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# NASA Issues





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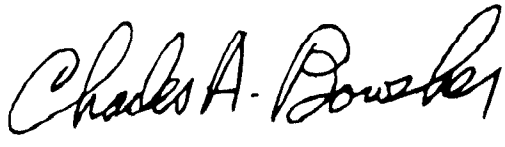
The Speaker of the House of Representatives
The Majority Leader of the Senate

In response to your request, this transition series report discusses major policy, management, and program issues facing the Congress and the new administration at the National Aeronautics and Space Administration (NASA). This report recognizes the changes that have occurred since our first NASA transition report 4 years ago and summarizes the current challenges facing the agency: (1) bringing plans in line with likely budgets, (2) managing systems development more efficiently, (3) improving operations and oversight, and (4) preserving U.S. aeronautics leadership.

As part of our high-risk series on program areas vulnerable to waste, fraud, abuse, and mismanagement, we are issuing a separate report that also addresses some of NASA's current challenges, NASA Contract Management (GAO/HR-93-11, Dec. 1992).

The GAO products upon which this transition series report is based are listed at the end of the report.

We are also sending copies of this report to the President-elect, the Republican leadership of the Congress, and the Administrator-designate of NASA.



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In our November 1988 transition report, we noted that NASA needed to (1) launch planetary missions on time, (2) institutionalize a life-cycle cost management approach for the Space Station, and (3) develop a strategic plan and report full project costs to the Congress. Since that time, most of these issues have been at least partly resolved.

When we issued that report, NASA's program officials had established the protection of launch opportunities for four major planetary missions as their highest priority. The agency met the mission schedules that were in place at that time. NASA's only remaining planetary mission currently under development—the Cassini mission to Saturn—is scheduled for launch in October 1997.

In our report, we discussed the long-term cost savings potential of a life-cycle cost management approach for the Space Station program. However, the comprehensive use of such an approach, which can entail higher near-term development costs, has been hampered by budget levels lower than those required to support the program's planned content and pace. As a practical matter, with budgets below planned levels likely to

continue for the foreseeable future, the life-cycle approach cannot be fully implemented until upgraded and replacement systems are needed over the Space Station's operating life.

NASA still does not report complete cost estimates on all its significant projects, but it has improved its reporting of cost estimates on selected major development efforts. Under an agreement with its congressional authorization and appropriations subcommittees, NASA currently reports more comprehensive cost estimates on approved development projects when contractors' costs to research and develop them are estimated at $200 million or more.

In the late 1980s, NASA intended to develop a strategic plan. However, no plan was issued until NASA was directed by the Congress to prepare one in association with its fiscal year 1993 budget request. That plan was deficient in a number of significant ways. Specific problems with the plan are discussed below in relation to a mismatch of more than $15 billion between the agency's current 5-year plan and its likely budgets. In addition, this report discusses other major issues facing NASA's management. All of these issues are known to NASA's

management and, in varying degrees, are currently being addressed by the agency.

# Bringing Plans in Line With Likely Budgets

NASA's strategic and program plans for future years do not adequately recognize the likely level of available resources. From the mid-1980s until last year, NASA's budget increased from less than $8 billion to over $14 billion. However, the agency's fiscal year 1993 budget is essentially unchanged from that of 1992, and NASA has been told to expect only modest budget growth in the near future. But NASA's plans call for future budgets that are well above likely funding levels.

The overall situation is exacerbated by the increasing share of NASA's total budget that is scheduled for the agency's largest programs. In its fiscal year 1993 budget submission, NASA called for over $15 billion more for fiscal years 1993 through 1997 than the President's budget. NASA's 11 largest programs would absorb over three-quarters of the funding called for in the President's budget. Programs with too much content and too fast a pace are a prescription for an annual cycle of cutbacks, restructuring, stretching of projects over more time than was planned, and potential terminations, as costs are postponed.

## Need for Improvement in Strategic Plan

In late 1988, we pointed out that NASA needed to develop a strategic plan that clearly stated the agency's vision for the future and the steps needed to realize that future in an affordable manner. An effective strategic plan could provide a rational basis for helping NASA bring the content and pace of its programs more in line with likely future budgets.

