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SIRONA: SUSTAINABLE INTEGRATION OF REGENERATIVE OUTER-SPACE NATURE AND AGRICULTURE. PART 2 – DESIGN DEVELOPMENT AND PROJECTED PERFORMANCE

Abstract

A comprehensive Bioregenerative Life Support System (BLiSS) for human Long-duration Space Exploration Missions (LDEM) requires an innovative design philosophy and novel technical solutions. SIRONA: Sustainable Integration of Regenerative Outer-space Nature and Agriculture is a greenhouse design that produces a wide variety of food sources and provides life support functions including access to nature to improve astronaut restoration, relaxation, and recreation. Whereas Hava et al. 2019 outlined the primary technologies and system architecture of SIRONA, this paper describes the foundational design principles that informed the development of the greenhouse. Analyses on projected performance are also carried out to validate design assumptions and constraints.