



US Environmental Protection Agency  
Air and Radiation  
Office of Transportation and Air Quality

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August 2, 1996

Agency Correspondence Regarding RFG and Low RVP Gasoline

The following correspondence was received from Mr. Charles Krambuhl of the American Petroleum Institute (API) in response to an EPA staff-level memorandum which was posted on EPA's electronic bulletin board in March of this year. The subject is the relative benefits and detriments of the use of reformulated gasoline (RFG) and low RVP gasoline as alternative program options for assisting states in reaching NAAQ standards for ozone. EPA is posting the text of this API letter on EPA's electronic bulletin board to promote the ongoing dialogue between the Agency and other parties affected by this debate.

The API letter contains some statements with which EPA would agree, and many more with which it would disagree. However, because the issues involved are diverse and complex, complete resolution would likely only be possible through a more in-depth process established for that purpose. Following the text of the API letter, the text of a response letter from Charles Freed of the Fuels and Energy Division is given. It highlights EPA's position and intentions in drafting the original memorandum, and leaves open the possibility for further discussions.

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American Petroleum Institute      1220 L Street, Northwest  
Washington, D.C. 20005-4070      C. J. Krambuhl  
Tel 202-682-8150      Director  
Fax 202-682-8051      Manufacturing, Distribution  
E-mail krambuhl@api.org      and Marketing

June 26, 1996  
Mr. Charles N. Freed, Director  
Fuels and Energy Division  
Office of Mobile Sources  
U.S. Environmental Protection Agency  
401 M Street, S.W. (6406J)  
Washington, D.C. 20460

Dear Mr. Freed:

Last March, David Korotney (EPA) wrote a memo to Susan Willis (EPA)

titled "A comparison between reformulated gasoline and low RVP gasoline as alternative strategies for meeting NAAQ standards for tropospheric ozone." This memorandum recognizes that, compared to RFG, low RVP gasoline is a low cost and highly cost-effective strategy for reducing VOC emissions.

The American Petroleum Institute (API) has long advocated that need, sound science and cost-effectiveness be the key criteria for evaluating ozone control strategies and particular control measures. Furthermore, proposals for changes in fuels specifications should contribute to genuine, significant environmental improvement and should not impede efficient distribution of fuels. Thus, we are concerned that although EPA's memorandum recognizes that low RVP gasoline is a low cost and highly cost-effective strategy for reducing VOC emissions compared to RFG, overall, the memorandum understates the relative benefits of low RVP gasoline. Attached is a summary of API's comments.

Sincerely,

Attachment

cc: Susan Willis  
David Korotney

June 26, 1996

API'S CRITIQUE OF EPA'S MEMO ON LOW RVP GASOLINE VS. RFG

#### General Comments

This EPA memo recognizes that "the primary advantage of low RVP gasoline is its low cost and high cost-effectiveness in reducing VOC emissions." EPA also correctly recognizes that on a VOC reduction basis, compared to RFG, low RVP fuels will generally be significantly less costly per ton of needed emissions reduction, and significantly less costly on a total dollars spent basis. API has long advocated that need, sound science, and cost-effectiveness be the key criteria for evaluating ozone control strategies and particular control measures. Thus, we are very concerned that EPA would attempt to undermine its conclusions regarding the benefits of low RVP fuel with many unsupported or irrelevant criticisms.

This EPA memo attempts to make a generic comparison between the merits of RFG and low RVP fuels. Such a generic approach is confusing. Relevant comparisons are best made in the context of a specific ozone non-attainment area considering the full array of available control options.

Most of EPA's criticisms of low RVP fuel focus on the additional "benefits" of RFG. In particular, the Agency appears to argue that

RFG is preferable because it offers summertime NOx reductions and year-round CO and air toxics emissions reductions. However, as explained in more detail below, it is inappropriate to criticize low RVP fuel on these bases.

The Agency fails to fully recognize that a year-round RFG program may not be viewed as a benefit. Low RVP fuels address the summertime VOC reduction requirements mandated by CAA statutory language in ozone non-attainment areas where RFG is not required. These areas do not require, by statute or by science, any non-summertime reductions in VOC or NOx emissions.

