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June 18, 2009

Statement of
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National Aeronautics and Space Administration's
Aerospace Safety Advisory Panel

before the

Subcommittee on Space and Aeronautics
Committee on Science and Technology
U.S. House of Representatives

Chairwoman Giffords and other distinguished members of the Subcommittee on Space and Aeronautics, good morning. Thank you for inviting the Aerospace Safety Advisory Panel (ASAP) to testify before your Subcommittee today.

Unfortunately, our panel's chairman, Vice Admiral Joe Dyer (USN), Ret, is unable to participate in this morning's meeting, and he asked me and my colleague, Mr. John Frost, to represent the ASAP in his place, so I am fortunate to have Mr. Frost in attendance with me this morning. I should state up front that while our panel has several members that have an extensive background with NASA, including Major General Charlie Bolden, President Obama's nominee to be the next NASA administrator; Mr. Jim Bagian, a former mission specialist on two Space Shuttle flights; Ms. Joyce McDevitt, a former system safety engineer for NASA; and Mr. Randy Stone, the former Deputy Director of the Johnson Space Center; neither Mr. Frost nor I bring the hands-on technical expertise of having been either in space or directing daily space activities. Nevertheless, Mr. Frost and I together have over 90 years of experience in aviation, engineering, and safety. Mr. Frost was the Chief of Safety for the Army's Aviation and Missile Command, and I was an Air Force fighter pilot and then the Chief of Safety for Delta Air Lines. With Mr. Frost's valued assistance, I have prepared to talk about issues addressed collectively by the ASAP, and will be pleased to answer your questions.

As you know, the Panel's statutory duties are prescribed in Section 6 of the NASA Authorization Act of 1968. Included within this act is the need for the ASAP to "review safety studies and operations plans that are referred to it and ...to make reports thereon, ... advise the Administrator with respect to the hazards of proposed operations and with respect to the adequacy of proposed or existing safety standards, and...to perform such other duties as the Administrator may request."

Additionally, the ASAP is required by the NASA Authorization Act of 2005 to keep the House Committee on Science and Senate Committee on Commerce, Science and Transportation fully informed of its activities.

Since it was established in 1968, the ASAP actively has been fulfilling its charter by evaluating NASA's safety performance and advising the Agency on ways to improve that performance. The ASAP bases its advice on direct observation of NASA operations and decision-making. In the aftermath of the Shuttle Columbia accident, Congress required that the ASAP submit an Annual Report to the NASA Administrator and to Congress. This Annual Report was to summarize our major findings concerning the safety performance of NASA. It also is to examine NASA's compliance with the recommendations of the Columbia Accident Investigation Board (CAIB), as well as NASA's management and culture related to safety.

Consistent with our charter, on April 15, 2009, we issued our 2008 Annual Report. Today, I would like to formally submit that report to you and your committee for the record. In addition, Admiral Dyer earlier briefed this committee's senior staff, regarding our observations and recommendations. Not surprisingly then, my responses today to your questions identified in the letter of invitation to testify before this Subcommittee will be consistent with our report. You asked us to comment on six specific areas:

1. Identify top priorities and issues to consider in upcoming multi-year NASA authorization legislation.

- A. Without question, from the ASAP's perspective, the top priority for this agency is the need to have and to maintain a stable and sufficient budget that allows NASA to safely execute an integrated space program that follows the Administration's and Congress' national space objectives. Safety always is an unintended victim of reduced spending and any resultant stretch-out of major programs if we are not careful. That should not be allowed to happen for this agency!
- B. Next, an immediate and irrevocable decision regarding extending the Space Shuttle Program or not (as noted in our annual report, the ASAP does not support extending the shuttle from a safety standpoint) needs to be made quickly. If the decision is made to extend the Shuttle, then that decision must be accompanied with necessary resources. Without additional budget allocation, all the responsible parties must realize that such an action will seriously constrain available resources for development of any follow-on program, and will only shift, and may actually extend, the gap of developing a future vehicle. This clearly will further expose NASA to the risk of another Shuttle loss and may jeopardize the future U.S. exploration program.
- C. The next priority is to ensure that cost, schedule, and required performance are properly in balance with each other. The ASAP feels strongly that the imbalance of any of these key elements will lead to substantial increase in risk. For example, if NASA's performance is held constant in terms of objectives that must be met, and cost is constrained by budgetary authority, then schedule must extend. If schedule is constrained more than is required to meet more timely milestones, then risk to the mission and crew can only increase -- perhaps beyond control with fatal result.
- D. Finally, support for the Agency by expeditious confirmation of those selected to lead NASA is critical. Expeditious confirmation will lead to greater stability within NASA and decrease safety risks throughout the Agency.

