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

AUG 24 1999

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

Dear Dr. Parkinson:

Thank you for your report on the NASA Advisory Council meeting on May 20-21, 1999, which was held at Kennedy Space Center. I am sorry that I was unable to meet with the Council and that everyone was unable to see the launch of STS-96. The external tank was damaged shortly before the Council meeting by a hail storm, and since NASA is committed to the safety of our astronauts, our workforce, and the public, we delayed the launch to make repairs. Hopefully, the Council will be able to view a launch in the near future.

The Council's thoughts concerning the International Space Station (ISS) and the need for a Probability Risk Assessment (PRA) are well-founded. NASA is committed to the safe and timely deployment of the ISS. I agree that we need to do much more in the area of risk assessment for the ISS and other NASA programs. Tommy Holloway and the ISS program office are committed to conducting a PRA on the ISS program and will continue to keep the Council informed as they proceed.

Your request for NASA's position on your nine recommendations from your February meeting was forwarded to NASA Chief Engineer, Dr. Daniel Mulville, for consideration and response and are included in an enclosure to this letter. NASA is moving forward with the development of an integrated space transportation plan which will be presented to the Office of Management and Budget and the Office of Science and Technology Policy later this year. Currently, we have an "A" team and several "B" teams looking at a variety of issues in space transportation, including safety- driven Space Shuttle upgrades, development of critical technologies for second-generation launch systems, and development of revolutionary technologies for third-generation launch systems. The conclusion of this effort will lead to an integrated space transportation plan which will improve launch system safety, reduce launch costs, and provide assured access to space.

I was also pleased with the Council's continued interest in our Faster, Better, Cheaper (FBC) efforts and your efforts on institutionalizing these concepts within NASA. It is my understanding that Tony Spear, our lead contact at creating an Agencywide approach to FBC, will brief the Council at your December meeting.

Additionally, I would like to thank the Council for agreeing to evaluate the Agency's progress in our FY 1999 Performance Plan, which is a part of the Government Performance and Results Act. NASA is committed to meeting its program metrics and is very intersted in any comments or suggestions for improving the process or our future metrics.

As always, I appreciate the time and dedication you and the Council members give to our programs and policies. I hope to see you and the Council at your meeting in December at Headquarters.

Sincerely,

Daniel S. Goldin
Administrator

Enclosure

RESPONSE TO NASA ADVISORY COUNCIL (NAC) ACTIONS ON SPACE TRANSPORTATION ARCHITECTURE STUDY (STAS)

Statement 1 – The STAS plan needs to layout a replacement decision for Shuttle.

The STAS final recommendations do lay out a plan for replacement of the current Space Shuttle in the 2008 to 2012 time period. The STAS results indicate that a new 2nd generation Reusable Launch Vehicle (RLV) or a significantly upgraded Shuttle could be operational in that time period. The candidates for the 2nd generation RLV would have to demonstrate significant improvements in safety and reliability (approximately 1/1,000 loss of vehicle during assent and 1/10,000 loss of crew during assent) with cost reductions to approximately $1,000 per pound. The STAS results indicate that a 2nd generation RLV in the 2010 time period will require Government investment in mitigation of the technical risk for vehicle development and Government incentives (guaranteed loans, anchor tenancy) for closure of the business case either for a new RLV or significantly upgraded Space Shuttle.

Statement 2 – The requirements are not adequately scrubbed.

At initiation of the STAS, the only identified NASA requirements for human access to space were logistics support for the International Space Station (ISS). Since human exploration is not an Administration-approved program, it was not identified as a baseline mission requirement and was treated as an excursion from the baseline missions. In the assessment of the STAS results, it has become obvious that formulation of a NASA vision defining future mission options and human access requirements will significantly enhance the validity of future architecture studies. Recommendations from STAS indicate a need for definition of the mission requirements and associated vehicle capabilities to satisfy NASA's future space access needs. These requirements have been defined in the formulation of the criteria for the 2nd generation RLV and will be for the refined as part of the NASA Next Decadal Planning Activity.

Statement 3 – The urgent need for a Crew Return Vehicle.

In the formulation of the STAS recommendation for a Crew/Cargo Transfer Vehicle (CTV) follow-on study, the urgency of the ISS need for an operational Crew Rescue Vehicle to minimize future reliance on Soyuz, as the rescue vehicle, has been a major consideration. Any follow-on CTV study will be conducted in a noninterference parallel approach and to the planned CRV project.

Statement 4 – Some of the upgrades to Shuttle did not have adequate prioritizing.

