COMMENTS OF THE
NATIONAL PETROCHEMICAL & REFINERS ASSOCIATION (NPRA)
ON EPA'S DRAFT ANALYSIS OF CETANE AND NOx EMISSIONS
FROM HEAVY-DUTY HIGHWAY ENGINES

Summary

EPA released a draft technical report for public comment: The Effect of Cetane Number Increase Due to Additives on NOx Emissions from Heavy-Duty Highway Engines, EPA420-S-02-012, June 2002. This is an extension of a statistical analysis conducted last year by EPA's Office of Transportation and Air Quality.

Although it may be desirable for EPA to have some understanding of the effects that cetane has on heavy-duty diesel engine emissions, the Agency must ensure that such an analysis does not lead to unintended adverse consequences. NPRA does not believe that the supporting database is sufficiently robust to adequately predict the effects of cetane on emissions, particularly in modern and advanced technology engines using exhaust gas recirculation (EGR). Too many important considerations are ignored if the analysis is used by itself to calculate emissions reductions.

1. There is great potential for states and localities to misuse the study and devise unique fuel requirements (a.k.a. boutique fuels) that could balkanize the refining and distribution system and lead to unnecessary localized supply shortages and outages.
2. The analysis provides no information about the costs or practical limits of increasing cetane.
3. The study provides no information about the feasibility of producing and distributing a diesel fuel with higher cetane.
4. The analysis does not account for the change in diesel fuel properties that will occur when ultra low sulfur diesel (ULSD) is required for on-road vehicles in 2006.

NPRA strongly opposes any action by EPA that may encourage States to design their own individual, boutique diesel fuel regulations. NPRA recommends the following:

1. EPA should prepare a guidance document for the States that addresses federal preemption with respect to diesel fuels.
2. When considering a State waiver for nonidentical diesel fuel regulations, EPA should consider the effects that the proposed State regulation would have on diesel fuel supply, the diesel fuel distribution system and its transition to federal ULSD.

In addition, EPA should consider the availability and cost of alternate control measures**.** EPA should advise States that their regulations could result in local supply shortages and price volatility due to the tendency of boutique fuels to limit the number of suppliers in the market.

A. THE SUPPORTING DATABASE IS INADEQUATE FOR PREDICTING EMISSION EFFECTS.

The database is not sufficiently robust to serve as the basis for a correlation of cetane/emissions effects that can be used to predict future fleet emissions. Although EPA conducted a good faith data collection program, the creation of a database does not automatically confer sufficiency.

The database used for the report appears to contain 35 heavy-duty engines, only one of which was a post-1996 model. It is unlikely that one engine -- a prototype -- can adequately represent the fleet when EGR engines are expected to predominate after 2003. Available data suggest that the impact of cetane on engines built in the late 90s is smaller in magnitude relative to earlier engines. In some cases, higher cetane can even raise NOx emissions. EPA should be educating States on this potential negative consequence for advanced technology diesel engines.

Finally, there are no non-road engines in the database used for this study. Therefore, it is not appropriate to assume that the effects of cetane on emissions from these engines will be the same as for on-road engines.

B. EPA SHOULD PREPARE A GUIDANCE DOCUMENT FOR STATES THAT ADDRESSES FEDERAL PREEMPTION WITH RESPECT TO DIESEL FUELS.

Recently, EPA addressed preemption in the preamble for the federal highway ULSD regulations (66 FR 5084). In addition, the Agency elaborated in another report:

> As stated in the preamble, CAA section 211(c)(4)(A) prohibits states (and political subdivisions of states, which shall be included in the term "states" for this response) from establishing controls or prohibitions respecting motor vehicle fuel characteristics or components for the purpose of motor vehicle emissions control if EPA has established a control of the fuel characteristic or component. This preemption applies to all states except California, in accordance with section 211(c)(4)(B). . . . because of EPA's controls of highway diesel fuel in 80 [should be 40] CFR 80.29, states are preempted under section 211(c)(4)(A) from establishing highway diesel fuel controls respecting sulfur content, cetane index, aromatics content, and the use of certain visible dyes.[1]

In August 1997, the Agency released "Guidance on Use of Opt-in to RFG and Low RVP Requirements in Ozone SIPs." EPA should issue a similar document for the preparation and

[1] U.S. EPA, Heavy-duty Engine and Vehicle Standards and Highway Diesel Fuel Sulfur Control Requirements: Response to Comments, EPA420-R-00-027, December 2000, p. 4-64.

review of State boutique diesel fuel proposals. This would facilitate communication and clarify statutory requirements.

EPA can approve a SIP provision for a nonidentical State fuel standard and waive federal preemption only if it is necessary to achieve the primary or secondary NAAQS. In addition, the Agency must find that "no other measures that would bring about timely attainment exist" or that "other measures exist and are technically possible to implement, but are unreasonable or impracticable." The Agency will not approve requests for preemption waivers without States submitting a comprehensive and detailed study regarding numerous other (unadopted) emissions control programs. Guidance on the evaluation of alternative measures would be useful to identify State legal and analytical tasks as well as to provide uniformity for the EPA regional office review process. All parties need to understand what justifications are sufficient to address the "unreasonable or impracticable" statutory criteria.

The guidance document should also address the effects that changes in fuel properties will have on production costs and the feasibility of production and distribution. Furthermore, EPA should describe its expectations regarding the complexity of State testing, record keeping and enforcement activities.

1. Diesel Fuel Supply

Over the past decade, U.S. refineries have operated at sustained high utilization rates -- 92 to 94 percent of capacity with peak periods of over 95 percent. Refining capacity increased over the period, but at a rate somewhat less than the increase in petroleum product demand. The high capacity utilization rate has been characterized as close to maximum, as evidenced by tightening of product markets and resulting price spikes during periods of peak product demand, refining or distribution outages, product changes (i.e., new product introductions), etc. The California experience in 1999, that of the Northeast in early 2000 and that of the Midwest in the summer of 2000 provide illustrations of what can happen when there is a disruption (reduction) in fuel supplies.

Continual growth in demand for transportation fuels and the need to address several overlapping fuel regulations have left refineries with less operating flexibility and reduced capability, which results in a very high utilization of U.S. refining capacity. The net result is a refining system that is dangerously close to the breaking point such that interruptions in refinery operations result in an under supplied market. Maintaining adequate supplies will depend on maintaining near maximum utilization since capacity growth is likely to be limited to incremental, low cost expansions at existing refineries. Historically, the refining industry has kept pace with increasing demand and quality requirements given adequate time and realistic expectations. However, with utilization projected to remain high and as refined product requirements approach actual technological, economic, and practical limits, supply capability becomes less certain. Thus, it appears that the U.S. has entered a prolonged period of tight supplies and more frequent market disruptions.

Many new "boutique" State diesel fuel regulations would have a major adverse impact on future supplies and market stability. Even under a status quo regulatory environment, high refinery utilization rates must be sustained over the longer term to avoid short-term supply disruptions. Any requirement for a unique diesel fuel will affect refinery processing capability, petroleum product yields, utilization, participating refineries, etc., and eventually, the delicate diesel fuel supply balance. Unique diesel fuel regulations can also act as a barrier to diesel fuel imports that might otherwise be available during a domestic supply disruption, leaving the industry without one of its backstops. While industry has historically been resourceful in meeting petroleum product requirements, a State boutique diesel fuel rule increases the risk that fuel markets will be disrupted, particularly when supply capability and demand are closely balanced.

NPRA recommends that EPA require States to incorporate an analysis of fuel supply impacts in all State boutique fuel rulemakings. NPRA believes it is possible to enjoy reliable and affordable fuel supplies while preserving, and continuing, our environmental progress. However, this goal can only be achieved if the costs and benefits of new regulatory requirements are carefully weighed in the context of their impact on energy supplies. A State boutique diesel fuel regulation should not threaten the State's practical need for assurance that there will be sufficient and affordable diesel supplies.

