Report to Science Committee of the NAC

July 28, 2015

Planetary Protection Subcommittee Meeting – June 8-10, 2015

- We welcomed 6 new members, subcommittee now includes 12 voting members, 5 international space agency representatives and 3 U.S. government agency members

- We received updates on:
  - Recent Planetary Protection (PP) Strategic Knowledge Gaps Workshop
  - PSD and Mars Exploration Program Updates
  - Mars INSIGHT / MarCO Cubesat Mission update
  - SSB Meeting(s) of Experts on Terrestrial Organic Contamination Requirements Associated with Sample Caching and Return for Planetary Protection (SSB MoE)
  - NASA Communications Campaign
  - ESA and COSPAR PP Update
  - Mars 2020 Update
  - Juno Update

June 8-10, 2015 PPS Meeting – Top Issues

- Reviewing planetary protection history; planetary protection policies, procedures and best practices; and PPS obligations for the benefit of new PPS members
- PPS recommendation on categorization of Mars 2020 mission
- PP concerns arising from unanticipated discoveries during Curiosity surface operations
- Planning for the next joint PPS / PPWG meeting

Topics for Future PPS Meetings

- Presentation on the recent *International Mars Architecture for the Return of Samples* (iMARS) report
- Presentation on the recent *SSB MoE* report and minority opinion
- Presentation on latest Curiosity science discoveries relevant to PP
- Presentation on awarded 2014 ROSES studies on PP technologies
- Possible joint meeting with the Curation and Analysis Planning Team for Extraterrestrial Materials (CAPTEM)
- Spacecraft cleanliness and Mars Special Regions
- The need for regulatory bodies to monitor PP compliance of non-state actors
- Considering a joint PSS/PPS meeting in 2016

Recommendation to NASA Science Directorate
Categorization for the Mars 2020 Mission

Recommendation

At the June 2015 Planetary Protection Subcommittee meeting, the PPS heard presentations on the Mars Exploration Program (MEP) from its Director, James Watzin, and on the Mars 2020 mission from Deputy Project Manager Matt Wallace. Based on the mission description and the Mars 2020 project's stated goal to assemble a returnable cache of samples for possible future return to Earth, the mission should be given a Category V, restricted Earth return classification.

The subcommittee is responsible for recommending to NASA the planetary protection categorization for all planetary missions

Major Reasons for the Recommendation

All missions designed to return samples to Earth are Category V, which includes two subcategories – unrestricted Earth return, and restricted Earth return.

Current NASA policy dictates that sample return missions to Mars, Europa and Enceladus be Category V - restricted Earth return. Category V requirements are specific to the issue of ***backward*** contamination of Earth.

NASA policy dictates that these missions also meet all Category IVb requirements, addressing the ***forward*** contamination of Mars. Category IVb applies to Mars (and Europa and Enceladus) missions designed to investigate extant Martian life, but not designed to visit a Mars Special Region.

Consequences of No Action on the Recommendation

PPS has a statutory responsibility to recommend a planetary protection categorization for each NASA planetary mission.

Recommendation to NAC/Science Committee
Planetary Protection Contingency Action Plan for ongoing surface operations

Recommendation

The Planetary Protection Subcommittee recommends that NASA develop a contingency action plan to address planetary protection issues as they arise during surface operations on current and future Mars surface exploration missions.

The Subcommittee also recommends that NASA convene a Gale Crater "trailblazer" workshop to address the development of a contingency action plan in the context of recent scientific discoveries made by the Curiosity team.

This recommends improvement in practice during ongoing mission operations.

Major Reasons for the Recommendation

Mars rovers, including Curiosity, have an operational requirement to meet planetary protection requirements during the course of surface operations. As an example, the Curiosity rover is restricted from coming in contact with a Mars Special Region. Science obtained during the mission may lead to the determination of a nearby Special Region that was not anticipated prior to launch.

The PPS notes that operations on the Mars surface involve at least three stakeholders: the science teams, the operations teams, and the Planetary Protection Officer. In the view of the PPS, it may be difficult to develop a list of indicators, and *a priori* strategies, for dealing with unanticipated discoveries. The PPS therefore recommends that a **PP contingency action plan** be developed for each mission, agreed to by all stakeholders. The contingency action plan would serve to guide a **PP rapid response team**, including the PPO, the science teams and the operations teams with equal voices around the table.

The PPS recommends that NASA convene a **Gale Crater "trailblazer" workshop**, possibly with European counterparts, to review the science and continued plans for Curiosity operation, in view of the findings of frost, methane spikes and RSLs at Gale Crater.

Consequences of No Action on the Recommendation

Future NASA science, particularly life detection efforts, may be compromised if unanticipated planetary protection concerns are not promptly addressed during surface exploration operations.

Status of Open Recommendations from Previous Meetings

Nov. 2011 (meeting held jointly with ESA PPWG)

- Continue joint meetings with ESA – A joint meeting between PPS and the ESA PPWG is planned for October 28-29 in Madrid, Spain

Jan. 2015

- That NASA's internal review of proposed licenses for launches and reentries by non-governmental entities include an assessment by the NASA Science Mission Directorate/Planetary Protection Office – Recommendation reiterated at January 2015 SC meeting

- Improve MSL Project Office – Planetary Protection Officer Communications – Tabled; current recommendation for a contingency action plan and rapid response team addresses the issue more directly