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1200 Pennsylvania Avenue, NW
Washington, DC 20560

Growth Energy's Comments on EPA's Proposed Control of Air Pollution from Motor Vehicles: Tier 3 Motor Vehicle Emission and Fuel Standards

To Whom It May Concern:

Growth Energy is the leading trade association for America's ethanol producers and supporters. Growth Energy represents 79 ethanol production facilities and thousands of ethanol supporters across the nation. We promote expanding the use of ethanol in gasoline, decreasing our dependence on foreign oil, improving our environment and creating American jobs. Ethanol is a home-grown, renewable fuel that provides significant benefits to our nation's air quality. We vigorously support the Renewable Fuel Standard (RFS) and the continued use of ethanol in our nation's fuel supply as it significantly reduces carbon monoxide, particulate matter and greenhouse gas emissions. As such, we are pleased to have this opportunity to comment on the Agency's proposed "Tier 3" Emission and Fuel Standards as there are several key issues that, when addressed, will continue to promote the expanded use of biofuels in our nation's transportation fuel system.

In particular, Growth Energy fully supports the use of E15 emission certification fuel, the introduction of a high octane, low-emission E30 certification fuel, and the treatment of midlevel ethanol blends (E16-50) as alternative fuels. We also have several concerns about some of the specific standards for Denatured Fuel Ethanol (DFE) and some of the hurdles to the potential use of an E30 certification fuel. We also continue to stress the Agency's importance to the deployment of higher ethanol blends into the marketplace in order to fulfill the goals of improving air quality, reduce greenhouse gas emissions as well as to achieve the RFS volumes.

Growth Energy Strongly Supports an E15 Certification Fuel

Growth Energy saw the need for additional market space for the higher biofuel volumes called for under the RFS and subsequently filed the Green Jobs waiver for E15 with the Agency in 2009. In January 2011, the Agency approved the waiver for 2001 and newer light duty vehicles. While the critics have done everything in their power to prevent higher ethanol blends in the marketplace, EPA has appropriately proposed that all 2017 and newer vehicles should be certified on E15 – clearly the fuel of the near future. Nearly the entire American vehicle fleet fuels on E10 today rather than E0. Now that EPA has approved E15 and the U.S. Supreme Court has denied cert on the critics' lawsuits to prevent the implementation of the E15 waiver, it only makes sense that the automakers and the American public move forward with what EPA views as a major transportation gasoline blend in the near term. With the approach of the RFS blend wall, it only makes sense that we will begin to see more E15 in the marketplace. Additionally, more than 70 percent of the vehicles on the road have been approved by EPA for use with E15 (model years 2001 and newer), and two major automobile manufacturers, Ford and General Motors, are already warrantying their newer vehicles for E15 – GM for model years 2012 and 2013 and Ford for model year 2013 (Oil Price Information Service, October 2, 2012 "Ford and GM Okay E15 Blends for Newer Vehicles").

Growth Energy also recognizes ethanol's important octane contribution to the nation's fuel supply. As it relates to the proposed E15 certification fuel, we feel that it is crucial that any additional octane achieved by adding ethanol should not be lost by making lower-octane gasoline blendstocks (CBOB and RBOB). As such, Growth Energy believes that a higher octane level certification fuel would be more reflective of in-use octane levels of E15 fuels. Specifically, we recommend a base octane level of 88.5 - 90 [(R+M)/2]. With the addition of ethanol, it may also be necessary to lower aromatics, benzene and specific distillation temperature limits. ASTM Standard D4814 uses a T50 distillation temperature range of 150 – 190 degrees, while EPA proposed a T50 distillation temperature range of 170-190 degrees. EPA should lower the lower end of the temperature range to be consistent with the ASTM standard. Growth Energy also agrees that additional ethanol use can, and should, lower total aromatics, and that should be reflected in the E15 certification fuel accordingly.

Demonstration of Ethanol's Emissions Benefits and Growth Energy's Support of a Workable E30 Certification Fuel

We wholeheartedly agree with EPA's assessment that the proposed standards "represent a 'systems approach' to reducing vehicle-related exhaust and evaporative emissions by addressing the vehicle and fuel as a system." Growth Energy made substantive comments in this regard on the Agency's proposed Greenhouse Gas Emissions and Corporate Average Fuel Economy Standards for 2017 and Later Model Year Light-Duty Vehicles aimed to aid the automakers as they design the next generation of vehicles to take advantage of ethanol's octane and emissions properties, as well as a means to achieve the goals of the RFS. Numerous studies have shown that as our nation moves to smaller, higher-compression engines, higher octane fuels using ethanol will be required. These higher-octane fuels using ethanol should not be more expensive – like today's premium. Later in these comments we present the results of a study that shows these fuels will likely be lower cost than today's regular. EPA should insist that refineries and fuel producers not reduce the quality of our nation's fuel and potentially jeopardize the nation's air quality.

While Aromatic Gasoline Components Substantially Increase PM Emissions, Ethanol Improves Air Quality

As we noted in previous comments to the Agency, numerous studies have looked at the impact of fuel quality on emissions from vehicles. These studies have found that the heavier gasoline components-aromatics - substantially increase particulate matter (PM) emissions (Iizuka, M., Kirii, A., Takeda, H., Watanabe, H. (2007). Effect of Fuel Properties on Particulate Matter Emissions from a Direct Injection Gasoline Vehicle. *JSAE Technical Paper* 20074414, 2007, http://www.pecj.or.jp/japanese/overseas/asian/asia_symp_5th/pdf_5th/15-MasashiIizuka.pdf; Jetter, J. (2010). Effect of Fuel Composition on PM Emissions, LEV III Workshop, May 18, 2010, El Monte, California; Aikawa, K., Sakurai, T., Jetter, J.J. (2010). Development of a Predictive Model for Gasoline Vehicle Particulate Matter Emissions. *SAE Technical Paper* 2010-01-2115. DOI: 10.4271/2010-01-2115; Khalek I.A., Bougher T., Jetter, J. (2010). Particle Emissions from a 2009 Gasoline Direct Injection Engine Using Different Commercially Available Fuels. *SAE Technical Paper*

2010-01-2117. DOI: 10.4271/2010-01-2117.)