In addition, there are other important factors related to the diesel fuel distribution system. The fungible pipeline system may have difficulty adding an additional boutique fuel type with limited suppliers and a limited distribution area or it may simply be uneconomical. Inserting an additional fuel could increase the amount of transmix that must be processed. A boutique diesel fuel would have to be accommodated at terminals. These terminals may not have the capability to provide bulk storage for an additional fuel type and could be faced with the dilemma of choosing to store the current federal diesel or the new boutique diesel with a loss of customers and overall supply.

2. Costs of Changing Fuel Properties

Changing diesel fuel properties (such as increasing cetane) can require processing in the refinery that is very expensive and may lead to unintended supply problems or other consequences. For example, even small changes in aromatics content or natural cetane number may require severe hydrotreating to saturate and open aromatic and poly-aromatic rings. These operations require large capital investments, as well as additional capital and operating costs associated with energy requirements, catalyst usage, hydrogen consumption, gas treating and other support operations. This level of processing also results in a loss of diesel product yield and a reduction in its energy content (resulting in a mileage penalty), which further increases costs and exacerbates potential shortfalls in diesel fuel supplies. The cost of aromatics reduction or cetane upgrading may be greater than the cost of downgrading high-aromatics diesel blendstocks to lower value uses, which would also act to reduce diesel supply.

Other seemingly straightforward and less complex diesel property modifications can present significant costs and problems as well. For example, reliance on additives for cetane upgrading would require costly additions at terminals for tanks and injection systems in addition to the cost of the additive itself (which is not trivial). Other significant issues would include determining an effective additive addition rate in a fungible system (due to fluctuations in the base fuel's properties), addressing safety concerns in handling the additive, and testing diesel fuels for cetane number compliance since cetane index does not apply to fuels that have been improved with additive and the alternative is costly and impractical, i.e. cetane test engines.

C. THE REGULATORY CHANGES FOR EPA'S ULTRA-LOW SULFUR ON-ROAD DIESEL FUEL (2006) WILL COMPLICATE ANY ASSESSMENT OF THE EMISSIONS EFFECTS OF A STATE'S PROPOSED DIESEL FUEL REGULATIONS.

The change(s) in baseline diesel fuel due to EPA's ultra low sulfur diesel (ULSD) rule for highway vehicles, which is effective in 2006 (66 FR 5002), is another confounding issue when using the data to estimate emissions reductions. Because refineries will have to treat more of the diesel fuel pool and treat it more severely (higher temperatures and pressures), there will be a significant change in the properties of the diesel pool. Although more severe hydrotreating of diesel fuel blendstocks should act to increase cetane number and reduce aromatics and specific gravity for the whole pool, it is not possible to quantify what the changes will be following the effective date of the federal ULSD rule (June 1, 2006 at refineries). Therefore, using EPA's analysis to predict NOx emissions benefits from an increase in cetane will inevitably be complicated by the shifting diesel fuel property baseline. The important question is how much difference a proposed State minimum cetane specification would make relative to the federal ULSD that will be produced beginning in 2006.

D. EPA SHOULD DISCOURAGE STATES FROM PROPOSING DIESEL FUEL REGULATIONS THAT DIFFER FROM FEDERAL REGULATIONS.

NPRA is concerned that EPA's study, inadequately developed and inappropriately applied, may result in the proliferation of boutique diesel fuels with serious adverse supply implications. Diesel fuel supplies will soon be overtaxed as ultra-low sulfur programs are implemented and the distribution system does not have the flexibility to accommodate multiple diesel grades. The Agency should remind States that unique local fuel requirements will reduce the efficiency of the distribution system and impose additional costs on consumers.

American Petroleum Institute

1220 L Street, Northwest
Washington, DC 20005-4070
Tel 202-682-8150
Fax 202-682-8051
E-mail murphy@api.org

Edward H. Murphy
Downstream General Manager

July 15, 2002

Mr. David Korotney
U.S. Environmental Protection Agency
2000 Traverwood Drive
Ann Arbor, MI48105

RE: EPA Draft Technical Report, *The Effect of Cetane Number Increase Due To Additives on NOx Emissions from Heavy-Duty Highway Engines*, June 2002

Dear Mr. Korotney:

The American Petroleum Institute (API) is pleased to provide comments on the referenced report. API is a national trade association that represents over 400 members that are engaged in all aspects of the petroleum business. Our members have a significant interest in issues relating to the correlation of diesel fuel properties with mobile source emissions and associated potential impacts on fuel supply. As such, we have a number of technical as well as policy concerns with regard to the referenced document (hereafter termed the "June 2002 EPA report").

The Draft Report Will Encourage the Development of Area-Specific Diesel Cetane Controls

In comments submitted to EPA last October, API expressed grave concerns that the draft diesel fuel effects model published in the July 2001 "Staff Discussion Document" could encourage states to create area-specific fuel requirements. [1, 2] We have similar concerns with the June 2002 EPA report on additized cetane. In essence, the latter document provides states with an EPA-approved procedure to gain NOx SIP credits by increasing diesel fuel cetane number. We are deeply concerned that making the proposed cetane model available to state and local air quality planners without proper policy guidance will lead the nation down the path of proliferating area-specific diesel fuel controls. The model by itself provides no information on the costs of modifying fuel properties nor does it convey any information on the refinery feasibility of producing the fuel being modeled. Neither does the model consider impacts of boutique fuels on the fuel distribution system. Furthermore, no consideration is given to the vehicle performance implications for the fuel properties being modeled. If any of these factors is not properly evaluated, there is significant potential for states to create area-specific fuel requirements that could lead to unintended disruptions of the refining and distribution system and hurt the consumer without providing a significant air quality benefit.

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[1] Letter from Ed Murphy, API, to Margo Oge, EPA, dated October 30, 2001

[2] EPA Staff Discussion Document, *Strategies and Issues in Correlating Diesel Fuel Properties with Emissions*, July 2001

The Underlying Database Is Inadequate

EPA correctly notes that one of the most significant issues associated with the NOx model presented in the June 2001 "Staff Discussion Document" is the presence of collinearity between natural cetane and other diesel fuel properties (aromatics and specific gravity). The June 2002 EPA report attempts to eliminate the multicollinearity issue by focusing only on natural and additized cetane and restricting the scope of the modeling effort to include only data from those experimental programs which tested cetane-improved fuels. However, while this approach may filter out confounding effects in the underlying database, it serves only to accentuate issues concerning the adequate representation of engine technology. As we indicated in prior comments on the EPA "Staff Discussion Document," the underlying database contains very little data for engines built after 1996. In fact, the database used for the June 2002 EPA report appears to have relied upon emissions test data generated on 35 heavy-duty engines of which only one was a post-1996 model. That engine, classified as model year 1998, was, in fact, a prototype. It is highly improbable that one prototype engine can adequately and accurately represent fuel effects for that fraction of the fleet (1997 – 2003 vehicles) likely to dominate in-use emissions and VMT in calendar year 2003.

