally, CCDs can absorb and release hydrocarbons, leading to an increase in hydrocarbon emissions. See also current edition Worldwide Fuel Charter recommendations, available from the Alliance of Automobile Manufacturers.
84 - The text from the CAA requirement in Sec. 211(1) reads as follows: "Effective beginning January 1, 1995, no person may sell or dispense to an ultimate consumer in the United States, and no refiner or marketer may directly or indirectly sell or dispense to persons who sell or dispense to ultimate consumers in the United States any gasoline which does not contain additives to prevent the accumulation of deposits in engines or fuel supply system. Not later than 2 years after the date of the enactment of the Clean Air Act Amendments of 1990, the Administrator shall promulgate a rule establishing specifications for such additives."
85 - The LAC requirement is defined in 40 C.F.R. Part 80, Subpart G, Sec. 80.141(c)(3) as follows: "Minimum recommended concentration: (i) The lower boundary of the recommended range of concentration for the detergent additive package in gasoline, which the additive manufacturer must report pursuant to the registration requirements in § 79.21(d) of this chapter, must equal or exceed the minimum concentration which the manufacturer has determined to be necessary for the control of deposits in the associated fuel type, pursuant to paragraph (e) of this section. The minimum recommended concentration shall be provided to EPA in units of gallons of detergent additive package per thousand gallons of

gasoline or PRC, reported to four digits. This concentration is the lowest additive concentration (LAC) referred to elsewhere in this subpart."

Commenter: Ford Motor Company (Ford)

Increased Detergency Requirements for Market Fuel: Gasoline additives used to protect vehicles from damage caused by deposits are known as detergents. Deposits are formed within the engine and/or fuel system during normal vehicle operation over a period of time. Certain gasoline components have higher boiling points, such as di-olefins, and during the combustion process, they thermally breakdown during engine operation, leading to formation of deposits on fuel injectors, inlet valves, and within the combustion chamber. Combustion chamber deposits (CCD) can result in a higher effective compression ratio, which then increases the need for a higher octane rated fuel. Additionally, CCDs allow for a medium to which liquid hydrocarbons can absorb and release, leading to an increase in hydrocarbon emissions. Another consequence of CCD is 'carbon knock' which can result from the mechanical interference between the piston top and the cylinder head. Fuel injector deposits are of particular concern because the fuel passages are so small that deposits can prevent normal flow of fuel, resulting in degraded driveability, decreased power and fuel economy and increased exhaust emissions. Intake valve deposits also result in reduced power, cold-start and warm-up driveability issues and increased exhaust emissions.

The lowest additive concentration (LAC) regulation allows for refiners to meet the requirements by adding the lowest additive concentration that prevents deposits based on a selected batch sample from the refinery. The shortcoming of this practice is that the batch sample selected may be a sample representative of the "best-case" fuel formulation that results in minimal deposit formation. This allows obligated parties to choose an under representative sample from the population of fuels that the obligated party produces for the marketplace. Common practice results in an incorrectly calculated LAC that is then employed across all fuels produced. Experience has shown that fuels meeting LAC are insufficient for meeting the needs across the marketplace, which includes nearly 250 million vehicles. Auto manufacturers remain concerned about induction system deposits in U.S. marketed vehicles. Despite continued messaging about the need for more stringent detergency requirements, the LAC program has received no modifications since its inception, over two decades ago. Since the Tier 3 program acknowledges that "vehicles and fuels [are] a system," the detergency requirements of fuels must be adjusted to ensure adequate deposit control protection for all finished gasoline sold in the U.S. market, so that meeting the increased durability requirements of Tier 3 can be assured.

Recommendation: Ford supports the Alliance's request to require all fuels meet deposit control tests such that enough detergents are added to meet the needs of the lowest quality product batch rather than just the cleanest stream. Ford supports the Alliance's request that the Lowest Additive Concentration (LAC) requirement for gasoline detergency be eliminated and an appropriate rule be introduced in its place.

Our Response:

EPA's consideration of whether changes to the gasoline deposit control program are needed is beyond the scope of the Tier 3 rule. There is no data available that indicates the current levels of deposit control protection are insufficient to support the maintenance of the Tier 3 vehicle emissions standards in-use. EPA continues to be open to working with industry to evaluate the potential emissions benefits of implementing updated deposit control requirements. Data on the potential emissions benefits is vital to this evaluation. As discussed in Chapter 6.1.4 of this Summary and Analysis of Comments document and Section VI.A.4 of the preamble to the Tier 3 final rule, we are finalizing provisions to accept "Top Tier" deposit control test data in the certification of deposit control additives.

