

## NASA Advisory Council Subcommittee Recommendation

Subcommittee Name: Planetary Science

Chair: Sean Solomon

Date of Public Deliberation: 9 January 2009

Date of Transmission to Science Committee: 21 January 2009

Short title of the proposed Recommendation

Endorsement of PSD approach for accommodation of MSL cost growth.

Short description of proposed Recommendation

The PSS endorses the approach and prioritization set forth by PSD to find the ~\$400M needed to accommodate cost growth in the Mars Science Laboratory (MSL) mission given the delayed launch. Specifically, if the full \$400M is needed to complete the MSL mission, the PSS endorses utilizing the Headquarters-held reserves for the Juno mission as a contribution toward readying MSL for launch in 2011. Nevertheless, the PSS recommends that PSD take steps to ensure that Juno is completed and launched on schedule in 2011.

Should growth in the projected MSL mission cost over current budget exceed the Headquarters estimate of \$400M, however, the PSS recommends that NASA seek additional input from the subcommittee prior to making any further cost accommodations across PSD programs.

Major reasons for proposing the Recommendation

The approach recommended by PSD and SMD to accommodate the increased mission cost of MSL involves four actions within the Mars Exploration Program. The first is a deletion of five years of investment in technology for future missions to Mars; those funds in 2010 and 2011 would go directly to MSL, and those funds in 2012-2014 would go to pay back “loans” from other programs. The second action is a reduction in scope of the planned mission to Mars in the 2016 launch window; the reduction would not permit a major mission at this opportunity except through a partnership with the European Space Agency (ESA). The third action is to reduce SMD support for Mars entry, descent, and landing (EDL) technical readiness, on the grounds that the MSL launch slip and the potential to partner with ESA for the 2016 opportunity will maintain PSD’s commitment in this key area. The fourth action is a reduction in the budget for operating Mars Exploration Program missions, through reductions in mission carry over, program and mission reserves, and funding for mission extensions.

In addition to the above actions, two further steps within mission lines outside of the Mars Exploration Program would release funds for MSL at no major impact. The first is to rephase the study effort for the next Outer Planet Flagship mission, by reducing expenditures in 2010-2011 and paying those reductions back in 2012, an action that will

align NASA's planning efforts for this flagship mission with those of ESA; this action would likely have been taken in any case to permit the OPF mission to go forward as a partnership between the two agencies. The second action is a rephasing of reserves in the Discovery and New Frontiers Programs and the Lunar Reconnaissance Orbiter (LRO) science mission; the rephasing for LRO is enabled by the recent delay in the launch date for that mission.

These six actions, four within the Mars Exploration Program and two low-impact budgetary moves outside of that program, yield approximately \$353M toward the ~\$400M needed to accommodate cost growth in MSL. Given the current estimate that the \$400M figure will be sufficient to accomplish the full MSL mission, an additional ~\$47M must be found.

PSD presented three options for securing such an additional ~\$47M. In order of PSD priority, they are a rephasing of Headquarters-held reserves for the Juno mission, a delay in the next Discovery Program AO and a parallel delay in Advanced Stirling Radioisotope Generator (ASRG) development – possibly an enabling technology for the next Discovery mission – and a delay in ILN and a budgetary rephasing of Lunar Missions of Opportunity.

The PSS was informed that the first of these options would have the least impact on PSD missions. The Headquarters-held reserves for Juno, the second mission in the New Frontiers mission line, were set aside at the time of mission confirmation to meet what was then a new agency requirement that there be a 70% probability of meeting mission success criteria within cost. The reserves were over and above the budget that both the mission principal investigator and the implementing organization feel are needed to complete the mission on schedule and within budget (including project-held reserves).

Given the history of repeated episodes of cost growth for the MSL project, the subcommittee is not confident that the \$400M figure will bound the final increase in cost requested by MSL's implementing organization to complete the development and launch of this mission as well as all nominal operations of the landed rover on Mars. The subcommittee requests that it be informed of the estimated cost to complete the MSL project, once that estimate is provided by JPL later this month, as well as any subsequent changes to that estimate.

#### Consequences of no action on the proposed Recommendation

In the absence of this recommendation, the accommodation of the cost growth in the MSL mission will be made without any input from the planetary science community. Such an action would gravely reduce the confidence within the science community that this accommodation was one with the least impact on the non-Mars portion of the Planetary Science Program.