



# Study of Boutique Fuels and Issues Relating to Transition from Winter to Summer Gasoline

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

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## **I. INTRODUCTION**

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### **The Clean Air Act and Clean Fuels**

In the Clean Air Act Amendments of 1990, Congress established a clean fuel program to reduce harmful emissions from our nation's vehicles. Cleaner fuels have been an integral component of the nation's strategy to reduce smog forming emissions and other harmful pollutants, including air toxics from our nation's air. Specifically, the reformulated gasoline program (RFG), which began in 1995, has been cost effective and has provided significant and immediate reductions in air pollution levels throughout the nation. Seventy-five million Americans breathe cleaner air today due to this program. The Clean Air Act also allows states, under specified circumstances, to implement their own clean fuel programs. Fifteen states have done so, providing cleaner air to millions more.

The RFG program was designed to serve several goals. These include improving air quality and extending the gasoline supply through the use of oxygenates. Congress established the overall requirements of the RFG program by identifying the specific cities in which the fuel would be required, the specific performance standards, and the oxygenate requirement. Today, roughly 30 percent of this country's gasoline consumption is cleaner-burning RFG. Neither the Clean Air Act nor EPA requires the use of any specific oxygenate in RFG. Both ethanol and MTBE are used in the RFG program, with fuel providers choosing to use MTBE in about 87 percent of the RFG. Ethanol is used in 100 percent of RFG in Chicago and Milwaukee, which are closer to major ethanol production centers. Congress mandated the use of oxygenates in reformulated gasoline in the Clean Air Act Amendments of 1990 to promote the use of renewable fuels, improve energy security, and enhance agricultural markets. Oxygenates have helped reduce VOC's (an ozone precursor), air toxics and carbon monoxide from tailpipe emissions.

### **The President's National Energy Policy Report**

On May 17, 2001 the White House released the President's National Energy Policy Report, which identified a comprehensive energy strategy to address a range of concerns. On the issue of fuel refinery and delivery infrastructure, the National Energy Policy Report directed:

the Administrator of the EPA to study opportunities to maintain or improve the environmental benefits of state and local "boutique" clean fuel programs while exploring ways to increase the flexibility of the fuels distribution infrastructure, improve fungibility, and provide added gasoline market liquidity. In concluding this study, the Administrator

shall consult with the Departments of Energy and Agriculture, and other agencies as needed.

In response to the National Energy Policy Report directive, EPA has undertaken a study, in consultation with the Departments of Energy and Agriculture, of “boutique fuels,” focusing on the various types of fuels, the motivation and causes for states to implement boutique fuels, the impact of these fuels on the fuel production and distribution system, and potential ways to mitigate the impact of disruptions (i.e., refinery fires, pipeline shutdowns) to allow for a more fungible gasoline fuel system.

### **Focus of the Report**

During the course of this study, requirements concerning the transition from winter to summer fuels were identified as a concern. Stakeholders with whom EPA met expressed concerns that there currently may not be enough flexibility during the transition season (April - June) to allow for an orderly changeover. We therefore have focused discussion in this report to methods that should provide more flexibility during the transition season. Such actions could improve inventory of fuels and potentially ease the price spikes which occur during the season. All improvements and options discussed would either maintain or improve the air quality benefits provided by today’s fuels programs.

EPA is prepared to act on a set of administrative and regulatory actions in the near term to mitigate the concerns that were expressed. These changes are intended to better facilitate seasonal gasoline transition and reduce the incentive for low inventories. In separate actions, we have outlined the planned and potential actions. We expect to act on these adjustments as early as this fall and intend to complete action on these transition improvements in advance of next year’s ozone season.

### **Additional Study**

EPA is also releasing a separate document that explores options for addressing boutique fuels issues in the longer term. EPA will release a Staff White Paper with more substantive information, including a discussion of the options examined for addressing the boutique fuels situation. A Notice of Availability will be published in the Federal Register requesting public review and comment on the White Paper.

Given the time constraints and complexity involved in the regulation and production of transportation fuels, EPA is not able to provide a full and complete study of options for recommendations at this time. Additional study is needed in areas beyond the air quality impacts, such as water quality impacts, efficiency of fuel production, distribution and consumption, energy security and import dependence, consumer affordability and regional impacts of options. This will require examination from a cross-section of experts within the Government and externally.