12.9. Methylcyclopentadienyl Manganese Tricarbonyl (MMT)

What Commenters Said:

Commenter: Alliance of Automobile Manufacturers (Alliance) and Association of Global Automakers (Global)

EPA Should Undertake Regulatory Review of MMT/Metallic Additive: All vehicle manufacturers have long opposed the use of any metallic based additive in gasoline, including compounds of iron, silicon, phosphorus, and manganese such as MMT (methylcyclopentadienyl manganese tricarbonyl). Their use results in damage to engine parts and emissions control components.

Manganese-based additive can be used as an octane enhancer for gasoline; however, when combusted in an internal combustion engine, manganese is transformed into manganese oxide particles. As documented in numerous studies and scientific papers, the prolonged use of gasoline with manganese-based additives results in such particles contributing to the plugging and failure of catalytic converters, which have been used on vehicles for decades to control emissions of carbon monoxide, hydrocarbons, and oxides of nitrogen.

Over the years, catalytic converter technology has improved dramatically, with conversion efficiencies today of more than 95%, to keep pace with increasingly more stringent vehicle emission standards. The residual amount, technically speaking, corresponds to the vehicle's tailpipe emission level. As emission standards become more stringent, this residual amount becomes even smaller. For today's advanced equipment, such plugging and failure problems – which reduce conversion efficiencies – are especially problematic. Degradation and failure of catalytic converters cause vehicles to have higher emissions, degrading air quality and potentially causing vehicles to exceed emissions standards, and to fail state/local vehicle mission inspections. Damaged catalytic converters are very expensive to replace.

The manganese oxide particles also cause deposits to build up on internal engine parts, spark plugs, and oxygen sensors. This can also cause vehicle performance and emission problems, including loss of fuel economy and illumination of dashboard "check engine" lights, and premature and additional vehicle repairs for consumers.

Because of these risks, all major manufacturers selling vehicles in the U. S. recommend in their vehicle owner manuals that any fuel containing manganese-based additives NOT be used in today's vehicles.

Metallic additives, including those with manganese, are prohibited in Federal reformulated gasoline (RFG), which represents about one-third of the U.S., non-California gasoline pool and is prohibited under State law in all gasoline sold in California. EPA allows the use of MMT in non-RFG gasoline at a maximum of 1/32 gram Mn as MMT/gallon (80) following a long stakeholder controversy beginning that had resulted in an earlier EPA ban of MMT.

For a number of years there have been no MMT or other metallic additives detected in the annual (Summer/July and Winter/January) Alliance of Automobile Manufacturers North American Fuel Surveys for the U.S. In the past several years, however, in several States, including Nevada and neighboring states, and also in the Southeast, there has been renewed local interest in using MMT additive, raising concerns among various stakeholders. An issue so fundamental for all vehicles is not suited for State by State response – the same costly and inconsistent dynamic which led to CAA additive provisions and a federal EPA standard in the first instance.

It would be appropriate for EPA to again consider a comprehensive prohibition for metallic additives for any gasoline sold in the US, at the earliest possible time. EPA should formally consider studies and data that have become available on adverse effects of MMT on vehicle equipment since EPA's last action, for example, the findings in the 2008 Sierra Research Report "Impacts of MMT(R) Use in Unleaded Gasoline on Engines, Emissions Control Systems, and Emissions (copy attached as Appendix 6 to these comments) (81).

Many other organizations are also on record opposing the use of manganese-based gasoline additives for both technical and health reasons, including the Manufacturers of Emission Controls Association, The International Council for Clean Transportation, Truck and Engine Manufacturers Association, and the National Resources Defense Council. See also, the current 4th edition and pending 5th edition of the Worldwide Fuel Charter, available from the Alliance of Automobile Manufacturers website (www.autoalliance.org).

CAA §211(c) addresses EPA's ability to prohibit or limit the sale of fuel additives that are already approved if they will "impair to a significant degree the performance of any emission control device or system which is in general use." The Agency should undertake an updated evaluation of MMT use as a gasoline additive.

Recommendation: EPA should promptly initiate a formal review of MMT use with notice and comment to prevent putting all gasoline engines and emission reductions at risk from metallic additives.

