Syntroleum

October 10, 2002

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Linda Bluestein
U.S. Department of Energy
Office of Energy Efficiency and Renewable Energy/
Office of FreedomCAR and Vehicle Technologies
Docket No. EE-RM-02-200, EE-2G
1000 Independence Avenue, SW
Washington, DC 20585-0121

Re: A Discussion of Issues Pertinent to the Rulemaking to Designate FTD fuels as Alternative Fuels Under Section 301(2) of the Energy Policy Act of 1992

Dear Ms. Bluestein,

Please find attached a revised copy of the oral comments I sent you a few days ago. In going over the document I found a few typos and mistakes that I would prefer be corrected since this document will be part of the DOE docket.

I look forward to seeing you next week. If you have any questions with regard to the attached information, please feel free to contact me.

Sincerely,

R. Steven Woodward
Manager Fuel Sales
Syntroleum Corporation

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Syntroleum Comments Pertinent to the Rulemaking to Designate FTD Fuels As Alternative Fuels Under Section 301(2) of the Energy Policy Act of 1992

Syntroleum would like to thank Ms. Bluestein and the Office of Energy Efficiency and Renewable Energy for the opportunity to address this workshop regarding the rulemaking to designate FTD fuels as Alternative Fuels under Section 301(2) of the Energy Policy Act of 1992 (EPAct).

Syntroleum Corporation is one of the three companies who have petitioned the DOE requesting that FTD be designated an Alternative Fuel under EPAct. Information regarding Syntroleum's fuel production technology; the physical and chemical composition of the EPAct fuel proposed by Syntroleum, which is a Fisher-Tropsch diesel called Syntroleum S-2; and relevant test data supporting this petition can be found in the DOE Docket No.EE-RM-02-200, EE-2G. I would also like to comment on the fact that Syntroleum S-2 is composition specific fuel and as such in not technology specific.

Domestically produced FTD fuels are already qualified as alternative fuels. Obviously, having filed a petition under consideration, Syntroleum also supports the designation of non-domestic Fischer-Tropsch diesel (FTD) fuels as Alternative Fuels under EPAct. Such a designation would be a significant step toward improving our national security, as well as enhancing our environment. Syntroleum believes that FTD is a logical choice of fuel whose use will help the U.S. to accomplish the goals of EPAct.

Few people would disagree that EPAct has not been entirely successful. When EPAct was passed in October 1992, the goal of the legislation was to reduce petroleum dependence and specifically, imported crude oil and products from nations that could be a potential threat to U.S. national energy security. U.S. demand for crude oil and petroleum products in 1992 was 17 million barrels per day. Domestic production was about 9 million barrels per day and 8 million barrels per day or about 47 percent of total U.S. demand was imported.

Current demand (as measured over the first six months of 2002) is about 19.5 million barrels per day, which is an increase of 2.5 million barrels of oil per day since 1992. U.S. production is now just slightly above 8 million barrels per day, reflecting a decline of almost 1 million barrels per day since 1992. Essentially, almost all the growth in demand since 1992 has been supported by increases in foreign imports, which now amount to 58 percent of the total U.S. oil and products demand. Unfortunately, without a yet to be identified domestic source of petroleum and/or dramatic improvement in energy efficiency, U.S. energy security is not likely to improve. In the Annual Energy Outlook 2002, the EIA projects that U.S. reliance on foreign oil will increase to 62 percent by the year 2020. Clearly, there needs to be some means to turn this situation around and reduce U.S. dependence upon foreign petroleum.