The EPA Analysis Overestimates Cetane Effects in Modern Engines without EGR

The approach used in the June 2002 EPA report assumes that all non-EGR engines have the same NOx benefit. Available data suggest that this is not a correct assumption. Heavy-duty non-EGR-equipped engines produced during the late 1990s were designed with reduced pre-mixed burn combustion to lower NOx emissions. Cetane impacts in these engines are smaller in magnitude relative to earlier engines. [3] The Heavy-Duty Engine Work Group (HDEWG) program evaluated both EGR-equipped and non-EGR-equipped engines on a subset of test fuels that varied natural and additized cetane levels. There were no NOx benefits for increased fuel cetane for engines equipped either with or without EGR. [4] This indicates that EGR does not by itself explain the lack of a benefit for increased cetane in modern engines. Another recent study found that increasing cetane increased NOx emissions in 2 out of 5 modern engines tested. [5] As discussed above, there is very little data from modern engines in the EPA database and these data are lumped with much more extensive data from older engines. It is unlikely that cetane impacts in modern engines are well characterized by the proposed cetane model.

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[3] Rob Lee et al, "Fuel Quality Impact on Heavy-Duty Diesel Emissions: A Literature Review," Society of Automotive Engineers, Technical Paper #982649, October 1998

[4] Robert Mason et al, "EPA HDEWG Program – Statistical Analysis," Society of Automotive Engineers, Technical Paper #2000-01-1859, June 2000

[5] Ken Mitchell, "Effects of Fuel Properties and Source on Emissions From Five Different Heavy Duty Diesel Engines," Society of Automotive Engineers, Technical Paper #2000-01-2890, October 2000.

Non-Road Engines Are Not Represented in the Database

As EPA correctly notes, there are no non-road engines represented in the database to support either the draft model developed in the 2001 "Staff Discussion Document" or the draft cetane model shown in the June 2002 EPA report. There are no data available to validate the application of the draft cetane model to non-road engines. Any attempt to do so carries with it the implicit assumptions that the distribution of non-road engine and emission control technology is similar to that used on-highway and that duty cycles are similar. As EPA has noted in the "Staff Discussion Document," neither of these assumptions has been tested or validated. Therefore, it is inappropriate to apply the draft cetane equations developed in the June 2002 EPA report to non-road engines.

The Impact of Cetane on NOx Emissions from the Current Fleet Is Small and Will Rapidly Diminish in the Future

The June 2002 EPA report projects a small 2% effect for 2003 highway diesel vehicles due to a 5 cetane number (CN) increase. EPA correctly notes that this small effect will further diminish with time with the increasing penetration of cetane-insensitive EGR-equipped engine technology. As shown in Table III.C-1 of the June 2002 EPA report, the already small highway fleet average NOx benefit of a 5 CN increase will drop 30% from 2003 to 2007. Using EPA's draft cetane equation and extending the time frame of Table III.C-1 even further into the future shows that the emissions benefit of a 5 CN increase will decline by an additional 14% by 2010. As discussed above, EPA's draft model probably overestimates cetane impacts in recent engines without EGR. If so, then current and future cetane impacts will be even smaller than projected in the June 2002 EPA report. Looking further into the future, as cetane primarily influences the combustion of fuel and formation of emissions in the engine, its effectiveness in reducing tailpipe emissions will be even further attenuated due to the highly anticipated increased use of NOx aftertreatment controls. Thus, the initially very small NOx benefit of cetane control will become neglible in the future.

Cetane Control Programs Are Difficult to Implement

It is important to note that the proposed EPA cetane model is constructed from a database of test fuels and emissions measurements that does not comprehend the real-world impacts associated with the commingling of cetane improver additives in a fungible fuel supply and distribution system. The response of cetane to the addition of cetane improvers is non-linear. Given differences among cetane improver additives as well as different practices among fuel suppliers with respect to additizing fuels at the refinery gate versus at the terminal, it would be extremely difficult for state and local authorities to develop an enforceable mechanism that would ensure, for instance, an across-the-board 5 cetane number increase in diesel fuel quality in a given area.

Cetane Control Programs Could Have Unintended Consequences in the Field

In the absence of proper guidance, the deployment of EPA's draft model by states to set area-specific cetane specifications will surely proliferate the use of cetane improver additives and this could lead to increased customer problems with filter plugging and vehicle operational issues in the field. This is because EPA's draft model does not account for potential negative impacts associated with some classes of cetane improver additives on the thermal stability of diesel fuel – an issue that can arise particularly when fuels are commingled beyond control of the refiner downstream of the refinery gate. Research has shown, for instance, that the mingling of un-additized diesel fuel and diesel fuel additized with 2-ethylhexyl nitrate cetane improver (both fuels with reasonably good thermal stability) can yield blends with poor thermal stability (measured by the presence of high levels of insoluble material).[6] The effect of commingling the fuels on the degradation of thermal stability is attributed to interactions between the precursors to the formation of insoluble material in the fuel and the added 2-ethylhexyl nitrate cetane improver. Reduced thermal stability can lead to premature filter plugging and attendant vehicle operational problems.

A Program to Regulate Diesel Cetane Is Not Cost-Effective

In comments submitted on a Draft Diesel Cetane Levels Model Rule under consideration by the Ozone Transport Commission (OTC), API estimated that the cost-effectiveness of a 5 CN increase in diesel fuel was on the order of $12,000 - $24,000 per ton of NOx reduced in 2000, and these costs could roughly triple by 2007 as the benefits disappear due to the increased penetration of less cetane-sensitive EGR- and aftertreatment-equipped engines into the on-road fleet.[7] The table below compares the cost-effectiveness of cetane control with EPA estimates

Mobile Source Control Programs	**$/Ton**
EPA Rulemakings:[8]*	
2004 Highway HD Diesel Engine	200 - 400
Off-Highway Diesel Engine	400 -700
Tier 2 Vehicle/Gasoline Sulfur	1,300 - 2,300
2007 HDV/Highway Diesel Sulfur	1,600 - 2,100
Tier 1 Vehicle	2,100 - 2,800
OTC Cetane Control	**12,000 - 24,000**

*The EPA estimates are in dollars per ton of NOx+NMHC. API's estimate for the proposed OTC Cetane Control is in dollars per ton of NOx. While the two figures of merit are not strictly on the same basis, any comparison should not be overly biased because the NOx emissions attributable to the heavy-duty diesel engine on-road fleet are typically about an order of magnitude higher relative to the NMHC emissions.

[6] John D. Bacha, et al, "Diesel Fuel Thermal Stability @ 300F," paper presented at 6th International Conference on Stability and Handling of Liquid Fuels, Vancouver, BC, October 1997.
[7] Letter from Ed Murphy, API, to Leah Weiss, Ozone Transport Commission, September 26, 2000.
[8] The "EPA Rulemaking" cost-effectiveness estimates are taken from: 66 *Federal Register* 5102, January 18, 2001 and are rounded to the nearest hundred.

of the cost-effectiveness associated with other mobile source control programs that EPA has promulgated in the recent past. It shows that a cetane control strategy is less cost-effective by roughly an order of magnitude in comparison to other mobile source emissions regulatory programs.

Clearly, EPA and state and local air quality planners should abandon efforts to control diesel cetane and pursue more cost-effective and environmentally beneficial programs to lower NOx inventories.

API appreciates the opportunity to provide input to EPA on this important issue. We will be happy to discuss these comments in more detail. If you have any questions, please do not hesitate to contact David Lax at (202) 682-8479.

