

## Workshop on Planetary Protection Knowledge Gaps for Human Extraterrestrial Missions

March 24-26<sup>th</sup>, 2015; NASA Ames Research Center, CA

THIRD/REVISED ANNOUNCEMENT — JANUARY, 2015

### Institutional Support:

National Aeronautics and Space Administration  
NASA Ames Research Center  
SETI Institute  
Universities Space Research Association

### Conveners

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Dr. Gerhard Kminek  
*ESA/Planetary Protection Officer*  
Dr. Bette Siegel  
*NASA/Human Exploration and Operations Directorate*

### Science Organizing Committee

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Dr. Margaret Race  
*SETI Institute*  
Dr. John D. Rummel  
*East Carolina University*  
Dr. J Andy Spry  
*NASA/Jet Propulsion Laboratory*

## MEETING LOCATION AND DATE

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NASA's Ames Research Center and SETI Institute will co-host a Workshop on Planetary Protection Knowledge Gaps for Human Extraterrestrial Missions on March 24 – 26, 2015 in Moffett Field, CA. The workshop will take place in Building 152 in the NASA Research Park (NRP).

Further details and map can be located here:

<http://www.nasa.gov/ames/ppw2015workshop>

## PURPOSE AND SCOPE

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During the course of planetary exploration, internationally recognized planetary protection measures have been developed and are in place to prevent confounding the search for life on Mars and to safeguard Earth from the return of potentially hazardous material. Since the close of the Apollo program, planetary protection practices have not been necessary for crewed missions and little consideration was given to planetary protection in human system design and development. With preparations underway for exploration beyond low Earth orbit, including NASA's development of the Space Launch System (SLS) and Orion capsule, planetary protection must once again be considered and incorporated in system design. Space suits, habitat modules, and in-situ resource utilization (ISRU) equipment are just a few of the systems that will need to address planetary protection requirements and guidelines in their design, development, and operations.

While planetary protection requirements are in place for robotic missions, there is presently insufficient scientific, technological, and operational knowledge to establish detailed quantitative requirements for the development of crewed spacecraft and missions, while respecting planetary protection policy objectives. To prepare for such future missions, NASA has created the *NASA Policy on Planetary Protection Requirements for Human Extraterrestrial Missions* (NPI 8020.7) which outlines the need to increase knowledge in the following study areas while iteratively developing an appropriate set of requirements:

- Study Area 1: Microbial and human health monitoring
- Study Area 2: Technology and operations for contamination control
- Study Area 3: Natural transport of contamination on Mars

The goal of this workshop is to capture the current state of knowledge in these areas and identify additional research to appropriately inform planetary protection requirements for the human exploration of Mars in line with current planetary protection policy objectives. The information collected at this workshop, in addition to information collected from literature review and previous planetary protection workshops, will enable NASA to efficiently conduct studies that will define the initial set of planetary protection requirements for human missions.

## MEETING THEMES

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To capture the current state of knowledge appropriate to planetary protection and future human missions, the following themes under each of the three main study areas are being sought for review and discussion:

- Study Area 1: Microbial and human health monitoring
  - Monitoring growth and survival of human & habitat associated microbial populations in space environments
  - Minimal mass/volume and low consumable/waste product biological assay techniques
  - Microbiome research and the ability to detect extraterrestrial perturbations
  - Crew quarantine measures for preventing back contamination
  - Crew health and habitat microbiome impacts from Mars material exposure
- Study Area 2: Technology and operations for contamination control
  - Cleaning, sterilization, re-contamination prevention, and associated verification technologies for in-situ application
  - Environmental Control and Life Support (ECLS) loop closure and mitigation of spacecraft effluents
  - Technologies for contamination control of human surface mobility systems and spacesuits
  - Contamination control and preventing creation of localized habitable environments by support systems (In-situ Resource Utilization (ISRU), power, etc.)
  - Human surface exploration operational strategies for mitigating contamination
  - Sample acquisition, containment and breaking-the-chain (BTC) of contact technologies
  - Environmental clean-up of inadvertent release of unsterilized terrestrial material
- Study Area 3: Natural transport of contamination on Mars
  - Transport of biological contamination
  - Transport of organic contamination (particulates and molecular)

Additional study areas and themes related to planetary protection requirement development for human missions may be proposed for consideration prior to the abstract submission deadline.

## MEETING FORMAT

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The workshop will open with a brief review of the goals and scope for the workshop and NASA's current perception of knowledge gaps and suggested studies. The meeting will then proceed with oral presentation of accepted abstracts covering each of the main study areas and their corresponding themes before concluding with a summarization of findings and open discussion. A draft overview agenda follows:

<b>Workshop Day</b>	<b>Workshop Agenda Item (DRAFT)</b>
	<b>Opening/Welcome</b>
	<b>Workshop Goals &amp; Scope</b>
	<b>Where NASA is Now</b>
<b>Day 1</b>	<i>NASA's Exploration Overview</i>
	<i>Current Planetary Protection Policy &amp; Human Spaceflight</i>
	<i>NASA's Perceived Gaps &amp; Suggested Studies</i>
	<b>Study Area 1 Briefings – Abstracts with Q&amp;A</b>
<b>Day 2</b>	<b>Study Area 2 Briefings – Abstracts with Q&amp;A</b>
	<b>Study Area 3 Briefings – Abstracts with Q&amp;A</b>
	<b>Workshop Conclusion</b>
<b>Day 3</b>	<i>Presentation of Study Area Targeted Q&amp;A Summaries</i>
	<i>Open Discussion with Panelists</i>
	<i>Wrap-Up/Closing Comments</i>

An updated agenda will be made available on this site in the coming months.