## **II. WINTER TO SUMMER TRANSITION CONCERNS AND POTENTIAL SHORT-TERM IMPROVEMENTS**

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### **A. Background**

Although gasoline prices generally rise around Memorial Day, the start of the summer driving season, for the past two years spikes have occurred in various parts of the United States. These price spikes occur when gasoline inventories become unusually low. Low gasoline inventories have occurred for a variety of reasons, including a recent trend in the petroleum industry towards reducing inventories to near the minimum operating levels. This has been particularly the case recently during the winter to summer transition. Additionally, because it costs refiners more to make summer grade fuel than winter grade fuel, competitive economic pressures lead refiners to delay this expense as long as possible. Another factor is that refineries and pipelines are currently operating at or near their maximum capacity. Refinery or pipeline equipment failures in areas with little spare supply capability have caused unexpected drops in gasoline inventories, sometimes to extremely low levels. With refineries and pipelines operating at near their maximum capacity, it is difficult to recover. The effect of a supply disruption is magnified if storage terminals are trying to minimize the amount of gasoline in their storage tanks at the same time a supply disruption occurs.

Both winter grade conventional gasoline (CG) and winter grade reformulated gasoline (RFG) have a higher Reid Vapor Pressure, or RVP, than corresponding summer grades. RVP is a measure of the gas pressure that gasoline would develop in a closed system when heated to 100 degrees Fahrenheit. As gasoline RVP increases, the tendency of the gasoline to evaporate or volatilize also increases. Higher evaporation rates result in increased emissions of volatile organic compounds (VOCs). Therefore, gasoline RVP is permitted to be relatively high during colder months because colder temperatures reduce the tendency of gasoline to evaporate and reduce emissions of volatile vapors. During warmer months when ozone is of most concern, gasoline RVP must be reduced to minimize VOC emissions and, in the case of RFG, to meet the VOC performance standards. (See Appendix B for a description of the federal gasoline requirements).

Each spring, high RVP winter grade CG and RFG must be replaced with lower RVP summer grade gasoline. EPA regulations stipulate that gasoline retailers must be selling summer grade CG and RFG by June 1 of each year. To assure sufficient supplies of summer grade gasoline are available to the retailer by the June 1 compliance date, EPA requires that by May 1 terminals and all other facilities upstream of the retailer must have only those gasolines that meet

the summertime requirements.<sup>1</sup> State RVP control programs for local areas follow similar target compliance dates. Refineries typically begin producing lower RVP fuel in March or April in order for terminals to be in compliance by May 1.

This can be done by starting to blend summer gasoline into the terminal tank prior to May 1, so that by May 1 the gasoline in the terminal tank meets summer specifications (“blend down”.) Another approach is to draw down the winter gasoline from the terminal tank by continuing to make deliveries of winter gasoline, but not replacing it. When the tank is sufficiently low, the terminal begins accepting summer gasoline in order to meet the May 1 compliance date. This method is called “draw down.” As noted earlier, there is market pressure to delay production and sale of summer gasoline, increasing the likelihood that terminals will use the draw down method for the transition to summer fuel. However, the draw down method may lead to low inventories of gasoline as the supply of winter fuel is drawn down and not replaced.

## **B. Potential Improvements to Address Logistical Concerns during Seasonal Transition**

Based on discussions with stakeholders regarding opportunities to improve supply by providing more flexibility during the transition from winter to summer fuels, EPA is considering a set of regulatory proposals. We expect to complete action on these transition improvements in advance of next year’s ozone season. These changes are intended to better facilitate seasonal gasoline transition and reduce the incentive for low inventories. EPA’s proposal will also address other regulatory changes that could help address gasoline supply concerns. Discussed below are the regulatory adjustments EPA will propose this fall. The Agency intends to seek public comment on the various options and alternatives discussed below with one exception. EPA has already proposed a rule to allow clean conventional gasoline to be reclassified as RFG. The public comment period on this rule has closed. We intend to take final action on this proposal without further comment.

### **1. Proposing Rule to Address Orderly Seasonal Transition**

EPA is considering a rule to establish an April 15 date for receipt of federal summer RFG at terminals.<sup>2</sup> This option would require terminals to accept only summer grade gasoline beginning April 15. We will also take comment on eliminating the current May 1 compliance date for summer grade gasoline. Requiring all terminals to receive summer grade gasoline by April 15 should ease competitive pressure on terminals (and refiners supplying these terminals)

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<sup>1</sup> The May 1 compliance date basically applies to all parties upstream of the retail facilities, including terminal, pipelines, tank truck carriers, though the focus of the transition problem involve terminals. For ease of discussion the May 1 date will be referred to here as either a compliance date or a terminal compliance date.