Sincerely,

E H Murphy

Edward H. Murphy

c: Margo Oge, US Environmental Protection Agency
Jeffrey Holmstead, US Environmental Protection Agency

Before the
United States Environmental Protection Agency
Office of Transportation and Air Quality

AMERICAN
TRUCKING
ASSOCIATIONS

Driving Trucking's Success

Comments on The United States Environmental Protection Agency Office of Transportation and Air Quality Assessment and Standards Division Draft Technical Report: *The Effects of Cetane Number Increase Due to Additives on NOx Emissions from Heavy-Duty Highway Engines* (June 2002)

To: **Mr. David Korotney**
U.S. Environmental Protection Agency
Office of Transportation and Air Quality
2000 Traverwood Drive
Ann Arbor, MI 48105
Korotney.David@epamail.epa.gov

July 15, 2002

The American Trucking Associations, Inc. ("ATA") submits the following comments in response to the U.S. Environmental Protection Agency's ("EPA" or "Agency") Draft Technical Report entitled *The Effects of Cetane Number Increase Due to Additives on NOx Emissions from Heavy-Duty Highway Engines* ("Draft Technical Report").[1]

ATA is the trade association representing the American trucking industry.[2] As the national representative of the trucking industry, ATA is vitally interested in matters affecting the nation's trucking fleet, including the use of boutique diesel fuels.[3] The membership of ATA strongly supports the achievement of cleaner air and the protection of human health and the environment. At the same time, ATA has serious concerns regarding EPA's efforts to quantify NOx reductions by increasing the cetane number of diesel fuel ("cetane controls"). This effort will encourage states to depart from the national diesel fuel standard in an attempt to secure additional NOx reduction credits.

ATA is particularly concerned over the inaccuracy of the technical report. On October 26, 2001, ATA submitted comments to EPA on its staff discussion document entitled *Strategies and Issues in Correlating Diesel Fuel Properties with Emissions* and EPA's proposed Diesel Fuel Impact Model ("DFIM").[4] At that time, ATA contracted with Sierra Research, Inc. ("Sierra") for assistance in evaluating the report and the DFIM. Sierra's final report concluded that EPA's proposed DFIM did not accurately predict emissions changes resulting from varying fuel parameters (See Attachment A).[5] EPA's efforts to quantify the effects of cetane controls under the Draft Technical Report suffer from the same deficiencies as the DFIM since the methodology and database are similar. There are several reasons that the proposed quantification does not work, the most significant is that the data from which the predictive equations were derived are not representative of the fuels and engines that dominate our nation's roadways.

[1] *See* U.S. EPA, Office of Transportation and Air Quality, *The Effect of Cetane Number Increase Due to Additives on NOx Emissions from Heavy-Duty Highway Engines*, EPA420-S-02-012 (June 2002) ("Draft Technical Report").

[2] ATA is a united federation of motor carriers, state trucking associations, and national trucking conferences created to promote and protect the interests of the trucking industry. Its membership includes more than 2,000 trucking companies and industry suppliers of equipment and services. Directly and through its affiliated organizations, ATA encompasses over 34,000 companies and every type and class of motor carrier operation.

[3] Throughout these comments we use the phrase "boutique fuels" to represent state-mandated fuel formulations that differ from the federal fuel standard. Boutique fuels, such as the diesel fuel sold in California and adopted in Texas; prescribe different aromatic and/or cetane limits than the federal diesel fuel.

[4] *See* U.S. EPA, Office of Air and Radiation, *Strategies and Issues in Correlating Diesel Fuel Properties and Emissions Staff Discussion Document*, EPA420-P-01-001 (July 2001) ("Staff Discussion Document"); http://www.epa.gov/otaq/models/analysis/p01001.pdf.

[5] Sierra Research, Inc., *Review of U.S. EPA's Diesel Fuel Impact Model* (October 25, 2001).

The only way to produce equations capable of predicting the emissions impact from varying certain fuel parameters is to construct a new database that is based upon emissions and fuel tests conducted under controlled conditions. These emissions tests must: (1) utilize a representative set of in-use engines and emission control devices; (2) account for all relevant fuel parameters; (3) implement a uniform transient-cycle testing procedure; and (4) monitor all pollutants of concern during each test run. No amount of manipulation will result in an accurate product until the database upon which the equations are based is revised to include a sufficient amount of data produced in accordance with the procedures described above.

The remainder of these comments highlights many of the public policy implications of cetane controls. We then address the specific problems underlying EPA's proposed quantification of cetane controls.

A. BOUTIQUE FUELS ARE CONTRARY TO SOUND PUBLIC POLICY OBJECTIVES.

EPA's stated intention in quantify cetane controls is to help states claim NOx reduction credits from boutique diesel fuel formulations.

> Since any NOx benefits claimed in a SIP as a result of cetane control must eventually be approved by EPA, we have determined that it is now appropriate to investigate the NOx benefits of cetane control in a comprehensive fashion.[6]

The introduction of boutique diesel fuels runs counter to Title II of the Clean Air Act, which expresses Congress' intent to create a national fuel standard by preempting states from regulating the content of certain fuels.[7] EPA's quantification of cetane controls, if corrected and finalized, will encourage the proliferation of boutique fuels. This will result in a patchwork quilt of boutique diesel fuels, which likely will result in supply shortages and price spikes that are devastating to the trucking industry.

EPA granted its first approval of a boutique diesel fuel program for the State of Texas in September 2001, but was careful to note that other state diesel fuel control programs need to be evaluated on a case-by-case basis.[8] In May 2002, EPA postponed efforts to develop a DFIM to allow for the collection of additional data.[9] The

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[6] Draft Technical Report at 2.

[7] Section 211(c) of the Clean Air Act allows states to petition EPA for permission to depart from the national fuel standard only if necessary to achieve compliance with the National Ambient Air Quality Standards ("NAAQS") after demonstrating that other control measures are unreasonable or impracticable.

[8] U.S. EPA Memorandum, "Texas Low Emission Diesel (LED) Fuel Benefits," from Robert Larson, Transportation and Regional Programs Division, OAR, to Karl Edlund, Region VI (September 27, 2001).

[9] U.S. EPA, OTAQ, "Near-Term Plans for Heavy Duty Diesel Fuel Analysis Program" (May 2, 2002).

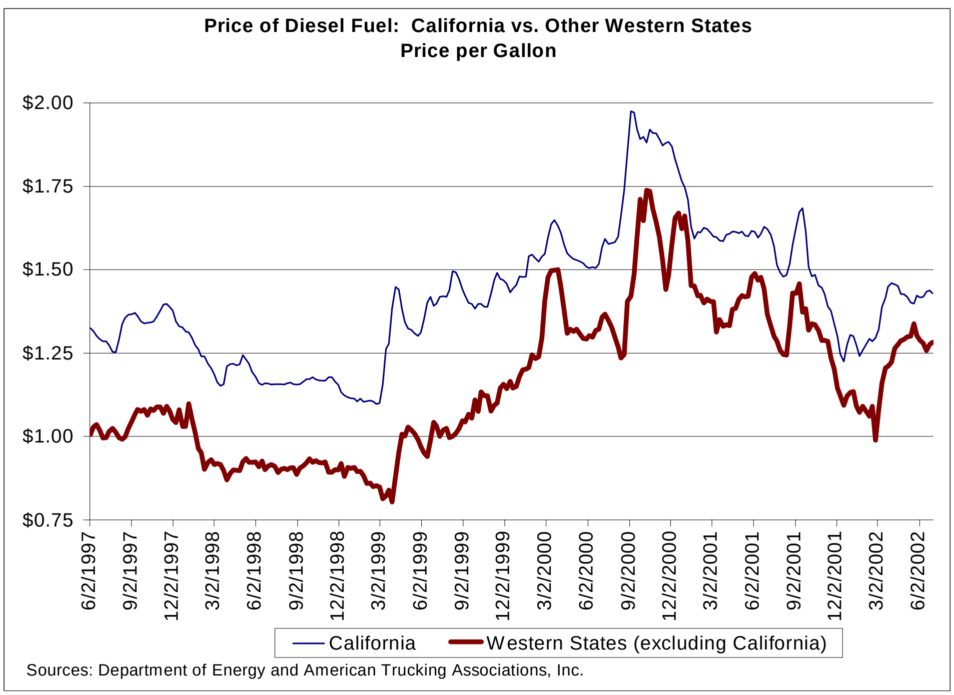
postponement cited a number of areas where additional data are needed, specifically mentioning the effects of cetane.