None of the current EPAct Alternative Fuels are likely to significantly reduce U.S. dependence on petroleum anytime soon. EPAct intended that this U.S. reliance upon imported oil be reduced by increased use of replacement fuels (by EPAct definition alternative fuels are replacement fuels). At the time EPAct was enacted, part of the

strategy was replacement of conventionally fueled vehicles with alternative fueled vehicles, which would lead to the increased use of alternative fuels while at the same time decreasing the use of petroleum-based fuels. While there have been substantial increases in the number of alternative fueled vehicles placed into service, consumer choice has fundamentally limited a corresponding increase in the use of alternative fuels. The people have spoken- current EPAct Alternative Fuels continue to be awkward and difficult to find, commonly uneconomic on an energy to wheels basis even with substantial public subsidies and thus, generally non-competitive.

The total number of alternative fueled vehicles has grown by almost 7 percent per year since 1992, while the actual use of alternative fuel in those vehicles has only increased by about 5 percent per year. However, these figures are somewhat misleading due to the dominance of the use of LPG vehicles, which comprise 60 percent of all alternative vehicles. Over this same 10-year time frame, the number of CNG and LNG alternative vehicles grew by almost 20 percent per year and the use of natural gas in these vehicles matched this growth. On the other hand, while the growth rate of alcohol fuel vehicles was even higher during the last 10 years, at 32 percent per year, the actual use of alcohol fuels only grew at 5 percent per year. It appears that only about 15 percent of the alcohol-capable alternative fueled vehicles are using an alternative fuel. The other 85 percent of these vehicles continued to use conventional gasoline because it was more convenient and contains more energy.

For EPAct to best accomplish its original goals, a safe, reliable and affordable fuel must be available to the affected fleets. A fuel that is most like conventional fuels. It should be noted that conventional fuels evolved over the past century and they are preferred for several sound physical, chemical and economic reasons. An ideal EPAct fuel must be unquestionable safe during its transportation, storage and vehicle fueling. It must be safe for the people in the surrounding communities. It must be safe for the environment, by contributing both to lower emissions and by not creating any additional toxicity issues. The ideal EPAct fuel must be both stable and reliable. It should perform the job it was intended to do without introducing new complications to a fleet manager or an individual vehicle owner. Lastly, the ideal EPAct fuel should be affordable. It is recognized that any purposely designed fuel or fuel system will be marginally more expensive than the conventional product it replaces, particularly during the early years. However, after considering all costs, including the purchase of the vehicle and the fueling infrastructure, it must ultimately be competitive with conventional fuels.

The challenge with most EPAct fuels in use today is that they cannot meet many of these criteria. Many alternative fuels offer substantial emission benefits but are difficult to dispense and handle safely. Other alternative fuels require complicated delivery platforms and have reliability issues during normal vehicle duties and require increased attention to vehicle maintenance. Perhaps the biggest challenge is affordability. Most alternative fuels require additional expense to either modify vehicles for their use or to install a special purpose fuel system in the vehicle. In many cases, it is the cost of the fuel and the fuel delivery system that limits the use of the fuel in the vehicles intended to use it, thus creating the much discussed "chicken and egg" problem associated with alternative fuels.

FTD meets all of these criteria to be a successful alternative fuel. Not only does FTD offer substantial reductions in criteria pollutants, it has a very low toxicity and is highly biodegradable. There is nothing more reliable in the road transportation industry than a diesel engine. While diesel engine technology is advancing, diesel engines are simple to operate and easy to maintain. FTD diesel can be transported, stored and dispensed using the same type of equipment as conventional diesel. FTD does not increase the cost of a new vehicle in order to be used, it does not increase (and probably will decrease) vehicle maintenance needs, and it does not require modification of and/or the addition of fuel infrastructure. Once cleaned to remove traces of higher sulfur, most of the existing equipment in a central fleet fueling location is ready to store and dispense FTD diesel.

Alternative vehicles with clean diesel engines using FTD would be approximately 40 percent more efficient than spark ignition engines used in many dual fueled alternative vehicles. Such FTD fueled vehicles would do more work and travel more miles while using less fuel. An additional benefit of FTD fuels is that they are technology neutral. FTD fuels can be used in current and advanced designed compression ignition engines, and as a transition to the future, they are fully compatible with diesel electric hybrid vehicle power systems and fuel cells.