A strategic Shuttle upgrade plan is currently being developed by the Space Shuttle Program for consideration by NASA Senior Management. The intent of this upgrade proposal is to ensure that the Shuttle will continue to support American human access to space safely and efficiently through at least 2012 and potentially to 2020. A joint industry and NASA upgrade definition team, led by the Space Shuttle Program and the United Space Alliance Corp., has established a top-level set of upgrade goals and objectives and has defined an evaluation criteria for

systematically identifying, analyzing, and prioritizing upgrade candidates in terms of program goals. The systems engineering process, which is being used to select the contents of the proposal, is utilizing a suite of prioritized selection criteria. Shuttle safety is the most important criteria. Flight manifest supportability and mission success improvements are the next most important criteria, and overall improvement of Shuttle operations, especially cost reduction, is the other important consideration. A variety of analytical tools and methods are being used to understand and rank the contributions of candidate upgrades to those program goals. Reduction in risk of catastrophic loss of vehicle and crew is being assessed with quantitative probabilistic risk-assessment methods and qualitative assessment of hazard reductions. Potential hardware obsolescence issues, hardware aging reliability issues, and overall hardware availability for mission support are being assessed and upgrade needs and candidate solutions identified and prioritized. Hardware upgrade options, which have the potential to provide additional vehicle turnaround efficiencies and flight rate improvements, are being identified and assessed in terms of cost versus benefit. Upgrades which are primarily proposed to reduce operations costs are evaluated for both annual cost reductions as well as eventual investment payback through cumulative multiyear cost reductions. The proposal under development was reviewed by Senior Management in July.

Statement 5 – What milestones need to be demonstrated prior to proceeding with a Single Stage to Orbit (SSTO).

The single most important milestone for proceeding with a commercially developed SSTO launch system and a commitment to move ahead with full-scale development is a successful X-33 flight test program.

Statement 6 - A lower technology, reusable Two Stage To Orbit (TSTO) has not been adequately examined.

In the industry and in-house studies, SSTO and TSTO concepts were assessed as candidate vehicles for the recommended architectures. The STAS recommendation for a 2nd generation RLV does not specify either SSTO or TSTO solutions. The 2nd generation RLV requirements provide the basis for assessment of candidate systems to meet NASA future launch needs. Any technology activity for RLV risk mitigation would support future development of either an SSTO or TSTO vehicle.

Statement 7 – Reliability and safety of an ELV should be further examined.

Understanding what is involved in human rating and developing a crew escape system is the reason the CTV is recommended as an option requiring additional study. Current planning for the follow-on study will focus on human rating the Evolutionary Expendable Launch Vehicle to a reliability of greater than .99 and a crew escape system, capable of escape throughout the entire launch envelope.

Statement 8 – Human missions and cargo should be separate requirements.

One finding of the STAS did indicate that systems that separate crew and cargo could provide for an approach where the vehicle required to support NASA human access could be developed by the Government with the use of a commercial RLV. This approach could foster development of the commercial market; however, it would require multiple launches to do those missions that require human interaction with the cargo. The STAS recommendation is that before NASA embarks on the path of separating crew from cargo, an assessment should be made of future mission requirements and the impact on NASA's future needs determined.

Statement 9 – The liquid flyback booster is not adequately justified and is a deterrent to commercial development.

All of the studies (industry and in-house) did not indicate an economic benefit for the development of the liquid flyback booster. However, a liquid flyback booster could be an element of an industry-developed Shuttle derived or new RLV system that could meet NASA's requirement for a 2nd generation RLV.

NAC Recommendations from May 20-21, 1999 meeting.

1) The NAC accepted the following recommendations from the Technology and Commercialization Advisory Committee (TCAC):

    a) The Agency should conduct a top down, mission- and vision-driven definition of its required and core competencies. The core competencies should be benchmarked against "competitors" to evaluate "world class" standing. This study should then be used for planned hiring and deployment of resources, for a rationale for commercialization/privatization, and the rationale for Broad Area Peer Review (BAPR) decisions.

    b) The Agency should establish "reference goals" and specific metrics for the near/mid/far term mix of research. The goals and metrics should then be tracked in the yearly budget cycle during the OMB and Congressional review, tracked during mid-year "reprogramming," and be the basis for "rules" to use during "reprogramming."

    c) The Enterprises should develop technology planning and inventory processes that are indexed to a "reference template," so that cross-Enterprise coordination and transparency is facilitated. This process should include an explicit prioritization of goals for each Enterprise.

NASA Response: The Chief Engineer and Chief Technologist, Samuel Venneri, are coordinating an Agencywide plan to define mission- and vision-driven core competency requirements at each NASA center. The draft plan will be available for consideration at the November TCAC meeting.

Additionally, the NASA Chief Technologist will work with each of the Program Enterprises to incorporate goals and metrics for the balance of near- to far-term technology into the individual Enterprise technology strategies. During the budget preparation cycle, the Technology Inventory will be used to assess the Enterprise technology programs with regard to near- versus far-term metrics. The Chief Technologist will also monitor the metrics during major reprogramming activities not directly related to the annual budget cycle. The Chief Technologist, in conjunction with the Enterprises, will attempt to incorporate a reference template into this planning and inventory process that will be linked to the activities of the Technology Leadership Council. The Chief Technologist will present a preliminary approach for developing and implementing these metrics to the TCAC at their November meeting.