2. Identify critical issues facing NASA, the corresponding decisions that are required, and the agency's ability to address these issues within the context of the budgetary outlook described in its FY 2010 request.

- A. As noted a critical issue facing NASA is resolution of the issue of continuing to fly or to retire the shuttle after completion of the Space Station. If the shuttle is continued beyond the flights currently planned, the agency must be given the resources to restart the shuttle program. Modification and redesign work that was deferred due to the decision to retire the shuttle must be funded and completed. Again, this restart must be properly funded and staffed with the knowledge that it will now cost more to do this work. The ASAP believes that in the absence of this additional effort, the shuttle must be retired.
- B. Next, there must be a re-affirmation or re-definition of a set course for the Exploration Mission Directorate. This means confirming or developing goals, developing realistic time tables, developing plans consistent with budget realities, and developing the necessary systems to achieve the objectives. Hopefully, the Augustine Blue-Ribbon Panel will do this. This said, the ASAP believes that if Constellation is not the optimum answer, then any other new design has to be substantially superior to justify starting over. If a restart is indeed necessary, no amount of resources will recover the approximately 4 years in effort that has been expended. It further is the ASAP's conclusion that the current budget cut of approximately \$500 million dollars make Constellation (or any other program) un-executable to meet the current schedule for exploration. There is no such thing in this program as a "pause." Contracts are cancelled, teams are dismissed, test windows missed, and industrial capability is shut down. Denying the program funding in 2010 means at best a year to two year interruption...and will be the same for any other program.
- C. Deferred maintenance, modification, and upgrading of the basic NASA infrastructure, which is more than 40-years-old, deserve a higher priority. Aging facilities are in need of timely repair and upgrades, and a prompt and thorough assessment of NASA's fixed wing aircraft fleet and aircraft support facilities should be funded.
- D. The role of robotics in support of human exploration in the NASA of the next decade requires clarification. While optimization of this mix must come from NASA, the long range missions assigned to NASA should not preclude use of robotics when appropriate to minimize human risk and optimize exploration efficiency. This committee should ask NASA for a written strategy and plan, with defined parameters, for when humans are necessary and when they are not.
- E. Full funding of the NASA Safety Center is important and necessary so that this new organization properly can begin to serve as the agency's focal point for developing and integrating safety excellence further into the culture of the agency.

3. Discuss NASA's compliance with the Columbia Accident Investigation Board's (CAIB) recommendation on "Return to Flight" and "Continue to Fly."

- A. As you know, 15 of the 29 CAIB recommendations were designated "Return to Flight." When the Return to Flight Task Group completed its work in 2005 (when the monitoring function was transferred to the ASAP), it had determined that NASA had met the intent of all but 3 issues:

- Dealing with External Tank Debris Shedding,
 - Orbiter hardening,
 - and, Thermal Protection System Inspection and Repair.
- B. The ASAP has received periodic updates regarding the status and progress on the remaining 3 areas. We are pleased with NASA's overall response and believe the residual risk associated with the remaining recommendations cannot be completely eliminated without a major redesign of the current Shuttle. Accordingly, the ASAP recommended that NASA use its formal risk acceptance process to make a decision on how to close out the remaining actions.
- C. As recommended by the CAIB, recertification of the Space Shuttle materials, components, subsystem, and system levels would be required to "continue to fly" the Shuttle beyond 2010. The ASAP concurs with that recommendation. This said, NASA has not yet undertaken the development of an action plan to accomplish this.
- D. The ASAP will continue to monitor the remaining 3 CAIB issues, as required by its mandate, and is prepared to immediately engage the Agency if required.