Syntroleum understands the key considerations for Alternative Fuel designation under EPAct are that the candidate fuel be substantially not petroleum, and that its use must yield substantial energy security benefits and substantial environmental benefits. We believe that FTD meets all of these criteria and offer the following observations:

1. FTD fuels would be produced primarily from clean natural gas feedstock, clearly a non-petroleum source.

2. Production of FTD fuels would contribute to greater U.S. energy security. These fuels would be produced from abundant natural gas deposits in many global locations that are economically stranded because they too far from markets to be monetized in a gaseous state. Utilization of these stranded reserves would provide a new, more diversified energy supply, thus significantly reducing both U.S. and world dependence on crude oil from politically unstable regions.

3. Introduction of FTD fuels into the supply mix would also provide substantial environmental benefits. Upstream, particularly when gas that is currently being flared or vented in the course of producing crude oil is used as feedstock, huge amounts of daily greenhouse gas emissions would be eliminated from our planet. Downstream, the cleanliness of these fuels, i.e., the absence of sulfur and other contaminants, would enable vehicle manufacturers to apply emission control technologies that virtually eliminate vehicle emissions of particulate matter, hydrocarbon and other harmful pollutants.

I would now like to turn my attention to a specifically address a few questions posed by the DOE for the purposes of this workshop. Please let me note that Syntroleum has

submitted detailed comments on all of the questions posed by the DOE to DOE Docket No.EE-RM-02-200, EE-2G.

DOE EPAct Question 1: Syntroleum agrees that the DOE should define natural gas-based FTD fuels and that FTD fuels made from coal and/or biomass can be excluded from that definition since they are already covered under the original guidelines of EPAct.

DOE EPAct Question 3: Syntroleum does not believe that process energy use limits should be considered in the determination of U.S. energy security. The issue of U.S. energy security is a much broader issue than plant operating efficiencies. The cumulative effect of improving the conversion efficiencies of a few FTD plants would do little to offset the large (and growing) amount of foreign crude oil we import each year. We know of no precedent that has established energy use limits for any of the other alternative fuels that are currently named under EPAct, many of which are imported into the U.S. To our knowledge, there has been no effort or ruling established to quantify and/or monitor the amount of energy it would take for the U.S. refining industry to comply with the EPA's mandated reduction of the sulfur content in conventional diesel to 15 ppm.

In a much broader sense, Syntroleum believes that the use of FTD derived from natural gas in the U.S. alterative fuel market would decrease our dependence on imported oil without making the U.S. venerable to outside influences. This view is supported by the Oak Ridge National Laboratory. We would direct you review a white paper prepared for the DOE, "An Assessment of Energy and Environmental Issues Related to the Use of Gas-to-Liquid Fuels in Transportation" published in November 1999 for further details.

DOE EPAct Question 4: Syntroleum believes that there are basic differences in judging between the benefits of FTD as it pertains to criteria pollutants, toxic pollutants, biodegradability and ecotoxicity and the quantification of potential FTD greenhouse gas emissions. All of the first group can be determined by quantitative measurement using established test protocols. Determination of greenhouse gas emissions is based on subjective assumptions and analysis.

In their analysis of the petitions, NREL concluded that there is a 99% confidence level in the analysis that absence of sulfur, aromatic hydrocarbons and the higher cetane numbers in FTD reduces all regulated (or criteria) pollutants. Notwithstanding their comments on the statistical significance of the individual tests comparing FTD emissions to those of conventional and low sulfur diesel fuels, it is conclusive that the tests that have been conducted report significant emission reductions using FTD. FTD has also been shown to reduce air toxics and has been shown to be biodegradable and to have low ecotoxicity. Syntroleum has submitted supporting data to that effect in response to DOE Question 9.