> Emission data over a fuel matrix that separates the effects of cetane, aromatics and specific gravity, because existing data exhibits much colinearity between these properties.[10]

With an acknowledged need for additional data, we question EPA's intention to quantify cetane controls at this time. The resulting proliferation of boutique diesel fuels will wreak economic havoc on the trucking industry. State boutique diesel fuel blends will create an uneven playing field in the trucking industry, will exacerbate periodic shortages of diesel fuel, and likely will result in price spikes that are devastating to truck operators.[11]

(1) Boutique Fuels Decrease Competition in the Refinery Industry.

Boutique fuels reduce competition among refineries, as only a handful of refineries will invest the capital required to manufacture the boutique blend. In California, the only state to actually implement a boutique diesel fuel, the increased cost to refine the boutique fuel is estimated to be only one to five cents per gallon.[12] The data



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[10] Id.

[11] While there exists anecdotal evidence that the proliferation of boutique *gasolines* have exacerbated supply shortages and caused dramatic price spikes, the federal government has yet to quantify the impact that boutique *diesel* fuels will have on the nation's diesel supply.

[12] California Air Resources Board, *Fact Sheet: California Diesel Fuel"* (October 6, 2000).

depicted in the above chart, however, indicate the retail cost to the consumer is on average 25.9 cents more per gallon than the retail cost of diesel in states bordering California.[13]

The primary reason for these price differentials is that the boutique fuel mandate has isolated the California diesel fuel market from the rest of the country. This means that California diesel fuel consumers must rely on output produced solely in their state. Other western states have access to diesel refined in other states and other regions. The inability to transfer fuel to California from other states inhibits the efficient functioning of the market, resulting in prolonged shortages and significant price spikes. Indeed, California's boutique fuel requirement has resulted in the inability to respond to fuel shortages by simply importing additional fuel from neighboring jurisdictions, creating price spikes of more than 40 cents per gallon.[14]

(2) Boutique fuels will create an uneven playing field for trucking companies.

The price disparity that results from state-mandated boutique diesel fuel will result in an uneven playing field for trucking companies that are located within the affected area. Many of these companies will be unable to compete against companies operating in neighboring jurisdictions with lower fuel costs. The companies located within the affected area that remain in business will have an economic incentive to refuel their trucks outside the affected area, resulting in additional vehicle miles traveled and a corresponding *increase* in associated air emissions.

(3) Departure from the National Diesel Fuel Standard Will Disrupt the Interstate and Local Trucking Industries.

We all bore witness to the significance of uniform fuel standards when shortages of reformulated gasoline ("RFG") caused huge price increases in the Midwest. We must learn from these mistakes and not allow the proliferation of different diesel fuel formulations. More recently, the Federal Trade Commission warned against the proliferation of boutique fuels.

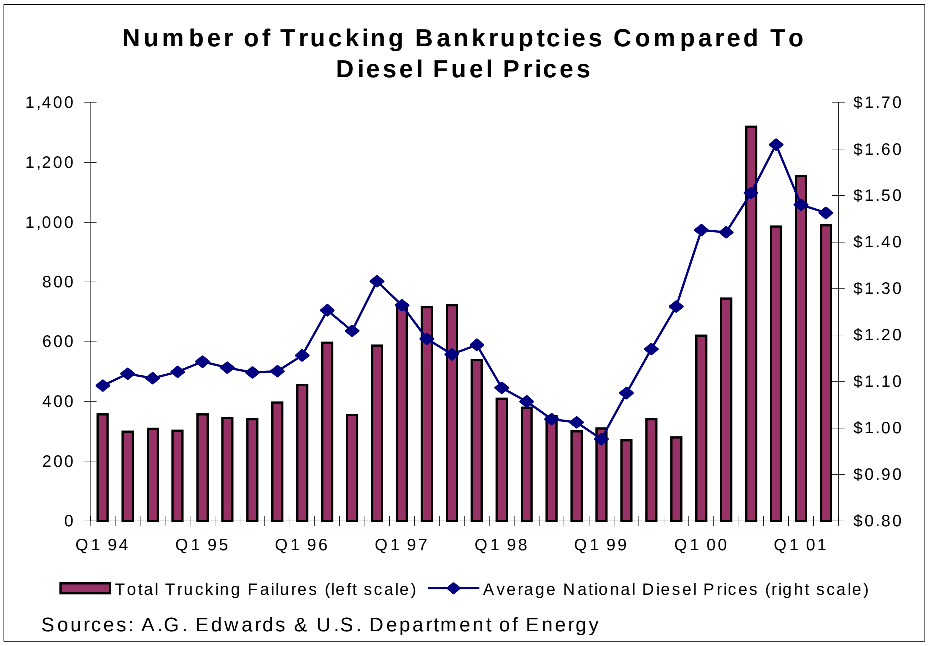
> Over the past decade, gasoline has become a smorgasbord of grades and ingredients that differ from state to state and even county to county, dictated by a dozen different clean-air requirements. The distribution difficulties caused by this patchwork of gasolines is compounding a national scarcity of refinery, pipeline and storage capacity, raising the risk of future price spikes if refiners take advantage of

[13] Energy Information Administration, Form EIA-888 "On-Highway Diesel Price Survey" (October 1, 2001); http://www.eia.doe.gov/pub/oil_gas/petroleum/data_publications/weekly_on_highway_diesel_prices/current/html/diesel.html

[14] Id.

supply shortages, the Federal Trade Commission warned recently.[15]

Diesel fuel is the lifeblood of the trucking industry. Fuel accounts for up to 20 percent of a trucking company's total expenses. Due to the competitive nature of the trucking industry – with operating margins of only two to four percent – a sudden increase in the price of diesel fuel turns a marginally profitable truck route into an unprofitable obligation. Thus, it is not surprising that the bankruptcy rates in the trucking industry closely mirror the price spikes in diesel fuel and have an adverse impact on small trucking operations.



The graph above demonstrates the tight correlation between escalations in the price of diesel fuel and increased bankruptcies in the trucking industry. While the industry can pass through to shippers predictable, long-term diesel price increases, unpredictable price spikes, which are exacerbated by boutique fuels, will force many small operators into bankruptcy.

To the extent that new diesel formulations will result in environmental benefits, these fuels should be mandated nationally, rather than on a state-by-state basis to minimize the market distortions they create. In the absence of a national diesel fuel standard, diesel supply shortages and price spikes will take their toll on the trucking industry, creating economic conditions that make it impossible for small trucking operations to continue in business.

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[15] Behr, Peter, "Kicking the Gasoline 'Cocktail' Habit" *Washington Post*, H1, H5 (April 29, 2001).

B. PROBLEMS WITH THE QUANTIFICATION OF CETANE CONTROLS.

Notwithstanding our opposition to boutique fuels, we offer our comments on the specific problems that must be addressed in connection with EPA's quantification of cetane controls. As highlighted in our previous comments regarding EPA's DFIM, several issues rendered the proposed DFIM inaccurate and unusable for its intended purpose. These issues have not been resolved and continue to undermine EPA's efforts to quantify cetane controls. In addition, EPA has not validated the accuracy of the predictive equations used to quantify cetane controls. Based on our previous experience with the DFIM, the predictive equations were not able to replicate the change in emissions that was experienced when changes to diesel fuel composition were made. Given this, and the lack of validation efforts by EPA, it would be scientifically unsound to rely on the proposed predictive equations.

(1) Issues of Concern.

