Artist's concept of an astronaut on Mars, as viewed through the window of a spacecraft

https://www.nasa.gov/image-feature/viewing-the-red-planet

Planetary Protection Activities at Intersections of Human and Science Missions to Mars

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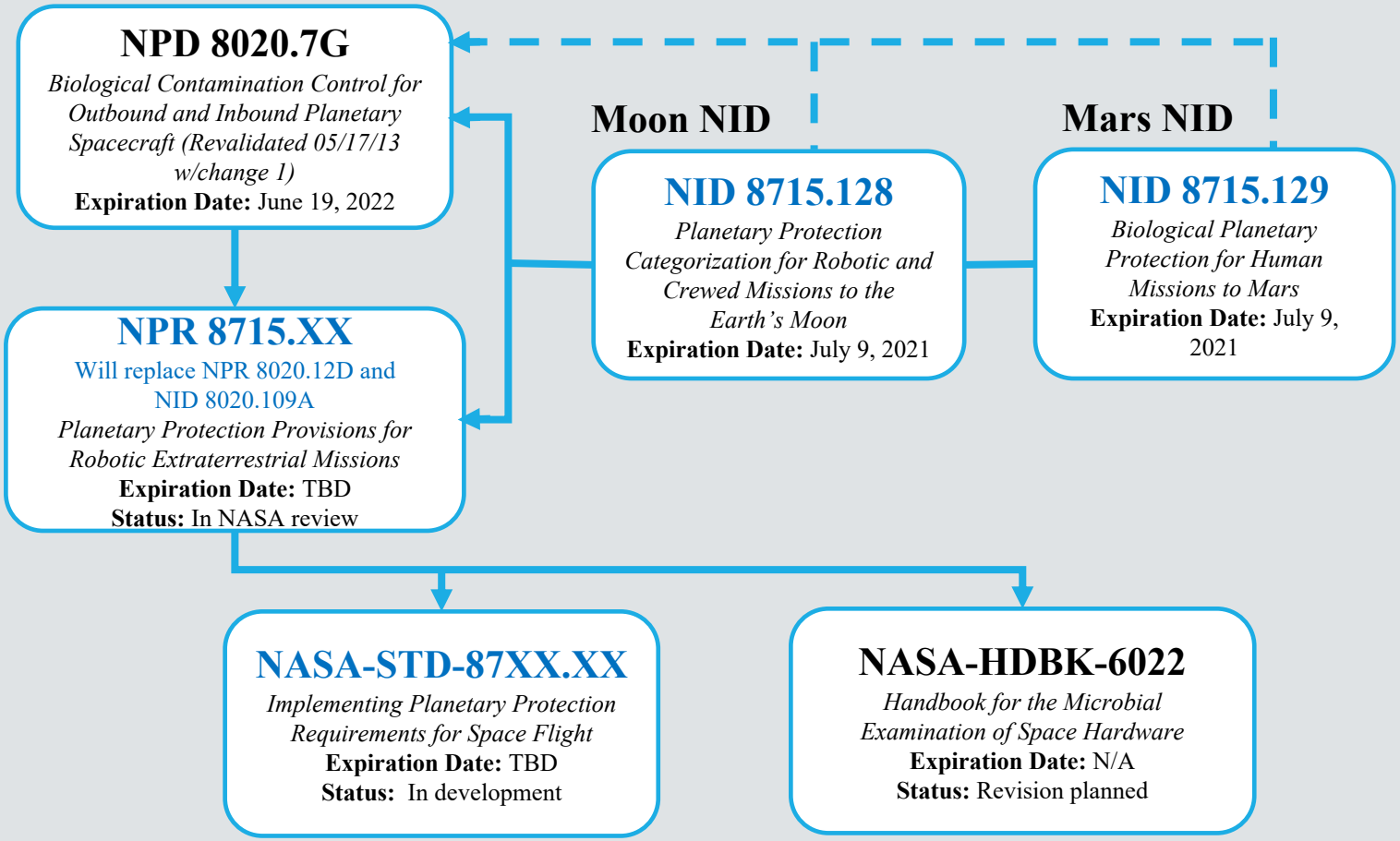
NASA's Current Policy Documents



Expedited Planetary Protection NID's as Catalysts for COSPAR Review

NID 8715.128 Planetary Protection Categorization for Robotic and Crewed Missions to the Earth's Moon

NID 8715.129 Biological Planetary Protection for Human Missions to Mars

NID 8715.128 *Planetary Protection Categorization for Robotic and Crewed Missions to the Earth's Moon*

Purpose:

- Directive sets forth NASA requirements applicable to robotic and crewed missions travelling to the Earth's Moon
- Directive specifically addresses the control of terrestrial biological contamination associated with space vehicles intended to land, orbit, flyby, or otherwise encounter Earth's Moon

New NASA Categories I-L and II-L

All missions to the Moon designated as NASA Mission Planetary Protection Category I-L except:

- Permanently Shadowed Regions (PSRs): For the purposes of complying with this NID, the PSRs include areas of the Moon south of 79°S latitude and areas north of 86°N latitude, based on Lunar Reconnaissance Orbiter mapping
- Apollo landing and other lunar historic sites

Missions to the two exceptions designated as NASA Mission Planetary Protection Category II-L and must provide:

- Inventory of biological materials (living and dead) included in spacecraft hardware and payloads
- For crewed missions only, a listing of amount and disposition of biological waste to remain in the lunar environment

Impact of Findings from Previous NASA/COSPAR Working Meetings

Identification and prioritization of knowledge gaps during the four previous NASA/COSPAR planetary protection working groups on human missions was foundational input for NASA's Interim Directive (NID) 8715.129:

Co-leaders of this series of international working meetings are Bette Siegel (NASA) Andy Spry (SETI/NASA) and Gerhard Kminek (ESA)

NID 8715.129
Biological Planetary Protection for Human Missions to Mars

1.3.1 NASA will develop risk-informed decision making implementation strategies for human missions to Mars, which account for and balance the needs of human space exploration, science, commercial activities, and safety. Specifically, NASA will develop guidelines and utilize data and experience gained via ground-based tests, the International Space Station (ISS), Artemis, and other missions.

1.3.2 If there is a gap between current knowledge/capability and the desired outcome as described in 1.3.1, NASA will undertake a program of activities to close the knowledge/capability gap.

NID 8715.129
Biological Planetary Protection for Human Missions to Mars

1.3.2 Close knowledge/capability gaps

a. Capabilities to monitor biological processes associated with the human presence in space exploration and to evaluate changes over time;

b. Technologies for mitigating contamination release or intrusion, potentially including closed-loop systems; cleaning/re-cleaning capabilities; quarantine, support systems, and biological waste disposal that minimize impact of humans on the environment of Mars; and

c. An understanding of environmental processes on Mars that would contribute to transport and sterilization of terrestrial organisms released by human activity.

Interagency Coordination of a National Strategy

In July 2020, The White House Office of Science and Technology Policy (OSTP) and the National Space Council (NSpC) invited NASA and some 15 other agencies and offices to participate in an interagency working group (IWG). In December 2020 a National Strategy for Planetary Protection was released.

The strategy addresses 21st Century stakeholders and technical capabilities likely to impact the protection of the Earth and other planetary bodies from harmful biological contamination during space exploration.

NASA participants on IWG: Mike Gold (OIIR), Margaret Kieffer (OIIR), Lisa Pratt (OSMA), Ursula Rick (SMD)

https://www.whitehouse.gov/wp-content/uploads/2020/12/National-Strategy-for-Planetary-Protection.pdf

Committee on Planetary Protection (CoPP) at National Academies

CoPP was formed in 2020 to cover aspects of planetary environments, life sciences, spacecraft engineering, technology, and science policy relevant to the control of biological cross-contamination arising from robotic missions and human exploration and utilization of solar system bodies.

SMD and OPP currently determine specific topics and deadlines for CoPP assessment. Going forward, OPP recommends inclusion of HEO in task setting and incorporation of experts in biodefense and disease prevention on CoPP.

1. Finding from CoPP on Biological Materials

CoPP Finding 4: Inventories of biological materials for spacecraft and other lunar equipment are unimportant for planetary protection purposes because (1) the Moon's surface does not support indigenous forms of life or the proliferation of terrestrial organisms brought to the Moon; (2) biological contamination of the lunar surface will not contaminate the lunar subsurface through the operation of natural processes on the Moon; and (3) any biological material identified in samples from the lunar surface or subsurface can be tested against terrestrial organisms to determine its source.

CoPP addressed biological materials for spacecraft and other lunar equipment but appears not to have consider "amount and disposition of biological waste that will remain in the lunar environment from future human missions" as identified in NID 8715.128.

2. Finding from CoPP on Biological Materials

Magnitudes of potential waste generation from various protocols for waste management during sustained human presence on the Moon should be assessed as a potential negative impact on future science discoveries both from the perspective of volatile emissions and viability of terrestrial spores and other dormant life forms contained in processed and unprocessed waste left on the surface, buried in the shallow subsurface, or placed in heliocentric orbit. The lunar surface is an appropriate proving ground for human life-support systems in preparation for human exploration of Mars given the low likelihood of harmful biological contamination on the lunar surface.