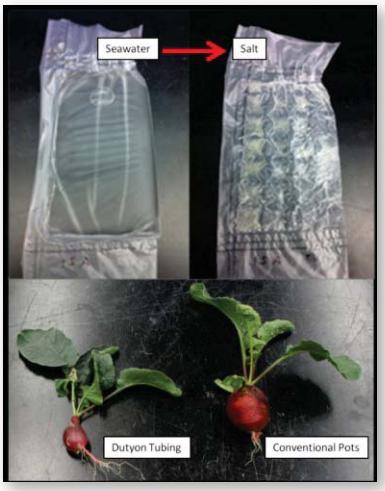
Distillation Brine Purification For Resource Recovery Applications Project

Center Innovation Fund: KSC CIF Program

Space Technology Mission Directorate (STMD)

National Aeronautics and Space Administration



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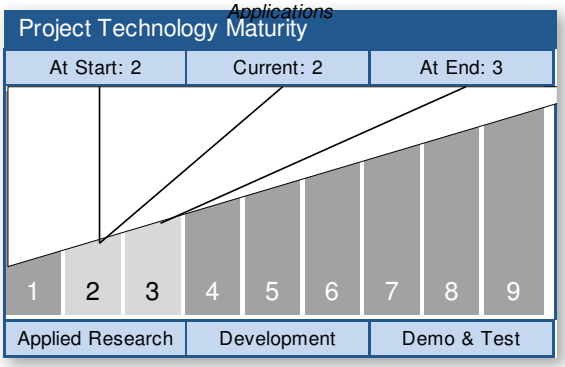

ABSTRACT

Wastewater processing systems for space generate residual brine that contains water and salts that could be recovered to reduce life support consumables. The project assessed the use of ion-exchange resins to selectively remove salts from wastewater treatment brines. The resins were then regenerated for additional use. The intention would be to generate a Na/K and Cl rich or purified brine that would then be processed into high value chemicals, such as acids, bases, and/or bleach.

Technology Area: Environmental Control & Life Support Systems & Habitation Systems TA06.1 (Primary)
Human Health, Life Support & Habitation Systems TA06 (Secondary)

ANTICIPATED BENEFITS

To NASA funded missions:

NASA would benefit from reduced resupply of water, chemicals, and other consumables to the ISS, NEO, and future surface missions, and save operation costs.

To NASA unfunded & planned missions:

This project could demonstrate an increased level of autonomy for future space mission, e.g., surface settings and benefit ISRU efforts to harvest local elements and water.

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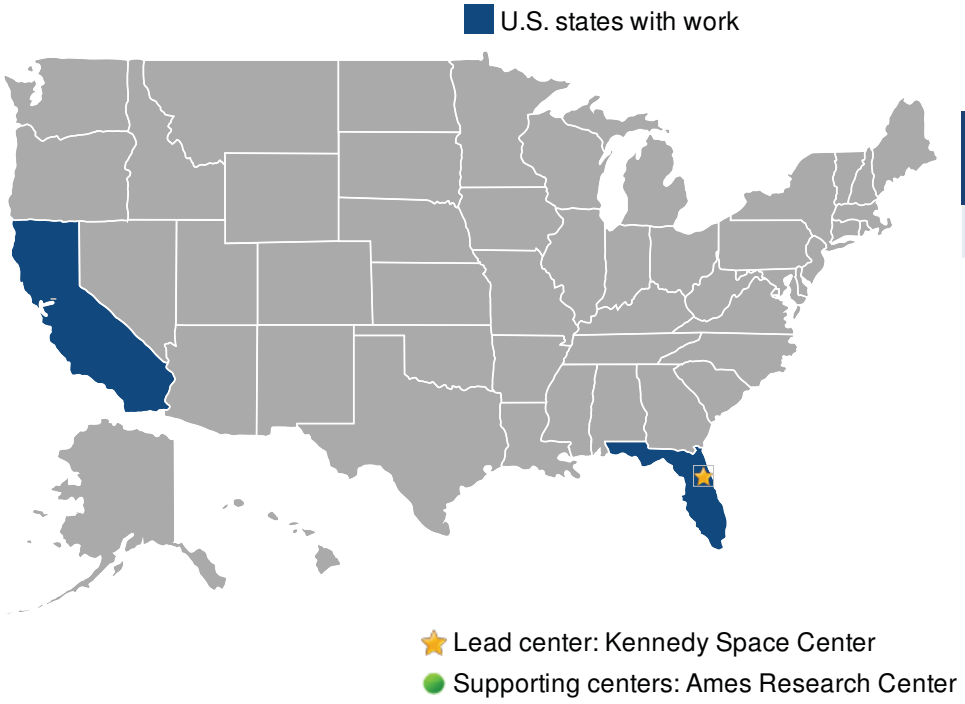
Read more on the last page.



Other Organizations Performing Work
QinetiQ North America/ESC

DETAILED DESCRIPTION

Current wastewater processing approaches generate residual brines that must be discarded as waste. But additional water and chemicals could be retrieved from these brines, using the appropriate processing concepts. This technology could 1) increase water recovery from residual brines, and 2) retrieve valuable elements that could be used to generate high value chemicals (acid, base, bleach or even plant fertilizer). If proven feasible, the combined benefits would reduce consumables and further close the water loop for future space exploration.

MANAGEMENT

Program Director:
John Falker

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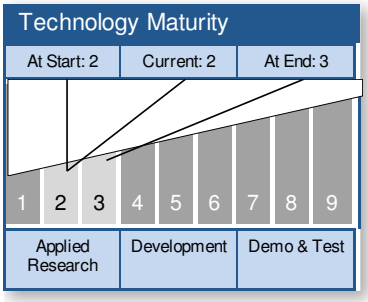
Griffin Lunn

Co-Investigator:
Griffin Lunn

TECHNOLOGY DETAILS

Distillation Brine Purification for Resource Recovery Applications



TECHNOLOGY DESCRIPTION

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- This technology is categorized as a hardware system for other applications
- Technology Area
    - TA06.1 Environmental Control & Life Support Systems & Habitation Systems (Primary)
    - TA06 Human Health, Life Support & Habitation Systems (Secondary)
    - TA07 Human Exploration Destination Systems (Additional)

CAPABILITIES PROVIDED

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TECHNOLOGY DETAILS

POTENTIAL APPLICATIONS (CONT'D)

Development and application of brine tolerant ion-exchange resins could provide more efficient methods for retrieving elements and pure water from salt water, and provide feed stocks for commercial processes that generate bleach, HCl, and Na/KOH (e.g., Chlor-alkalai Process).

IMAGE GALLERY

Distillation Brine Purification for Resource Recovery Application

ANTICIPATED BENEFITS

To the commercial space industry: (CONT'D)

Development and application of brine tolerant ion-exchange resins could provide more efficient methods for retrieving elements and pure water from salt water, and provide feed stocks for commercial processes that generate bleach, HCl, and Na/KOH (e.g., Chlor-alkalai Process).