Alternatively, there is substantial evidence that increased ethanol will actually reduce particulate matter mass and number emissions (PM and PN) from the vehicle fleet. Szybist et al.,(J. Szybist, A. Youngquist, T. Barone, J. Storey, W. Moore, M. Foster, and K. Confer, Ethanol Blends and Engine Operating Strategy Effects on Light-Duty Spark Ignition Engine Particle Emissions, *Energy and Fuels*, vol. 25, pp. 4977-4985, 2011) also summarize recent literature on how ethanol affects production engines:

> A number of investigations have examined the effect of ethanol content on particle emissions in vehicles. Storey et al. found that blends of 10 and 20% ethanol in gasoline (E10 and E20) decreased particle number emissions during vehicle drive cycles, with the 20% blend decreasing particles by about 40% during the high-load US06 vehicle drive cycle. In comparison to gasoline, He et al. found a 20% reduction in particle emissions with E20 but no change with E10. Khalek and Bougher showed that E10 increased particle emissions compared to two different gasoline formulations, both with higher volatility than the E10. This works showed the importance of the hydrocarbon fraction of the E10 blend and suggests that the heavier hydrocarbons used to control vapor pressure of E10 may also increase particulate emissions. Aakko and Nylund found that the particle mass emissions from 85% ethanol (E85) were comparable to those with gasoline in a PFI vehicle but that DI (direct injection) fueling with gasoline produced particle emissions that were an order of magnitude higher.

The Szybist et al. study investigated the effects of fuel type, fueling strategy, and engine breathing strategy on particle emissions in a flexible spark ignited engine that was designed for optimization with ethanol. They report:

> When DI fueling is used for gasoline and E20, the particle number emissions are increased by 1 to 2 orders of magnitude compared to PFI fueling, depending upon the fuel injection timing. In contrast, when DI fueling is used with E85, the particle number emissions remain low and comparable to PFI fueling. Thus, by using E85, the efficiency and power advantages of DI fueling can be gained without generating the increase in particle emissions observed with gasoline and E20. The main finding of the study is that use of E85 results in 1 to 2 orders of magnitude reduction in particle emissions relative to sDI (spray-guided DI) fueling with gasoline and E20. Furthermore, sDI particle emissions with E85 are similar to that for PFI fueling with gasoline. Thus, an increase in particle emissions beyond that of PFI engines can be prevented while gaining the efficiency of DI engines using E85.

Storey et al., 2010 (J. Storey, T. Barone, K. Norman, and S. Lewis, Ethanol Blend Effects On Direct Injection Spark-Ignition Gasoline Vehicle Particulate Matter Emissions, SAE publication 2010-01-2129) characterized the emissions, including PM and aldehydes, from a U.S. legal stoichiometric direct injected spark-ignited (DISI) vehicle operating on E0, E10, and E20. The PM emissions were characterized for mass, size, number concentration and OC-EC (organic carbon-elemental carbon) content. The DISI particle number-size distribution curves were similar in shape to light-duty diesel vehicles without Diesel Particle Filters, but had lower overall particle number and mass emissions. The aggressive US06 transient cycle had much higher PM mass emissions in comparison to the PM mass emission observed for the FTP. With respect to added ethanol, Storey et al. concluded:

> Ethanol blends reduced the PM mass and number concentration emissions for both transient and steady-state cycles. By increasing the ethanol blend level from E0 to E20, the average mass emissions declined 30% and 42% over the FTP and US06, respectively. Measurements during hot

> cycle transient operation demonstrated that E20 also lowered particle number concentrations. The adoption of small displacement, turbocharged DISI engines into the U.S. fleet is likely to continue in the future, and the results of this study suggest that increasing ethanol blend levels in gasoline will lower DISI PM emissions. In addition, increasing ethanol content significantly reduced the number concentration of 50 and 100 nm particles during gradual and wide open throttle (WOT) accelerations.

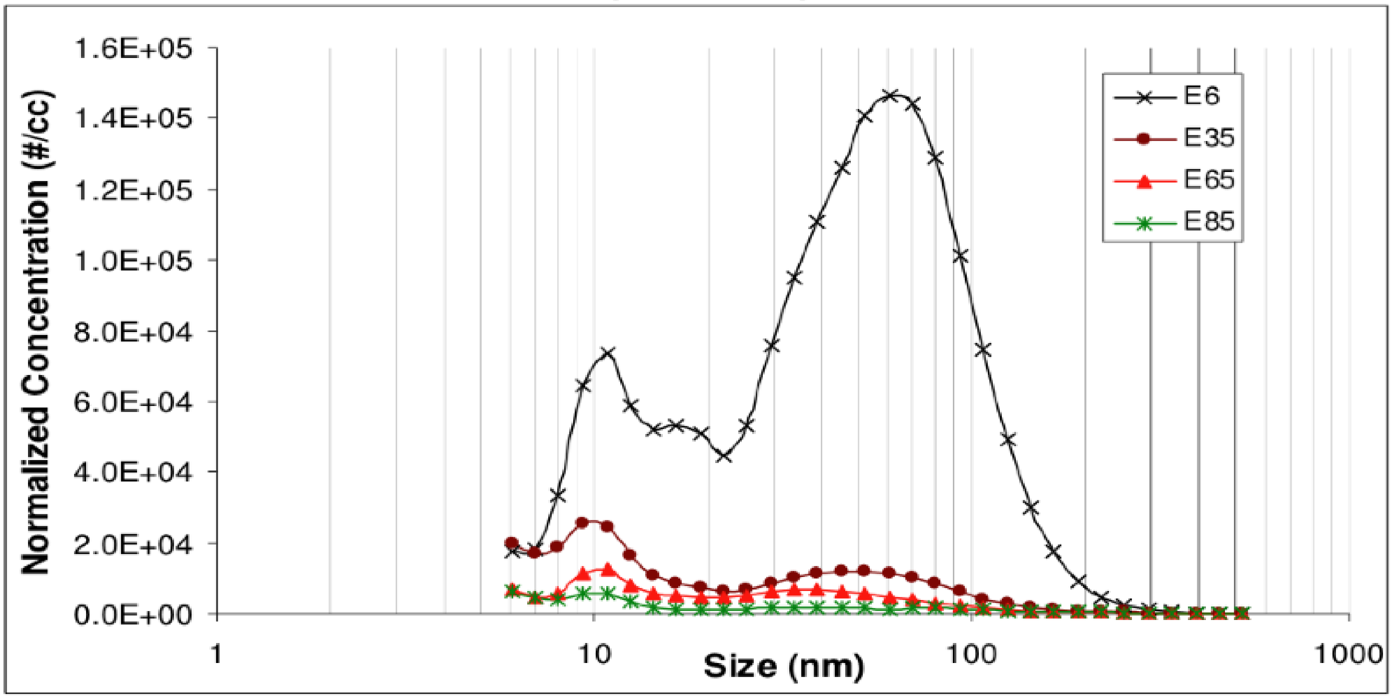
Maricq et al., 2012 (M. Maricq, J. Szente, and K. Jahr: The Impact of Ethanol Fuel Blends on PM Emissions from a Light Duty GDI Vehicle, Aerosol Science and Technology, 465, 576-583) tested a light-duty truck equipped with a 3.5-L V6 gasoline turbocharged direct injection engine that is representative of current GDI products, but contained prototype elements that allowed changes in engine calibrations. Because PM formation in GDI engines is sensitive to a number of operating parameters, two engine calibrations were examined to gauge the robustness of the results. The study used four fuels: certification test gasoline (E0), a commercial E10 fuel similar to that expected for future certification, a commercial pump grade E10, and a commercial E100 fuel used for blending. E100 and E0 were splash-blended to produce E17, E32, and E45 fuels. Maricq et al. report:

