ECLSS Reliability for Long Duration Missions Beyond Lower Earth Orbit

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Reliability has been highlighted by NASA as critical to future human space exploration particularly in the area of environmental controls and life support systems. The Advanced Exploration Systems (AES) projects have been encouraged to pursue higher reliability components and systems as part of technology development plans. However there is no consensus on what is meant by improving on reliability; nor on how to assess reliability within the AES projects. This became apparent when trying to assess reliability as one of several figures of merit for a regenerable water architecture trade study. In the spring of 2013, the AES Water Recovery Project (WRP) hosted a series of events at the NASA Johnson Space Center (JSC) with the intended goal of establishing a common language and understanding of our reliability goals, and equipping the projects with acceptable means of assessing our respective systems. This campaign included an educational series in which experts from across the agency and academia provided information on terminology, tools and techniques associated with evalauating and designing for system reliability. The campaign culminated in a workshop at JSC with members of the ECLSS and AES communities with the goal of developing a consensus on what reliability means to AES and identifying methods for assessing our low to mid-technology readiness level (TRL) technologies for reliability. This paper details the results of the workshop.

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