The Senate Committee on Appropriations directed NASA to complete an agencywide strategic plan by the time the fiscal year 1993 budget was submitted to the Congress. The Committee specified certain criteria for the plan, including setting priorities, anticipating more modest future budget growth, and coming to grips with accurate cost estimates. In January 1992, NASA published a strategic plan called Vision 21. However, the plan did not indicate mission priorities, strike a balance between strategic planning and budgeting, or discuss plans for improving cost estimates.

## Improvement Efforts Under Way

The NASA Administrator has stated that the development of a new strategic plan that matches specific program goals with realistic budgets is one of his highest priorities. Also, NASA officials told us they

will not pursue their major programs as currently planned at the expense of other essential activities if budget constraints require adjustments to programs. They are working to reshape their programs in recognition of more constrained future funding, and an agencywide review is under way with a goal of reducing the future cost of NASA's major programs. However, the effects of NASA's efforts to bring the content and pace of its programs more in line with likely budgets will not be known until the agency makes its fiscal year 1994 budget request.

# Managing Systems Development More Efficiently

In managing its research and development efforts, NASA must establish realistic cost, schedule, and technical performance goals and then work to identify and mitigate problems that can significantly increase costs, disrupt schedules, and impair performance. Currently, however, NASA projects often cost more than estimated, frequently do not meet schedules, and sometimes perform at lower levels than originally forecast. Such cost, schedule, and performance problems arise for a myriad of reasons, some of which NASA can overcome. NASA must be willing to set priorities, identify and pursue cost-effective alternatives, and terminate low-priority projects. Two efforts that currently deserve special attention from NASA's management are the Space Station Freedom and Advanced Solid Rocket Motor (ASRM) programs.

## Space Station's Continuing Challenge

NASA faces a major challenge in keeping development of the Space Station on schedule and within its estimated cost without adversely affecting the facility's remaining scientific purpose—microgravity and life science research. This challenge will be especially difficult because of the expectation of only modest growth in NASA's

budget and the program's limited financial reserves, especially for the next few years.

NASA estimates that Space Station Freedom will cost $30 billion to develop, construct, and operate through 1999, when permanent occupancy of the facility is scheduled to begin. However, we have reported that this estimate should be at least $40 billion because of additional equipment, assembly, and operations costs related to the facility, including a crew rescue vehicle and a centrifuge for life science experiments. The total estimated program cost increases to about $118 billion because another $78 billion will be needed to keep the facility fully operational between 2000 and 2027.

Efforts are under way to examine how to cut the program's cost. Some of these efforts may lead to increasing reliance on other countries' funding, technology, or space hardware for the station. One such initiative is an assessment of the potential for adapting a Russian spacecraft for use as a crew rescue vehicle in lieu of NASA's developing and constructing the vehicle at a cost well in excess of $1 billion.

## Reduced Need for New Rocket Motor

The ASRM was intended to enhance the space shuttle's safety and reliability and to provide an additional 12,000 pounds of lift. So far, the ASRM's development cost has almost doubled—to a total of more than $3 billion. Also, the ASRM's first flight has slipped by over 2-1/2 years since the program was first approved, and another delay of about 2 years is expected. The cost of this additional delay is not yet known.

NASA advisory groups have questioned the development of the ASRM because the motor currently in use has proven safe and reliable since being redesigned after the Challenger accident. In addition, the only two shuttle payloads requiring the added lift the ASRM would provide were the Advanced X-ray Astrophysics Facility and the Space Station's laboratory modules. The X-ray facility will now be launched in smaller payloads. Moreover, as currently scheduled, the ASRM will not be available in time to launch the U.S. laboratory module for the Space Station, although it may be available for the Japanese and European laboratory modules. Ultimately, the ASRM may not be needed at all to help launch Space Station Freedom. NASA is currently evaluating alternatives to the space shuttle for launching the station.