80 - See http://www.epa.gov/otaq/regs/fuels/additive/mmt cmts.htm; and 65 Fed. Reg. 44775 (July 19, 2000).

81 - Sierra Research, Report No. SR2008-08-01, August 29, 2008, prepared for the Canadian Vehicle Manufacturers' Association and Association of International Automobile Manufacturers of Canada. Also available from the Alliance website under Fuels, www.autoalliance.org.

Commenter: American Honda Motor Co., Inc.

Honda wishes to voice strong support for the recommendation made in the joint Association of Global Automakers-Alliance of Automobile Manufacturers comments regarding the issue of MMT and other metallic fuel additives. Honda sees an urgent need for, and strongly recommends, that EPA once again consider a comprehensive prohibition of metallic additives for any gasoline sold in the United States.

Commenter: Ford Motor Company (Ford)

Elimination of the use of Metallic Additives in Market Fuel: The use of manganese (also known as methylcyclopentadienyl manganese tricarbonyl or MMT) began with the phase-out of leaded fuel as it is marketed as an octane booster. When used in gasoline as an octane booster, MMT does not burn completely, as does its ethanol counterpart. Instead, the manganese in MMT reacts during the combustion process to form solid manganese oxide particles that are reddish-brown in color. These particles form deposits in the engine as well as accumulate on the front inlet face of catalytic converters and throughout the exhaust system. Manganese oxide deposits also appear on engine components including deposits on spark plugs (leading to misfire, which leads to increased emissions, increased fuel consumption and poor performance) and on the oxygen sensor (causing malfunction and again increasing emissions and resulting in poor performance). Additionally, manganese oxide deposits on the catalytic converter cause plugging of the catalyst, increased back pressure, poor vehicle operation and increased fuel consumption, as well as increased tailpipe emissions due to diminished emission control function.

In order to meet the more stringent emissions standards of Tier 2, the vast majority of vehicle manufacturers implemented the use of high density close coupled catalysts (HDCC) which contain more catalyst cells per unit area than older technology catalysts. The increase in the number of cells per unit area results in an increase in the overall catalytic active surface area and also decreases the actual size of each individual channel of the substrate. This advanced technology allows for reduced time needed for the catalyst to reach operating temperatures, but due to the smaller channel sizes, it also results in increased susceptibility to front-face catalyst blockage from manganese oxide deposits. Many manufacturers cite that no other technologies exist that are as effective as HDCC catalysts. Further, the need to meet the more stringent emissions standards of the future will drive the catalysts closer to the engine, resulting in increased catalyst inlet and front-face temperatures. With the inevitable manganese oxide deposits that the combustion of MMT in gasoline creates, these HDCC catalysts can be rendered useless for emissions control and can create vehicle performance issues once contaminated.

The following images, extracted from the 2008 Sierra Research report (9), illustrate the typical severity of the plugging observed on a catalyst exposed to MMT. The first image (Figure 1) is a catalyst obtained from a vehicle operated with MMT-free fuel for approximately 100,000 miles while the second image (Figure 2) shows a catalyst from a vehicle after accumulating only 40,000 miles using gasoline containing MMT. The considerable amount (almost 95% of the catalyst is covered) of manganese oxide deposits in Figure 2 demonstrates the severity of manganese-based deposits coating catalysts (and therefore rendering them useless). Furthermore, the additional emissions durability requirements of 150,000 miles will demand that vehicles do not use fuel which may damage the catalyst. Thus, considering the known abilities of MMT containing gasoline to damage vehicle catalysts, MMT and similar metallic additives must be prohibited from market fuels.

Recommendation: Ford continues to remain opposed to the use of any metallic based gasoline additive (lead, iron, silicon, phosphorus, and manganese) and strongly supports the Alliance comments which ask for the EPA to perform a regulatory review of the use of metallic additives and manganese (also known as MMT). Ford strongly supports the Alliance comments submitted in regard to MMT and seconds their recommendation for the ban of manganese based gasoline additives.

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9 Sierra Research Inc. "Impacts of MMTR Use in Unleaded Gasoline on Engines, Emission Control Systems, and Emissions," August 29, 2008.

Our Response:

Comments on metallic fuel additives are outside the scope of this Tier 3 rulemaking.