4. NASA's incorporation of safety and risk mitigation in its design of new crewed transportation systems:

- A. Safety and risk mitigation for any future crewed systems needs to continue to receive the highest level of support. We have reviewed Orion's development, and we have agreed that issues that have been identified to date are properly being addressed with developmental mitigation plans and tests. Issues that have come up like the "vibration" and the potential tower strike have been or are being thoroughly investigated and subjected to substantial multi-disciplinary technical reviews using both government and industry teams, as well as outside expertise.
- B. The Constellation program offers a one-time opportunity for safety to be better hardwired into overall NASA processes. Experience has shown that one of the best ways for a large organization to advance the state of art of its processes is to institutionalize the procedures developed by a major new program that is highly motivated and staffed with the best and brightest. Constellation provides such an opportunity to lead NASA safety culture into the future. NASA must capitalize on this opportunity to improve long-term safety improvements.
- C. NASA's role in the COTS programs for manned transport systems thus far has been to not directly levy NASA-restricting requirements. This has been a subject of some debate between NASA and the panel for several meetings. While we endorse and support investing in a COTS program, we believe at this juncture that NASA needs to take a more aggressive role articulating human rating requirements for the COTS Program since most programs are well underway. To do otherwise may, at a later time, pressure NASA into accepting a system for expediency that is below its normal standard for safety. This said, we applaud NASA providing the COTS manufacturers with all their lessons learned. As a separate, but like issue, the ASAP has reviewed the Constellation / Orion systems engineering process and how they are managing the human rating process. We have not found any lack of attention or faulty process thus far.

- D. The ASAP has concerns about recently revised NASA Human Rating requirements standard with regard to substance, application, and standardization NASA-wide. Direct linkage to current technical standards and engineering directives is missing; NASA must integrate its technical requirements to its new human rating requirements before new Constellation systems are finalized.

5. Discuss NASA's progress in instilling and maintaining safety in the agency's culture, standards, and processes:

The ASAP believes that NASA has continued to improve its awareness and development of a positive safety culture. Areas where improvements have been made include:

- A. Implementation of a new governance model and acceptance and implementation throughout the agency of independent engineering and safety Technical Authority policies.
- B. Establishment of an agency-wide Safety Center.
- C. Initial Funding to support the use of a senior-level leadership team within the Safety Center.
- D. Endorsement that experience in the Safety and Mission Assurance (S&MA) career field will be a strong requirement for promotion into senior management positions.
- E. Safe Shuttle and International Space Station operations have been demonstrated successfully since the Columbia accident. The recent Hubble rescue mission was a masterpiece for safety. As a side note, NASA deserves significant recognition for continuously operating manned the Space Station safely in orbit for 9 years without a major incident – quite an accomplishment.
- F. Development of an Astronaut medical health Technical Authority that establishes checks and balances among program and institutional requirements.
- G. Positive changes in workforce attitude towards safety, continued awareness of safety and risk programs, and continued management effort to create and nurture open dialogue and discourse on technical differences.

However, there can be more attention put forth into the following:

- A. Improve contractor safety management and communications at all centers.
- B. Implement a more robust incident investigation process that not only identifies the root causes but then distributes the lesson-learned information in a timely manner to those who need to know.
- C. Develop a standardized set of hard and soft, leading and lagging safety metrics that are reviewed and analyzed by each center's management team on a monthly basis; such an analysis would then enable them to focus attention on the areas that need more critical intervention and will stimulate comparisons between centers.
- D. Develop a standardized way to proactively measure the safety culture at each center; then continue to foster the required leadership behaviors to engender the openness. Transparency and trust are needed to ensure that safety issues are solved at the lowest possible level in the organization.
- E. Improve the current technical standards program to better capture and apply hard-won lessons learned and best practices.

6. Discuss any other matters that merit attention:

- A. The Administration, Congress, and NASA all need to be transparent with the public on risk communication – that losses may occur in space exploration and the risk of this should be mutually shouldered; the national message on the space program needs to be that we're going to do it, but that launching humans into space with today's technology can never be considered a completely safe endeavor as judged by normal standards; this message is complicated further by the tendency of the media to communicate issues with an exaggerated "spin."
- B. NASA is addressing the potential limitations involved in relying on Soyuz during the gap between the Shuttle retirement and Constellation initial operating capability (IOC). In the meantime, a good, open working relationship with the Russians at a high level is necessary for any period of dependence on Soyuz.
- C. NASA currently has a good plan for managing the workforce transition from the Space Shuttle to the Constellation program. The ASAP concerns involve retention of key technical, engineering, and management leaders and include the need for Office of Personnel Management (OPM) to grant NASA authority to reemploy retired NASA civil service annuitants without financial penalty from the retirement compensation offset particularly at Marshall Space Flight Center where a large influx of Department of Defense Base Realignment and Closure Positions provides unfair competition.

Once again, I thank you for the opportunity to offer the ASAP's view on these issues and would be happy to respond to any questions you or other Members of the Subcommittee may have.