<sup>2</sup> The proposal discussed in this section would affect basically all parties upstream of retail facilities. As with the May 1 date, however, the focus of this issue is on the transition at terminals, so for ease of discussion the April 15 date will be referred to as a terminal receipt date.

to draw down their inventory of winter fuel as low as possible before starting to accept summer grade fuel. This change would moderate the draw down of gasoline stocks at terminals during the transition period and should help reduce price volatility in certain geographic areas by lengthening the turnover time. Different terminals would make their RVP transition at different times, eliminating the simultaneous draw down at many terminals.

With an April 15 terminal receipt date, there would still be market pressure for refiners to delay production of summer gasoline until it is required but the terminal would not need to draw down the winter gasoline in their tanks prior to April 15. This is because the April 15 date applies to gasoline supplies received on or after that date; it does not require that the gasoline in the tanks be in compliance with summer specifications on April 15. This should lead to greater use of the blend down method to meet a market driven terminal compliance date. Even if a terminal does end up drawing down their winter gasoline supplies before April 15, there is more time to then build up supplies of summer fuel before the summer driving season leads to increased demand for gasoline.

A terminal receipt date earlier than April 15, say April 1, would further help to spread out the time window for terminals to make their transition. Making the terminal receipt date earlier in April, however, would increase concerns that driveability problems could occur at lower RVPs earlier in the year. Vehicle engines may experience difficulty in start-up and smooth operation, particularly at cooler ambient temperatures, if their fuel RVP is too low for such temperatures. Refiners also prefer a later date than April 1 to reduce production costs and increase overall volume. EPA will take comment on the earlier date.

Two possible variations on this option are to maintain the current May 1 compliance date for summer grade gasoline or change the May 1 compliance date to May 15. Some have suggested that the May 15 date may be sufficient without establishing a receipt date at the terminal. Without a receipt compliance date most agreed that more of a compliance burden would be placed on the retailers. The May 1 compliance date currently allows retail stations one month to turn over their tanks from winter grade to summer grade RFG. Discussions to date with retailers, terminals and refiners have indicated that retail stations may need less than one month to turn over their tanks. If the May 1 compliance date is eliminated or pushed too far back in May, however, retailers may begin receiving winter grade RFG so late in May that they are unable to have their tanks completely turned over by June 1. This potential situation is more acute for smaller, low volume retailers. We will further outline these issues in the proposal and seek comment on these variations.

Finally, some have suggested that another way to address the issue of transition is to require a two step phase-in for RVP. This option would establish two-separate RVP compliance dates by which terminals must be in compliance. For example, terminals would need to have their RFG tanks completely turned over to an intermediate RVP of 9.0 psi by April 15 and completely turned over to summer grade RFG by May 1. An alternative example could be that

terminals must have their RFG tanks completely turned over to an intermediate RVP of 9.0 psi by May 1 and completely turned over to summer grade RFG by May 15.

Several comments were made during discussions regarding the two step phase-in option as an alternative to the terminal receipt date option. Some commented that the phase-in approach would be preferable to a terminal receipt date. Others commented that the addition of a second transitional RVP compliance date would not be as effective as a terminal receipt date, adding a layer of complexity to an already complex system and potentially adding more boutique fuels. The Agency currently believes that the change to the terminal receipt date will be more effective than a two-step phase-in method. We will also elaborate on this variation and seek comment in the proposal.

## **2. Permit Testing Tolerance for First Summer RFG Tank**

EPA will review its current position on the use of a downstream enforcement testing tolerance and explore the possibility of applying this testing tolerance to the first turn of the tanks at terminals from winter to summer gasoline. This would allow terminals to use the 2 percent downstream VOC enforcement tolerance for their first tank after the May 1 compliance date, easing conversion of their tanks to summer specifications. EPA regulations for Phase II summer RFG specify a minimum percentage in per-gallon VOC emissions. In VOC control region 1 (southern states with relatively warm weather), VOC emissions must be reduced 25.0 percent below the baseline on a per-gallon basis. In VOC control region 2 (northern states with relatively cool weather), VOC emissions must be reduced 23.4 percent below the emission baseline on a per-gallon basis.<sup>3</sup> Through an enforcement testing tolerance, EPA allows RFG downstream of the refinery if the emissions performance is 23.0 or 21.4 percent for RFG used in VOC control regions 1 or 2, respectively. The flexibility being contemplated here should help increase RFG supply during the transition period and reduce costs for correcting slightly off-spec batches.

