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United States General Accounting Office
Washington, DC 20548

April 26, 2001

The Honorable John McCain
Chairman
The Honorable Ernest F. Hollings
Ranking Member
Committee on Commerce,
Science, and Transportation
United States Senate

The Honorable Sherwood L. Boehlert
Chairman
The Honorable Ralph M. Hall
Ranking Minority Member
Committee on Science
House of Representatives

Subject: International Space Station Propulsion Module Procurement Process

The National Aeronautics and Space Administration (NASA) initiated the Space Station Program in 1984 to provide for a permanent human presence in an orbiting laboratory. The original U.S. design included a propulsion module that could adjust the orientation of the space station, known as “attitude control,” and boost its altitude, known as “re-boost capability”. Both capabilities are basic requirements for successful long-term operation. In 1993, Russia joined the program and agreed to provide space assets, including the propulsion capability. Because of concerns about Russian delays, however, NASA later initiated a parallel, U.S.-funded effort in December 1998 to design and build a propulsion module to ensure the required attitude control and re-boost capability.

Subsequently, the U.S. propulsion module project experienced cost increases and schedule delays. Concerned that technical, cost, and schedule risks were not adequately managed, you asked us to examine a number of issues related to the propulsion module procurement. One issue involves the process NASA used in

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Abstract The National Aeronautics and Space Administration (NASA) initiated the Space Station Program in 1984 to provide for a permanent human presence in an orbiting laboratory. The original U.S. design included a propulsion module that could adjust the orientation of the space station, known as attitude control, and boost its altitude, known as re-boost capability. Both capabilities are basic requirements for successful long-term operation. In 1993, Russia joined the program and agreed to provide space assets, including the propulsion capability. Because of concerns about Russian delays, however, NASA later initiated a parallel, U.S.-funded effort in December 1998 to design and build a propulsion module to ensure the required attitude control and re-boost capability. Subsequently, the U.S. propulsion module project experienced cost increases and schedule delays. Concerned that technical, cost, and schedule risks were not adequately managed, you asked us to examine a number of issues related to the propulsion module procurement. One issue involves the process NASA used in		Monitoring Agency Acronym
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contracting for the design and delivery of the propulsion module.¹ Specifically, our objectives were to determine (1) whether NASA considered a competitive procurement for the propulsion module, and (2) the propriety of modifying an existing contract to add the propulsion module requirement. We will report separately on other aspects of NASA's Space Station Program that you asked us to examine.

RESULTS IN BRIEF

Based on technical, schedule, and management considerations, NASA did not consider conducting a competitive procurement for a propulsion module. Rather, NASA modified its existing contract with the space station prime contractor, Boeing Corporation, to obtain this capability without competition.

The modification of NASA's contract with Boeing was proper. The Changes clause of the prime contract allowed NASA to modify the contract to add additional requirements, provided they were "within the scope" of the contract. NASA reasonably concluded that the propulsion module requirement was within the scope of Boeing's prime contract, which assigned Boeing the responsibility to design, develop, and deliver the U.S. segment of the space station.

BACKGROUND

In 1987, NASA awarded various "work package" contracts to design, develop, test, build, and deliver parts of the space station. McDonnell Douglas Corporation received the contract for the truss framework, subsystems necessary for station operations, and a propulsion module. Boeing Defense and Space Group received the contract for the pressurized modules and life support systems. Other firms were responsible for other components and support functions. None of the contractors was responsible for managing, integrating, and delivering the space station as a fully functional space vehicle.

In 1993, the President directed NASA to redesign the space station to reduce costs. NASA established a team to develop design options, a streamlined management structure, and a more efficient acquisition approach. The team recommended that NASA designate one of the existing space station contractors as the single prime contractor to be responsible for managing and integrating the space station and coordinating the design and development of all necessary hardware.

NASA established a panel to develop evaluation criteria for selecting the prime contractor. The panel's assessment showed Boeing as the strongest candidate among the existing space station contractors. NASA decided, with the consent of all parties

¹ Subsequent to plans to acquire the propulsion module, NASA redirected the project and was proceeding with an alternative design when work on the latter was terminated in March 2001.

concerned, to restructure the individual contracts, including McDonnell Douglas's contract for the propulsion capability, to make them subcontracts under Boeing's single prime contract. To implement this decision, NASA's Administrator signed a Determination and Findings under the Competition in Contracting Act,² that it was in the public interest to use other than full and open competition to make Boeing the single prime contractor. Under the single prime contract, Boeing was given the responsibility for managing and integrating the space station and for the design, development, and delivery of certain space station assets, known as the U.S. on-orbit segment.

The 1993 restructuring of the Space Station Program also incorporated Russia as an international partner. An international agreement between the U.S. and Russia requires Russians to provide a propulsion capability with propellant re-supply for the life of the program. This work, which had been performed by McDonnell Douglas under its work package was, therefore, not included in NASA's contract with Boeing.

