

Title: Optimizing Consumable Gas Tank Usage while Maintaining Emergency Reserves Between Two Pressure Control Systems on Gateway

Two of NASA's Lunar Space Station (Gateway) modules, the Habitation and Logistics Outpost (HALO) and International Habitat (IHAB) contain a pressure control system (PCS) that is used to supply Nitrogen (N₂) and Oxygen (O₂) to maintain a habitable environment within Gateway, with only one of the PCS active at any given time. To protect the crew during a contingency that is affecting pressure control and therefore gas consumables, Gateway is required to have sufficient amount of reserve consumable gas across the entire habitable Gateway stack of modules until the gas can be replenished by crew changing out a gas tank. This will occur in a non-contingency setting either on the current mission or on the next mission. To access the stack reserve Gateway features a Nitrogen Oxygen Transfer System (NOTS) between HALO and IHAB that allows each module's PCS to access the gas tanks in the other module. The PCS designs are different between the two modules and lack interchangeable tanks so which module has active PCS must be accounted for in logistics planning. This paper describes the logistics resupply planning analysis used to determine the most efficient use of the tanks within each PCS, and a method for switching which module is active for PCS while maintaining the stack reserve that preserves enough gas to cover contingency cases.