NASA AEROSPACE SAFETY ADVISORY PANEL
National Aeronautics and Space Administration
Washington, DC 20546
VADM Joseph W. Dyer USN, (Ret.), Chairman

February 5, 2007

The Honorable Michael D. Griffin
Administrator
National Aeronautics and Space Administration
Washington, DC 20546

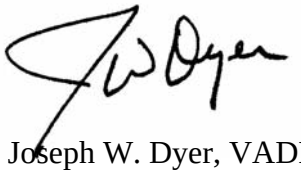
Dear Dr. Griffin:

This report includes the minutes and recommendations resulting from our 2007 First Quarterly Meeting at NASA Headquarters. We greatly appreciate the time you spent with us and your willingness to discuss our concerns openly and candidly. Our newest Panel members are onboard and rapidly coming up to speed.

After our meetings at Headquarters, we carried away concerns regarding NASA's Human Capital planning process, Shuttle and Constellation Transition planning, and the Safety and Mission Assurance budget profile. In contrast, we were encouraged by the progress on organizing Technical Authority.

With great respect, I submit our First Quarterly Report for 2007.

Sincerely,



Joseph W. Dyer, VADM, USN (Ret)
Chairman
Aerospace Safety Advisory Panel

Aerospace Safety Advisory Panel
2007 First Quarterly Report
Minutes and Recommendations

ASAP Public Meeting
January 12, 2007
PRC 9H40
NASA Headquarters
Washington, D.C.

Aerospace Safety Advisory Panel

- Vice Admiral Joseph Dyer, USN (Retired), Chairman
- Ms. Joyce McDevitt
- Dr. Don McErlean
- Mr. John Marshall
- Major General Charles Bolden USMC (Retired)
- Mr. John Frost
- Dr. Amy Donahue
- Ms. Deborah Grubbe
- Mr. Mark Kowaleski, incoming ASAP Executive Director
- Mr. John Marinaro, outgoing ASAP Executive Director
- Ms. Susan Burch, ASAP Staff Assistant

Attendees, Public Session

- Ms. Robyn Witter/NASA/MSFC
- Ms. Joan Zimmermann/Infonetic
- Mr. James Paul/Professional Staff, House Science and Technology Committee
- Mr. Devin Bryant/House Science and Technology Committee Subcommittee on Space and Aeronautics
- Ms. Kelly Farrell/NASA Legislative Affairs
- Mr. Sean Maroney/Voice of America
- Mr. Valer Gergely/Voice of America

Introductory Remarks

Aerospace Safety Advisory Panel (ASAP) Chairman, Adm. Joe Dyer, offered commentary on the two preceding preparatory working days in which the ASAP had been in session, and announced that the meeting had been the finest quarterly meetings he had yet attended. While recognizing that there was still much work left to be done, the panel was pleased at the emergence of a more holistic picture at NASA, "a vision of the star we're steering by." Adm. Dyer described ASAP's lengthy discussion with Administrator Michael Griffin as productive and encouraging, resulting in great admiration for the Administrator's forthright approach to leading the Agency. Adm. Dyer welcomed two new panel members, Dr. Don McErlean, a former Chief Engineer at the Naval Air Systems Command and longtime specialist in functional aspects of aircraft, organizational development, and the intersection of competency and program, and Gen. Charles Bolden, a longtime astronaut with four Shuttle flights on his resume, a subject

matter expert for the ASAP. Adm. Dyer noted the departure of Dr. Amy Donahue, who had ably contributed her expertise in workforce planning and human aspects of organizational development, and Mr. John Marinaro, who had served as the Executive Director, and was returning to the NASA Independent Verification and Validation Facility, after 18 months of greatly appreciated service in the ASAP.

After engaging in working sessions for three days, Adm. Dyer reported significant progress on ASAP's Annual Report, which is to be published in the first quarter of 2007. Topics covered in working session were numerous, including discussions dealing with the Shuttle, International Space Station (ISS), Constellation, NASA governance issues, the establishment of a Technical Authority, Transition planning (specifically the ramping down of Shuttle and ramping up of the Exploration program), and the continued safe and successful operation of Shuttle during the transition period. The ASAP noted positive improvements in numerous areas but likewise believes there is further room for improvement. Of major concern is the need to operate under the Congressional Continuing Resolution, which will further cut spending and thereby increase the Agency's overall safety risk. In this regard, the ASAP repeatedly expressed concern that to launch a program without proper resources is to build in risk as people try to execute that program. The fact that an increasing number of areas in the NASA purview appear to be showing the effects of this budgetary pinch is a matter of great concern to the ASAP.