On the other hand, the comparison of potential greenhouse gas emissions between FTD production and diesel is a not a measurement at all, it is the result of subjective modeling. The Argonne GREET model is based on a detailed analysis of a series of assumptions. The fact that the analysis includes probability distribution functions speaks to the subjective nature of the data used. The Argonne analysis included separate cases for

stand alone FTD plants, FTD plants capable of exporting steam and/or electricity and a FTD plant fed with flared gas as a feedstock but no attempt was made to model a base case scenario encompassing these cases. Other scenarios for the production of FTD were not considered. One such scenario is the sequestering of FTD plant CO_2 emissions by reinjection to maintain reservoir pressure in adjacent oil and gas fields.

On the comparative side, for the conventional diesel and low-sulfur diesel, Argonne used default fuel characteristics from their GREET 1.6 model and established parametric assumptions for production and refining efficiencies. The various process pathways by which hundreds of U.S. refiners will reduce the sulfur content off on-road diesel fuel from 500 ppm to 15 ppm (in order to comply with the EPA ruling to produce this fuel by the year 2006) is not clearly defined. That being the case, are the assumed energy requirements and the resulting greenhouse gases in the two diesel comparative cases accurate enough to suggest that the FTD will have more or less emissions?

Additionally, there is no consideration given that the use of FTD as an alternative fuel will replace other alternatives being used in fleets impacted by EPAct. In fact, a good argument could be made that FTD will replace conventional gasoline, since it is being used in over 80 percent in the dual fuelled AV's designed to use E85 and M85 alternative fuels.

Based on these considerations, Syntroleum believes that there is not enough objective information to suggest that greenhouse gases from FTD will or will not be greater than the fuel or fuels they ultimately replace. That being the case, we would suggest that the issue of environmental benefit be judged on measured reductions of criteria pollutants, the reduction in air toxics, its biodegradability and having reduced ecotoxicity compared to conventional fuels.

DOE Question 7: Syntroleum supports the DOE recommendation that designation of FTD fuels should be based on a uniform set of specifications for neat fuel. However, we do believe that such specifications should be based on setting limits on FTD fuel consistent with maintaining the environmental and performance aspects of the fuel. We would like to see limits set that would keep the fuel non-toxic and biodegradable, compatible with current and future engines and fuel systems. In our detailed response to this question Syntroleum has suggested that such specifications be based on ASTM D975 with additional requirements for sulfur, aromatics, olefins and oxygenates.

DOE Question 11: Syntroleum does not believe that additives should be part of the specifications discussed above. We take this position in the belief that the issue of fuel lubricity will be a common problem with ultra-low sulfur EPA #2 diesel fuel and will be addressed by the appropriate ASTM committee on standards.

I hope that Syntroleum's perspective on these issues has been helpful in your rulemaking to designate FTD fuels as alternative fuels under section 301(2) of the Energy Policy Act of 1992.

I thank you again for the opportunity to express our views.

Syntroleum

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1000 Independence Avenue, SW
Washington, DC 20585-0121

Re: A Discussion of Issues Pertinent to the Rulemaking to Designate FTD fuels as Alternative Fuels Under Section 301(2) of the Energy Policy Act of 1992

Dear Ms. Bluestein:

Please find enclosed a copy of Syntroleum's written response to the technical questions you raised in your referenced workshop discussion paper.

If you have any questions with regard to the enclosed information, please feel free to contact me.

Sincerely,

R Swoodward

R. Steven Woodward
Manager Fuel Sales
Syntroleum Corporation

Enclosure

RSW/kp

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Syntroleum Response to DOE Questions Pertinent to the Rulemaking to Designate FTD Fuels As Alternative Fuels Under Section 301(2) of the Energy Policy Act of 1992

DOE EPAct Question 1:
How should DOE define natural gas-based diesel fuels, and particularly FTD fuels, if designation is ultimately limited to that process?