> As the ethanol level in gasoline increases from 0% to 20%, there is possibly a small (<20%) benefit in PM mass and particle number emissions, but this is within test variability. When the ethanol content increases to >30%, there is a statistically significant 20%-45% reduction in PM mass and number emissions observed for both engine calibrations.

The results reported by Zhang (Zhang et al, "A Comparision of Total Mass, Particle size Distribution and Particle Number Emissions of Light Duty Vehicles tested at Haagen-Smit Laboratory from 2009 to 2010," In Proceedings of 21st CRC Real World Emissions Workshop, San Diego, CA, USA, 20-23 March 2011) are also particularly informative. The key results are shown below. In this testing, a 2008 FFV was tested on a hot Unified Cycle on E6, E35, E65, and E85. Ethanol appears to have caused a large reduction in PM emissions (and particularly PN) from E6 to E35, with further PM reductions as ethanol concentration increased. However, the most significant PM and PN reductions are between E6 and E35.

2008 MY - Flex Fuel

Hot UC – composite phase 1 and 2



Ethanol Fuel	PM mg/mile	PN 10^{12} #/mile
E6	1.60	4.70
E35	N/A	0.70
E65	0.60	0.30
E85	0.27	0.14

EPA's analysis of EPACT data shows the possibility of slightly higher PM emissions with increasing ethanol concentration. However, the EPACT test fleet was all Tier 2 vehicles, with few if any vehicles with direct injection. Direct injection vehicles can experience higher baseline PM emissions than ported fuel injected vehicles, which is the predominate fuel system technology utilized for Tier 2 vehicles. It is likely that increasing ethanol content would reduce PM on DI vehicles, as shown in the previously referenced studies in these comments. Also, the fuels used in the EPACT testing program were match-blended. The higher ethanol blend used in the EPACT study - an E20 fuel - is not likely to be representative of a higher ethanol blend that would have higher octane. Therefore, the EPACT testing results are not applicable with respect to PM emissions for the 2017 and later Tier 3 fleet.

Thus, there are now a substantial number of studies showing that ethanol blends of 20 percent and higher reduce PM mass and number emissions in a variety of engines and vehicles. EPA should review these studies in detail and give serious consideration to further regulate the harmful components of gasoline as well as to encourage the use of additional ethanol as a means to improve the nation's air quality.

Growth Energy Supports a Workable, E30 Certification Fuel

Based on these findings, Growth Energy is very supportive of the Agency moving forward with an E30 certification fuel for emissions; however, we have significant concerns about some of the unnecessary hurdles that automakers would experience in order to use such a fuel based on EPA's proposal.

First, a requirement that the fuel be readily available nationwide is not workable. The distribution of fuels is largely dependent on some of ethanol's fiercest critics in the oil industry that continue to stifle the growth of any blends of ethanol above 10 percent. EPA should not hold the automakers accountable for the oil industry's effort to limit the availability of these fuels, and instead, should either allow the automakers to immediately certify their vehicles on E30 or otherwise require that it be made available nationwide.

Secondly, as we have shown, midlevel ethanol blends make significant contributions to our nation's air quality. As such, EPA should consider using its authority and weight to make E30 and other midlevel ethanol blends more available in the marketplace and should not penalize automakers for making vehicles capable of using such fuels. By requiring automakers to "demonstrate that vehicles would not operate appropriately on other available fuels" would run completely counter to their already well-established FFV production and the intent of making a Flexible Fuel vehicle.

Growth Energy is also concerned that the R-Factor of 0.6 in the current fuel economy equation could also prevent automakers from using an E30 certification fuel option because of its impact on the fuel economy standards. The current factor is based on the use of older engine technology using ethanol-free gasoline. Based on information contained in the docket for the proposal (Aaron Butler, "Analysis of the Effects of Changing Fuel Properties on the EPA Fuel Economy Equation and R-Factor"), a higher R-factor of 0.8 – 0.9 would be more accurate and may encourage automakers to use an E30 test fuel.

Finally, while we believe it is essential to remove these hurdles in order for automakers to use E30 as a certification and in-use fuel; we do, however, want to offer the agency the benefit of the extensive work and research we have done to get an in-use high octane, low-emission fuel into the national marketplace. Growth Energy commissioned two studies to look at both the refining cost, and distribution costs of developing a 92 Anti-Knock Index (AKI), E30 gasoline. These studies found that an E30 high octane blend can be produced for less than the cost of current gasoline, and that the development of the infrastructure over time is very affordable. Specifically, a 92 AKI E30 can be produced for between $11.7 billion and $30.8 billion per year less than the cost of current 88 AKI regular gasoline. Additionally, the costs to develop infrastructure at terminals and gas stations across the country ranged from $0.0024 to $0.0056 per gallon on a 15-year amortized basis. The complete studies are attached and are briefly summarized here:

MathPro RefineryStudy Shows E30 is Less Expensive Than Today's Gasoline

The MathPro Refinery study employed a linear programming (LP) model of the U.S. refining sector to estimate the main economic effects in the U.S. refining sector (including changes in the refining costs of transportation fuel) and on consumers of future fuel standards requiring the use of 92 AKI gasoline in HiTech vehicles. The refinery LP model incorporates the molar concentration blending method to represent ethanol's blending octane in the various ethanol/hydrocarbon BOB blends considered. This method produces estimates of the effective blending octane of ethanol in given ethanol/BOB blends that are functions of the molar fraction of ethanol in the blend, the octane of the BOB, and the octane of neat ethanol (109 RON/90 MON). After calibrating the refinery LP model to replicate reported operations of the U.S. refining sector in 2011, MathPro used the model to assess alternative assumptions on how the new fuel economy standards and increased ethanol use in the target years would affect the volume of U.S. gasoline exports in those years. They estimated the effects on refining economics and consumer costs of the various 92 AKI ethanol blend options by comparing the estimated costs returned by the refinery model in the 92 AKI Study cases with those in the corresponding 88 AKI Reference cases. Finally, they developed estimates in this manner for each of two assumed ethanol price scenarios: Low ethanol price: energy parity (¢/K BTU) with the wholesale price of 88 AKI E10, and High ethanol price: volumetric parity (¢/gal) with the wholesale price of 88 AKI E10. MathPro determined that the impact on the cost of transportation fuel was that the 92 AKI gasoline would be between $11.7 billion per year (ethanol at volumetric parity) and $30.8 billion per year (ethanol at energy parity) *less* than the current AKI 88 regular gasoline.

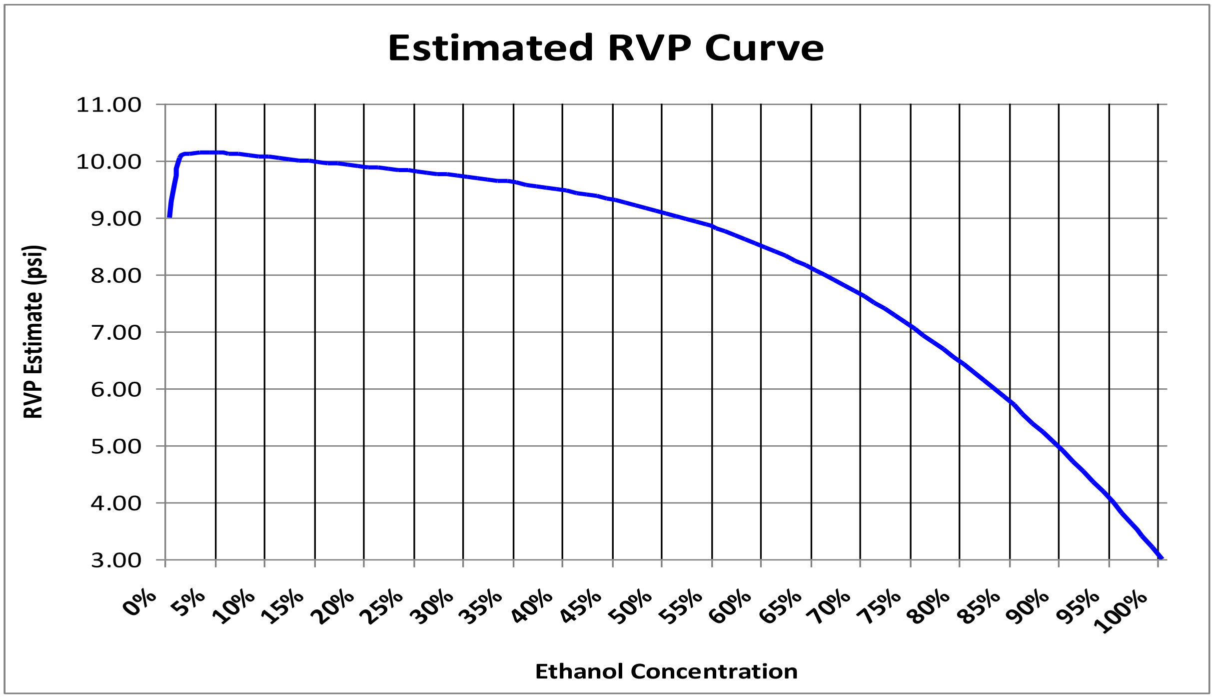
<u>Stillwater Associates Marketing and Distribution Study Shows E30 Infrastructure is Very Affordable</u>

Stillwater Associates examined the marketing and distribution costs of widespread distribution of E30 fuel to 2017 and later motor vehicles (and FFVs). Marketing and distribution costs consist of bulk transport of additional ethanol, modifications to terminals that store and blend ethanol with gasoline, and modifications to gasoline stations. Stillwater modeled three cases. In the first case, it was assumed that E30 would be blended at the terminal and delivered to the station. Both terminals and stations would incur costs because they are not currently capable of delivering E30 except for a limited number of Midwest localities. The cost of this case is estimated at $3.5 billion, an average of $37 thousand per participating service station or$.0024/gallon on a 15-year amortized basis. The second case recognizes that gasoline quality regulations could drive a different solution. This second case looked at a combination of terminal blending and service station blending. The case recognizes that in regions where Reid Vapor Pressure (RVP) is controlled by reformulated gasoline regulations or by State Implementation Plans, current gasoline can be blended with fuel ethanol through a "blender pump" at the service station to make E30 without requiring a special E30 blendstock. In the Conventional Gasoline areas where RVP is subject to the 1-psi waiver, the E30 would have to be blended with a separate gasoline blendstock at the distribution terminal and delivered to the gas station. The cost of the second case is estimated at $5.8 billion, an average of $62 thousand per participating service station or $.0040/gallon on a 15-year amortized basis. The third case examined the cost of doing all the E30 blending at the service station through blender pumps and assumes the RVP regulatory issues for E30 have been addressed. This option provides the retailer with the greatest level of flexibility for offering different blend levels, but also has the highest cost. The estimated cost of this case is $8.1 billion, or $87,000 per participating station. Spread over the 15 year life of the equipment, the cost of the changes is estimated to be $0.0056 per gallon.