12.10. Other

What Commenters Said:

Commenter: Peoples Republic of China

We noticed that in the measurement of limits of evaporative pollutants, Remote Sensing Device (RSD) testing technology is adopted, while in the measurement of PM emission level, a new FTP PM testing standard is adopted. In order to achieve the target specified by USA' Tier 3 emission standard, as specified in Article 11.3 of TBT Agreement, the Proposer shall grant other Members, especially the developing country Members, guidance on the testing technology and technical resistance, help them fully apprehend new testing technology and improve their production process scientifically to accommodate themselves to new technical requirement in time.

Environment protection is a common responsibility to be borne by all countries. Superior or inferior environment quality in any region is just partial and temporary. With a view to realize effective environmental protection, we believe that in accordance with Article 2.6 of TBT Agreement, WTO Members that are advanced in science and technology shall, giving priority to appropriate international standardizing bodies, play a full part in and promote preparation of international standards, lead actively the world to take concerted actions to realize comprehensive and scientific environmental protection.

Commenter: Algenol Biofuels Inc.

The national policy particularly favors biofuels such as Algenol's ethanol which has an especially low life-cycle output of greenhouse gas emissions. A life-cycle analysis conducted by the company along with the Georgia Institute of Technology's Strategic Energy Institute demonstrates at least a 60%, and in many scenarios 80%, reduction in greenhouse gas emissions when compared to regular gasoline. (See Luo, Hu, et al, "Life Cycle Energy and Greenhouse Gas Emissions for an Ethanol Production Process based on Blue-Green Algae," Environmental Science & Technology, 2010, 44 (22), pp. 8670-8677.)

Commenter: Private Citizen

Subsidize electric vehicles instead! When they become less costly and services more widely available, people will easily change to electric.

Commenter: Private Citizen

This may also decrease the emission of cadmium which is present in all combustion but not measured adequately since lead was removed from gasoline. All the problems associated with exposure to motor vehicle emissions can occur with cadmium exposure alone. Cadmium lowers 25 OH vit D3. Low levels are found in all serious diseases. This phenomenon has occurred since lead was removed from gasoline. Lead blocks cadmium uptake and lead chloride formed a complex with cadmium fumes making it less bioavailable. Blood, urine, and hair levels of cadmium do not necessarily reflect cadmium exposure and toxicity because if there is not sufficient metallothionein to bind it, cadmium quickly disappears from blood into the lining cells of blood vessels and into endocrine cells and the choroid plexus.

These new standards need to address cadmium as well by developing new technologies to look at cadmium fumes from motor vehicle emissions.

It is really necessary to re-examine the effects of lead in gasoline. Lead is the lesser toxin. By removing lead from gasoline RICE which contains arsenic is more toxic. Lead, cadmium and arsenic block each other's toxicity while cadmium and arsenic are synergistically toxic.

We know that these new standards are highly cost-effective – costing about a penny per gallon of gasoline. In return, Americans would save over $10 billion per year on health care costs by 2030. They would save even more if cadmium were addressed.

Commenter: Open Joint-Stock Company

Currently, we also found a way to solve the above-mentioned major environmental problems. To fulfill this goal, we have developed a comprehensive high-tech multi-functional devices of new generation for the petrochemical industry, for example, CS 'TORNADO'. Moreover, on the basis of CS 'TORNADO', developed, such as CS 'Mercury' and other complex systems and installations for the treatment and disposal of toxic and output of toxic gases, as well as a variety of solid particles produced by different factories and mills of various sources of pollution.

The main purpose of the above systems, a complete cleaning of exhaust gases and obtaining alternative fuel, for example, synthesis gas, and other gas mixtures for combustion of hydrocarbon fuel, and for cleaning of gases. The use of CS 'TORNADO' for crude oil and other chemicals, will raise the refining and petrochemical sector in Latvia to a new level of high-tech development and production standards.

We offer you a brief look at some key features and specifications of CS 'TORNADO', which will be applied in the 21st century, and possibly the 22nd century. Next, read the applications ... (See Appendix 4).

Commenter: Robert Bosch GmbH, Gasoline Systems, Germany

Also it needs to be assured the levels for silicone compounds from biomethane originating from waste or sewage sludge are fixed at 0,1 mg/m³ to ensure proper working of exhaust gas treatment systems.

Commenter: Private Citizen

I would like to add one thing. Please create a stop pollution hotline. Create a 1- 800-CLE-ANUP hotline so that drivers and pedestrians may report vehicles that seem to be polluting, whether it is from tail pipes or uncovered loads of materials being transported. Let such a violation result in the situation being improved and heavy fines being collected. Perhaps the fines could be used to reimburse hospitals that work on asthma patients. Although you will receive this message from other citizens who care about the atmosphere, I will leave it in the letter. The facts are important and clearly stated. Let's not emulate the pollution in China.

