

Active Project (2015 - 2016)

EVA Suit Microbial Leakage Investigation Project

Center Independent Research & Developments: JSC IRAD Program | Space Technology Mission Directorate (STMD)



ABSTRACT

The objective of this project is to collect microbial samples from various EVA suits to determine how much microbial contamination is typically released during simulated planetary exploration activities. Data will be released to the planetary protection and science communities, and advanced EVA system designers. In the best case scenario, we will discover that very little microbial contamination leaks from our current or prototype suit designs, in the worst case scenario, we will identify leak paths, learn more about what affects leakage--and we'll have a new, flight-certified swab tool for our EVA toolbox.

ANTICIPATED BENEFITS

To NASA funded missions:

Suit test data will help advanced suit designers develop strategies for planetary protection compliance. Characterization of suit microbial environment will also help quantify the effectiveness of suit cleaning processes and equipment between suit uses, which may be important for crew health.

DETAILED DESCRIPTION

NASA has a strategic knowledge gap (B5-3) regarding what life signatures leak/vent from our Extravehicular Activity (EVA) systems; this potentially impacts how we will search for evidence of life at exploration destinations. Funding will be used to fabricate and sterilize test consumables (swab tips), prepare Test Readiness Review products (such as materials compatibility and hazard assessments), certify the EVA Swab Tool, participate in test opportunities as they arise, and perform analysis on collected swabs.

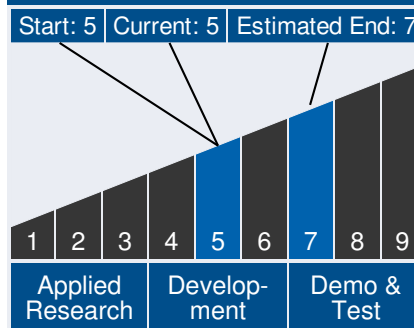


Form, Fit, and Function Testing of EVA Swab With Mark III Suited Subject

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Technology Maturity

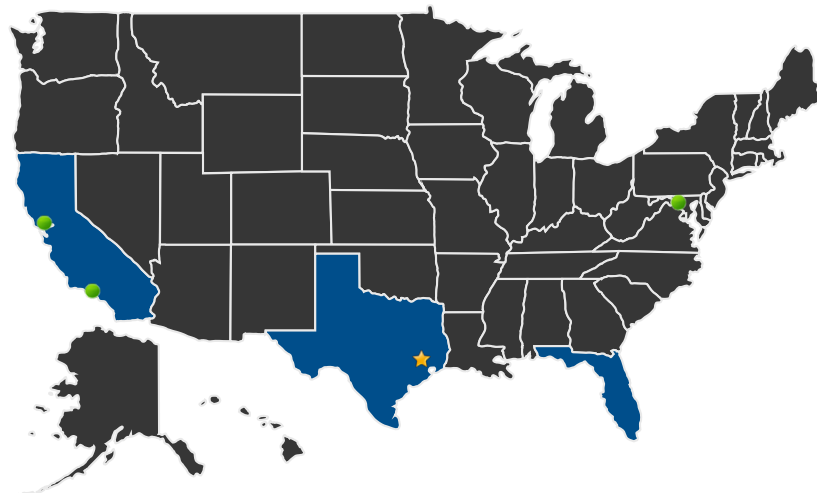


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U.S. WORK LOCATIONS AND KEY PARTNERS



 U.S. States With Work  **Lead Center:**
Johnson Space Center

 **Supporting Centers:**

- Ames Research Center
- Goddard Space Flight Center
- Jet Propulsion Laboratory

Other Organizations Performing Work:

- The University of Florida
- University of California at Davis

Management Team

Program Director:

- Jay Falker

Program Executive:

- Christopher Baker

Program Manager:

- Ronald Clayton

Project Manager:

- Michelle Rucker

Technology Areas

Primary Technology Area:

Human Health, Life Support, and Habitation Systems (TA 6)

Other Technology Areas:

- Environmental Control and Life Support Systems and Habitation Systems (TA 6.1)
- Water Recovery and Management (TA 6.1.2)
- Brine Processing (TA 6.1.2.3)

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DETAILS FOR TECHNOLOGY 1

Technology Title

EVA Suit Microbial Leakage Investigation

Technology Description

This technology is categorized as a hardware subsystem for tools

NASA has a strategic knowledge gap (B5-3) regarding what life signatures leak/vent from our Extravehicular Activity (EVA) systems; this potentially impacts how we will search for evidence of life at exploration destinations. Funding will be used to fabricate and sterilize test consumables (swab tips), prepare Test Readiness Review products (such as materials compatibility and hazard assessments), certify the EVA Swab Tool, participate in test opportunities as they arise, and perform analysis on collected swabs.

Capabilities Provided

Suit test data will help advanced suit designers develop strategies for planetary protection compliance—for example, do fabric gauntlets over the wrist joints prevent leaked microbes from migrating? Do neck dams help keep respirated microbes from migrating to one of the leakier joints? By using fully suited crew to collect microbial samples, these tests also provide an opportunity to practice the operational procedures needed to sample crewed equipment on Mars and assess what we may be leaking out—or what kinds of contaminants Mars may be depositing on our hardware.

Potential Applications

The objective of this project is to collect microbial samples from various EVA suits to determine how much microbial contamination is typically released during simulated planetary exploration activities. Data will be released to the planetary protection and science communities, and advanced EVA system designers. In the best case scenario, we will discover that very little microbial contamination leaks from our current or prototype suit designs, in the worst case scenario, we will identify leak paths, learn more about what affects leakage--and we'll have a new, flight-certified swab tool for our EVA toolbox.