National Aeronautics and Space Administration
Office of the Administrator
Washington, DC 20546-0001

May 9, 2012

Vice Admiral Joseph W. Dyer, USN (Ret.)
Chair
Aerospace Safety Advisory Panel
National Aeronautics and Space Administration
Washington, DC 20546

Dear Admiral Dyer:

Enclosed is NASA's response to two recommendations from the 2012 First Quarterly Meeting of the Aerospace Safety Advisory Panel (ASAP). Please do not hesitate to contact me if the ASAP would like further background on the information provided in the enclosures.

I look forward to receiving continued advice from the ASAP that results from your important fact-finding and quarterly meetings.

Sincerely,

Charles F. Bolden, Jr.
Administrator

2 Enclosures
2012-01-02 ISS De-orbit Capability
2012-01-03 Extension of Soyuz Lifetime

Tracking Number 2012-01-02
ISS De-orbit Capability

Finding:
The ISS Program Office is in the early stages of developing a plan and capability to safely de-orbit the Station at the end of its operational life in 2020 or beyond. Because that milestone will be at least eight years away, there is significant time available to prepare for it. However, there is a real possibility that any of a number of potential malfunctions could occur at any time that could force the evacuation and de-orbit of the Station with little notice. Uncontrolled Station reentry at a random location may pose a significant risk to the public on the ground. Therefore, development and implementation of a controlled reentry capability should be pursued as quickly as possible.

Recommendation:
(1) To assess the urgency of this issue, NASA should develop an estimate of the risk to ground personnel in the event of uncontrolled ISS reentry.
(2) NASA should then develop a timeline for development of a controlled reentry capability that can safely de-orbit the ISS in the event of foreseeable anomalies.

Rationale:
An unexpected, emergency event could precipitate the need to de-orbit the ISS at any time. Timely development of the plan on how to respond to such a situation before it occurs will allow an optimum response and maximize the safety to the public in such a situation.

NASA Response to Recommendation (1):
As described in NASA's 1996 Environmental Impact Statement (EIS) for ISS, the planned method of decommissioning the ISS is to execute a controlled targeted reentry, with surviving debris landing in remote ocean areas, to avoid any risk to the ground population. Further, NASA's EIS recognized the possibility that components of ISS could impact over land, following an unplanned event that resulted in an uncontrolled reentry. NASA is currently developing an analytical tool to assess and compare the ground population risks under specific ground tracks (as opposed to prior capability to only give a world statistical average risk for a fully random reentry). The tool is insensitive to the number of objects, and only assesses the at-risk population. This tool and the results will be presented at a future ASAP meeting.

NASA Response to Recommendation (2):
A Technical Interchange Meeting (TIM) was completed in Moscow on February 17, 2012, with a joint technical recommendation on a plan that can immediately and significantly improve on the prior contingency option of using an Automated Transfer Vehicle (ATV) as the de-orbit vehicle. The plan would de-orbit the ISS using unmodified Progress M vehicle(s) and the Service Module.

This proposal can safely deliver the ISS to unpopulated ocean with some rather simple Service Module software modifications to provide the control of multiple delta-velocity sources simultaneously. Two additional enhancements are identified for future study that may provide more margins and a consequently shorter footprint as a nominal reentry option. This de-orbit proposal provides 60 percent more impulse than the prior contingency plan of a sole ATV as the de-orbit vehicle, which is considered to be sufficient for the contingency de-orbit scenario. It is estimated that the minimum enhancements to enable the new de-orbit scenario can be demonstrated and in place within the next year. This new de-orbit technique would also be the planned approach for nominal End of Life.

Tracking Number 2012-01-03
Extension of Soyuz Lifetime

Finding:
Crew return capability from the ISS currently is totally dependent on docked Soyuz spacecraft. Because of physical life limits on a limited number of specific systems on the Soyuz, they have a strict life limit of six months. That means crews must complete their tour and return home on a rigorous schedule. Unfortunately, in the event of a significant delay in the arrival of replacement crew, this strict life limit could conceivably cause the de-crewing of the Station. Extension of the life limits on the Soyuz could greatly reduce the probability of such a situation. The Russians have determined that such an extension is feasible, but are not currently pursuing it.

Recommendation:
NASA should actively pursue with the Russians the plan to extend the Soyuz on-orbit lifetime from six months to twelve months.

Rationale:
An extended Soyuz lifetime could double the crew's potential dwell time and greatly reduce problems if there is a Soyuz launch delay.

NASA should actively pursue with the Russians the plan to extend the Soyuz on-orbit lifetime from six months to twelve months.

Response:
NASA has actively engaged in discussions with Roscosmos regarding Soyuz life extension. Roscosmos cited several technical issues that would have to be overcome (e.g., batteries, seals, and the hydrogen peroxide system), some of which would entail an entire redesign of the subsystem, and deemed the expenditure of resources and technical challenges to be more significant than the potential benefits gained through a life extension effort. A definitive timeframe has not been identified in which system improvements, full life extension testing, and vehicle certification could be completed, if properly supported and funded. It is estimated that two years would be required in order to assess individual systems, design improvements, and implement necessary changes. Furthermore, there is an existing crew on-orbit stay constraint of 220-days, which is independent of the Soyuz certified life. Although NASA recognizes Roscosmos' position on the life extension, the manageable risk associated with the Soyuz 200-day on-orbit life, and the future availability of a commercial crew vehicle, NASA will continue to work with Roscosmos in pursuit of a Soyuz life extension in order to increase the robustness of our ability to support contingency cases.