T10.02 – Energy Conservation and Sustainability, Technologies for Propellant

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Identification and Significance of Innovation

Innovation

(1) commercial H_2 sensor to monitoring of H_2 during a He purge.

(2) bypass configuration w/control valves (temp, pressure protection)

Significance of Innovation

1)Improve safety during purges– real time real time monitoring of H2

-alert personnel to the dangers associated with high H_2 concentrations,

-reduce sampling events & time spent in the near hydrogen.

-avoids pumps, mechanical actuators, or the need to vent H_2

(2) Reduce the time required for purges- Reduce "sniff" operations

(3) Conserve helium – reduce the # of purge events and purge time.

Expected TRL Range at the end of Contract (1-9): 3-3.5

H_2 Sensor In Bypass Configuration with 2 Control Valves

Technical Objectives and Work Plan

Technical Objectives

1. Identify sensors' limits of detection for H2 in He
2. Conduct and evaluate sensor conditioning, verification and calibration procedures
3. Develop accuracy of measurement techniques
4. Minimization of response time & maximize accuracy
5. Identify the best sensor and installation option

Work Plan

Task 1- Configure Test Fixtures to Simulate SSC

Task 2- Determine Reliability in Cryogenic Conditions.

Task 3- Run Pressure Tests at Low Temperatures.

Task 4- Test Standoff and Capillary Designs.

Task 5- Test Delay Valve That Will Satisfy Requirements

Task 6- Determine Optimum Configuration

Task 7- Test for Accuracy and Repeatability

NASA and Non-NASA Applications

o He purge of H2
o Thermodynamic condition monitoring
o Liquid/vapor distribution scenarios
o Mass gauging
o Leak Detection

Non-NASA Applications

o He purge of H2, Mass gauging, Leak detection
o Thermodynamic condition monitoring
o Liquid/vapor distribution scenarios
o Insulation integrity determination
o Commercial liquid hydrogen rockets
o Alternative fuel vehicles

Firm Contacts

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