



CPIAC Success Story

Hydrocarbon Rocket Fuel Compositional Variability and Specification

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Customer:	U.S. Air Force Research Laboratory (AFRL)
Challenge:	Following the 2005 Gulf Coast hurricane season and a period of unsustainably, high-cost petroleum resources (e.g., Rocket Kerosene (RP-1) used in U.S. hydrocarbon-fueled rockets such as Atlas V and the SpaceX Falcon, and RP-2, a new high-thermal stability rocket fuel) production operations were diversified. This was done to control costs and ensure availability. As a result, this led to increased compositional variability. Since the specification of Rocket Kerosene is based on bulk physical properties, this variation can lead to changes in more compositional dependant properties (e.g., heat transfer coefficient and thermal stability).
Approach:	CPIAC established a series of Workshops, inviting the rocket propulsion community, launch vehicle provider community, and the fuel manufacturer, to educate both users and the suppliers on current practices, needs, and fuel-related property impacts.
Value:	As unbiased subject matter experts, CPIAC provided data analysis and test program guidance to quantify these effects. AFRL was able to be proactive, rather than reactive, in working with the Air Force launch community, and will derive increased life for its new RP-2 Hydrocarbon Boost Demonstrator engine (the first U.S. hydrocarbon rocket engine designed to be both high performance and highly reusable, enabling operationally responsive access to space). In addition to increased life for the RP-2, the specification review and control have been significantly improved.