

# Cascade Distillation System Design for Safety and Mission Assurance

Miriam J. Sargusingh<sup>1</sup>, and Michael R. Callahan<sup>2</sup>  
*NASA Johnson Space Center, Houston, TX, 77058*

Per the NASA Human Health, Life Support and Habitation System Technology Area 06 report “crewed missions venturing beyond Low-Earth Orbit (LEO) will require technologies with improved reliability, reduced mass, self-sufficiency, and minimal logistical needs as an emergency or quick-return option will not be feasible. To meet this need, the development team of the second generation Cascade Distillation System (CDS 2.0) opted a development approach that explicitly incorporate consideration of safety, mission assurance, and autonomy. The CDS 2.0 preliminary design focused on establishing a functional baseline that meets the CDS core capabilities and performance. The critical design phase is now focused on incorporating features through a deliberative process of establishing the systems failure modes and effects, identifying mitigative strategies, and evaluating the merit of the proposed actions through analysis and test. This paper details results of this effort on the CDS 2.0 design.

---

<sup>1</sup> Systems Engineer, Crew and Thermal Systems Division, 2101 NASA Parkway/EC2

<sup>2</sup> , Crew and Thermal Systems Division, 2101 NASA Parkway/EC3