<u>Higher Ethanol Blends Improve Air Quality and Warrant Consideration for Higher Reid Vapor Pressure Limits</u>

In the proposal, EPA seeks comment on whether it is appropriate to allow higher RVP limits for midlevel in-use ethanol blends (E16-E50). Currently, EPA is required to limit gasoline to 9.0 pounds per square inch (psi) except in areas where further emission control is required, and E10 currently has a 1 psi waiver allowing it to rise to 10.0 psi. Any review of RVP and ethanol blends shows that RVP decreases as ethanol is added and that the highest RVP occurs with an E10 blend (estimated RVP curve below). As ethanol increases, RVP decreases and better air quality is achieved. Therefore it is certainly appropriate and Growth

Energy would fully support higher RVP limits for all ethanol blends above E10. It would be counter to the intent of this proposed rule to continue to provide a waiver for E10 while requiring blends above E10 which demonstrate better air quality not to enjoy the same treatment.



Specifically, EPA sought comment on the regulation of midlevel and highlevel ethanol blends (E16-E85) as an alternative fuel family as discussed in the Herzog memo to the docket (Jeff Herzog, "Possible Approach to Fuel Quality Standards for Fuel Used in Flexible-Fuel Automotive Spark-Ignition Vehicles (FFVs)"). Growth Energy fully supports the treatment of ethanol blends above E15 as an alternative fuel family rather than as gasoline and feels as though EPA can use its authority under 211(C) to take ethanol blends' lower RVP relative to E10 gasoline to provide similar RVP leeway as that given to gasoline. Additionally, because evaporative emissions from the current vehicle fleet are already well controlled and will be further controlled through the Tier 3 evaporative emissions standards, Growth Energy believes that a similar 1 psi waiver should also be extended to gasoline blends above E10 as well as midlevel ethanol blends.

Growth Energy Supports a Workable Flex Fuel Vehicle (FFV) Certification Fuel

EPA also proposed a specific "E85" test fuel with an ethanol concentration of E80-E83 that would be made by blending ethanol (either denatured fuel ethanol or neat ethanol) with the E15 test fuel.

Growth Energy continues to believe that Flexible Fuel vehicles will be essential to use the higher ethanol blends needed to meet the future volumes of the RFS. As such, it only makes sense to develop a specific test fuel for FFVs. However, we do not think that the specifications are representative of E85 found in marketplace, especially since ASTM has published its "Flexible Fuel" specification.

Growth Energy would suggest that the RVP of the FFV certification fuel should be at 9 psi and the ethanol content should be somewhere in the range of 70-78 percent (E70 – E78).

<u>EPA must not burden the ethanol industry with additional, unnecessary production restrictions</u>

EPA must not burden the ethanol industry with additional, unnecessary production restrictions. These restrictions include both the specifications for DFE (denatured fuel ethanol) as well as the process of blending gasoline with DFE to create ethanol-blended fuels.

a. **EPA should change the proposed DFE 10 ppm sulfur cap to a 10 ppm sulfur <u>average</u> to put DFE on a level playing field with unleaded**.

In the past, EPA has regulated DFE with a sulfur limit that "reflects that 30-ppm refinery average."[1] EPA says that "consistent with" its new 10-ppm refinery sulfur standard, EPA proposes "that manufacturers of DFE for use by oxygenate blenders would be required to meet a 10-ppm sulfur cap."[2] EPA also proposes that DFE manufacturers would be subject to batch testing (including batch volume, sulfur content, and denaturant concentration as applicable).[3] While the final ethanol *<u>blends</u>* (e.g., E30, E85, or some other blend ratio from E16 to E85) would not necessarily be subject to batching testing, EPA here proposes that the DFE would be tested.

If DFE will have the same batch testing and registration requirements as gasoline, requiring a10 ppm sulfur cap versus an average could disadvantage DFE versus gasoline, which can generate and profit from sulfur credits. DFE having the same sulfur limits as gasoline, along with a compliant petroleum blendstock, will result in ethanol blends having a sulfur limit that is identical to the proposed finished gasoline specifications.

Furthermore, if the burden of implementing batch testing and reporting is imposed on ethanol producers, they should be allowed to generate sulfur credits. EPA states that "While certain batches of ethanol could theoretically be low enough in sulfur to generate credits, it is our desire to limit credit generation to companies required to comply with the proposed Tier 3 sulfur standards, i.e., refiners and importers."[4]

Growth Energy believes that ethanol producers should not be required to undertake batch testing; however, if DFE producers are required to complete the batch testing, reporting, and record keeping on DFE similar to refiner requirements on gasoline, they should have the same ability to generate or use credits.

EPA mistakenly states that "since many refiners currently comply with our standards taking into consideration the fuel property changes expected as a result of downstream ethanol blending, providing ethanol blenders with sulfur credit would result in double counting the effects of ethanol."[5] However, double counting would not result if refiners are assuming that DFE has a sulfur level of 10 ppm. Credits would only be generated at levels that are below this 10 ppm level.

EPA attempts to further reject ethanol generating sulfur credits by stating that "Over compliance with the per-gallon cap would not be a valid basis for credit generation, as you would expect that in all cases the DFE would be below the cap. To allow credit generation, we would need to propose an additional

[1] 78 Fed. Reg. at 29,936.
[2] *Id.*
[3] *See Id.* and *Id.* at 29,943.
[4] *Id.* at 29,938.
[5] *Id.*

annual average sulfur standard for DFE at some level below 10 ppm, and allow credits to be generated for over compliance with that standard."[6] Ethanol producers should have the same ability to generate credits if they have the same testing and reporting standards. In order to remain price-competitive with gasoline, ethanol should be allowed to generate credits in a similar manner as gasoline. Furthermore, such credit trading could allow ethanol producers to offset the cost of [new] DFE testing and reporting requirements.

b. It is unnecessary to establish benzene, aromatics and olefin limits on DFE.

The Proposed Rule states that limiting denaturants (e.g., to natural gasoline, gasoline, and BOBs "along with Internal Revenue Service ethanol denaturant requirements would limit benzene, olefins, and aromatics content of DFE to very low levels."[7] Growth Energy agrees with EPA's "<u>not</u> proposing any limits on these parameters in DFE."[8]

We further agree that the California DFE standards for benzene, aromatics, and olefins not be adopted.[9] Not only would this impose a testing and record keeping burden on DFE producers, but it would not be meaningful given that there are no aromatics or olefin limitations for gasoline components (outside of base and certification fuel standards). [10]

c. Benzene limits for ethanol blends <u>must</u> take into account the gasoline blended with ethanol.

EPA believes "it may be possible to set the benzene standard for E51-83 at a 0.20 volume percent cap or even lower without imposing any burden rather than implementing an average annual benzene standard similar to that for gasoline." (Herzog, FQS for FFVs, p. 5) Gasoline has 0.62 volume percent average maximum benzene content.