Syntroleum agrees with the DOE that for purposes of designating FTD as an alternative fuel under EPAct, there needs to be a definition of the feedstock such as "naturally occurring natural gas." Further, we support the assertion that FTD made from coal and/or biomass would already be considered an alternative fuel under the original guidelines of EPAct. Additionally, we support the assertion that any FTD that is derived from petroleum waste or refinery by-product streams should not be considered.

Syntroleum would suggest that the definition include natural gas from fossil sources with a minimum methane content specified and to include methane from landfill gas. The definition should be broad enough to encompass natural gas that can be produced and recovered by current technology and by future technologies. For example, natural gas from methane hydrates should be included.

DOE EPAct Question 2:
DOE requests comments on analysis provided by the Argonne National Laboratory (ANL) and the National Renewable Energy Laboratory (NREL), which will be used for making a determination regarding designation of FTD fuels.

Syntroleum has reviewed the referenced documents and generally supports the analytical work done and the results indicated. Where appropriate, we have made specific comments on certain areas of both documents in response to the questions posed by the DOE.

DOE EPAct Question 2a:
DOE also requests that interested parties submit any additional emissions data not cited in the NREL report.

In preparing their assessment of the emissions benefits of FTD, NREL referenced an extensive list of reports, papers and publications. While several Society of Automotive Engineers (SAE) papers were included in the reference list, Syntroleum would direct NREL to additional SAE papers and technical reports that discuss the results of various emission tests comparing FTD to conventional and ultra-low sulfur fuels. These reports are listed in Attachment 1.

DOE EPAct Question 3:
Should DOE set process energy use limits in its EPAct designation process to ensure that qualifying FTD fuels provide substantial energy security benefits?

Syntroleum does not believe that process energy use limits should be considered in the context of providing for U.S. energy security. The issue of U.S. energy security is a much broader issue than plant operating efficiencies. The cumulative effect of improving the conversion efficiencies of a few FTD plants would do little to offset the large (and

growing) amount of foreign crude oil we import each year. We know of no established energy use limits imposed on other EPAct alternative fuels, some of which are imported into the U.S. Also, we know of no energy use limits imposed upon the amount of energy it would take for the U.S. refining industry to comply the with the EPA's mandated reduction of the sulfur content in conventional diesel to 15 ppm. Perhaps more importantly, there are no energy use limits imposed on domestically produced FTD. Taking this posture on FTD has no established precedent. Moreover, under those authorities granted to the DOE under Section 504(c) of EPAct, the DOE is specifically enjoined not to mandate marketing or pricing practices for alternative fuels. By setting process energy use limits on FTD plants, the DOE would be establishing in a "defacto" fashion FTD production costs. Such additional costs would then have to be borne in the market place by the FTD producer, thus affecting his pricing practices.

Being produced from natural gas, any FTD supplied to the U.S. alterative fuel market would decrease our dependence on imported oil thus increasing our energy security. Oak Ridge National Laboratory (ORNL) supports this position. In a white paper prepared for the DOE, "An Assessment of Energy and Environmental Issues Related to the Use of Gas-to-Liquid Fuels in Transportation, November 1999," ORNL was very clear on their findings on the issue of energy security as it pertains to the production of FTD outside the U.S. Quoting from this document,

> "It is very likely that emergence of a G-T-L industry would enhance U.S. energy security, despite the fact that much, if not most, of the fuel would be imported."
>
> "From the economic perspective, improving energy security becomes a matter of reducing the quantity of oil imported, increasing the economy's ability to substitute other energy sources for oil and reducing the potential market power of oil producers."

The document further supported this last statement by modeling the world petroleum supply, demand and pricing forces, considering the production of G-T-L supply by both OPEC and non-OPEC countries. This analysis concluded that,

> "The existence of a significant substitute for petroleum would change market competition in at least three significant ways. First, the cartel's pricing problem would now include the joint maximization of profits over two feedstocks instead of just one. This makes the pricing formula considerably more complex. Second, the creation of a new substitute increases the world price elasticity of crude oil demand, which would lower the optimal monopoly price of oil, whether or not the cartel chooses to produce any G-T-L's. Third, because the distribution of gas reserves, there is a change in the balance of power within the cartel that could affect its internal decision making, most importantly its ability to agree on and enforce optimal monopoly pricing decisions."