Currently, to help ensure that summer standards are met, EPA does not permit terminals to use the 2 percent downstream VOC enforcement tolerance for the first tank of summer grade gasoline, thus requiring fuel to, in some cases, exceed the performance standards by the test tolerance. Gasoline can be called VOC-controlled only when the first tank meets the VOC standard without a tolerance.

This option might minimally decrease emission benefits of the RFG and RVP programs, but only for the first tank and prior to the start of the June 1 retailer compliance date and the approximate start of the high ozone season – therefore, at a time of year when the decrease of emission benefits will not be critical. This added flexibility should help increase RFG supply during the transition period and reduce costs for correcting slightly off-spec batches.

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<sup>3</sup> Refiners must meet the per-gallon standards at a minimum; i.e., these standards represent the least amount of emission reduction allowed on a per gallon basis. Refiners must meet, on average, a more stringent standard, as discussed in Section IV. Specifically, in VOC control Region 1, the VOC performance standard is 29 percent; in VOC control Region 2 it is 27.4 percent.



### **3. Simplify Blendstock Accounting Regulation**

Another flexibility to address seasonal transition issues is to simplify the existing blendstock accounting regulations, under the anti-dumping regulations for conventional gasoline (CG). Simplification of these regulations would directionally improve overall gasoline supply by increasing refiners' flexibility to transfer gasoline blendstocks. This would not be uniquely designed to apply only to boutique fuels but would apply to all conventional gasoline. EPA will propose modifications in the blendstock accounting regulations as part of the rulemaking package addressing seasonal transition issues.

The anti-dumping regulations were instituted as part of the RFG program to prevent increases in oxides of nitrogen (NOX) and toxics emissions from conventional gasoline as a result of RFG production. RFG is formulated to produce relatively low levels of emissions compared to conventional gasoline. Anti-dumping prevents CG from becoming higher in emissions due to the extensive use of clean blendstocks in RFG. In practice, these regulations require refineries to produce conventional gasoline with emissions of NOX and toxics as good as or better than 1990 baseline emissions. Under these regulations, refineries developed individual baselines for these emissions based upon gasoline production in 1990. Importers and some refiners not able to develop an individualized baseline were allowed to adopt a baseline equivalent to the U.S. average for 1990 referred to as the statutory baseline.

Because some refineries had baselines with much lower emissions than the 1990 average and some much higher than the average, there were concerns that refineries with cleaner than average baselines would transfer dirty blendstocks to refineries with dirtier baselines since these refineries might be more able to absorb these blendstocks for compliance purposes. The blendstock accounting regulations require that if a cleaner refinery transfers excessive amounts of dirty gasoline blendstocks to another refinery, the original cleaner refinery would have to account for these blendstocks in its compliance calculations. Thus, the cleaner refinery could not benefit from such a transfer. This regulation requires significant additional reporting by a refinery with a baseline cleaner than the statutory baseline that transfers 10 percent more blendstocks than it transferred in 1990 relative to its total production.

The blendstock accounting regulation can possibly be simplified to apply only in unusual situations that would circumvent the intention of the regulation. Additional requirements placed on refiners by the recent Mobile Source Air Toxics Rule (MSAT) make refineries much less likely to accept high toxics-emissions gasoline blendstocks from other refineries. Additionally, when refineries produce more total gasoline than produced in 1990, the additional CG, over and above the 1990 baseline volume, must meet the statutory baseline for all refineries regardless of the refinery's individual baseline. Since nearly all refiners produce significantly more gasoline than produced in 1990, a significant portion of every refinery's CG is produced today to meet the statutory baseline. Given this situation, the opportunities to benefit from the transfer of blendstocks based upon differences in individual baselines is significantly decreased. Also, beginning in 2004, sulfur in all gasoline must be reduced significantly for compliance with new

Tier 2 vehicles, virtually eliminating NOX emissions. Therefore, this simplification should have no adverse impact on air quality.