The previously submitted Sierra report discusses in detail the issues of concern associated with the creation of the DFIM database and the DFIM predictive equations. The following section of the Sierra report summarizes those issues that apply to EPA's efforts to quantify cetane controls.

(a) The engines used to generate the emissions data upon which the predictive equations are based are not representative of the engines used by the on-road fleet.

There is only one 1997 to 2001 model-year engine in the database although this model-year range will account for more than 50% of the in-use HDDV fleet in 2002. Because there are few data from 1997 to 2001 engines, there is no way to tell if the emissions responses of those engines to changes in fuel properties are the same or different from other model-year engines for which there were data.

Even in light of the above, one engine technology-related difference in emissions response was identified between older and newer technology engines. This was in the effect of differences between natural and additized cetane level on NOx emissions. The DFIM predicts that NOx emissions will decrease from older engines as the cetane difference increases, but NOx is predicted to increase from EGR-equipped engines under the same conditions. This could lead to a situation where a boutique fuel found to reduce NOx emissions from the in-use fleet at present could actually lead to increased NOx emissions at some point in the future.

This finding is further supported by the work of the Heavy-Duty Engine Workgroup which indicates that NOx emissions from advanced EGR equipped engines are not sensitive to the cetane number of the fuel. According to Southwest Research Institute, there are also indications that emissions can actually increased with increased cetane number, where the cetane increase is accomplished using nitrate-based cetane improver additive. This lack of sensitivity of the NOx emissions to cetane number has also been verified in a non-EGR version of the test engine, using a 1994 timing calibration.[16]

(b) The predictive equations do not account for future emission control technologies that have already been mandated by EPA.

There are no data in the database from engines equipped with the types of after-treatment devices (catalyzed PM traps and SCR/lean NOx adsorbers) that EPA believes will be required to comply with the recently promulgated federal standards for 2007 and later model-year engines. Given that these devices are expected to reduce engine-out levels of PM, NOx, and HC by 90% or more, it is likely that emissions from engines equipped with these devices will be less sensitive than current engines to changes in diesel fuel properties (other than sulfur of course). As a result, the predictive equations cannot be used to predict changes in emissions due to diesel fuel composition changes after engines using these technologies enter the fleet.

(c) The predictive equations fail to account for regional differences in baseline fuel properties.

Use of a national average baseline fuel in regional analyses (such as the evaluation of the impacts of using California fuel in other states) fails to take into account that there may be non-random differences in the properties of diesel in different regions of the United States. These differences can occur as the result of differences in crude oil properties as well as differences in the types of process units and product balances from refinery to refinery, among other factors. Use of a nationwide baseline fuel that fails to account for regional differences in fuel properties will decrease the accuracy of estimates of the impact of fuel changes on emissions regardless of the accuracy of the predictive equations themselves.

Another related issue ignored in the development of the predictive equations is that a recent U.S. EPA rulemaking requires that the maximum sulfur content limit for on-highway diesel fuel be reduced from 500 ppm to 15 ppm beginning in 2006. Although no changes in fuel specifications other than the sulfur limit were made, it is not clear how the need to modify refinery operations to produce the ultra-low sulfur

[16] Ryan, T.W., Buckingham, J., Dodge, L.D., and Olikara, C., "The Effects of Fuel Properties on Emissions from a 2.5gm NOx Heavy-Duty Diesel Engine." SAE Paper 982491 (1998).

diesel fuel for on-highway vehicles will affect other fuel properties. It is important that regulations that would result in changes in diesel fuel properties be considered relative to the proper baseline for 2006 and later years.

(d) The correlation among fuel properties, such as cetane, aromatics, and specific gravity, make it impossible to distinguish which fuel property is responsible for an emissions-related effect.

As indicated in the Draft Technical Report, there are strong correlations between natural cetane, total aromatics, specific gravity, and the distillation properties.[17] In this context, "strong correlation" means that changes in one fuel property directly result in changes in another. Because of these correlations, it is not possible to use statistical methods to accurately distinguish which fuel properties are truly responsible in a physical sense for an emissions-related effect and which appear to be simply because they change in the same manner.

As shown in the presentation made by Robert Crawford, whose work was sponsored by the U.S. Department of Energy at the August 28, 2001 DFIM workshop, due to correlations between fuel properties and other factors, there are hundreds of predictive equations that can be fit to the DFIM database.[18] These equations involve a multitude of different fuel property terms and combinations of fuel property terms and have essentially the same statistical validity and predictive power. The bottom line is that EPA cannot conclusively demonstrate the superiority of the equations it selected for inclusion in quantifying cetane controls relative to other equations involving other fuel properties and combinations thereof.

(e) The accuracy of the predictive equations have not been independently validated

The performance of predictive equations is often evaluated by comparing predicted results to observed data that were not included in the database. In this way, one can validate that the equations have predictive power that extends beyond the data upon which they were developed. The most preferable way in which this can be accomplished is to have EPA develop a validation database by performing a new study of fuel property impacts on emissions and then comparing the results of that testing to the predictive equations. Alternatively, EPA could exclude

[17] Draft Technical Report at 3.

[18] Crawford, R.W., "Issues in Model Development Using Interrelated Predictors," Presented at the U.S. EPA Diesel Fuel Effect on Emissions Workshop, Ann Arbor, MI (August 28, 2001).

a portion of the data from the database during the equation development phase and then use those data to validate the performance of the equation.

Because EPA has not performed any independent validation, EPA cannot claim that the predictive equations have any ability to accurately predict cetane-related changes in emissions for engines and fuels not included in the database. This indicates that the predictive equations have not been demonstrated as being adequate for its intended use as a regulatory tool.

It is likely that one or more of these issues may result in the predictive equations not being able to predict the impact on emissions from varying the cetane content of diesel fuel.

CONCLUSION

ATA believes that a uniform national diesel fuel standard is desirable, achievable and in the interest of all parties affected by this rulemaking. EPA's attempt to quantify cetane controls to help states reduce NOx emissions runs counter to Title II of the Clean Air Act, which expresses Congress' preference for a single national fuel standard. EPA's attempts to encourage boutique diesel fuels by quantifying cetane controls run counter to the public policy arguments expressed herein.

Even more significant is the fact that the proposed quantification does not work. The database from which the cetane control's predictive equations were derived is inaccurate and not representative of real world conditions. We also note that EPA has not attempted to validate the predictive equations' capabilities, while validation experiments conducted by Sierra using the same database indicated that previous equations were incapable of accurately predicting changes in emissions from varying diesel fuel parameters. As such, the Agency's reliance upon the predictive capabilities of the proposed cetane controls in supporting potential boutique fuel waiver requests under Section 211(c)(4)(C) of the Clean Air Act is arbitrary and capricious.

To the extent that accurate predictive equations would be helpful in revising the national diesel fuel standard, we believe that EPA should create a new database that is based upon emissions and fuel tests conducted under controlled conditions. These controlled emissions tests must: (1) utilize a representative set of in-use engines that include future emission controls that the Agency expects to be introduced; (2) account for all relevant fuel parameters; (3) implement a uniform transient-cycle testing procedure; and (4) monitor all pollutants of concern during each test run.