Shuttle and International Space Station

Mr. John Frost reported that the Panel received an excellent review from Dr. Michael Hawes, Deputy Associate Administrator for Space Operations, on recent Shuttle operations. STS-115 flight (September 2006) was highly successful, having installed P3 and P4 trusses and solar arrays on the ISS with a total of three spacewalks. The thermal protection system (TPS) functioned well. STS-116's successful night launch highlighted and addressed issues of visibility for detection of foam damage, and introduced more flexibility and therefore safety into the Shuttle launch regimen. STS-116 also marked the most extra-vehicular activities (EVAs) performed by a crew member, the delivery of a solar array and the first instance of an array retraction. Lessons, such as solar array design for refraction, were learned during this mission, pointing up the need to continually document these lessons. The ASAP has supported the reactivation of a standards program to properly capture lessons learned, and is already seeing evidence of this process under way. NASA's Office of the Chief Engineer is engaged in this effort, as is the Office of Safety and Mission Assurance (SM&A). Dr. McErlean interjected similar support of ongoing documentation of "living standards," noting that the vast amount of standards can be an intimidating force. The engineering and safety communities have a primary duty to continue to cultivate necessary standards, updating them and keeping them alive for ongoing promulgation. Dr. McErlean noted that NASA agrees that standardization is important, (although the ASAP has in the past noted with concern that more center-to-center standardization is required), and the Agency is also heeding the call to maintain an engineering workforce aware of best practices and latest technology.

Mr. Frost continued, noting that the upcoming Hubble Space Telescope mission was making progress, and pointed out the importance of NASA adequately preparing for the unusual pressure of having two vehicles fully prepared for this mission. A review of ISS evolution also showed good planning, with steps in place for the completion of a valuable project. STS-117 is scheduled

for a March 2007 launch, and will install S3 and S4 trusses and deploy another solar array. Mr. John Marshall interjected comments, noting that he had participated in an ISS Task Force review that recently had been completed and expressed full confidence that the program was being expertly managed to reduce risk. Nevertheless, he noted that both the Shuttle and Station missions were very dangerous mission, with many moving parts and challenges. Mr. Marshall expressed further concern regarding ISS logistic sustainability upon Shuttle retirement. At present, there are two funded contingency flights on the books that are critical for post-shuttle sustainment. Nevertheless, these flights are at risk of not being executed. Again, the ASAP noted that commitment and resource allocations must be consistent to address safety implications and concerns.

Constellation

Adm. Dyer described the Constellation as a program of dual significance. It is a major program of national and international importance, but it is also important because of the kinds of changes NASA is trying to shape for the future. These changes will ride on the back of this major new initiative.

Gen. Bolden led the summary discussion on Constellation, which he viewed as an emerging crown jewel in the implementation of the Space Vision. NASA has an opportunity in this instance to put forth a new, truly safety-centric culture, with an opportunity to design safety into the system as it is developed. He felt NASA was headed in the right direction. Initial Constellation flights to the lunar surface are anticipated to be robotic. The first flights of the Crew Exploration Vehicle (CEV) are scheduled for approximately 2014, and human lunar flights no later than 2020. Developing the Exploration Systems architecture was a daunting task. The system must provide improved crew safety, and must also serve as the main driver of space transportation, with equal or better reliability than the Shuttle. It must also be capable of servicing ISS, capable of delivering a lander to the Moon, with growth capability for delivering a lander to Mars, and must be equal to or less expensive than expendable systems. NASA should be proud of this accomplishment. However, Gen. Bolden urged caution on the impact of budget problems. The budget issue has been causing concerns with cost and schedule. All programmatic red issues have thus far been related to cost and schedule, and these problems will eventually make an impact on safety. ASAP has made this message clear to the Administrator.

Adm. Dyer added that this instance marks the first time that ASAP has addressed funding issues at NASA, because this is the first time ASAP has seen the connection this early in a major program. Mr. Frost noted as an example the need for the adequate testing of the Constellation reentry protection system to determine functionality in returning from lunar orbit. While NASA is now planning to test this function, it may require significant funding. More of these issues will be coming up as NASA develops this new program while continuing Shuttle operations with an essentially flat funding profile.