Commenter: Children's Environmental Health Network (CEHN)

EPA should issue a public annual compliance "report card" on each automaker. This level of transparency is in the spirit of right-to-know laws and facilitates informed consumer choices.

Commenter: Textile Industries, Inc.

I am admittedly not a scientist or an expert on sequestration of greenhouse gases, but due to my profession, I am required to keep myself apprised of all things having to do with our environment. As such, I can say with some confidence that there is enough scientific evidence now to show that air pollution, and especially greenhouse gases, are mainly responsible for global warming, also known as climate change, in the world we currently live in. And this is the only world we've got.

Some scientific evidence indicates that we have perhaps already passed a tipping point beyond which we cannot prevent the domino effect of increased greenhouse gases being released from beneath the ocean bottoms in the form of methane, which is worse even than the CO2 which has been primarily responsible for climate change until now.

Commenter: Thomas Jefferson University Hospital

I have spent over 150 hours a year for the last 20 years as a volunteer in trying to decrease the burden of asthma on children in this city and State. I've been an advocate on many levels. I was one of the founding members of the Pennsylvania Allies Against Asthma, now deceased because of funding, but a great organization in its time. And I'm now the Medical Director of the Pennsylvania Asthma Partnership.

Why am I spending all this time? That's about three weeks of my year that I spend doing this, and, trust me, no one pays me for it. Well, I do it because asthma is the most common cause of medical school absence nationally, and, in Philadelphia, which has an even larger burden, it reflects almost half the days lost in school to medical reasons. I do it because it's the most common reason that people from our emergency rooms are admitted to the hospital.

But as a group, we can cause an even more important effect, and that's the effect of diesel vehicle's emissions on asthma. If you live on a street that has lots of trucks and buses going down it, your chances of having either chronic or acute asthma is almost double that of someone who lives in the same city a few blocks away on a quiet street that doesn't have trucks on it.

So we know that truck emissions, even though the diesel vehicles are much cleaner than they ever were, we know we can do more. And we can, once we have a problem, solve it. When I started in pediatrics 34 years ago, the average lead in a child in Philadelphia was a 20 micrograms per deciliter. It is now a three. There's no safe level of lead in children, but three is a lot better than 20.

In this same way, if we can actually stop trucks and buses from idling, if we can install systems that turn them off when they come to a red light, if we can take the city light system, stop light system, and get them to be coordinated so there are less stops and less traffic jams, and on a few streets put some traffic officers to stop traffic jams from happening, we can reduce the number of children I see in the ER. We can reduce the number of children admitted, and we can have children go to school a lot more days than they're going to school right now. And from the world of pediatrics, we would thank – all of us would thank you if you could do anything to help us out on that.

Commenter: National Corn Growers Association (NCGA)

We also provide comments on EPA's stated plan to develop an assessment of the health effects of exposure to ethanol in Appendix A.

The proposed rule indicates that: EPA is planning to develop an assessment of the health effects of exposure to ethanol, a compound which is not currently listed on EPA's IRIS database. Extensive health effects data are available for ingestion of ethanol, while data on inhalation exposure effects are sparse. In developing the assessment, EPA is evaluating pharmacokinetic models as a means of extrapolating across species (animal to human) and across exposure routes (oral to inhalation) to better characterize the health hazards and dose-response relationships for low levels of ethanol exposure in the environment.

The potential for health effects due to ethanol exposures associated with its use in motor vehicle fuel were extensively evaluated a number of years ago by several organizations. The California EPA, (21) the Health Effects Institute (HEI), and several other groups evaluated ethanol as a replacement when problems associated with the gasoline additive, methyl tertiary-butyl ether (MTBE), became apparent. All these analyses have concluded that the exposures to ethanol from its use as a motor vehicle fuel are very unlikely to have any adverse consequences.

Although it is well established that relatively high doses of ingested ethanol and high blood levels of ethanol associated with the consumption of alcoholic beverages have toxic effects in humans, the amount of alcohol absorbed from the low doses of environmental ethanol is extremely small in comparison. In fact, the small doses that may be experienced are the same order of magnitude as naturally-occurring levels of ethanol in blood. In addition, ethanol is readily degraded in the environment, both in air and in water so it will not accumulate to levels of concern. These findings provide strong evidence that environmental exposures to ethanol will have no adverse health impact.