To maximize the opportunity of the face-to-face meeting, consideration is being given to hosting a virtual-only pre-workshop meeting. Such a virtual forum would provide registered participants and authors a brief summary of previous effort surrounding planetary protection requirement development for human missions in addition to summarizing NASA's development of the *NASA Policy on Planetary Protection Requirements for Human Extraterrestrial Missions* (NPI 8020.7). Interest and availability to attend such a virtual workshop is being collected through the registration portal and additional details will be posted on this site in the event a virtual pre-workshop meeting is organized.

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#### **INDICATION OF INTEREST**

To subscribe to a mailing list to receive electronic reminders and special announcements relating to the meeting via e-mail, please submit an electronic Indication of Interest form through the Universities Space Research Association Meeting Portal by Monday, February 9, 2015: [https://www.hou.usra.edu/meeting\\_portal/iofi/?mtg=ppw2015](https://www.hou.usra.edu/meeting_portal/iofi/?mtg=ppw2015)

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#### **CALL FOR ABSTRACTS**

The workshop conveners are seeking abstracts summarizing the current state of knowledge with respect to science, technology, and operations relevant to the implementation of planetary protection practices during future human exploration. Authors should strive to identify current research and technology development, its applicability to monitoring and mitigating both forward and backward microbial contamination, and what research or development gaps may need to be addressed in advance of future human extraterrestrial exploration. Abstracts should provide particular focus to one or more of the identified workshop study areas and related themes or propose additional areas of investigation for consideration by the organizing committee. Submitted abstracts may also want to consider

addressing the advancements made since the publication of final reports from similar workshops on planetary protection and human exploration, such as:

- Report summarizing a planetary protection workshop at Pingree Park in Fort Collins, Colorado in 2001:
  - *Planetary Protection Issues in the Human Exploration of Mars*. Race, M. S., Criswell, M. E., & Rummel, J. D. (2003).
- Report from the Life Support and Habitation and Planetary Protection Workshop held at the Center for Advanced Space Studies in Houston, Texas in 2005:
  - *Life Support and Habitation and Planetary Protection Workshop Final Report*. Fisher, J. W., Hogan, J. A., Joshi, J. A., et. al. (2006).
- Report from a NASA & ESA collaborative workshop on planetary protection held in Noordwijk, The Netherlands in 2005:
  - *Joint ESA/NASA Workshop: Planetary Protection & Human System Research and Technology* ESA WPP-276 Kminek, G., Rummel, J.D., and Race, M.S. (2007).
- Report of the MEPAG Mars Human Precursor Science Steering Group (2005):
  - *An Analysis of the Precursor Measurements of Mars Needed to Reduce the Risk of the First Human Mission to Mars*. Beaty, D. W. et al. JPL Doc. I.D. CL#05-0381

These final reports and additional relevant resources are available for download from NASA's Planetary Protection website: <http://planetaryprotection.nasa.gov/documents/>

At this time, submitted abstracts are to be considered for oral presentation only.

**Abstract Deadline — Thursday, January 22, 2015, 5:00 p.m. U.S. Central Daylight Time (GMT-5).**

To access forms and instructions for abstract submission, please visit: <http://www.hou.usra.edu/meetings/ppw2015/>.

## **TRAVEL FUNDS**

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Please note that all travel and accommodations associated with the Workshop on Planetary Protection Knowledge Gaps for Human Extraterrestrial Missions is the responsibility of the attendee and no sponsorships can be provided at this time.

## **REGISTRATION**

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No registration fees are being collected for this workshop, however registration is required for planning purposes. **Registration closes Tuesday, March 10, 2015.** To access forms and instructions for registration, please visit <http://www.hou.usra.edu/meetings/ppw2015/>.

## DIRECTIONS

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Directions to the meeting location may be located here:

<http://www.nasa.gov/ames/ppw2015workshop>

## CONTACTS

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For further information regarding the content and details of this workshop:

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For further information regarding abstract submission or registration:

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## SCHEDULE

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Abstract deadline	Thursday, January 22, 2015
Deadline for submitting indication of interest	Monday, February 9, 2015
Final announcement with program and abstracts posted on this website	Monday, February 09, 2015
Pre-Registration deadline	Monday, February 23, 2015
Registration closes	Tuesday, March 10, 2015
Workshop on Planetary Protection Knowledge Gaps for Human Extraterrestrial Missions	March 24-26, 2015