#### **4. Allow previously certified fuel to be reclassified**

EPA has already proposed to establish procedures for using previously certified gasoline, or “PCG,” in the production of gasoline.<sup>4</sup> We intend to take final action on this proposal. PCG is gasoline that has been previously included in a refiner’s compliance calculations for purposes of complying with the RFG or CG standards. Currently, if PCG is combined with other gasoline blending components to produce a new batch of gasoline, the PCG volume and properties are required to be excluded from existing compliance calculations to avoid double counting of the PCG.

The proposed procedures for using PCG would allow refiners to upgrade previously certified CG to RFG, or reclassify RFG with regard to VOC control categories (e.g., conversion of northern RFG to southern RFG). This will improve flexibility by providing additional RFG sources in a tight RFG market.

Refiners currently are prohibited from using previously certified CG to produce RFG (i.e., from “upgrading” CG to RFG), and from reclassifying RFG with regard to VOC control. These prohibitions were intended to prevent a degradation of the overall quality of the various gasoline pools. For example, a refiner could produce very “clean” CG and include it in its anti-dumping compliance calculations, and then reclassify it as RFG with little or no additional blending. The CG pool would then appear cleaner than it actually is because the clean previously certified CG would be sold as RFG rather than CG. The proposed procedures for using PCG contain requirements and limitations to ensure that there will be no degradation of the quality of the various gasoline pools or other adverse impact on air quality.

#### **C. Other Potential Changes Suggested by Stakeholders**

In addition to these proposed changes discussed above, EPA is seeking comment through a subsequent rulemaking on an option to decrease the minimum allowable RVP. This suggestion was raised during the course of our stakeholder discussions. While the Agency is not inclined to take action on this option at this time, we invite public comments on it as part of the public review of this study.

The suggested option would decrease the allowable minimum RVP for RFG at the refinery gate to 6.0 psi from 6.4 psi. Under the emissions model used to measure RFG

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<sup>4</sup> See 62 Fed. Reg. 37338 (July 11, 1997). EPA has sought comment on the change regarding previously certified gasoline and is not reopening the comment period at this time.

performance, the lower valid range limit for RVP is 6.4 psi. This lower limit works to prevent problems with vehicle driveability associated with lower RVP gasoline.

Reducing the RVP of gasoline at the refinery gate increases the ability of terminals to blend down to compliant RVP levels by allowing lower RVP RFG to be blended with winter grade RFG during the tank turnover process. For example, if a tank containing 10,000 barrels of winter grade RFG with a 13.0 psi RVP is blended with 90,000 barrels of summer grade RFG with a 6.4 psi RVP, the resulting mix would have an RVP of 7.06 psi. If 10,000 barrels of 13.0 psi RVP RFG were blended with 90,000 barrels of 6.0 psi RVP RFG, the resulting mix would have an RVP of 6.70 psi.

This option has no adverse air quality impact. California Air Resources Board (CARB) allows an increased valid RVP range of 6.2 to 6.8 psi. To allay concerns about driveability, the minimum RVP specification could be limited to an RVP transition period (March 15 - May 1), and relaxed only at the refinery gate, not at the terminals; that is, terminals could be required to only allow distribution of fuel with RVP no lower than 6.4 psi. We are also not certain how frequently refiners would use this option due to the additional processing cost required to reduce the RVP below 6.4 psi. We welcome comments on the potential impacts and benefits of this option.

## **Conclusion**

Boutique fuels have been designed by state and local governments to achieve specific reductions in motor vehicle-related air pollution. EPA has found that one of the primary reasons for states taking this action is the oxygenate mandate in the Clean Air Act's reformulated gasoline program that often results in an increased use in MTBE, an oxygenated gasoline additive. Many states want to avoid the use of MTBE in their gasoline because the additive has been found to contaminate water supplies.

EPA has also found that the current gasoline production and distribution system is able to provide adequate quantities of boutique fuels, as long as there are no disruptions. If there is a disruption, such as a pipeline break or refinery fire, it becomes much more difficult to provide gasoline supplies to affected areas because of constraints created by these boutique fuel requirements. In addition, EPA clearly heard from fuel providers that state laws that ban the use of MTBE in future years will proliferate the number of boutique fuels and may present new challenges to this country's fuel production and distribution system.

The potential improvements discussed in this section are the result of discussions with diverse stakeholders. While EPA has identified a series of proposed regulatory changes designed to provide additional flexibility during the seasonal gasoline transition listed under (B) above, upon publication of the proposed rule in the Federal Register, we will be inviting public comment on all the suggested improvements discussed in this section with the exception of the suggestion regarding reclassified gasoline.