



## HUMAN HEALTH AND PERFORMANCE

Exploring Space | Enhancing Life

# Environmental Monitoring (Surfaces, Air, Water, and Lunar Dust)

## Understanding Environmental Conditions of Humans in Extreme Environments

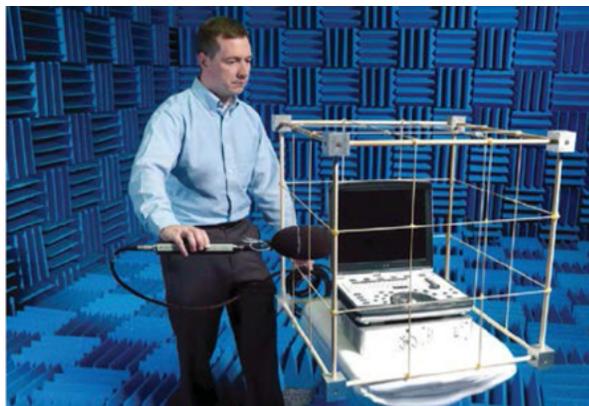
Our unique environmental monitoring, analysis, and data assessment expertise and capabilities ensures environmental standards and crew health and safety are achieved for human spaceflight, as well as technologies, into integrated testing of human-system interfaces, human performance into system concepts, and mission operations.

### World Renowned Skills and Unique Capabilities

The Johnson Space Center, a world leader in human spaceflight, possesses unique knowledge, skills, and capabilities that can be applied to solving human health and performance challenges here on earth—particularly those related to operating in extreme and harsh environments.



NASA expertise is available in the areas of environmental monitoring, analysis, and data assessment. This expertise ranges from environmental research to operational and hardware requirements development, design & implementation, verification/validation, monitoring, analysis, and data assessment. Research capabilities include numerous unique space environmental laboratory facilities.



Johnson Space Center

Unique Environmental Monitoring, Analysis, and Data Assessment expertise, skills, knowledge and capabilities are available to support establishment of spacecraft environmental requirements, pre-flight analyses and planning, and evaluation of actual on-orbit internal environmental conditions. Research activities include the development of advanced environmental monitoring technology concepts that could be used for terrestrial applications; military (e.g. Army and Navy) uses and operations; to aid in development of capabilities for Commercial Crew; new space mission endeavors such as an orbiting commercial venture; terrestrial operational challenges of working and living in extreme and harsh environments; environmental monitoring research and development; and optimizing for human health and performance.

### **Acoustics and Noise Control Lab**

Acoustics and Noise Control Lab ensures safe, healthy, and habitable vehicle acoustic environments in which astronauts can live, communicate, and work, inclusive of acoustics modeling, requirements allocation, and implementation of appropriate noise controls using flight-certified acoustics materials as well as testing and noise remediation assistance.

### **Toxicology**

The Toxicology discipline protects crews from toxic exposures during extreme environment operations by setting limits to protect crew health; assessing health hazards of payload/system chemicals based on composition, concentration, and volume; evaluating air quality in real-time; and performing off-gas material testing of hardware.

### **Environmental Chemistry Laboratory**

The Environmental Chemistry Laboratory specializes in delivering high-quality analytical data relevant to chemicals that may be present in spaceflight air, water, or food samples. Laboratory personnel have extensive experience in optimizing analytical methods for the types of analysis most relevant to spaceflight, and adapting those methods to be able to handle inherent spaceflight limitations (e.g., small sample volumes, non-ideal storage conditions). Personnel also have extensive experience in conducting chemical stability studies, in calibrating and ground testing relevant spaceflight monitoring devices, and in quality control and data management functions.

### **Microbiology**

The JSC Microbiology Community is concerned with addressing issues related to infectious disease, microbial ecology of spacecraft, and effects on crew health. This community is comprised of an integrated team of certified medical technologists, environmental microbiologists, immunologists, industrial hygienists, industrial microbiologists, mycologists, and biosafety professionals. The laboratory processes environmental samples (such as air, potable water, spacecraft surfaces, in-flight hardware, and food) to ensure that microorganisms do not adversely affect crew health or system performance.

