

## ICES 2023

**Title:** Evaluation of Iodine and Silver as Biocides for Potable Water in Human Missions beyond Low Earth Orbit

**Authors:** Dean Muirhead (JETS2), Stacey Moller, (JETS2), Niklas Adam (NASA), Michael Callahan (NASA)

**Abstract:** Chemical biocides play an important role in potable water storage and distribution systems. They provide protection against microbial growth that can negatively impact efficient water transport and crew health. Molecular iodine and ionic silver have been used on the International Space Station for decades. Future orbiting and surface habitats will have potable water systems that will require reliable potable water storage and challenging transport schemes during daily operations with potentially lengthy and repeated periods of non-use. Based on a review of literature, experimental data, and flight data this paper categorizes the advantages and disadvantages of the two heritage biocides on ISS: iodine and silver. The history of biocide practices on ISS is compared to requirements of future human missions beyond low Earth Orbit. The upstream water quality supply and downstream water uses are defined with respect to the two biocides. The methods of injection and removal of the two biocides are compared for a range of downstream water uses including drinking water, hygiene water, technical water, oxygen generation water, and extravehicular activity water. The paper provides mission planners with a technical and engineering assessment of the two biocides and identifies gaps in knowledge and on-orbit experiences.