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January 16, 2003

Dr. Edward Weiler
Associate Administrator
Office of Space Science
National Aeronautics and Space
Administration
Washington, DC 20546

Dear Dr. Weiler:

The Planetary Protection Advisory Committee (PPAC) met on October 1-2, 2002 at The Holiday Inn Capitol Hill. This venue was chosen in order to facilitate access to and participation in the meeting for the international representatives to the Committee and for the broader stakeholder community.

The Committee received information on the status of a number of missions with planetary protection implications, including planned Mars missions and Stardust, a mission to collect and return cometary and pre-solar nebula dust.

With regard to Mars, PPAC spent considerable time discussing issues related to both forward and backward contamination. This is especially timely since the Mars Exploration Rovers are both scheduled to depart for Mars in the summer of 2003. The Committee expressed some concern that the "Viking-level" standard of sterilization used for previous missions (based on the National Research Council Recommendation of 1992) may not be adequate in light of a growing body of scientific information both about Mars and about certain classes of micro-organisms, "extremophiles," that could escape the current cleaning and sterilization procedure. In our discussions with Mr. Figueroa, the Committee was disappointed to learn that funding had been eliminated by the Mars program for studies of an Earth-based sample handling facility to support a future surface sample return mission. This facility will require extensive study and planning before a decision can be made whether and how to proceed with building it. The PPAC recommends that at the very least, funding be sought at the earliest opportunity for preliminary study of the key requirements for such a facility.

We heard from Dr. Jim Garvin on Mars science, both from the Global Surveyor and the Odyssey missions and the expected science from the Mars Orbiter (MRO). Dr. David Senske then discussed bioburden standards for MRO and a planetary protection strategy based on detailed modeling of unsuccessful mission scenarios that result in breakup and burnup of the spacecraft. We especially appreciated the information on the analysis of these scenarios and their application in tailoring a planetary protection strategy to the mission's science requirements, a subject especially relevant to the PPAC charge. We look forward to hearing more about Mars planetary protection issues at our next meeting.

The Committee also heard from an ESA representative, Dr. Gerhard Schwehm, on the science and the mission progress for the Mars Express mission. There was discussion of the planned landing site (about which the Committee requested more information) and of the

planetary protection requirements. This mission has significant private sector participation and this has raised intellectual property (IP) issues with regard to the planetary protection implementation plan for the lander. Since this was primarily an informational briefing by ESA on a mission for which it has the lead responsibility, the Committee's needs were met, but if NASA develops future partnerships directly with private entities, these IP issues will need continued review.

The Committee heard from Dr. Rummel on the status of work on the Draft Protocol for handling samples that might be returned from Mars. This protocol has been developed with the assistance of two expert committees and several workshops involving over 100 participants. While there are still questions to be resolved, the next step will be to publish a notice of availability in the Federal Register for the reports summarizing the workshops and the Draft Protocol itself. Because of the importance of this protocol, the Committee recommends that there be a longer than normal comment period (120 days) and that a special effort be made to contact interested parties and solicit comments. This would include access to the documents via the Internet and documentation of comments received and NASA responses. The public comments and responses would themselves be extremely useful once the planning for a Mars sample handling facility is reinstituted.

Dr. Colleen Hartman reported on the Solar System Exploration (SSE) program. The Committee was pleased to hear about the Nuclear Systems Initiative proposed in the President's FY2003 Budget, however we do note that as planetary missions are developed, particularly nuclear-powered landers or probes, the impact of these nuclear materials should be considered from a planetary protection viewpoint. While the Committee is currently not charged with the consideration of all environmental consequences of solar system exploration missions, we want to point out that nuclear systems provide a source of heat that, in the presence of water ice, can potentially convert even the most frigid solar system object into a potential site for microbial contamination. The Committee was, therefore, disappointed to learn that planetary protection technologies were not included in the SSE technology assessment. The Committee believes that these technologies may need long-lead times for development, especially considering the rapidly increasing knowledge base about extremophiles. In addition, planetary protection strategies will be a "critical path" item for certain missions. While we recognize that there may be funding for development of planetary protection technologies in the Mars program, we recommend that there be an expeditious assessment of this area of technology. The synergies between the Mars program and the broader SSE program should be identified and a coordinated investment strategy developed and implemented.

We heard a particularly interesting presentation from Dr. Joyce Jatko of the National Science Foundation on the status and plans for scientific studies of subglacial lakes in Antarctica. These lakes could be viewed as analogs for ice-covered solar system bodies, such as Europa, in collaboration between NSF and NASA's Astrobiology Program. Thus, the technology development and the way in which both forward and backward contamination are handled as the exploration continues will be of great interest to the Committee.

We were interested to hear from Dr. Fujiwara that the MUSES-C mission has received formal approval from Environment Australia for its sampling container to reenter the Earth in Australian airspace. NASA has also approved the sample return plan thus ensuring its participation. We were gratified that our deliberations on this mission at our March 2002 meeting were helpful both to COSPAR and to Environment Australia in their consideration of this mission.

In future meetings, the Committee will address a number of emerging issues. These include:

- Current understanding of sterilization techniques and evaluation of alternative methods
- Research on extremophiles, particularly on the efficacy and accuracy of both current and novel detection methodologies
- Intellectual property issues and how these impact the Committee's ability to assess planetary protection plans for future missions, especially internationally-led missions
- Assessment of forward contamination probabilities in an environment of rapidly changing understanding (from remote measurement)
- Chemical contamination issues
- Assessment and control of bioburden and the process for setting bioburden standards

Again, we appreciate the assistance of NASA staff in making this a most productive meeting and we look forward to our next meeting in Spring, 2003.

Sincerely,

Norine E. Noonan

Norine E. Noonan, Ph.D.
Chairman