Respectfully submitted,

Michael Tunnell
Director, Environmental Affairs
American Trucking Associations, Inc.

cc: Ms. Margo Oge
U.S. Environmental Protection Agency
Office of Transportation & Air Quality
Ariel Rios Building, North
1200 Pennsylvania Avenue, N.W.
Washington, DC 20460

July 15, 2002

Ms. Margo Oge
U.S. Environmental Protection Agency
Office of Transportation and Air Quality
Ariel Rios Building, North
1200 Pennsylvania Avenue, N.W.
Washington D.C., 20460

RE: Draft Technical Report: The Effects of Cetane Number Increase Due to Additives on NOx Emissions from Heavy-Duty Highway Engines (June 2002)

Dear Ms. Oge:

The California Trucking Association (CTA) is a non-profit trade association representing nearly 2,500 private and for-hire carriers and suppliers operating within California. Our members include both intrastate and interstate motor carriers ranging from the one-truck owner/operator to large international companies. Our average member is a family-owned business operating 10-15 trucks with 20 employees or less. Your agency is familiar with the un-level playing field boutique fuels have created for California's trucking industry. It led to our support of the 2006 fuel reformulation, which now comes into question based on the draft report "The Effects of Cetane Number Increase Due to Additives on NOx Emissions from Heavy-Duty Highway Engines, June 2002," (the Technical Report).

It appears that the Draft Technical Report has found the 15ppm-sulfur standard inadequate and a need to adopt a parallel cetane standard. CTA finds that the data relied upon in regard to the Technical Report is inadequate and conflicting and we retain our support for the 2006 national diesel fuel standard as it is.

Beyond calling into question the 2006 low sulfur diesel fuel standard, the inaccuracy of the above mentioned technical report is inexcusable. Independent review by Sierra Research[1] found the model developed by your staff did not accurately predict emissions changes. Sierra Research documented that your staff did not develop a scientific model that could predict cetane additives into today's diesel fuel, yet the Technical Report translates emission reductions for today and into the future. The proposed model represented engines from decades ago, engines that can't be purchased and do not drive on-road in any state in even single digit populations. The correlations could not distinguish between fuel properties, much less decide if cetane, aromatics or specific gravity was responsible for emissions reductions or increases (mostly increases were found in emissions with regard to cetane additives). The proposed model is only useful if EPA is interested in quantifying emissions reductions in truck museums where the vehicles in the database are currently housed.

[1] Sierra Research, Inc., Review of U.S. EPA's Diesel Fuel Impact Model, (October 25, 2001)

The accuracy of the proposed model was, and is, in question. The scientific community has not validated the proposed model. Although CTA recommended in our previous comments[2] to "Provide a complete and valid peer reviewed analysis that demonstrates the predictive accuracy of the DFIM (proposed model)," our concerns were neither considered nor responded to. EPA has failed to attempt to validate the predictive capabilities of the model. This is not surprising since validation by others, including CTA, find that cetane additives actually increase emissions on model year engines that were manufactured after 1993.

CASAC has not reviewed the draft Technical Report, which EPA will provide to states as support for underground control measures, which does not provide due process to interested parties. States drafting State Implementation Plans (SIPs) will be lured into adopting this type of control measure that only reflects paper emissions reductions instead of pollutant emissions reductions. Keep in mind, others have tested this very model and found actual increases in emissions where decreases were predicted.

Due to the extreme economic and environmental consequences of releasing this Technical Report, we believe EPA should conduct an Environmental Impact Statement (EIS) as this is a defacto control measure approved in advance by EPA for states to adopt. This EIS is required by the National Environmental Policy Act (NEPA) when a federal agency takes action significantly affecting the quality of human environment. In this case, California will be significantly impacted by increased vehicle miles traveled in the state and increases in NOx emissions where decreases are predicted.

Before further action is taken by EPA to finalize the Technical Report, CTA respectfully requests a meeting with you, in Washington, at your earliest convenience to remedy our concerns. This issue has far reaching consequences to our members and air quality nationwide.

Sincerely,

Stephanie R. Williams
Vice President, Legislative and Regulatory Affairs

SRW:amw

cc: David Korotney, U.S. EPA
Chet France, U.S. EPA

[2] Comments of the California Trucking Association on the United States Environmental Protection Agency's staff discussion document entitled, "Strategies and Issues in Correlating Diesel Fuel Properties with Emissions." (October 30, 2001)

July 17, 2002

David Korotney
U.S. EPA
2000 Traverwood Drive
Ann Arbor, MI 48105

Subject: Comments on the EPA's Draft Technical Report – "The Effect of Cetane Number Increase Due to Additives on NOx Emissions from Heavy-Duty Highway Engines"

David,

Ethyl Corporation wishes to compliment the EPA for their efforts in developing a model to determine the NOx emissions benefits from increasing the cetane number of diesel fuel. We believe that the concerns Ethyl raised in the original Staff Discussion Document "Strategies and Issues in Correlating Diesel Fuel Properties with Emissions" have been appropriately addressed. While in some cases, we believe that higher NOx emission reductions could be achieved than the model predicts, the model represents real world experiences in NOx emission benefits of higher cetane number diesel fuel.

This technical report when finalized should provide the industry and regulators with a good model for determining the NOx emissions benefits on increasing a diesel fuel's cetane number. States and various regions of the U.S. are under increased pressure to reduce emissions to meet air quality targets or standards. Most are looking at all sources of NOx emissions to determine the most cost-effective way to reduce emissions. Heavy-duty diesel emissions contribute significantly to most NOx inventories and this model will help the industry determine if increasing cetane number is a cost-effective approach to reducing NOx.

It is anticipated that the actual use of the increased cetane number approach to reducing NOx from heavy-duty diesel engines will be based on the overall cost effectiveness of this approach. Cetane number of diesel fuel is a variable property that can by modified with the use of additives without impacting properties of the fuel other than ignition quality. Cetane number improving additives can be added at the refinery or at fuel distribution terminals to focus use in areas most needing NOx and VOC reductions. This provides significant flexibility for increasing cetane number of fuel where it is needed to help reduce emissions. Cetane can also be increased by crude selection, refinery component blending and/or processing changes.

Cetane number improvers have a proven track record for use in diesel fuel. They have been used safely and effectively to improve the quality of diesel fuel since the late 1940's. They are typically added to fuel at the refinery, but have also been added in the form of diesel fuel marketing packages at terminals. Cetane number improvers are effective at low concentrations such 2500 ppm or less and are registered with the EPA. Cetane number improvers are soluble in diesel fuel at all concentrations and are not water soluble. In addition to lower NOx emissions, higher cetane number fuels result in reduced white smoke, noise and vibration, smoother combustion, easier startability, and reduced CO, VOC, and in some cases particulates.

Increasing the cetane number of diesel fuel is a safe, practical, cost-effective way for States and Regions to reduce NOx and other regulated emissions and provide the end user with a higher quality fuel.

Again, we appreciate the effort the EPA has put into developing this model and look forward to working with stakeholders to determine if higher cetane diesel fuel can be used as an economical approach to lowering NOx emissions in their regions.

Sincerely,

Larry Cunningham
Technology Manger
Ethyl Corporation

FLINT HILLS RESOURCES™

STANLEY KAPLAN
VICE PRESIDENT
MOTOR FUELS COMPLIANCE

P.O. Box 2917
Wichta, KS 67201-2917
316.828.5557
Stan.Kaplan@FHR.Com

July 15, 2002

David J. Korotney
US EPA
Korotney.David@epamail.epa.gov

Dear Mr. Korotney:

Flint Hills Resources, LP (formerly Koch Petroleum Group, L.P.), is pleased to submit these comments on <u>The Effect of Cetane Number Increase Due To Additives on NOx Emissions from Heavy-Duty Highway Engines</u>. Flint Hills Resources, LP (FHR) has a keen interest in diesel emission properties and the means of representing the emission properties in terms of measured diesel parameters. We have a refinery located in Corpus Christi, Texas, that supplies diesel fuel to the area that falls under the TNRCC requirements for "Low Emission Diesel". We hope that our comments are useful in constructing a meaningful representation.

