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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
RESEARCH TRIANGLE PARK, NC 27711

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OFFICE OF  
AIR QUALITY PLANNING  
AND STANDARDS

**MEMORANDUM**

**Subject:** Assessment of Biofuels as an Alternative to Conventional Fossil Fuels

**From:** Stephen D. Page, *Henry Thomas*  
Office of Air Quality Planning and Standards (C404-04)

**To:** EPA Regional Air Directors

The Vice President's Energy Plan calls for alternative fuel sources (e.g., renewables, biofuels, etc.) to supply up to 20 percent of the U.S. energy needs within 2 decades. This initiative is designed to reduce America's dependence on foreign oil imports and more importantly increase homeland security. Given the volatility in international fuel markets, industrial users have been aggressively seeking alternatives to the use of petroleum-based fossil fuels. Biofuels, such as yellow grease, lard, recycled cooking fat and other animal-derived products have been used successfully to replace petroleum-based fuels while using essentially the same power-producing equipment (e.g., boilers, engines, etc.). Additionally, these fuels have been demonstrated effective with no adverse environmental consequences.

Over the past several months, the Office of Air Quality Planning and Standards (OAQPS) has worked closely with the National Renderers Association (NRA) to gather available emissions information from the burning of selected biofuels (e.g., animal fats, reclaimed greases and oils). The focus of this data collection and analysis effort, which has involved several industry trade associations, the Fats and Protein Research Foundation and the University of Georgia, has been to assess the emissions characteristics of biofuels compared to the emissions from the burning of conventional fossil fuels (i.e., #2 and #6 fuel oils and natural gas). The information presented in this memorandum, plus the availability of the test reports that have already been completed, should provide State/Local permitting authorities with sufficient information to make permit decisions regarding the substitution of biofuels for conventional fuels without the need for costly stack testing prior to issuing a permit.

We obtained the emissions data in the form of eight emission test reports and several emission test report summaries. The data consists of 14 emission tests for the burning of yellow grease, two emission tests for the burning of lard, two emission tests for the burning of reclaimed cooking oil, four emission tests for the burning of tallow, and two emission tests for the burning of fat. One University of Georgia (UGA) boiler was tested using various biofuels, blends of

biofuels and #2 fuel oil, and conventional fuels, for a total of 173 emissions tests. We believe the available emission test data are adequate to make general statements regarding the emission characteristics of biofuels.

Based on the attached assessment, the following conclusions can be made regarding the burning of biofuels<sup>1</sup>:

1. Biofuels may be substituted for #6 fuel oil. Compared to burning #6 fuel oil, biofuels emit less emissions of nitrogen dioxide (NO<sub>2</sub>), sulfur dioxide (SO<sub>2</sub>), carbon monoxide (CO), and particulate matter (PM);
2. Biofuels, with the exception of chicken fat and choice white grease, may be substituted for #2 fuel oil. Compared to burning #2 fuel oil, biofuels generally emit lower emissions of NO<sub>2</sub> and SO<sub>2</sub> and emissions of CO and PM vary between slightly higher and lower. Chicken fat and choice white grease emit significantly higher PM emissions and slightly higher NO<sub>2</sub> emissions compared to other biofuels that were tested;
3. Biofuels, with the exception of chicken fat and choice white grease, may be substituted for natural gas if local and regional air quality conditions warrant (i.e., consideration given for ozone, PM and CO attainment status). Compared to burning natural gas, biofuels emit slightly higher emissions of NO<sub>2</sub>, SO<sub>2</sub>, and PM, and comparable emissions of CO.

<sup>1</sup>Note: Burning these fuels with and without flue gas recirculation followed the same trends as above except that in all cases, the flue gas recirculation resulted in lower NO<sub>2</sub> emissions.

As the nation's dependence on foreign oil continues to increase, OAQPS is striving to promote the use of alternative fuel sources - renewables, biofuels and fuel cells. In recent months, the agricultural sector has been actively seeking approval for alternatives to the use of petroleum-based fuels. Biofuels such as yellow grease, lard, recycled cooking fat, and other animal-derived fuel products provide such an environmentally safe alternative. Thus, OAQPS would like to promote the utilization of biofuels whenever possible.

In an effort to do this, I ask that Regional, State, and Local permitting authorities consider the attached memorandum, which outlines the emission characteristics for several biofuels, when evaluating future permit applications requesting the usage of biofuels as an alternative to conventional fossil fuels. As stated above, the assessment demonstrates that biofuels could effectively replace #6 fuel oil with no resultant increase in emissions. The substitution of biofuels for #2 fuel oil and natural gas may require additional analysis on a case-by-case basis, depending on a specific region's air quality concerns/needs.

Attachment

cc: Sally Shaver, Director, Emission Standards Division (ESD)  
Penny Lassiter, Acting Associate Director, ESD  
Bob Wayland, Leader, Combustion Group, ESD

Attachments available upon request. Contact Robert J. Wayland at 919-541-1045.