

National Aeronautics and Space Administration

International Space Station Advisory Committee

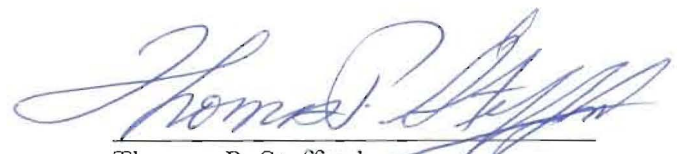
**February 9, 2012
NASA Headquarters
Washington, DC**

OPEN MEETING REPORT





J. Donald Miller
Executive Secretary



Thomas P. Stafford
Chairman

NASA INTERNATIONAL SPACE STATION ADVISORY COMMITTEE

February 9, 2012
NASA Headquarters
Washington, DC

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NASA INTERNATIONAL SPACE STATION ADVISORY COMMITTEE

February 9, 2012
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MEETING REPORT

Dr. J. Donald Miller, Executive Secretary of the NASA International Space Station (ISS) Advisory Committee (AC), welcomed the participants and called roll. Chairman Thomas Stafford was unexpectedly unavailable. Dr. Miller welcomed the Committee Members and guests in attendance. :

BACKGROUND

Good afternoon and thank you for participating in this open meeting of the NASA International Space Station Advisory Committee. Thanks to all of you who engaged in the recent fact-finding meetings we held in late November. To review the areas that were covered in the Committee's latest assessment, I'm going to read from the report from the Committee's meetings at the NASA Johnson Space Center, where the Committee met with the Russian Advisory Expert Council.

MEETING SUMMARY

At the direction of NASA and Roscosmos management, outlined in letters of February 14, 2008, March 12, 2008, and December 14, 2010 / April 22, 2011, the NASA International Space Station (ISS) Advisory Committee (AC) – Roscosmos Advisory Expert Council (AEC) Joint Commission (JC) met at the NASA Johnson Space Center in Houston, Texas, from November 28 to the 30th, 2011, to continue to evaluate the viability of the ISS with specific focus on crew safety and the challenges to ISS operations and to assess the possibilities for using the ISS for future space exploration.

The first day of the meeting was devoted exclusively to consideration of the possible uses of the ISS for space exploration. The JC received and discussed overview briefings from Mr. William Gerstenmaier, NASA Associate Administrator for Human Exploration and Operations, and Mr. Gennady Raykunov, Director General of the Central Scientific Research Institute for Machine Building and Chairman of the AEC, on ISS utilization for exploration. The JC also received briefings by technical experts on possible concepts under consideration by both sides. The briefings noted that upon completion of ISS assembly and the transition to its full-scale use as an orbiting laboratory, it is necessary to find a way to increase the effectiveness of scientific and research work, which is not very high at present. There should be an approach to ISS utilization and exploration mission plans based on a strategy that provides the most value from balancing investments in human space flight by each international partner and the development of an integrated approach across international partners. The effectiveness of this approach will affect the scope and duration of the investment made in ISS research or ISS development to prepare for space exploration versus the scope and duration of investment in the actual exploration projects. It is for this reason that the ISS Expert Working Group (IEWG) is reviewing the concept for possible use of the ISS for developing future space-exploration technologies. In addition, the following question was posed for consideration by the IEWG:

Do the partners have a joint interest in using a near-Earth manned (or visitable) platform after 2020? If such a platform is needed, then what engineering solutions defining its configuration and functional capabilities will be the most effective?

The JC reviewed proposals on expanding the JC authority in evaluating future manned programs, specifically for development of advanced space exploration technologies utilizing the ISS and other space platforms. The JC considered the proposed design, programmatic, and technical decisions on the use of ISS and/or other facilities for testing space exploration technologies to be viable. The JC is prepared to issue its views regarding such proposals and will do so with regard to the safety of these proposed decisions, their practical feasibility and compliance with overall goals and tasks, as formulated by the International Partners (IPs).

The JC considers that the evaluation of the proposed use of the ISS for advanced technology testing presented during the JC meeting will require more detailed information of proposed programs. Upon the review of this information, the JC will be prepared to issue its views. The JC considers that such programs, specifically high-cost programs, should be implemented multilaterally.

The JC accepts the new assignment to assess the effectiveness of science and technology research in support of future space exploration on the ISS. It is important for the JC to assess the plans and requirements as they are developed for Design Reference Missions (DRMs), as well as the necessary technologies and capabilities that are needed and must be developed for their implementation. An additional role of the JC is expected to include evaluating individual technology demonstrations, approaches to integrate technologies and new developments, and assessment of combined technologies in DRMs to various destinations. The JC notes that this process would be greatly aided by a set of consolidated requirements for exploration goals and purposes. The JC is ready to assess projects and individual activities based on exploration derived requirements as soon as they are proposed, and to suggest additional activities as they develop. These DRMs and associated technologies should be based on identified needs, requirements, and priorities for space exploration for a near-, middle-, and long-term strategy.