The California analysis included detailed modeling of the ambient ethanol exposures for several fuel variations and comparisons of the results to levels of concern developed by the Office of Environmental Health Hazard Assessment (OEHHA). The modeled incremental ambient ethanol concentrations were in the range of 5 to 100 ppb. The OEHHA health protective concentration (HPC) was 53 ppm. It was derived from a study that reported a lowest effect level of 5300 ppm for sensory irritation from inhaled ethanol in normal healthy subjects. OEHHA applied an uncertainty factor of 100 to derive the 53 ppm (53,000 ppb) health protective level.

When the modeled ambient levels were compared to the acute and chronic non-cancer HPCs, OEHHA concluded that modeled concentrations are at least 500-fold below the HPCs. This led OEHHA to conclude that health effects due to ethanol exposure are not expected to occur.

OEHHA also evaluated the potential for cancer and concluded that there is no evidence that ethanol is carcinogenic via the inhalation route even though heavy consumption of alcoholic beverages is known to be associated with increased incidences of some cancers, including those of the oral cavity and of the liver. OEHHA noted that ethanol was considered by the Proposition 65 Science Advisory Panel, who reviewed the evidence as to the carcinogenic and co-carcinogenic effects of ethanol in humans and animals. The Panel specified the listing of "alcoholic beverages, when associated with alcohol abuse" as carcinogenic in July 1988. The 1999 OEHHA report followed this assessment in concluding that, whereas high levels of chronic exposure to ethanol are carcinogenic to humans, the levels of ethanol predicted to occur in air or water as a result of its use in gasoline were unlikely to result in a cancer risk to the exposed population.

The Health Effects Institute carried out a thorough review of the information on exposures to and health effects from various oxygenates including ethanol. In agreement with CalEPA, the HEI Committee concluded that it was unlikely that the low exposures to ethanol would cause any health effects. For example, the Health Effects Institute review included estimates of incremental blood level increases for two refueling exposure: a typical refueling scenario, 1 ppm for 3 minutes, and an extreme exposure scenario, 10 ppm for 15 minutes. The HEI Panel concluded:

Even the extreme scenario is expected to result in an incremental blood level that is insignificant compared with the endogenous blood levels resulting from normal metabolism.

The HEI Committee concluded that in exposure scenarios encountered by the general public, it is unlikely that an increase in ethanol blood levels will be measurable and that health effects from exposure to ambient levels of ethanol are unlikely because endogenous blood ethanol levels are not predicted to increase significantly from inhaling ethanol in fuel.

In addition to the findings of the extensive reviews by HEI, CalEPA and others, the U. S. EPA has not considered ethanol as an air toxic of concern in its recent evaluations and rulemakings. For example, the Agency did not include ethanol in a group of 177 air toxics compounds that were evaluated in the most recent National-Scale Air Toxics Assessment. Ethanol was not explicitly considered in the February 26, 2007 Mobile Source Air Toxics Rulemaking. When EPA first announced its interest in removing MTBE, the Agency understood that.

Given that ethanol is formed naturally in the body at low levels, inhalation exposure to ethanol at the low levels that human are likely to be exposed are generally not expected to result in adverse health effects.

Although the EPA IRIS database does not currently include ethanol, there has been a 1,000 ppm occupational standard for ethanol for decades. The 1,000 ppm 8-hour time-weighted average standard was set to provide a no-effect level for irritation in the occupational setting. An additional relevant study is available. Nadeau, et al., 2003 specifically evaluated possible neuromotor effects of six-hour exposures to 0, 250, 500, and 1,000 ppm ethanol to healthy non-smoking adult males in a controlled environment exposure chamber. Nadeau et al. report no significant differences in body sway, hand tremor, or reaction time between exposed and non-exposed conditions. In addition, ethanol was not detected in blood or in alveolar air when volunteers were exposed to 250 and 500 ppm. At 1,000 ppm, the blood alcohol concentration was 0.4 mg/dl. For comparison, the legal limits for drivers are usually 80 to 100 mg/dl and the peak blood alcohol for an adult male consuming a typical alcoholic beverage containing 12 g of alcohol is on the order of 25 mg/dl. Given the extremely low doses of alcohol from inhalation of ambient ethanol, the health impacts of ethanol should not be a serious concern in the Tier 3 Rulemaking.

Our Response:

These comments are all outside of the scope of the Tier 3 rulemaking.