Abstract for ESA-3AF Space Propulsion 2014

Title: Green Propulsion Auxiliary Power Unit Demonstration at MSFC
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In 2012, the National Aeronautics & Space Administration (NASA) Space Technology Mission Directorate (STMD) began the process of building an integrated technology roadmap, including both technology pull and technology push strategies. Technology Area 1 (TA-01) for Launch Propulsion Systems is one of fourteen TA's that provide recommendations for the overall technology investment strategy and prioritization of NASA's space technology activities. Identified within TA-01 was the need for a green propulsion auxiliary power unit (APU) for hydraulic power by 2015.

Engineers led by the author at the Marshall Space Flight Center (MSFC) have been evaluating green propellant alternatives and have begun the development of an APU testbed to demonstrate the feasibility of use. NASA has residual APU assets remaining from the retired Space Shuttle Program. Likewise, the F-16 Falcon fighter jet also uses an Emergency Power Unit (EPU) that has similar characteristics to the NASA hardware. Both EPU's and APU components have been acquired for testing at MSFC.

In concert with this effort, ATK has been developing green propellant technology based on the Swedish Space Corp ECAPS LMP-103S propellant. Propellant blending and test facilities have been established at ATK's Elkton MD facility with the intent to provide suitable propellant blends for application to green APU systems as well as thrusters.

This paper will summarize the status of the testing efforts with ATK for use of the green propellant LMP-103S based on ammonium dinitramide and use of the Air Force Research Laboratory (AFRL) propellant AF-M315E based on hydroxyl ammonium nitrate with these test assets.