A benzene cap of 0.20 percent on ethanol blends would create a tremendous burden on blenders and could render certain production impossible. For instance, an E51 blend composed of 51 percent DFE and 49 percent certified gasoline would likely have a benzene content of 0.31 percent as the gasoline would bring 0.62 percent benzene to the mixture. This mixture would not meet the regulatory requirements.

Under the proposed approach, E51-83 could only exist as E75-83 with DFE at a 0.06 percent benzene and gasoline at 0.62 percent benzene. Higher benzene levels in the gasoline due to averaging would further limit the hydrocarbon content of this fuel as well as the RVP and cold start capability in cold weather. It is imperative that EPA provide a higher benzene limit to account for the gasoline blended with ethanol. Growth Energy feels that EPA should set this benzene standard at 0.62 volume percent, identical to the gasoline limit.

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[6] *Id*. at 29,938–39.

[7] *Id*. at 29,936.

[8] *Id*.

[9] *Id*.

[10] The California regulations are also inappropriately stringent. California requires ethanol benzene levels to be 0.06 percent or lower and the denaturant to contain 1.1 percent benzene maximum. This benzene level in the DFE is 10 percent of the 0.62 percent benzene limit for unleaded gasoline. Ethanol should not bear a burden so strict compared to gasoline. Also, many natural gasoline streams do not meet this 1.1 percent benzene specification, as the benzene content is related to the natural gasoline source stream and processing. Many locations need to use denaturants with non-California-compliant benzene content. Using California benzene limits would increase costs as many companies would be forced to use far more expensive denaturants.

d. EPA's streamlined "Blender Option" requirements should be the default regulations for E16-E85 production (as opposed to full refiner responsibilities).

The Tier 3 rule appropriately recognizes that ethanol blending is of central importance to our nation's transportation fuel supply and accomplishing key environmental and energy security goals. To achieve these goals and maintain a robust domestic transportation fuel supply, it is critical that EPA design its regulations to facilitate the production and blending of ethanol.

EPA discusses its possible approaches to the regulation of ethanol (and vehicles that use ethanol) in the Proposed Rule, including the section "Standards for Fuel Used in Flexible Fueled Vehicles."[11] This section then references a detailed memo to the docket, the FQS for FFVs Memo.

The FQS for FFVs memo outlines two options for regulating manufacturers of E51-E83. Growth Energy strongly supports "Option 2: Treatment as a Blender" (the "Blender Option") as the default option. Under this Blender Option, EPA states that E51-E83 producers can reduce their regulatory burden if they only use *blendstocks that meet certain specifications* that would ensure sulfur and benzene does not exceed appropriate amounts.[12]

More specifically, under this Blender Option, EPA proposes generally to limit blendstocks for ethanol blends to gasoline, BOBs, and DFE, as well as natural gas liquids (NGLs) and butane if they are produced to certain standards. Under this Blender Option, the finished E51-83 would be subject to the proposed downstream sulfur cap for gasoline of either 65 ppm or 95 ppm.[13] A benzene limit would also apply to the finished blend (as discussed above).

Growth Energy agrees that testing of final blends would not be needed as the DFE and blendstocks are regulated individually for sulfur and benzene (and RVP issues can be handled in a streamlined fashion as well).

Growth Energy also believes that the Blender Option requirements could apply equally to E16-E50 as well as E51-E83. The FQS for FFVs memo also notes that "the draft regulations written to address E51-83 might be modified to cover E16-50 blends."[14] Growth Energy believes that this Blender Option can be applied across all ethanol blended fuels from E16-E85. If EPA considers it necessary to further delineate midlevel ethanol blending, we suggest that applicable ASTM standards *already* provide a suitable approach. In particular, ASTM Standard D7794 allows midlevel ethanol blends only to be created from a mixture of gasoline and DFE, or gasoline and E85.[15] Thus, the constituents of midlevel ethanol blends (gasoline, DFE,

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[11] 78 Fed. Reg. at 29,936–38.

[12] Some ethanol producers may wish to use non-standard blendstocks, which they should maintain the option to do as long as the end product meets appropriate specifications. Ethanol producers should have the option to do so, if they opt to undertake broader "refiner" responsibilities. These "refiner" responsibilities could require batch testing of the end product, and some ethanol producers may consider this extra cost and burden appropriate.

[13] FQS for FFVs Memo, *supra*, at 7.

[14] *Id*. at 11.

[15] *See* ASTM D7794-12 (D7794) "Standard Practice for Blending Mid-Level Ethanol Fuel Blends for Flexible-Fuel Vehicles with Automotive Spark-Ignition Engines." This standard incorporates by reference ASTM standards governing the permissible constituents of MLEBs including one for gasoline (D4814), as well as ASTM D4806-12 ("Standard Specification for Denatured Fuel Ethanol for Blending with Gasolines for Use as

and E85) are already controlled. This is consistent with the streamlined "Blender Option" that avoids batch testing for *blends* when the constituents of those blends are already controlled.

While we support EPA's Blender Option approach, blendstocks for ethanol blends (i.e., those substances blended with DFE to achieve a certain ethanol/"gasoline" blend) should not be regulated more than is necessary to accomplish EPA's emission-control goals, as further discussed immediately below.

i. Under the Blender Option, <u>gasoline blendstocks</u> should be allowed for blending (in addition to NGLs and butane) as long as they meet adequate specifications.

Light straight run naphtha, hydrotreated naphthas, and hydrotreated natural gasoline are potential streams to consider. These gasoline blendstocks could be subject to the same sulfur and benzene specifications as NGLs and butane and should be allowed as blendstocks for ethanol blends.

ii. We agree with EPA that addressing RVP in blends does not require batch testing.

