

**11<sup>TH</sup> INTERNATIONAL CONFERENCE ON STABILITY,  
HANDLING AND USE OF LIQUID FUELS  
October 18-22, 2009  
Prague, Czech Republic**

**INITIAL EVALUATION OF CHEMICAL, THERMAL STABILITY AND EMISSIONS  
CHARACTERISTICS OF JET FUELS FROM ALTERNATIVE SOURCES**

E. Corporan<sup>1</sup>, L. Shafer<sup>2</sup>, M.J. DeWitt<sup>2</sup>, C. Klingshirn<sup>2</sup>, S. Zabarnick<sup>2</sup>, Z. West<sup>2</sup>, R. Striebich<sup>2</sup>,  
J. Klein<sup>3</sup>

<sup>1</sup>*Air Force Research Laboratory, Fuels and Energy Branch AFRL/RZPF, Wright-Patterson AFB,  
OH 45433 USA*

<sup>2</sup>*University of Dayton Research Institute, 300 College Park, Dayton, OH 45469 USA*

<sup>3</sup>*Jim Klein LLC. Wright-Patterson AFB, OH 45433 USA*

Instability in petroleum-rich countries and the potential impact on the cost of petroleum products and national security, have renewed interest in the research and development of fuels derived from alternative and domestic sources. In addition, concerns with greenhouse gas emissions and impacts on global warming has increased interest in the production of fuels from renewable (carbon neutral) feedstocks and processes. In recent years, the US Air Force has been very active in the evaluation, demonstration and certification of fuels derived from natural gas and coal via Fischer-Tropsch (FT) synthesis, specifically, Synthetic Paraffinic Kerosene (SPK). To date, the B-52, C-17 and B-1B have been certified for use of a 50/50 JP-8/FT blend. Other aircraft (i.e., F-22, KC-135, F-15, C-5, T-38) have already undergone flight tests and are scheduled to be certified on the FT blend in the near future. In order to certify fuels for use in aircraft, extensive laboratory and large-scale evaluations are performed to demonstrate aircraft system compatibility, proper engine performance and ensure no negative impacts on the aircraft mission and emissions. The present effort describes recent evaluations of jet fuel candidates derived from coal, natural gas, chicken fat and shale oil. Evaluations for specification tests per MIL-DTL-83133F, chemical composition and characteristics, thermal stability as assessed on several test rigs, and emissions characteristics using a T63 engine were completed. Comparisons between the performance of these alternative fuel candidates relative to specification JP-8 and currently approved SPKs will be presented. The potential of these fuels as drop-in replacements for conventional jet fuel and observed deficiencies will be discussed.