Constellation SRM&QA

Mr. Frost reported that a year ago, he had had concerns about the early contracting efforts, as he had not seen the framework of top level requirements at that time. He was happy to say, however, that there has been great progress, with installation of, and action by, high-quality managers. He complimented Ms. Lauri Hansen, Constellation SR&QA Director, in particular for

having established a clear, requirements-based safety program, which is rapidly progressing in developing both safety and technical requirements and baselining almost all of them. A total of 3400 requirements that may or may not be levied on such a program have been rigorously reviewed. Dr. McErlean reported having seen a reinvigoration of living standards, which will drive systems engineering and updated best practices. Ms. McDevitt concurred, noting that she had identified process documentation, performance of hazards analysis, etc., based on Agency-level policy, which was moving along quite well. Mr. Frost continued the discussion, noting there might be an incremental risk involved in the process of requirement modification. NASA is documenting and tracking that risk.

Adm. Dyer interjected at this point that the "sparkiest" exchange of the working sessions had taken place in a discussion of manned vs. unmanned exploration. There are two cultures at NASA: unmanned (science-oriented) and manned (exploration/transportation). The ASAP believes in the importance of human space flight and exploration, as well as in the role of robotics in science. ASAP thinks there is a middle ground of trade space between the two cultures that has the potential to help manage both cost and risk. A stronger consideration of unmanned systems to lower risk is crucial.

Mr. Frost reported that Constellation is implementing the meat of Technical Authority governance model, maintaining a healthy tension between the program and Technical Authority. Technical Authorities appear to be acting independently and are being funded independently. Constellation can be a leader in applying the Technical Authority governance model. However, in identifying safety requirements in both a technical and probabilistic sense, Mr. Frost cautioned that this is a complex, high-energy undertaking. The public must understand that this is a difficult challenge and poses significant risk. Mr. Marshall added that while the ASAP was pleased by the Administrator's response to ASAP concerns, NASA still needs to be creative and innovative, while also considering (useful) legacy policy and processes. NASA must be methodical and careful not to eliminate tried and proven methods while creating opportunities and innovations. The ASAP unanimously agreed that SMA and the Office of the Chief Engineer must participate in discussions concerning deviations that the Constellation program is considering. The ASAP also agreed that while the issue of cost is paramount, there absolutely must be adequate funding at the right levels for desirable testing and design work, without which, the ASAP opined, the Constellation program would be at great risk.

Gen. Bolden noted that from a military viewpoint, he had been pleased to see a throwback to the post-Challenger days. More people are being employed in the area of safety, and engineers are being detailed for "cross-pollination" purposes. A good example of this is Ms. Lauri Hansen's assignment from engineering into SRM&QA, which shows that the safety culture understands the real needs in risk assessment.

Adm. Dyer agreed, and commented that improving the status and stature of safety personnel is clearly an objective of Mr. Bryan O'Connor (NASA's Chief Safety and Mission Assurance Officer), reflected by the move to blend staff from multiple disciplines into areas of safety competency. Gen. Bolden noted that an additional challenge has been to address the "culture" findings of the CAIB. Discussions of safety have been public and openly addressed. This is good. There are possible signs of some slippage in the contractor area, which may be detrimental

to safety, *per se*. Technical competency helps garner respect for managers, and the ASAP has been encouraged to see that safety personnel are gaining in stature in the management community. This will require continuous reinforcement: it is a long-term task to inculcate safety as a total attitude across the board. Mr. Frost remarked that another encouraging development has been the establishment of the Technical Fellows program, identifying the world-class experts on particular subjects, who can represent NASA internally and externally. The safety program equivalent is progressing at a slower pace but should be as well thought-through as the efforts on the engineering side. Mr. Marshall added that the program had not been implemented agency-wide, but has been approved. The execution is important.

Technical Authority

Adm. Dyer introduced a discussion of the Technical Authority (TA), focusing on its efforts to identify subject matter experts in technical disciplines. He reported being convinced that the current structure of the TA is a better system than the previous one, but that it is a year behind where it should be in the implementation aspect. The Fellows program is the nexus between good thought, design and policy, for example, who works with career planning and education, and who is the recognized, agency wide, subject matter expert on each functional area. The target date is still TBD. ASAP strongly encourages this program. Dr. McErlean commented that the TA's job is to ascertain and develop the process by which repetitive technical tasks are undertaken, and how they are standardized across the enterprise. The process must be continually reviewed and compared to the best practices, with provision of the latest tool set. It is a key to maintaining technical proficiency and safety. Mr. Frost cited a long-term issue with standardization, and remarked that NASA will need orders of magnitude improvement in Agency-wide standardization. Ms. McDevitt noted that implementation of a technical governance model has been a great challenge for NASA, and has required reorganization. The effort has been more than just paperwork: it has entailed training, communication, moving people and reassigning responsibility

