

Requirements for Designing Life Support System Architectures for Crewed Exploration Missions beyond Low-Earth Orbit

David Howard, and Jay Perry
NASA Marshall Space Flight Center, Huntsville, AL

Miriam Sargusingh
NASA Johnson Space Center, Houston, TX

and

Nikzad Toomarian
NASA Jet Propulsion Laboratory, Pasadena, CA

NASA's technology development roadmaps provide guidance to focus technological development on areas that enable crewed exploration missions beyond low-Earth orbit. Specifically, the technology area roadmap on human health, life support and habitation systems describes the need for life support system (LSS) technologies that can improve reliability and in-situ maintainability within a minimally-sized package while enabling a high degree of mission autonomy. To address the needs outlined by the guiding technology area roadmap, NASA's Advanced Exploration Systems (AES) Program has commissioned the Life Support Systems (LSS) Project to lead technology development in the areas of water recovery and management, atmosphere revitalization, and environmental monitoring. A notional exploration LSS architecture derived from the International Space has been developed and serves as the developmental basis for these efforts. Functional requirements and key performance parameters that guide the exploration LSS technology development efforts are presented and discussed. Areas where LSS flight operations aboard the ISS afford lessons learned that are relevant to exploration missions are highlighted.