The fact is that a low RVP gasoline program, which lowers VOC emissions when such reductions are needed in ozone nonattainment areas, is a targeted solution to the relevant problem, while an RFG program imposes more costly and less costeffective controls on a year-round basis that may be completely unnecessary, and even counterproductive to obtaining the legitimate goals of the ozone nonattainment area. It seems only sensible for communities to start with a targeted cost-effective approach to ozone precursor reductions, and reserve the right to use broader and more stringent approaches, such as RFG, if initial controls prove inadequate in achieving attainment status. To recommend more costly control alternatives, where there is not a demonstrated need, seems contrary to common sense.

EPA criticizes low RVP gasoline because it does not offer the NOx reductions of RFG. This criticism demonstrates the inappropriateness of the generic comparison. As EPA is well aware, NOx reductions may in fact increase ozone levels and make it more difficult for an ozone nonattainment area to reach attainment. EPA's criticism also fails to acknowledge that beginning in the year 1998, there is a year-round average NOx cap for all conventional gasoline, including low RVP conventional gasoline.

EPA also criticizes low RVP fuels because they do not offer the toxics reduction of RFG. EPA fails to recognize that the anti-dumping regulations control air toxics emissions for all conventional gasoline, including low RVP gasoline; exhaust benzene emissions are currently controlled and exhaust toxics emissions will be controlled beginning in 1998. Secondly, it is far from clear that additional toxic emission reductions are needed. EPA itself has recognized that "the main control strategies for toxics, benzene and aromatics reductions, are very expensive" compared to the benefits that can be achieved through other programs. 59 Fed. Reg. 7755. EPA's statements concerning air toxics in this memorandum are also inconsistent to statements in other recent EPA documents. For example, an EPA document entitled "Summary of Peer Review of Motor Vehide-Related Air Toxics Study" states that one of the independent scientists that EPA hired to review the study believes that "there appears to be no cause for a public health concern for cancer from exposure to motor vehide exhaust, and it would seem that the agency could use its resources more productively on matters of higher concern."

EPA's memo overstates the benefits of carbon monoxide emissions

reductions that results from RFG usage. Although the CO emission reduction benefits of RFG may be relevant in CO nonattainment areas, the issue is of little, if any, relevance to ozone nonattainment areas where the focus is on VOC emissions. Any CO reduction benefits of RFG are only relevant to the extent of their impact on ozone, which most photochemical ozone formation models shows as relatively minor. EPA also fails to recognize that improved vehicle technology is reducing the CO reduction value of added oxygenate in the wintertime. And, lastly, low RVP gasoline has been demonstrated, by MOBILE5a model, to reduce CO emissions in certain temperature regimes.

#### Additional Specific Comments

Statement: "The values that I have included in this memorandum have been assimilated from several sources, including AAMA survey data from 1990 through 1995, Complex Model calculations, an analysis done by Information Resources, Inc., and actual test data."

Response: This data set is alluded to but never provided. In any event, there are serious flaws in using any of this data. AAMA survey data are not statistically valid, and are a one-time snapshot of summer fuel quality that is not even volumeweighted for the market, let alone over time. The AAMA survey data do not, and cannot, isolate RVP as the causative factor in emission changes, given many other possible factors affecting fuel quality. It is not obvious how 1990-1994 AAMA survey data could purport to represent current low RVP fuel characteristics, as if the antidumping regulations have no effect on conventional gasoline characteristics. The IRI analyses are also not free of bias. Unless the sources and data are specifically provided, the conclusions lack credibility.

EPA also relies solely on the Complex Model ("CM") as a basis for discussing emissions effects. The CM was designed for use as a gasoline certification model. It has limited value for predicting total fleet emission effects due to differences between the underlying 1990 vehicle technology and the in-use fleet in a specific nonattainment area. The CM's major weakness relates to older vehicles. EPA's MOBILE5a model, is the proper tool for analyzing local fleet responses, but has limitations in predicting the effects of fuel composition on exhaust emissions. The best approach is a combination of the two. EPA seems to ignore these modeling limitations in drawing its conclusions.

Statement: "All percent change estimates have been made with respect to a baseline fuel whose properties were given in section 211(k) of the Clean Air Act. This baseline fuel can be viewed as an approximation to the national average gasoline."

Response: Low RVP fuels are considered on an area-by-area basis. Thus, analysis of national, average responses is irrelevant.

Statement: "We would expect, then, to see little or no effect of low RVP gasoline on NOx. An evaluation of AAMA fuels survey data, however, indicates that low RVP gasoline may actually increase summer NOx emissions by 1%. RFG, on the other hand, will result in

summer NOx emission reductions of approximately 1.5% in Phase I,..."