DOE EPAct Question 3a:
If so, which levels are appropriate?

Syntroleum does not believe that process energy use limits should be considered as part of the DOE rulemaking. Please see our comments above.

DOE EPAct Question 4:
How should DOE balance its determinations about designating fuels if the fuels provide substantial benefits in some areas with regard to section 301(2) criteria, while being a slight detriment to others (e.g., positive attributes regarding criteria pollutants versus a slight increase in greenhouse gas emissions)?

In your discussion paper, you presented a list of the environmental impacts that the DOE was to consider with regard to one of the three criteria for rulemaking contained in Section 303(2), "substantial environmental benefits". Those were:

- Criteria pollutant emissions (principally from vehicles)
- Greenhouse gas emissions (from vehicles and fuel production/distribution)
- Toxic pollutant emissions (principally from vehicles)
- Other environmental impacts, such as groundwater pollution, marine pollution, etc. as related to biodegradation, ecotoxicity, etc.

Syntroleum believes that there are basic differences in judging between the benefits of FTD as it pertains to criteria pollutants, toxic pollutants, biodegradability and ecotoxicity and the quantification of potential FTD greenhouse gas emissions.

Analytical testing and examination of the measured results determine the reduction in criteria pollutants. NREL concluded that there is a 99% confidence level in the analysis that absence of sulfur, aromatic hydrocarbons and the higher cetane numbers in FTD reduces all regulated (or criteria) pollutants. Notwithstanding their comments on the statistical significance of the individual tests comparing FTD emissions to conventional and low sulfur diesel fuels, it is conclusive that the performed tests report significant emission reductions using FTD. FTD has also been shown to reduce air toxics and has been shown to be biodegradable and to have low ecotoxicity (see Syntroleum's response to Question 9.)

On the other hand, the comparison of potential greenhouse gas emissions between FTD production and diesel production is not a measurement at all, but a subjective analysis. It is based on a detailed analysis of a series of assumptions. The fact that the analysis includes probability distribution functions speaks to the subjective nature of the data used. In developing the assumptions for the FTD process efficiencies, ANL used detailed information submitted by the petitioners as well as other data from a variety of sources. This data and other assumptions were used to develop a range of possible operating conditions meant to represent high and low probabilities of energy use and GHG emissions. Also, ANL included separate cases for stand-alone FTD plants, FTD plants capable of exporting steam and/or electricity and a FTD plant with flared gas as a feedstock. However, no attempt was made to model a base case scenario whereby certain volumes of FTD would be produced wherein certain percentages of these production cases would be included.

On the comparative side, for the conventional diesel and low-sulfur diesel, ANL used default fuel characteristics from their GREET 1.6 model and established parametric assumptions for production and refining efficiencies. This comparative information is entirely subjective. The various process pathways by which hundreds of U.S. refiners will reduce the sulfur content of on-road diesel fuel from 500 ppm to 15 ppm (in order to comply with the EPA ruling to produce this fuel by the year 2006) is not clearly defined.

That being the case, are the assumed energy requirements and the resulting greenhouse gases in the two diesel comparative cases accurate enough to suggest that the FTD will have more or less emissions? Additionally, there is no consideration given that the use of FTD as an alternative fuel will replace other alternative fuels being used in EPAct fleets. In fact, a good argument could be made that FTD will replace conventional gasoline, since it is being used in over 80 percent of the dual fueled alcohol vehicles.

