

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



Dr. Bradford W. Parkinson  
Chair  
NASA Advisory Council  
Washington, DC 20546

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Dear Dr. Parkinson:

Thank you for your report on the NASA Advisory Council (NAC) meeting held September 12-13, 2000, at NASA Ames Research Center. I am pleased the NAC had a productive meeting. I regret that I was unable to attend the meeting, but I plan to see you and the Council at Kennedy Space Center for your November 30 – December 1, 2000, meeting.

I am glad that the NAC was finally able to hear the presentation by Dr. Henry McDonald and his staff on the Agency's efforts at trying to resolve the Nation's congested air transportation system. NASA research successes in programs such as the Traffic Management Advisor (TMA) and the passive Final Approach Spacing Tool (pFAST) demonstrate that new, well thoughtout technologies can improve the capacity of even the busiest airports. Today, NASA and the Federal Aviation Administration are working on a new generation of technologies that will further reduce delays and improve safety in our Nation's airspace. The Council's comments on the need for greater cooperation between the branches of the Federal Government in improving our air transportation system are well founded.

It is my understanding that the NAC is working on a white paper concerning the Agency's future space transportation plan. I eagerly await your thoughts on this subject. As far as your comments on the X-33 program, the contractor will be required to compete within the overall context of Space Launch Initiative (SLI) for any additional Government funds required to complete the program. SLI includes funds for detailed system analyses and for requirements definitions that will assess and refine future NASA and commercial launch vehicle needs. These assessments will consider various vehicle architectures, including multistage and viable single stage concepts, that will meet both the Government and commercial requirements.

The Agency is extremely thankful for the NAC's comments on the NASA Integrated Action Team (NIAT) report headed by our Chief Engineer, Brian Keegan. Your comments were to the point and well taken. Your comments made the document clearer and more concise. I have enclosed a copy of Mr. Keegan's letter dated October 18, 2000, to Lori Garver, NAC Executive Secretary, on the list of the NAC's thoughts on the Mars Review reports.

The NAC's efforts at reviewing our FY 2002 Performance Plan metrics are greatly appreciated. On the basis of your observations, the Chief Financial Officer has examined, with the NASA Enterprises, the feasibility of making the targets more measurable by reflecting some of the

quantitative nature of the indicators in the targets. The Agency continues to strive to meet the challenge of developing performance metrics that are quantifiable and useful in demonstrating how these metrics are used to measure our achievements. The NAC's comments were very helpful in this effort.

As far as other items from your September meeting, I received your revised charter language for the Planetary Protection Advisory Committee. Dr. Edward Weiler, Associate Administrator for Space Science, is working to have this important new Committee operational by the end of the year.

I have enclosed the Agency's formal response to the NAC's recommendations concerning the Space Shuttle Safety Upgrades. The safety of NASA workforce, both crew and support personnel, remains our number one priority. The NAC's comments are important and will be considered carefully as the Office of Space Flight moves forward with the Safety Upgrade program.

Finally, Dr. Kathie Olsen, NASA Chief Scientist, has briefed both the Life and Microgravity Sciences and Applications Advisory Committee and the Space Science Advisory Committee on the creation of the fifth Enterprise of the biological and physical research. As always, I appreciate the time and dedication you and the NAC members give to our programs and policies. I would also like to offer my personal thanks to you for agreeing to continue as Chairman of the NAC through March 2001. I look forward to seeing you and the Council members on November 30 at Kennedy Space Center.

Sincerely,



Daniel S. Goldin  
Administrator

2 Enclosures

## NAC Recommendations from September 12-13, 2000 meeting.

### 1. Selection & Prioritization of Current Upgrades

*NAC Recommendation: Definition of criteria for selection and rigor in applying criteria and ranking needs to be more apparent.*

**NASA Response:** It is the goal of the Space Shuttle program (SSP) upgrade selection process to establish an optimal suite of safety upgrades which will provide the greatest net risk-reduction within the constraints of available investment funds. Safety upgrade proposals are prioritized first, on considerations of relative risk-reduction potential, and second, on relative cost effectiveness. All upgrade candidates with very high-risk reduction potential, which were proposed by the responsible technical teams during the preceding year, were ranked high in this process and were included in the upgrade content briefed to the Council's Space Flight Advisory Committee on June 28, 2000. However, those candidates with lower risk-reduction potential were prioritized based on both relative potential safety benefit and an assessment of relative cost effectiveness. For example, an upgrade proposal with modest risk-reduction potential, but very high cost to implement is ranked lower than a much less expensive proposal that offers similar risk-reduction potential. Though we believe that we have a sound basis for our current suite of upgrades, we do agree that we can and should do a better job of explaining how and why specific selections were made among the lower priority level candidates. The SSP upgrades team is prepared to provide additional information on specific selections if desired by the Council.

