

## **NASA Advisory Council Recommendation**

### **Radiation Risk for Human Mars Missions 2015-02-03 (SC/HEOC-01)**

#### **Recommendation:**

The Council recommends that NASA openly communicate the radiation risks while proceeding with preparations to send humans to Mars in the 2030s. As part of the mission development process, NASA should continue its work to mitigate radiation risks through improved knowledge and technology. In particular, there may be additional means of investigating the full extent of the radiation problem (for example, stellar observations, geologic record, further understanding of the heliospheric environment). Synthesizing expertise from both human exploration and science is essential to achieving this goal. Furthermore, we encourage NASA to initiate a long-term medical care program for astronauts which includes long-term astronaut health monitoring to mitigate long duration exposure health consequences, and build a baseline for future long-term health and engineering decisions.

#### **Major Reasons for Proposing the Recommendation:**

The Council's Science Committee and Human Exploration and Operations Committee were impressed by the breadth and depth of the radiation research presentations and progress being made for understanding the nature of the deep space radiation environment, its implications for human space flight and the ethical issues that arise. The overarching message was that radiation for deep space flight is indeed a serious issue to be addressed as technology and understanding evolve. It was also clear that it is not likely we can mitigate all radiation risks to fully meet current radiation health standards. Therefore, some level of risk must be accepted (mission risk and long-term astronaut health risk) within the broader context of all risks associated with a mission to Mars. Because knowledge of key components continues to move forward, it is difficult to quantify the overall risk. For example, it is not clear how accurately we can define mission risk and long-term astronaut health risk based on our current understanding of heliophysics and human biology. Still, based on current estimates of the radiation risk, sending humans to Mars seems to be reasonable at this time.

#### **Consequences of No Action on the Proposed Recommendation:**

Accurate information regarding the Agency's planned approach to the critically important issue of radiation safety will not be adequately provided to all the relevant stakeholders.

#### **NASA Response:**

NASA concurs with the recommendation of the NASA Advisory Council. Work to mitigate radiation risks will continue through the research and technology development efforts of the Human Exploration and Operations, Science, and Space Technology Mission Directorates. Overall mission risks, including those posed by radiation, will be assessed and communicated through appropriate processes and mechanisms. Finally, while NASA concurs with the concept of "a long-term medical care program for astronauts...." as stated in the recommendation, it should be recognized that NASA's ability to provide such a program is limited by the authority given to the Agency by statute.

Enclosure