EPA states that "For blenders that use only gasoline, BOB's, and DFE to produce E51-83, demonstration of compliance with the maximum RVP standard under consideration could be accomplished by retention of Product Transfer Documents for the blendstocks."[16]

Additionally, EPA raises the issue of whether the SAE "Model for Estimating Vapor Pressures of Commingled Ethanol Fuels" is adequate to avoid testing for NGLs and refinery naphthas for RVP.[17] Growth Energy agrees that the SAE model referenced in the FQS for FFVs memo should be adequate to avoid testing for NGLs and refinery naphthas for RVP.[18]

EPA states that "Given the proposal in the Tier 3 NPRM to limit the denaturants that can be used to manufacture DFE to NGL, gasoline, and BOBs, and the narrow range in denaturant concentration, we believe that the RVP of different batches DFE would not vary substantially. Therefore, we currently do not believe that deliveries of new batches of DFE into the storage tank used to produce E51-83 would necessitate a return to per batch testing."[19] We agree that the variability of the ethanol RVP would not vary substantially, and batch testing should not be required, with a *5 percent* denaturant cap.[20]

Automotive Spark-Ignition Fuel") (DFE) and ASTM D5798-12 ("Standard Specification for Ethanol Fuel Blends for Flexible-Fuel Automotive Spark-Ignition Engines") (HLEBs).

[16] FQS for FFVs Memo, at 7.

[17] By way of background, EPA stated "If NGL and/or butane were used to manufacture E51-83, demonstration of compliance with a maximum RVP requirement could not be accomplished merely by retention of [product transfer documents (PTDs)] indicating that blendstocks were produced subject to applicable standards.… However, it may be possible to avoid sampling and testing for RVP as well. RVP models exist that could perhaps be developed further to avoid the need for sampling and testing for RVP when NGL or butane were used, but they are not yet applicable to these blends." *Id*.

[18] *See id*. at 7 n. 22 (referencing SAE paper 2007-01-4006, "A Model for Estimating the Vapor Pressures of Commingled Ethanol Fuels.").

[19] *Id*. at 8.

[20] [By way of example, 5 percent denaturant would create a .75 psi difference between a 9 psi and 14.5 psi denaturant in DFE. Either blend would change the E85 RVP by 0.5 psi or less according to the model in SAE paper 2007-01-4006. This minor impact would not cause any concerns for E85 (which already have low volatility), and the impact on MLEBs from the RVP of denaturant would be even smaller due to the overall

iii. **Growth Energy supports facilitating the use of NGLs under the Blender Option in the production of ethanol blends.**

We do not believe that any EPA limits on the volume of NGL used as a blendstock are necessary for ethanol blends (E51-E83). For midlevel ethanol blends (E16-E50), if EPA considers that some NGL limits are necessary, we would suggest that applicable ASTM standards *already* effectively limit the NGL content in midlevel ethanol blends. In particular, as noted above, ASTM Standard D7794 allows midlevel ethanol blends only to be created from a mixture of gasoline and DFE, or gasoline and high level ethanol blends (E51-E83). The amount of NGLs allowed in these constituent products are already controlled. Therefore, the volume of NGL in midlevel ethanol blends can effectively be no greater than what is already contained in approved components of a midlevel ethanol blend.

Furthermore, we respond to the following statements by EPA regarding NGLs under the Blender Option:

- Production "using NGL blendstocks would require that the NGL blendstock, like butane, meet a 10-ppm per-gallon sulfur cap."[21]
    - ***We agree that NGL (or gasoline blendstocks such as hydrotreated refinery streams) used for blending E16-E83 should meet the proposed 10 ppm sulfur cap under the Blender Option*** and therefore avoid burdensome batch testing requirements for blending.
- EPA notes that "Similar to the envisioned 0.20 volume percent benzene cap for butane, we would look to implement a 0.20 volume percent benzene cap standard for NGL rather than an average standard in order to simplify the regulatory requirements."[22]
    - ***A benzene cap of 0.20 percent for NGLs is too restrictive*** and may be impractical to meet. The benzene standard for NGLs should be 0.62 percent benzene similar to unleaded gasoline. Therefore, this NGL stream or gasoline could be used in the blend with no detrimental effect to the finished fuel since the DFE in which it is blended will have little to no benzene.
- "Since NGL properties from different sources can vary widely … we may also need to consider restricting the sources of NGL to natural gas liquids fractionation facilities and natural gas processing plants to ensure an appropriate level of quality control."[23]
    - ***EPA should maintain a provision for an alternative NGL source to allow for hydrotreated streams or refinery streams that meet the same criteria [i.e., benzene and***

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smaller proportional share of denaturant in the overall blend (i.e., 5 percent denaturant in an E30 blend would be only 1.5 percent of the total fuel mixture).]

[21] FQS for FFVs Memo, *supra*, at 9.

[22] *Id*.

[23] *Id*. at 10.

sulfur limits]. Refineries (including where hydrotreating takes place) can provide the same or superior quality control as NGL fractionation facilities and natural gas processing plants.

- "Stakeholders have stated that as additive concentration diminishes due to dilution with DFE, there is a point where the presence of a deposit control additive ceases to be beneficial and can actually contribute to deposit formation. In light of this, it may be appropriate to remove the requirement that the gasoline portion of E51-83 and perhaps E16-50 must contain a deposit control additive until the specific deposit control needs of these blends can be evaluated."[24]
    - ***We support removal of the requirement that the gasoline portion of E51-E83 must contain a deposit control additive until the specific deposit control needs of these blends can be evaluated***. A similar approach may be warranted for E16-E50.

e. EPA should not unduly regulate E16-E83 blendstocks.

EPA states that "Currently, only … RBOBs … and gasoline … are used to manufacture E51-83."[25] This is inaccurate. Gasoline blendstocks and natural gasoline can also be used in E51-E85 today.[26]

Some ethanol producers may wish to use non-standard blendstocks, which they should maintain the option to do as long as the end product meets appropriate specifications. Ethanol producers should have the option to do so, if they opt to undertake broader "refiner" responsibilities. These "refiner" responsibilities could require batch testing of the end product, and some ethanol producers may consider this extra cost and burden appropriate.[27]

f. EPA should not limit denaturants to only certified BOBs, certified gasoline and natural gasoline.

EPA limiting denaturants to only certified BOBs, certified gasoline, and natural gasoline would unnecessarily reduce denaturant flexibility to prevent use of hydrotreated or refinery produced streams that are readily available for gasoline blending or may be available for future use. Several denaturants are in use today that do not meet the Alcohol Tobacco Tax and Trade Bureau (TTB) or EPA definition of natural gasoline.

Historically DFE producers have used refinery gasoline blendstocks such as "light straight run" and "light naphtha" as denaturants. Removal of this flexibility will increase costs for DFE producers. Especially if the sulfur limit for DFE is reduced (i.e., from 30 ppm to 10 ppm) and the industry is forced to look at hydrotreated streams not covered in the natural gasoline definitions.