The planning of long-term space exploration programs by IPs is based on a capability-driven approach. There are a number of important capabilities that need to be supported regardless of future destinations. We anticipate that these technologies and capabilities might include, but will not be limited to: closed loop life support; advanced propulsion technologies, such as ion thrusters; mass reduction technologies for structures, systems, and components; crew and system autonomy capabilities (including voice and data delays); radiation protection technologies; human research for safety and health, including longer duration stays in space; and, demonstrations to establish high reliability for critical systems. Some elements of advanced technology systems, subsystems, components and materials may be verified on the ISS in the existing station configuration. The JC also considered proposals to create specialized separate platforms for development of certain technologies beyond low Earth orbit as viable. Assessments will be presented by the JC after review of the detailed technical data.

The JC applauds the new focus on research by ISS program experts, given the completion of the U.S. segment of the ISS assembly. As a note, however, the percentage of allocated research crew time to the total crew time seems low, especially with a crew of six. It is important that the ISS investment provide high-value return with more time allocated to research. Clearly the major drivers to increasing the utilization margins are crew size, which is three versus six, and

availability of utilization hardware, meaning up mass and down mass.

On the second day of the meeting the JC received briefings on the following topics: ISS Program Overview, which included De-Orbit Planning; Commercial Resupply Vehicle Status; ISS De-Crew/Re-Crew Planning; and, ISS Life Extension to 2020. The JC felt the items discussed in the following paragraphs were significant and are included in the report.

The ISS systems and hardware are functioning satisfactorily and onboard supplies and spares are adequate for at least one year. However, planning for alternative vehicles must begin much sooner than this one-year timeframe to preclude complete depletion of these supplies and spares in the event any current logistic vehicle becomes unavailable. The ability to maintain a 6-person crew, together with substantive ISS utilization, is critically dependent on the near-term success and continued viability of both commercial resupply service providers and continued viability of current logistics vehicles.

A common theme among the discussions was that there is a need for increased coordination and data sharing among the International Partners. Topics that highlighted this need for improved coordination included de-orbit plans for the ISS, ISS contamination and confidence in the schedules of the commercial resupply services.

The JC notes an additional risk for the ISS program is related to insufficient demonstrated reliability of the Falcon-9 rocket and Taurus-2 vehicles, due to the fact that these launch vehicles do not have sufficient statistical launch data. The JC considers the commercial vehicle launch schedule overly optimistic and not sufficiently substantiated, which could lead to multiple launch date delays. This could in turn lead to numerous ISS program reviews and cause reduction in utilization efficiency.

The JC agrees with the ISS Program Office that developing a detailed plan for de-orbiting the ISS should be a high-priority activity. The JC believes that the de-orbit plan should be expanded to accommodate multiple scenarios from nominal end-of-life to a rapidly-implemented, unplanned event. Furthermore, such a plan must be developed jointly with the IPs and include accommodations for scenarios that may include but are not limited to: graceful degradation and de-orbit scenarios; deconstruction and/or reuse of ISS components to support its Life Extension Plans and use for future space exploration goals; stabilization and staffing of the ISS for ISS disposition assessment; rapidly developing unexpected events that necessitate de-orbiting and must address crew and public risk and preclude ISS component reuse or other longer-term plans for ISS use; and, pre-placement of required assets for the execution of all these scenarios. The JC recognizes as of the meeting date, there are no controlled de-orbit analyses or plans for the ISS.

The JC recognizes the technical strength and comprehensive nature of the approach being taken by Khrunichev in establishing the capability to support the life extension of the FGB "Zarya" to the 2020 and 2028 timeframe. The AEC presented a comprehensive story which included a hardware-based ground delta qualification supported by analysis of samples returned from the FGB on-orbit. This is an excellent technical approach and it is suggested that, to the extent possible, the other ISS element owners adopt a similar degree of technical rigor in their determination of the capability of their hardware and systems to support an extended life on orbit.

Any assessment of ISS life extension should be completed within a period of 12 months so that the results can be used to decide at what point the assets need to be developed to support a controlled de-orbit of ISS. Given the timeframe required to manufacture the de-orbit assets, a lead time of several years will be required prior to the projected controlled de-orbit date.