We agree that use of cetane improver decreases NOX for typical EPA diesel fuel (40-45 cetane number). We do not agree that the curves and equations presented in the EPA draft report provide a reliable model of the relationship between NOX reduction and use of cetane improver. The agreement between the actual data for the effect of cetane improver addition versus NOX reduction and the prediction of the relationship between cetane improver and NOX reduction given by this EPA model is very poor for the data set referenced in the EPA study. The EPA presents data versus cetane number but the EPA relationship versus cetane improver can be inferred. The majority of the data for engines that do not use exhaust gas recycle are better represented by a simple plot that shows substantial reductions in NOX for the first 2000 ppm of cetane improver and minimal (and certainly not monotonically positive) effects for cetane improver greater than about 3000 ppm. The beneficial effect is most prominent for typical EPA diesel fuel (40-45 cetane number). We agree with the qualitative implication in the EPA study that increases in cetane improver as well as cetane number have a minimal effect for values approaching 50 cetane number.

The consequence of the majority of the data is that most of the expected benefit of Texas LED can be achieved by use of moderate amounts of cetane improver, with reductions in aromatics contributing little additional benefit. SAE papers document that NOX reduction by cetane improver addition is substantially lower cost than NOX reduction from aromatics reductions for engines that are certified without exhaust gas recirculation.

We disagree with the engine turnover model used by the EPA to predict the replacement factors of NOX inventories by EGR type engines. The EGR certified engines have lower NOX hence their effect on weighted NOX emissions is much lower than their numeric or miles driven contribution. Additionally these EPA assumptions ignore the widely recognized viewpoint that EGR engines will enter the fleet at a very slow rate because of the widely perceived view that fuel economy and reliability will be greatly compromised by EGR engines. Many fleets have indicated they will extend engine life rather than purchase EGR equipment.

You may contact either me (316.828.5557) or Charlie Selvidge (316.828.5002) with any questions.

Sincerely

Stanley Kaplan

Stanley Kaplan

July 17, 2002

David Korotney
U.S. EPA
2000 Traverwood Drive
Ann Arbor, Mi 48105

Re: "The Effect of Cetane Number Increase Due to Additives on NOx Emissions from Heavy-Duty Highway Engines," EPA420-S-02-012, June 2002.

Dear Dave:

On behalf of the members of the Alliance of Automobile Manufacturers, I am writing to submit comments on the above Draft Technical Report regarding the emissions impacts of additized cetane number. I hope that EPA will accept these comments despite the fact that I am submitting them past your deadline of July 15.

As you may suspect, the auto industry is pleased that EPA is examining the cetane issue in greater detail. We believe that higher cetane levels, along with other clean fuel parameters—for example, 5 ppm maximum sulfur, 15% by volume maximum aromatics and good lubricity (lower than 0.400 mm mean wear scar as measured by HFRR)—will be critical for enabling diesel technology to penetrate the light duty fleet in this country. The ability of clean light duty diesel to penetrate the U.S. market will be a critical factor in reducing the nation's fuel usage.

One of the reasons why clean diesel has penetrated the European markets so readily, besides the advancement in vehicle technology, is because the fuel found in Europe routinely has cetane numbers well above 50 (except for Arctic climates, a European Fuels Directive mandates a minimum cetane number of 51). The average cetane number of U.S. diesel fuel, by contrast, was just under 45 in the Alliance's winter 2002 fuel quality survey, and the minimum was less than 38.[1] Higher cetane levels allow diesel vehicles to perform as well as gasoline vehicles in the eyes of the consumer, in terms of start-up, noise-vibration-harshness and tailpipe smoke.

Automakers from around the world agree on the importance of high cetane levels in diesel fuel. Recently, the world's leading automakers reconfirmed that they recommend a minimum cetane number of 55 (cetane index of 52) in diesel fuel sold in the U.S. market. *See* the draft third edition of the World-Wide Fuel Charter, June 2002, attached to this document for reference.

[1] The Alliance of Automobile Manufacturers' North American Fuel Survey may be found at store.Autoalliance.org.

1401 H Street, N.W. Suite 900
Washington, D.C. 20005
Tel: (202) 326-5533
Fax: (202) 326-5589

Comments on Methodology

Excluding Data from EGR-equipped Vehicles. EPA states on page 14 that "EGR-equipped engines are expected to exhibit no discernable NOx response to cetane." EPA bases this statement on a report by the Heavy-Duty Engines Workgroup on the impact of cetane on EGR-equipped engines. Alliance members are familiar with this study and would caution EPA about extrapolating these results to all vehicles equipped with this technology. Light-duty vehicles, for example, are more sensitive than heavy-duty vehicles to cetane effects. Indeed, some of our members have provided proprietary information to EPA that shows EGR-equipped LDDV responding favorably to cetane. We hope that EPA will take these additional data into account as it considers the response of EGR technology to cetane levels.

Calculating Fleet-Wide Emission Benefits. EPA should include in its analysis an accounting of the benefits that would occur in every year after introduction of the higher cetane fuel, not just in 2003 and in 2007. The existing non-EGR fleet will produce the benefits as soon as it gets the higher cetane fuel and in every year that the size of the fleet remains significant. With a 30-year heavy-duty fleet turnover period, that period will last for many years beyond 2007.

Comments on Findings

Notwithstanding these comments, we believe EPA took reasonable steps to distinguish between the effects of natural cetane and additized cetane and to estimate cetane's impact on NOx emissions. Given that EPA's analysis was so conservative, in our view, and still estimated emission reductions of as much as 4.1% in 2003 and 3.5% in 2007 (including both on- and off-road impacts), shows that raising cetane levels in the U.S. is an important option for reducing NOx emissions in the U.S.

The bottom line is that EPA must continue to examine how cetane affects vehicle emissions. We are confident that such ongoing efforts will help convince both states and EPA that raising cetane levels will help states reach elusive ambient air quality goals in this country.

Recommendations

The Alliance recommends that EPA raise the national minimum natural cetane level to 55, or the cetane index to 52. Since vehicles and fuels operate as integrated systems, such action would enable auto and engine manufacturers to optimize light and heavy duty vehicles to the fuel found in the marketplace. This would deliver additional emission benefits to the American public not accounted for in the current analysis. It also would help prevent the development of boutique diesel fuels by pre-empting individual state actions.

The Alliance appreciates this opportunity to comment on this work. Please feel free to contact me if you have any questions.

Sincerely,

/original signed/

Ellen L. Shapiro
Director, Automotive Fuels

Enc: World-Wide Fuel Charter, June 2002 (draft 3d edition)

**David.M.Stehouwer@
Cummins.com**

08/06/2002 04:31 PM

To: David Korotney/AA/USEPA/US@EPA

cc: Jerry.C.Wang@Cummins.com, frank.bondarowicz@nav-international.com, greg.shank@macktrucks.com, tharpde@cat.com, robert.stockwell@gm.com

Subject: FW: Draft EPA technical report on cetane - PDF version

The Cummins Fuels and Lubricants Department has reviewed the subject report and we are in general agreement with the conclusions put forth. The data suggesting that increased cetane number (whether from natrual or artificial sources) causes a decrease in NOx emissions are not inconsistent with the discussions in the World Wide Fuel Charter which Cummins and the EMA have already publicly supported.

See page 36 of the attached PDF file which shows that increaseing cetane number can cause up to 8% reduction in NOx emissions, depending on engine load.
(See attached file: WWFC draft 3d edition June26bis2002_Brochure.pdf)

We encourage EPA to proceed with the release of this study.

David Stehouwer
Sr Technical Advisor
Fuels and Lubricants
Cummins Inc

812 377 9209

by copy of this note, I am reminding my fellow EMA members that they should get their individual responses in the EPA as soon as possible if they so choose.
---------------------- Forwarded by David M Stehouwer/Ind/Cummins on 07/17/2002 02:48 PM ---------------------------