Response: EPA's conclusion is based on inappropriate use of AAMA surveys and use of the wrong tool, the CM, to estimate fleet emissions. The CM does not estimate emissions for the whole fleet; only MOBILE5a does. Current RFG- simple model RFG- has no NOx reduction requirement. The more appropriate structure to this analysis would be to look at low RVP in comparison to simple model RFG through 1997, against complex model Phase IRFG for 1998-1999 effects (when there is an explicit NOx control standards), and Complex Model Phase II RFG for beyond 1999 (when NOx must be reduced in the summer). EPA's conclusion should have mentioned the fact that from 1998 on the anti-dumping regulations prohibit any NOx increase from baseline levels for conventional gasolines, which would include low RVP fuels.

EPA's memo seems to refer to entire NOx inventory changes, which may be misleading. The reference to a 1 % increase in NOx emissions for low RVP appears to be to light-duty gasoline vehicles and, therefore, it appears to refer to a negligible increase in total NOx emissions. EPA also draws global conclusions from small and relatively insignificant changes. The measurement science is not that good.

Statement: "Toxics reductions through the use of RFG are highly cost-effective, and the \$/ton estimate for the reduction of toxics may even be zero in Phase I. When a refiner makes changes to its gasoline in order to meet the VOC and NOx standards for RFG, the toxics standard is virtually always met by default. In other words, no additional reformulation is necessary to meet the toxics standards beyond that required to meet VOC and NOx standards."

Response: We simply disagree, and so do other EPA documents. In the final RFG rule, EPA recognized that the main control strategies for toxics, benzene and aromatics reductions, are "very expensive" compared to the benefits that can be achieved through other programs. 59 Fed. Reg. 7716, 7755-58. EPA's statements concerning air toxics in this memorandum are also inconsistent to statements in other recent EPA documents, which have recognized that "there appears to be no cause for a public health concern for cancer from exposure to motor vehicle exhaust, and it would seem that the agency could use its resources more productively on matters of higher concern." Furthermore, as EPA recognized in the final RFG rule, it is the benzene specification that drives toxics reduction, while it is RVP, sulfur, and to a lesser extent, olefins that drive VOC and NOx reduction. Benzene reductions impose additional costs on the production of RFG; API does not agree that the incremental cost of toxics reduction is zero.

Statement: "In the case of RFG which is required in a new area, the enforcement program for that area will be added to the already existing federal enforcement operations, and thus will not burden the state. In contrast, if low RVP gasoline is instead required in a new area, its enforcement program must be created from scratch and run by the state."

Response: There is little proven economy of scale or efficiency in federal enforcement programs, and the purported "burden" to a state with a low RVP program is very small. Southwest Research Institute (SwRI) quoted an estimated cost of less than \$50,000 for a single season RVP sampling and testing program for Louisville in 1994. Furthermore, some states already sample and test for RVP. For those states, there would be no incremental cost. In any case, the total costs to enforce an RVP program are minuscule compared to the costs to enforce the RFG program.

Statement: "There is some concern that the anti-dumping provisions for conventional gasoline under the Simple Model provide enough flexibility to refiners producing low RVP gasoline that decreases in VOC emissions could be accompanied by simultaneous increases in toxics and NOx emissions on the order of 3%. This theoretical occurrence would result from the fact that the anti-dumping program allows 25% increases in sulfur, olefins, and T90 over baseline levels for all conventional gasoline, including low RVP gasoline, until 1998. Any emission increases due to the 25% allowable increases in sulfur, olefins, and T90 cannot be controlled under a low RVP program because low RVP gasoline is by definition a fuel-property based program controlling only RVP."

Response: The anti-dumping regulations are based on statutory guidance and the final rules as established by EPA. Both the RIA and the preamble for the RFG final rule included the EPA view that allowing the 25% increase in pool values for these parameters would not result in increases in toxics or NOx emissions prior to use of the Complex Model. There is no data presented to support EPA's assertion of simultaneous increases in toxics and NOx emissions on the order of 3%.

Statement: "Public perception may play a role in determining which of the two fuels programs should be implemented in a given area. For instance, due to the inclusion of an oxygenate, RFG may result in lower fuel economy (on the order of 2-4%), and may cause accelerated deterioration of some plastic and rubber parts (particularly for ethanol blends)."