2) The NAC forwarded the following items from the Minority Business Resource Advisory Committee (MBRAC) as tentative recommendations to Gen. Dailey, pending his analysis:

    a) The Federal Streamlining Act of 1994 requires that NASA establish an Agencywide contracting goal for Historically Black Colleges and Universities (HBCU) and Minority Institutions (MI). NASA has not yet established such a goal. The Committee recommends that NASA establish an Agencywide goal for contracting with HBCU's and MI's.

    b) In order to increase Small Disadvantaged Business (SDB)--including women-owned businesses--participation in NASA's technology-transfer-commercialization activity, NASA should establish a user friendly process for SDB's to receive licenses from NASA to commercialize NASA technology. The Committee recommends that NASA establish a 3-year pilot program aimed at increasing the number of SDB's by doing the following at a minimum:
        i) Direct each Center to identify and select 10 technologies with high commercial potential that might be suitable for SDB's. Such technologies should be presented to SDB's through diverse mediums in conjunction with the Headquarters Office.
        ii) The Commercialization Office at each Center should assist SDB's in the identification of potential partners in the areas of financing, developing, utilizing, and/or marketing the technologies.
        iii) Licenses should be awarded to those SDB's that are able to successfully commercialize the selected technologies.
        iv) Agencywide metrics should be maintained on the number of licenses awarded to SDB's on an annual basis.

NASA Response: The Office of Small and Disadvantaged Business Utilization (Code K) has initiated action on establishing an HBCU goal. Agency coordination of this action has begun and will be completed by September 30, 1999. Code K will respond to the MBRAC at its next meeting on the disposition of this action.

In the area of technology transfer, Mr. Goldin has appointed a committee, consisting of Ralph Thomas (Associate Administrator (AA) for Small and Disadvantaged Business Utilization), Daniel Tam (Senior Advisor for Commercialization), Robert Norwood (Director of

Commercialization), and George Reese (AA for Equal Opportunity Programs) to develop an Agencywide plan that is user friendly for all small businesses with regards to technology transfer. The plan will be presented to Mr. Goldin in September. The spirit of the MBRAC's recommendation will be incorporated into the overall plan.

3) The NAC accepted the following recommendation on the ISS centrifuge from the Life and Microgravity Science and Application Advisory Committee (LMSAAC):

> The timely development and deployment, as well as the integrity, of the ISS centrifuge infrastructure should be maintained at the highest priority. Any modifications should consider the implications for astronaut safety, performance of scientific studies, and the impact on the timeline for the deployment of the centrifuge before being finalized.

NASA Response: NASA recognizes the critical role which the centrifuge facility will play in the ISS research. NASA has decided not to pursue changes to the Centrifuge infrastructure, which had earlier been contemplated. As a result, the previous capabilities and schedule for the Centrifuge infrastructure are unchanged.

4) The NAC accepted the following recommendations on Space Operations Management Office (SOMO) from the Earth Science Systems and Application Advisory Committee (ESSAAC)/Space Science Advisory Committee (SScAC) SOMO Study Team:

   a. Customer feedback: A user's group should be formed that communicates to both the SOMO team leader and the Space Operations Board of Directors to provide direct feedback from the end users. This group should review performance metrics and bring user concerns to the attention of Agency managers. Because there are already channels for such advice within NASA, the user's group should consist primarily of scientists external to NASA.

   b. Award Fee Determination: Office of Space Science (Code S) and Office of Earth Science (Code Y) Senior Management, who will receive the reports of the user's group, should participate in determination of the Consolidated Space Operations Contract (CSOC) award fee.

NASA Response: The Office of Space Flight (Code M) agrees with this recommendation and is working through the SOMO Board of Directors to establish the users' group.

Code M also agrees with the NAC's second recommendation. The SOMO award fee board for the CSOC is being constituted to include Code S and Code Y participation.

5) The NAC accepted the following recommendation of the ESSAAC.

> We recommend that NASA take the initiative to (organize an interagency group that can) formulate a plan with implementation mechanisms that will deal in an expeditious manner with the problem of guaranteeing long term, consistent, and well-calibrated measurements of variables related to climate change indicators.

NASA Response: NASA and the National Oceanic and Atmospheric Administration (NOAA) have recently been in discussions leading to a draft white paper entitled "Long-Term Monitoring for Climate" that will soon be completed. This reflects the joint interests of both NASA and NOAA in the development of long-term data sets which can be used to document and, where possible, to diagnose climate change. The plan includes consideration of both space- and ground-based measurements and recognizes the key role of coordination with international projects such as the Global Climate Observing System (GCOS) and the Integrated Global Observing Strategy (IGOS).

As part of this plan, there is a request for a "Joint Climate Monitoring Program Steering Council" to be composed of representatives from NASA, NOAA, and the National Academy of Sciences. This Council would "conduct reviews to ensure adequate and unbiased assessment of relevant research and technology findings with potential for transition into an operational mode. . . . As part of this activity, the Council would ensure regular consultation with both the external scientific community on research priorities and the broader user community on operational requirements."

Prior to establishing this council, NASA and NOAA would establish a joint planning team to develop and update a Joint Strategic Plan as well as establish the Council, the leadership membership, and terms of reference.

A copy of the current draft of the white paper is appended. It is recognized that this is still a document under development, and the details may change. However, the basic structure is unlikely to change.