Transition Plan

Mr. Marshall addressed the progress of the Shuttle/CEV transition plan, noting that there are key enterprise issues to consider, such as workforce management, etc. He noted that there is now a transition team that has the ability to examine the issue at the Associate Administrator (AA) level. Dr. McErlean added that the transition is both a safety-critical function and an incredibly large job. This gives the Enterprise the challenge of having to ramp down on the Shuttle Program and its impact on the Constellation Program. People, facilities and equipment will undergo transition that must be carried out on the same schedule. In terms of equipment, the transition is taking advantage of legacy equipment and design (SRB to the Ares vehicle, upper stage engine reconfiguration). In terms of people, NASA must identify skill sets, the future requirements of Constellation program by skill category, a "faces to spaces" problem. The biggest recognition is that communication is key- keep the workforce informed. It is going to be a stressful situation, and NASA needs to keep its employees incentivized and excited. Dr. McErlean felt there was a good solid plan to address these issues, as well as a good vision of what a NASA engineer is expected to be. There needs to be a lot of standardized education on mission design safety; safety is every engineer's job. The ASAP in general reported being pleased to find that NASA has adapted some of DOD's good tools of resource identification. Mr. Frost added that he had been impressed that NASA has been looking at the entire environment, and with ongoing HR efforts.

Much progress has been made in having centers and the agency working more closely together in a proactive way. Adm. Dyer commented that while the Human Resources databases don't answer the question of who possesses knowledge and how long they will be around, NASA is making progress in answering this question.

Recommendations Status Discussion

Ms. McDevitt briefly reviewed recommendations tracking by the ASAP. Twenty recommendations have been generated since 2004. Six recommendations are open from 2006. Of two long-term open actions– robotics and competency management- the ASAP has been receiving briefings and will continue to do so. Of 12 recommendations that have been closed in response to action plans, ASAP has been monitoring some of these as well, and has defined what surveillance activity or scheduled quarterly reporting are required on the progress and status of action items. The communication of the status report will provide encouragement to NASA to provide timely documentation, and to ensure that ASAP is assessing actions properly.

Closing Comments

Mr. Frost expressed appreciation for the amount of time the Administrator had spent with ASAP. Adm. Dyer presented an amphibious award to outgoing ASAP Executive Director Mr. John Marinaro, as a token of gratitude for service to the ASAP, and in recognition of his "early warning" capabilities. The meeting was adjourned.

2007 Quarterly Meeting Recommendations

2007-01-01 Standards Programs - NASA needs to re-energize the Agency's engineering and safety standards programs to make standards current and useful and keep them as "living documents."

2007-01-02 Exploration Safety Requirements - NASA should continue to develop detailed safety requirements including identifying the probability of the Loss of Crew, and track how these requirements are allocated and validated to the subsystem level.

2007-01-03 Exploration risks of waiver of safety requirements - NASA should insure that incremental risk changes that are associated with Constellation's requests for waiver of mandatory NASA safety requirements currently baselined within the agency are formally approved by the appropriate technical authorities.

2007-01-04 Exploration Human vs. Robotic Review Process - NASA should develop a formal review process to evaluate new mission proposals to ensure that optimum use is made of unmanned systems to minimize the risks of human exploration.

2007-01-05 Safety Fellows Program - NASA Engineering is moving forward with a robust "Technical Fellow" program to identify and empower Agency leads for all critical engineering specialties. NASA SMA should institute similar efforts to ensure that Safety Fellows are developed and empowered similarly.

2007-01-06 SMA Budget Profile - NASA should provide a SMA budget profile for providing adequate SMA resources to fly-out Shuttle safely and to simultaneously undertake the Constellation Program in a manner that optimizes safety.

2007-01-07 Human Capital & Transition Planning - NASA should coordinate its Human Capital Planning with the ongoing Shuttle/Constellation Transition Planning effort to develop an Agency-centric Human Capital Plan that balances shortages, excesses, and capabilities between, as well as within, Centers.

2007-01-08 Organization Chart Nomenclature - NASA should standardize the nomenclature used in organization charts for Programs and Projects, and ensure that all organization charts include the required Technical Authorities as part of their structure. There should be consistency in the use of the titles given to elements of the organization charts (e.g., SMA vs. SR&QA vs. SRM&QA).

2007-01-09 Direction, Alignment, and Communications – NASA should implement a consistent process to provide Technical Authority direction, alignment, and communications to ensure that the working level of NASA is fully informed on Technical Authority. Provide the Panel with feedback on the effectiveness of its implementation.