Response: EPA is correct in observing that public perceptions play a role in determining the mix of ozone control options. The 2-4 percent RFG fuel economy penalty is proven. In contrast, lowering RVP raises fuel economy.

Statement: "Areas which are out of attainment for ozone and CO are likely to also have hazardous toxics levels, and so could benefit from RFG."

Response: Once again, EPA overstates the potential benefits of air toxics emissions reductions. There is no NAAQS for toxics; there is no basis for linking ozone non-attainment with toxics levels, and EPA has stated that RFG is extremely costineffective in addressing air toxics and provides insignificant human health benefits.

Statement: "If a 1 psi waiver has been given to ethanol blends for the area in question, low RVP gasoline may have significantly higher

evaporative emissions than RFG (1 psi waivers for the use of ethanol in gasoline are applicable only to conventional gasoline, not RFG)."

Response: There is no reason to believe that a change in volatility standard will affect the amount of ethanol blending in a market, as long as the 1 psi waiver is in place. A relative improvement in RVP will be gained regardless. For example, in a 9 psi RVP market, ethanol blends will be found at 10 psi. A shift to a 7.8 psi RVP specification will lower the RVP of ethanol blends to 8.8 psi. The area will have gained a 1.2 psi improvement in the effective RVP of fuels, and a reduction in VOC emissions. Furthermore, it is possible for a state to choose not to allow the 1 psi waiver for ethanol blends since it would reduce VOC emissions and contribute towards attainment; Phoenix and El Paso have used this option.

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August 2, 1996

Charles J. Krambuhl  
American Petroleum Institute  
1220 L Street, NW  
Washington, DC 20005-4070

Dear Mr. Krambuhl:

Thank you for your recent letter in which you comment on a March 22, 1996, memorandum written by David Korotney of my staff. The subject of ozone formation and the utility of various fuels programs in this context are complex subjects. Here I want only to provide a few thoughts on these subjects in general, and more specifically on the aforementioned memo. If, after reading this letter, you would like to explore these issues further, it may be worthwhile scheduling a meeting with our Ann Arbor staff.

In the context of discussions in several states concerning the most appropriate combination of mobile and stationary-source programs that together would provide the reductions in ozone-forming precursors needed to attain the national standards for ozone, the Fuels and Energy Division was asked to assess the relative benefits of RFG and low RVP gasoline. The information collected was summarized in a memorandum for use in addressing inquiries on the subject. The memorandum was not intended to be specific to any given area, and did not provide a detailed discussion of the issues, data sources, and analyses relevant to any comparison of RFG to low RVP gasoline. However, the memo fulfilled its intended purpose in stating our views on the relative merits of RFG and low RVP gasoline while simultaneously making it clear that the choice of either fuels program depends on the circumstances applicable to a given area.

We recognize that low RVP gasoline may be a useful alternative for cost-effectively reducing emissions of VOCs. As stated in the Conclusions section of the March 22 memo, low RVP gasoline may be appropriate in areas where "VOC is determined to be presently more important than NOx control" and when the other benefits associated

with RFG are deemed to be unnecessary for a specific area. At the same time, the memo clearly states that the higher cost of RFG may be warranted by the reductions in NOx, toxics, and CO, as well as the lower ozone-forming potential of the VOC emission reductions, associated with an RFG program.

As you know, we believe that NOx control is an important element of any strategy designed to bring the ozone non-attainment areas of the nation into attainment. Local NOx controls may be effective in some urban centers only when combined with additional VOC reductions. The modest reductions in NOx for Phase I RFG, and the more substantial reductions in NOx for Phase II RFG, provide a means for immediately reducing ozone without waiting for fleet turnover. As for local NOx control waivers recently granted for several areas, they have been granted on a contingent basis and will be reassessed in the context of state attainment plans, due to EPA in mid-1997. Thus it would be up to individual states to determine if such NOx controls are appropriate.

As a means of furthering the discussion of the relative merits of RFG and low RVP gasoline, we will post a copy of your June 26, 1996, letter on EPA's electronic bulletin board alongside David Korotney's March 22 memo and this reply. If you would like to further discuss this complex subject, I would be pleased to arrange a meeting.

Sincerely,

Charles N. Freed  
Director  
Fuels and Energy Division