# Improving Operations and Oversight

NASA can improve its efficiency and effectiveness by changing the way it manages its major operational system—the space shuttle—and the way it oversees its contractors. By strengthening its guidance and oversight, NASA could improve its operating efficiency and reduce the risk of inconsistent and substandard performance by its field centers and contractors. Contractor oversight could also be enhanced by improvements in accounting for and reporting contractors' costs and government-owned property.

## Shuttle Targeted for Reduction

The space shuttle is the only U.S. vehicle for carrying humans into space, and it will have to continue operating into the 21st century. To keep it flying, NASA must upgrade components to prevent obsolescence and improve some subsystems to maintain safety margins. The program to operate and maintain the shuttle is NASA's most expensive one. It is, therefore, the most likely program to yield significant savings from the use of more efficient operating procedures. The shuttle currently consumes well over a quarter of NASA's budget, and the agency is trying to significantly reduce the system's future operating costs. To do so may require that many flight processing procedures and

related documentation requirements be streamlined or eliminated. Special care must be taken to see that this streamlining does not compromise the safety of ground personnel or crews.

## Need for Improvement in Contract-Management Activities

NASA spends almost 90 percent of its funds each year on contracts, and since the late 1980s, the agency has acknowledged in its Federal Managers' Financial Integrity Act reports that its contract management is inadequate. Without effective management of its contracts, NASA cannot reasonably ensure that its contract funding is properly used and accounted for. In some cases, inadequate contractor oversight has contributed to cost increases, schedule delays, and performance problems with space equipment.

NASA's difficulties in contract management stem mostly from three major problems. The first is the previously discussed mismatch between plans and budgets. With such a high proportion of its budget linked to contracts, NASA is forced to adjust the planned content and pace of work under contract when optimistic expectations are met with funding levels substantially lower than planned.

The other two problems involve instances of noncompliance by NASA's field centers with contract management requirements and the use of ineffective procedures and systems in overseeing contractors. The latter problem includes inadequacies in NASA's accounting, reporting, and property management systems. For example, contractors' costs and reports on government-owned property are sometimes not received, are filed late, or contain errors and insufficient detail. In addition, the results of property management system surveys that are intended to provide NASA with reasonable assurance that its contractors' property reports are reliable are not always reported to NASA. NASA also has a long-standing and well-recognized need to develop an adequate agencywide accounting system to help improve its oversight of contractors by providing more timely and accurate information. However, NASA's efforts have been slow, and the agency's planning for the new system has been inadequate.

NASA now has an opportunity to correct its financial management weaknesses. A Chief Financial Officer providing strong and sustained leadership could greatly improve the agency's financial management systems and operations by eliminating existing

system weaknesses and expediting the development and implementation of the new system.

NASA has taken, or plans to take, steps to correct most of the contract management and contractor oversight problems discussed in our reports in recent years. NASA officials have also initiated other corrective actions in contract management and related areas. NASA's problems have been many years in the making, and they will not be corrected quickly or easily. NASA's management faces a formidable challenge that will require vision, perseverance, and strong leadership.

# Preserving U.S. Aeronautics Leadership

Foreign companies have made significant gains in the global market for aeronautics products at the expense of U.S. manufacturers. According to the National Research Council, foreign companies now dominate the general aviation/commuter market, seriously threaten the subsonic jet transport market, and are positioning themselves for a leading role in the supersonic transport market. The Council also noted that foreign governments, in concert with their industries, have increased their investments in aeronautics research and development, especially for the subsonic jet transport market. A major airline manufacturer values this market at between $1.6 trillion and $1.8 trillion through 2030.

## Research Support Limitations

NASA is responsible for helping the U.S. aeronautics industry maintain its leadership position. However, NASA's aeronautics research funding has been limited relative to the agency's overall budget. An analysis of NASA's budget over the last 20 years illustrates that the agency has placed greater emphasis on space programs than it has on aeronautics programs. In fiscal year 1992, NASA budgeted about $1 billion—about 7 percent of its total budget—for its aeronautics program.

