Lunar In-Situ Volatile Extraction, Phase I

Completed Technology Project (2006 - 2006)

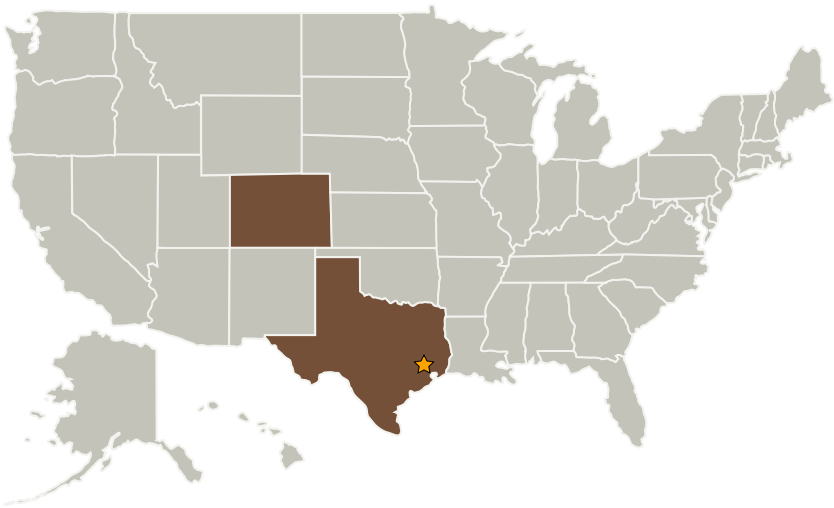
Project Introduction

A method of extracting volatile resources from the Lunar regolith is proposed to reduce the launch mass and cost of bringing such resources from the Earth to enable sustainable human space exploration. Thermal energy is applied to excavated soil releasing the solar wind volatiles and any water resources believed to exist in the Moon's polar regions. The in-situ resource extraction and separation system will be designed to integrate with TAI's planned in-situ collection and purification system to complete an end-to-end facility for producing high density fluids for propulsion, life support, and power generation. Regolith excavation and subsequent volatile production rates are derived from the baseline consumption of resources given in the point of departure mission information for proposals. A method of extracting volatiles in a fluidized, vacuum-isolated chamber will provide an energy-efficient process through effective recuperation of thermal energy. Several hundreds of times the excavation and extraction system mass in volatile product will be processed in the proposed concept per year of operation. The system design will be scalable for initial testing on the Moon and eventual operation on Mars.

Anticipated Benefits

Potential NASA Commercial Applications: Non-NASA applications include advancement of soil vapor-extraction processes for removal of contamination from Earth-based chemical spills and landfill remediation. Recovery of toxic volatiles entrained in soils will enable efficient, low-power containment and compact, lightweight designs for portable treatment facilities.

Primary U.S. Work Locations and Key Partners



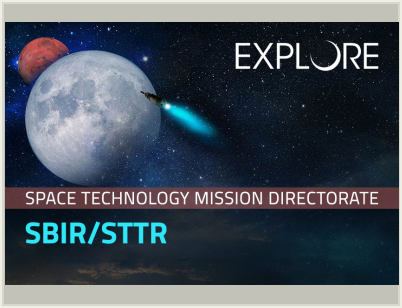


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Table of Contents

Project Introduction 1
Anticipated Benefits 1
Primary U.S. Work Locations and Key Partners 1
Organizational Responsibility 1
Project Management 2
Technology Areas 2

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Johnson Space Center (JSC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Johnson Space Center(JSC)	Lead Organization	NASA Center	Houston, Texas
Technology Applications, Inc.	Supporting Organization	Industry	Boulder, Colorado

Primary U.S. Work Locations	
Colorado	Texas

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Stephen J Nieczkoski

Technology Areas

Primary:

- TX07 Exploration Destination Systems
  └ TX07.1 In-Situ Resource Utilization
    └ TX07.1.2 Resource Acquisition, Isolation, and Preparation