

DRAFT – ICES 2013 Abstract

Efforts to Reduce International Space Station Crew Maintenance Time in the Management of the Extravehicular Mobility Unit Transport Loop Water Quality

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The EMU (Extravehicular Mobility Unit) contains a semi-closed-loop re-circulating water circuit (Transport Loop) to absorb heat into a LCVG (Liquid Coolant and Ventilation Garment) worn by the astronaut. A second, single-pass water circuit (Feed-water Loop) provides water to a cooling device (Sublimator) containing porous plates, and that water sublimates through the porous plates to space vacuum. The cooling effect from the sublimation of this water translates to a cooling of the LCVG water that circulates through the Sublimator. The quality of the EMU Transport Loop water is maintained through the use of a water processing kit (ALCLR – Airlock Cooling Loop Remediation) that is used to periodically clean and disinfect the water circuit. Opportunities to reduce crew time associated with ALCLR operations include a detailed review of the historical water quality data for evidence to support an extension to the implementation cycle. Furthermore, an EMU returned after 2-years of use on the ISS (International Space Station) is being used as a test bed to evaluate the results of extended and repeated ALCLR implementation cycles. Finally, design, use and on-orbit location enhancements to the ALCLR kit components are being considered to allow the implementation cycle to occur in parallel with other EMU maintenance and check-out activities, and to extend the life of the ALCLR kit components. These efforts are undertaken to reduce the crew-time and logistics burdens for the EMU, while ensuring the long-term health of the EMU water circuits for a post-Shuttle 6-year service life.