Beginning in late 1995, NASA became increasingly concerned about Russia's ability to meet its commitments. The greatest concern was that the Russian Service Module³, which provides the propulsion capability, would be delayed due to shortfalls in Russian funding. To mitigate the risks of Russian nonperformance, NASA began to develop a plan for a U.S.-funded propulsion capability. Late in 1998, NASA issued a change order to include the design portion of the propulsion module as part of Boeing's prime contract. This work was to augment rather than replace the propulsion module work that the Russians were performing. The total value of this proposed modification was about \$330 million. The total value of Boeing's existing prime contract at the time of modification was about \$7.1 billion.

NASA DID NOT CONSIDER COMPETING THE PROPULSION MODULE

NASA did not consider conducting a competitive procurement for a propulsion module. Several factors led NASA to conclude that it was not feasible to compete the requirement. These factors included management, schedule, and technical considerations.

Specifically, NASA believed that it was important to have its single prime contractor be responsible for critical space station components, such as the propulsion module. This was consistent with the management approach NASA adopted in 1993, which had been approved by the NASA Administrator through a Determination and Findings document. NASA also believed that the time involved in conducting a competitive procurement could jeopardize its ability to adhere to schedule constraints. Finally, NASA wished to take advantage of existing hardware that was under the control of Boeing.

² 10 U.S.C. 2304 (c)(7).

³ The Russian service module was successfully launched in July 2000.

MODIFICATION OF BOEING'S PRIME CONTRACT WAS PROPER

The modification of NASA's prime contract with Boeing was proper because NASA determined that requiring Boeing to provide a propulsion module was within the scope of the prime contract. Under the Changes clause of the space station prime contract, which is included in most other government contracts, NASA may require the contractor to perform extra work within the general scope of the contract. A contract change is within the scope of a contract if the original nature or purpose of the contract is not changed so substantially that the original and modified contracts are essentially different. Factors to be considered in making this determination include the type and extent of changes in the work required and the difference in costs between the contract as awarded and as modified. But where it is clear that the nature and purpose of the contract have not changed, a substantial price increase alone does not establish that the modification is beyond the scope of the original contract.

In this case, the modification was within the scope of Boeing's prime contract since it did not materially change the nature or purpose of the contract. Specifically, the contract statement of work provided that the contractor would be "responsible for the design, analysis, verification, and delivery of the U. S. On-Orbit Segment" of the space station. According to NASA, a propulsion capability for attitude control and re-boost is a basic requirement for on-orbit operation of the space station. The addition of the propulsion module is therefore consistent with the purpose of the prime contract to design and deliver the U. S. on-orbit segment because the space station cannot operate over the long-term in orbit without a propulsion capability. Although the value of the work in the modification (potentially \$330 million) appears substantial, it represents only about a 5 percent increase in the then-current value of the prime contract (\$7.1 billion). Because the modification was within the scope of the contract, NASA was not required to compete the propulsion module requirement.

AGENCY COMMENTS

In written comments on a draft of this report, NASA agreed with the finding that NASA's modification of the contract with Boeing to acquire the propulsion module was proper, and concurred that the requirement for the propulsion module was within the scope of the Boeing contract. NASA's comments are reprinted in enclosure I.

SCOPE AND METHODOLOGY

To determine whether NASA considered a competitive procurement for the propulsion module, we reviewed relevant parts of the contract file and asked NASA for a written explanation of its rationale. To assess the propriety of NASA's modification of Boeing's prime contract, we reviewed the contract and the terms of the modification, requested that NASA explain in writing the basis for its action, and considered relevant court cases involving the propriety of contract changes.

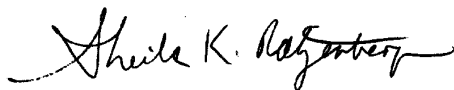
We conducted our review from December 2000 to April 2001 in accordance with generally accepted government auditing standards.

Unless you publicly announce its contents earlier, we plan no further distribution of this report until 5 days from its issue date. At that time, we will send copies to the Honorable Daniel S. Goldin, NASA Administrator; the Honorable Mitchell E. Daniels, Jr., Director, Office of Management and Budget; and other interested parties. We will also make copies available to others on request. This letter is also available on GAO's home page at <http://www.gao.gov>.

Please contact us at (202) 512-4841 or (202) 512-8244, respectively, if you or your staff have any questions about this report. Bill Woods, Sylvia Schatz, and Jerry Herley contributed to this report.



Allen Li
Director, Acquisition and Sourcing Management



Sheila Ratzenberger
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Comments From the National Aeronautics and Space Administration

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



APR 18 2001

Mr. Allen Li
Director
Acquisition and Sourcing Management
U.S. General Accounting Office
Washington, DC 20548

Dear Mr. Li:

Thank you for the opportunity to review and comment on the recent draft report entitled International Space Station Propulsion Module Procurement Process (GAO-01-576R).

I was pleased to learn that the General Accounting Office (GAO) has reviewed the events, interpretation of statutes and regulations, and agrees that NASA's modification of its contract with Boeing to acquire the Propulsion Module was proper. Consequently, the agency concurs with the draft report and endorses GAO's finding that the requirement for the Propulsion Module was within the scope of the Boeing contract.

If further assistance is required, please contact Mr. Michael Hawes, Deputy Associate Administrator for Space Station, on (202) 358-4424.

Sincerely,

A handwritten signature in black ink that reads "Daniel R. Mulville".

Daniel R. Mulville
Associate Deputy Administrator

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