The Council also expressed a concern about the lack of safety related infrastructure upgrades in the current initiative. Though it was not discussed in detail in the June 28, 2000, Space Flight Advisory Committee review, the safety initiative does include an "industrial engineering for safety" study to identify and prioritize opportunities to improve flight and ground safety through changes in flight hardware inspection, handling and flight preparation. Improvements are envisioned either through modifications to processes, or through upgrades to ground processing equipment and facilities, or through flight hardware design changes that will reduce vulnerability to collateral damage during ground processing. Funds have been allocated both for the study and for follow-on implementation projects. The initial phase of the study will be completed within 3 months, and it is expected that high-priority upgrade projects identified by the study will be initiated within FY01.

### 2. Schedule and Budget

*NAC Recommendation: Recognizing external policy and budgetary constraints on NASA, the Committee urges the Office of Space Flight (OSF) to work proposed upgrades with a critical and extremely realistic view to schedule, cost, and budget.*

**NASA Response:** The SSP and the OSF completely agree with the recommendation to thoroughly understand and be realistic about any commitments that we make concerning upgrade implementation schedules and costs.

Though NASA established 2005 as a planning target for implementation of the safety upgrades, we do not intend to disallow a very beneficial upgrade solely on an inability to implement it on this very aggressive schedule. We agree that some of the high-priority upgrades being considered may not be ready by 2005. Also, SSP commitments to the ISS assembly and re-supply manifest make it infeasible to be fully operational before the end of 2006. The complete upgrade installation into the Shuttle fleet should be complete by 2007. On the other hand, we have a very strong motivation to select and make safety upgrades as expeditiously as is possible. The SSP upgrade teams are mid-stream in developing detailed implementation plans, including development of upgrade project technical specifications, acquisition plans, detailed schedules and cost estimates, and risk assessments for those high-priority upgrades selected for further consideration. We intend to realistically understand the schedule and cost situation with each upgrade before committing to implementation. We also intend to identify and incorporate prudent cost and schedule risk-reduction planning into those project plans. In addition, the top five safety upgrade projects are undergoing a formal independent assessment, led by the Independent Program Assessment Office located at the NASA Langley Research Center. Each of those projects will be subjected to a formal review, including a report from the Independent Assessment team, before receiving authorization from the SSP and the OSF to proceed to implementation.

### **3. Human Factors**

***NAC Recommendation:** The Committee believes that human error must be factored into risk assessments utilized in establishing the Space Shuttle Upgrades program.*

**NASA Response:** We agree that human error is a significant component of flight mishap risk. Human error in manufacturing, assembly, inspection and test of flight hardware as a contributor to flight risk was implicitly incorporated into the flight risk assessments that were the basis for establishing the need for flight hardware upgrades. As a risk source, it is an implicit contributor to the problems logged in our historical problem databases for all of our systems. For example, an analysis of the problem history database for the Rocketdyne high-pressure oxidizer and fuel turbo pumps found that approximately 40 percent of the pump problems logged were attributable to human error. Vulnerability to human errors in hardware manufacturing, assembly, inspection, testing, shipping, handling, and flight preparation was also one of the expert judgment factors considered by the technical experts on our engineering staff who participated in establishing the flight risk assessments which were an integral part of our upgrade prioritization and selection process. To that extent human errors have been factored into our decisions on the upgrade program content. We agree with the Council's suggestion that such considerations continue to be an area of emphasis in our assessments of risk. In particular, the SSP initiative on "industrial engineering for safety" will provide a focused assessment of the risks associated with flight hardware processing, handling, and flight preparation as a source of induced flight safety risk. The results of that study will be used by the SSP to identify additional high-priority improvements to processes, support equipment, or flight hardware needed to reduce our vulnerability to such collateral damage.