

Planetary protection and humans missions to Mars: summary results from two workshops sponsored by NASA and NASA/ESA

M.S. Race (1), G. Kminek (2), J.D. Rummel (3)

1. SETI Institute, Mountain View, CA USA (mracemom@aol.com),
2. ESA, Noordwijk, NETHERLANDS,(Gerhard.Kminek@esa.int),
3. NASA HQ, Washington DC, USA (jrummel@hq.nasa.gov)

Planetary Protection (PP) requirements will strongly influence mission and spacecraft designs for future human missions to Mars, particularly those related to the operation of advanced life support systems (ALS), extravehicular activities (EVA), laboratory and *in situ* sampling operations, and systems for environmental monitoring and control (EMC). In order to initiate communication, understanding and working relations between the ALS, EVA, EMC and PP communities in both NASA and ESA, two separate workshops were held to focus on mission-specific PP issues during future human missions to Mars. The NASA “*Life Support and Habitation and Planetary Protection Workshop*” was held in Houston TX (Center for Advanced Space Studies, April 2005); and The “*Mars PP and Human Systems Research and Technology Joint NASA/ESA Workshop*” was held at ESA/ESTEC (Noordwijk, Netherlands, May 2005). This poster presentation summarizes the findings of both workshops and their associated recommendations, which are summarized as follows:

The NASA workshop developed a tentative conceptual approach consistent with current PP requirements to provide preliminary guidance in the assessment of EVA, ALS, EMC and other aspects of human missions. The workshop report identified the need for development of a comprehensive classification and zoning system for Mars to minimize contamination and guide operations, particularly in relation to COSPAR ‘Special Region’ and protection of science and environmental conditions. Critical research and technology development (R&TD) areas were also identified at the workshop, including greater understanding of forward contaminants, process products and by-products; improved waste disposal, venting and leakage management for gases, liquids and solids associated with habitats and mobile systems; and development of standards and systems for detecting biomarkers and living organisms associated with both forward and back contamination. Because of the long lead time for research and system design, it is critical that PP be integrated with all aspects of human missions from the start, highlighting the need for coordination across the various scientific and technical communities as well as with the international community in the years ahead.

The Joint NASA/ESA workshop considered the range of knowledge and information necessary to establish PP requirements with respect to ALS and EVA systems, including the identification of potential contaminants, contamination pathways, and potential off-nominal events typical of such systems. The top-level workshop goal was to determine how PP requirements will be implemented during human missions, and what standards of contamination control will apply to human explorers. The workshop report includes an overall approach to contamination control, waste and consumable management, and off-nominal events, as well as a list of R& D and precursor mission information necessary to cope with PP requirements during future long duration human missions to Mars.