Moreover, within its limited aeronautics budget, NASA has emphasized fundamental research rather than systems technology (demonstration and validation) efforts. While useful in supporting long-term competitiveness, fundamental research is less likely to affect near-term competitiveness. Under current policies, NASA has limited its support for the systems technology efforts needed to reduce the aeronautics industry's economic and technical risks in applying new technology.

NASA has devoted only a small part of its research activities to the area with the greatest near-term sales potential—large, subsonic jet transports. In addition, NASA has not adequately supported the U.S. industry's aircraft wind tunnel test requirements.

NASA recently reorganized to achieve a better balance of its aeronautics research and technology programs in sub-, super-, and hypersonics. However, given existing policies, it will be difficult for NASA to put more emphasis on systems technology work.

# Related GAO Products

## Plans and Budgets

NASA: Large Programs May Consume Increasing Share of Limited Future Budgets (GAO/NSIAD-92-278, Sept. 4, 1992).

NASA Budget: Potential Shortfalls in Funding NASA's 5-Year Plan (GAO/T-NSIAD-92-18, Mar. 17, 1992).

NASA 5-Year Planning (GAO/NSIAD-92-155R, Feb. 19, 1992).

NASA Issues (GAO/OCG-89-15TR, Nov. 1988).

## Systems Development

Space Shuttle: Status of Advanced Solid Rocket Motor Program (GAO/NSIAD-93-26, Nov. 17, 1992).

Space Programs: NASA's Independent Cost Estimating Capability Needs Improvement (GAO/NSIAD-93-73, Nov. 5, 1992).

Space Station: Status of Financial Reserves (GAO/NSIAD-92-279, July 20, 1992).

Weather Satellites: Action Needed to Resolve Status of the U.S. Geostationary Satellite Program (GAO/NSIAD-91-252, July 24, 1991).

Questions Remain on the Costs, Uses, and Risks of the Redesigned Space Station (GAO/T-NSIAD-91-26, May 1, 1991).

Space Transportation: NASA Has No Firm Need for Increasingly Costly Orbital Maneuvering Vehicle (GAO/NSIAD-90-192, July 31, 1990).

## Operations and Oversight

NASA Contract Management (GAO/HR-93-11, Dec. 1992).

Financial Management: NASA's Financial Reports Are Based on Unreliable Data (GAO/AFMD-93-3, Oct. 29, 1992).

NASA Procurement: Opportunities to Improve Contract Management (GAO/T-NSIAD-92-33, May 7, 1992).

NASA Procurement: Improving the Management of Delegated Contract Functions (GAO/NSIAD-92-75, Mar. 27, 1992).

NASA Procurement: Approach to Sharing Risk Under Certain Research and Development Contracts Is Starting to Change (GAO/T-NSIAD-92-12, Mar. 18, 1992).

NASA Procurement: Agencywide Action Needed to Improve Management of Contract Modifications (GAO/NSIAD-92-87, Mar. 2, 1992).

Space Shuttle: NASA Faces Challenges in Its Attempt to Achieve Planned Flight Rates (GAO/NSIAD-92-32, Dec. 6, 1991).

NASA Procurement: Management Oversight of Contract Cost and Time Changes Could Be Enhanced (GAO/NSIAD-91-259, Sept. 30, 1991).

Space Project Testing: Uniform Policies and Added Controls Would Strengthen Testing Activities (GAO/NSIAD-91-248, Sept. 16, 1991).

Financial Management: Actions Needed to Ensure Effective Implementation of NASA's Accounting System (GAO/AFMD-91-74, Aug 21, 1991).

Management Issues at the National Aeronautics and Space Administration (GAO/T-NSIAD-91-48, Aug 1, 1991).

Space Shuttle: External Tank Procurement Does Not Comply With Competition in Contracting Act (GAO/NSIAD-89-62, Dec. 16, 1988).

Aeronautics Leadership

NASA Aeronautics: Efforts to Preserve U.S. Leadership in the Aeronautics Industry Are Limited (GAO/T-NSIAD-92-14, Mar. 18, 1992).


*U.S.G.P.O.:1993-336-740

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