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[24] *Id*. at 11.
[25] 78 Fed. Reg. at 29,937.
[26] *See e.g.,* ASTM standard for HLEBs, ASTM D5798-12.
[27] Under either the Blender Option or the more stringent refiner option (which would regulate ethanol producers similar to gasoline refiners), the resulting E16-E83 "produced would be required to meet the downstream sulfur, RVP, and a benzene per-gallon cap standard in order to ensure emission performance over the life of the vehicles that use it." FQS for FFVs Memo, *supra*, at 4.

Importantly, "gasoline blendstocks" and "gasoline blendstocks for oxygenate blending (BOB)" are very different and adopting the stricter BOB requirement will have negative economic effects on the ethanol industry.

Instead, EPA should allow a wide range of hydrocarbons for denaturant as long as they meet the TTB requirements and the final DFE meets the required benzene and sulfur specifications. The TTB requirements at 27 CFR § 19.747 allow for substantial flexibility in denaturant use.[28] EPA should follow similar provisions as the TTB, or incorporate them by cross-reference.

g. EPA should not limit the denaturant content to 2 percent of DFE by volume. Denaturant limits exist in other regulations and should not be limited to 2 percent.

EPA notes regarding this issue that it is "proposing to limit the maximum concentration of denaturant that can be used in DFE to 2 volume percent."[29]

Both ASTM and California allow for up to 5 percent denaturant, and EPA should not adopt a more stringent limit. Ethanol producers are strongly incentivized by the RFS to keep denaturant under 2 percent.[30] However, under certain conditions the flexibility to have a slightly higher denaturant content can be very important to ethanol producers. Accordingly, EPA should adopt no more stringent than a 5 percent denaturant limit.

h. EPA's proposed regulations unduly restrict using NGL as a denaturant or blendstock.

In addition to the NGL issues noted above, we would the following comments.

i. ***The proposed definition of NGLs in 40 CFR 80.2 is too restrictive***.[31] The definition should not include an unduly narrow listing of the types of facilities that produce NGLs and should include, for instance, NGLs that may be produced through refineries and hydro-treating. The definition should be revised as follows (with additions underlined): "(zzz) Natural Gas Liquids (NGL) means the components of natural gas (primarily propane, butane, pentane, hexane, and heptane) that are separated from the gas state in the form of liquids in facilities such as a natural gas liquids fractionation production

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[28] In particular, the TTB requirements at The TTB requirements at 27 CFR § 19.747 provide that "If a proprietor wishes to use a material to render spirits unfit for beverage use that is not authorized under § 19.746 or that is not on the published list of materials, the proprietor may submit an application for approval to the appropriate TTB officer. The application must include the name of the material and the quantity of material that the proprietor proposes to add to each 100 gallons of spirits. The appropriate TTB officer may require the proprietor to submit an 8-ounce sample of such material. The proprietor may not use any proposed material until the appropriate TTB officer approves its use. Any material that impairs the quality of the spirits for fuel use will not be approved. The proprietor must retain as part of the records available for inspection by appropriate TTB officers any application approved by the appropriate TTB officer under this section."

[29] 78 Fed. Reg. at 29,936.

[30] The Proposed Rule notes that "Under the RFS2 regulations, if the denaturant level is 2 volume percent or less (effectively less than 2.5 volume percent considering rounding) the entire volume of denatured fuel ethanol can be used for determining compliance with the RFS2 renewable fuel volume requirements." *Id*.

[31] *See* FQS for FFVs Memo, *supra*, at 13; also, 78 Fed. Reg. at 30,003.

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facility, ~~or in a~~ natural gas processing plant, ~~or in a~~ natural gas pipeline, or refinery or similar facility. The higher temperature boiling components of NGL are sometimes also referred to as "natural gasoline"."

ii. ***A requirement to "Certify that the NGL was derived solely of from [sic] natural gas liquids fractionation facilities and natural gas processing plants" is too narrow***.[32] As noted above, EPA should include refineries (including hydrotreating) as potential hydrocarbon stream sources as long as blendstocks meet certain requirements (i.e., benzene and sulfur limits).

iii. ***A requirement to demonstrate "that the benzene content of each production batch of NGL is not greater than 0.03 volume percent" is too restrictive***.[33] This specification is unrealistic, and it is unclear whether a product that meets this specification even exists in any significant commercial quantities. For instance, this specification is 20 times more stringent than gasoline and wouldn't apply to NGLs blended directly into unleaded gasoline. [Even California ethanol specifications allow benzene content up to 0.06 volume percent in DFE. Therefore, the resultant specification allows NGL with benzene levels up to 2.4 volume percent.[34]]

iv. ***A prohibition that "NGL and E51-83 made from NGL cannot be sold as gasoline or E16 or be commingled with gasoline or E16-50 and subsequently sold as gasoline or E16-50" is unduly restrictive***.[35] This prohibition on commingling E51-83 made with NGL with MLEBs would unduly limit the ability for retail stations to provide E16-E83 fuels, especially if they employ blender pumps. Alternatively, EPA should follow ASTM requirements as stated in standards D4814, D4806, D5798 and standard practice D7794.

i. Denaturant manufacturers should not be required to register with EPA.

EPA requests comment "on whether to require manufacturers of denaturants for use in DFE to register with EPA, and demonstrate compliance with the maximum sulfur, benzene, olefins, and aromatics specifications enforced in the State of California based on the anticipated dilution with ethanol."

EPA should not require denaturant manufacturers to register with the EPA. Doing so would limit supply and unfairly increase production costs on the ethanol industry. Gasoline component manufacturers are not required to register, e.g., manufacturers of pyrolysis gasoline, natural gasoline, and chemical byproducts. We believe a registration requirement would limit the number of denaturant suppliers willing to supply the ethanol industry, versus the gasoline or crude blending markets where they would not need to register. It is inappropriate that a natural gasoline producer would need to register in order to supply product for DFE, but not need to supply the same product to a gasoline blender. The requirements should be similar to keep the market competitive and provide a level playing field to both gasoline and ethanol.

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[32] *See* FQS for FFVs Memo, at 20.
[33] *See* FQS for FFVs Memo, at 20.
[34] 13 Cal. Admin. Code 2262.9(a)(3).
[35] *See* FQS for FFVs Memo, at 20.