

DRAFT – ICES 2012 Abstract

Design and Evaluation of a Water Recirculation Loop Maintenance Device for the Advanced Spacesuit Water Membrane Evaporator

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A dual-bed device to maintain the water quality of the Advanced Spacesuit Water Membrane Evaporation (SWME) water recirculation loop has been designed and is undergoing testing. The SWME is a heat rejection device under development at the NASA Johnson Space Center to perform thermal control for advanced spacesuits. One advantage to this technology is the potential for a significantly greater degree of tolerance to contamination when compared to the existing Sublimator technology. The driver for the development of a water recirculation maintenance device is to further enhance this advantage through the leveraging of fluid loop management lessons-learned from the International Space Station (ISS). A bed design that was developed for a Hamilton Sundstrand military application, and considered for a potential ISS application with the Urine Processor Assembly, provides a low pressure drop means for water maintenance in a recirculation loop. The bed design is coupled with high capacity ion exchange resins, organic adsorbents, and a cyclic methodology developed for the Extravehicular Mobility Unit (EMU) Transport Water loop. The bed design further leverages a sorbent developed for ISS that introduces a biocide in a microgravity-compatible manner for the Internal Active Thermal Control System (IATCS). The leveraging of these water maintenance technologies to the SWME recirculation loop is a clear demonstration of applying the valuable lessons learned on the ISS to the next generation of manned spaceflight Environmental Control and Life Support System (ECLSS) hardware.