

Experimental Investigation of Sublimator Performance at Transient Heat Loads

Rubik B. Sheth and Ryan A. Stephan
NASA Johnson Space Center

Thomas O. Leimkuehler
Paragon Space Development Corporation

ABSTRACT

Sublimators have been used as heat rejection devices for a variety of space applications including the Apollo Lunar Module and the Extravehicular Mobility Unit (EMU). Sublimators typically operate with steady-state feedwater utilization at or near 100%. However, sublimators are currently being considered to operate in a cyclical topping mode, which represents a new mode of operation for sublimators. Sublimators can be used as a topper during mission phases such as low lunar or low earth orbit. In these mission phases, the sublimator will be repeatedly started and stopped during each orbit to provide supplemental heat rejection for the portion of the orbit where the radiative sink temperature exceeds the system setpoint temperature. This paper will summarize the effort put into understanding sublimator response under a transient heat load. The performance will be assessed by detailing the changes in feedwater utilization due to transient starts and stops during various feedwater timing scenarios. Sublimator start up utilization will be assessed as a possible relationship to transient performance of a sublimator. This paper will also provide recommendations for future sublimator designs and/or feedwater control.