Based on these considerations, Syntroleum believes that there is not enough objective information to suggest that greenhouse gases from FTD will or will not be greater than the fuel or fuels they ultimately replace. However, if a greenhouse gas comparison must be made, then Syntroleum contends that the data prepared by ANL be assessed on a more rigorous statistical basis considering the various FTD plant configurations and feedstock sources.

There are numerous areas of the world where a large amount of the natural gas is being vented, flared and/or leaked. To say that future FTD plants would not use feedstocks or that there would be some finite life to the use of these gas sources is an entirely subjective opinion on the part of the DOE. Even if a small percentage of vented and flared gas were used for a short period of time, the positive GHG emissions benefits would certainly offset other stand-alone plants using conventional natural gas. In a similar argument, to give no statistical weight to FTD plants that would produce exportable steam or power is again a subjective opinion. No mention has been made concerning the possibility of CO_2 sequestration that would be economically viable in many of the potential FTD plant locations. In many cases, the feedstock for the FTD plant would come from an oil or gas production area that would benefit from and often requires reservoir pressure maintenance. Again, as in the case of flared or vented gas, even a small percentage of FTD plants operated in such a fashion as to sequester CO_2, would have a very positive benefit on the aggregate FTD plant greenhouse gas inventory.

Finally, one should bear in mind that FT technology has just begun to embrace the various possibilities to improve efficiencies that would go directly to the plants economic robustness. Economic drivers will become environmental drivers.

DOE EPAct Question 4a:
Is such an approach desirable?

Based on the considerations detailed above, Syntroleum believes the greenhouse gas comparison is at best neutral at this point in time. Moreover, we would suggest that a longer-term view would demonstrate a much different position with regard to greenhouse gas emissions of FTD production compared to the fuel or fuels it ultimately replaces. Therefore, Syntroleum believes that the DOE should base the determination of substantial environmental benefits primarily on measurable reductions of criteria pollutants, reductions in air toxics, biodegradability and ecotoxicity.

DOE EPAct Question 5:
DOE requests comments on findings in NREL's report about NOx emissions benefits of 6-20 percent (compared to post-2006 diesel fuels) related to control of fuel aromatic content and cetane number.

Syntroleum agrees with the DOE findings concerning NOx. Several of the SAE papers referred to in Attachment 1 support this assertion.

DOE EPAct Question 5a:
Should these benefits be considered ``substantial" with regard to section 301(2) criteria?

Yes, Syntroleum believes that NOx benefits should be considered substantial.

DOE EPAct Question 6:
DOE is seeking additional data on actual test and control fuels for FTD when used in later-model diesel engines to gauge how fuel composition affects emissions from these engines.

Several of the SAE papers referred to in Attachment 1 provide this data.

DOE EPAct Question 7:
What parameters should be set for aromatics, cetane, sulfur, and other standards to assure emissions reductions based on NREL's findings or other sources of information?

Syntroleum supports the DOE recommendation that the designation of FTD fuels should be based on a uniform set of specifications for a neat fuel. Syntroleum would propose that FTD meet all current and future ASTM D975 specifications with the following exceptions and inclusions:

- A maximum sulfur content of 1 ppm by mass
- A minimum cetane number of 70
- A maximum aromatics content of 500 ppm by volume
- A maximum oxygen content of 100 ppm by volume

To the extent that the above fuel properties are already included as a specification in ASTM D975, the ASTM test method by which that property is measured will need to be changed in the FTD specification to reflect the degree of accuracy required to measure the appropriate specification limits.

The above specifications would be for un-additized FTD. Each individual producer would be responsible for developing appropriate additive packages for their product.

DOE EPAct Question 7a:
Also, will FTD fuels in the lower end of the aromatics range result in materials compatibility problems?

No. While there have been seal problems reported with past uses of ultra-low sulfur diesel fuels in older engines, based on discussions with diesel engine manufacturers, Syntroleum has the understanding that the seal material used in modern diesel engines can tolerate the absence of aromatic compounds in FTD.