The JC reviewed ISS service life extension to 2020 and plans of activities to extend ISS service life to 2028. The JC noted the progress of these activities and confirmed the viability of implementing the work necessary to extend service life first and foremost of the ISS modules FGB “Zarya” and Node 1 “Unity”. The JC stresses explicitly that some key modules of the ISS are certified only through 2013 and that all possible effort must be made to re-certify these modules as soon as possible. These activities include testing of critical, non-replaceable units and system safety and reliability analysis of these modules. Similar requirements must also be applied to a number of core ISS modules and systems -- the safe operation of which remains unconfirmed for the period from 2016 to 2020. Due to the lack of timely information on the technical operating capabilities of ISS modules beyond the certified timeframe and the undetermined nature of the associated risks, it is not possible to declare that ISS flight is safe beyond 2013. Until these problems are resolved, it is not possible to prepare a legal document concurred by the IPs that establishes the ISS operational timeframes. Such a document is required. The JC notes that in the absence of such a document, the operational life of the ISS is essentially limited to 2013–2015, as being driven by the certified operational life of its early modules and critical systems.

The Joint Commission noted that the medical organizations of Roscosmos, NASA and other ISS partners interact effectively and ensure the health of the ISS crews before, during, and after space flights, according to the requirements of the ISS MORD, SSP 50260. For health support of crew members during ISS operation, important areas of work are to maintain an integrated approach to the maintenance and use of ISS medical resources for crew operations.

With the addition (or inclusion) of commercial transport vehicles to the ISS Program manifest, the Program Office should require them to meet all the existing toxicological, microbiological and cleanliness requirements and certification processes for preflight preparation and in-flight control of facilities and cargo. The data from these inspections and processes must be made available to all of the IPs.

The JC commends the ISS Program and the International Partners for the continued successful operation of the ISS with the attempt to maintain an international crew of six. The JC recognizes that continued vigilance is required to maintain the 6-PC capability.

The Joint Commission agreed to meet again in Moscow to continue its review of the above issues. In preparation for that meeting, the Joint Commission will request additional information on the above mentioned topics from the appropriate Program points of contact.

That concludes the current report and summarizes the work accomplished by the Working Group during the recent meetings in Houston.

Do any Advisory Committee members have any questions? There were no questions.

Are there any objections to the report? There were no objections.

Fine, then based on our fact-finding meetings, the full Advisory Committee and Joint Commission concurs with the assessment outlined here today.

Thank you all again for the expertise you bring to our committee.

Now, one more thing, we're all aware that since the Joint Commission meeting, events affecting the ISS logistics have happened that are cause for concern. These issues will probably be addressed by the Joint Commission as part of its on-going review of ISS viability and crew safety. We will need to allow the Russian Investigative Council to complete their investigation and arrive at their findings. In the meantime we are planning for the next meeting in Moscow, and identifying the agenda items to be addressed, and will be discussing with our Russian colleagues an appropriate time for those meetings.

CLOSING

Don Miller:

This meeting is adjourned at 12:24 PM (EST).

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Attachment A

ADVISORY COMMITTEE MEMBERSHIP

Chairman

Lt. Gen. Thomas Stafford, USAF (Ret.)

Members

Col. James Adamson, U.S. Army (Ret.)

Mr. Percy Baynes

Mr. Joseph Cuzzupoli

Dr. Charles Daniel

Mr. Wilson B. Harkins, III

Dr. Daniel Heimerdinger

Maj. Gen. Ralph Jacobson, USAF (Ret.)

Dr. Ronald Merrell

Dr. Josef Schmid

Col. Jeffrey Williams, U.S. Army (Ret.)

Technical Advisors

Maj. Gen. Joe Engle, USAF (Ret.)

Maj. Bob Maiberger, U.S. Army (Ret.)

Executive Secretary

Dr. J. Donald Miller

Asst. Executive Secretary

Ms. Holly Stevens

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Attachment B

MEETING ATTENDEES

Members

Mr. Percy Baynes – via teleconference
Mr. Joe Cuzzupoli – via teleconference
Dr. Charles Daniel – via teleconference
Mr. Wilson B. Harkins – via teleconference
Dr. Daniel Heimerdinger – via teleconference
Dr. Ronald Merrell – via teleconference
Dr. Josef Schmid – via teleconference
Col. Jeffrey Williams – via teleconference

Technical Advisors

Maj. Gen. Joe Engle – via teleconference
Maj. Bob Maiberger – via teleconference

Executive Secretary

Dr. J. Donald Miller

Asst. Executive Secretary

Ms. Holly Stevens – via teleconference

Others

Mr. William Mackey, Counselor, Space Affairs, Canadian Space Agency, Canadian Embassy,
Washington, DC
Mr. Kenneth S. Monroe, U.S. House Committee on Science, Space and Technology
Ms. Anne Connor, U.S. House Committee on Science, Space and Technology
Mr. Doug Cooke, Subject Matter Expert
Bo Bejmuk, Aerospace Consultant