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August 13, 2001

The Honorable Dana Rohrabacher
Chairman, Subcommittee on Space and Aeronautics
Committee on Science
House of Representatives

Subject: NASA's X-33 and X-34 Programs

Dear Mr. Chairman:

On June 29, 2001, you asked me to provide additional comments on several issues that I raised in my June 20, 2001, testimony before your Subcommittee on areas the National Aeronautics and Space Administration (NASA) needs to address in managing its Reusable Launch Vehicle Program. I am pleased to submit the following comments for your consideration.

1. What are your conclusions regarding the usefulness of cooperative agreements as a NASA contractual mechanism and should they be terminated?

Cooperative agreements with commercial firms, such as the one used in the X-33 Program, can be useful in limiting the government's investment in a research and development project by providing for cost sharing with private industry. However, such agreements can pose risks to the government when the extent of private investment is based on assumptions about the potential commercial viability of a project.

Under the Federal Grant and Cooperative Agreements Act of 1977,¹ a procurement contract is used when an agency's purpose is to acquire property or services for the direct benefit to the government. When the agency is merely transferring money to a commercial entity to carry out an activity with a public purpose, and there is substantial government involvement, the act generally requires the use of a cooperative agreement. This was the case for the X-33 Program. NASA's specific objective was to demonstrate the technical, operational, and business feasibility of a single-stage-to-orbit commercial reusable launch vehicle, and it sought to work with private industry in doing so. Given the purposes of the X-33 program, NASA's use of a cooperative agreement in this instance was in accordance with the act.

¹ 31 U.S.C. sec. 6301 et seq.,

The X-33 cooperative agreement was NASA's first large-scale attempt to implement a program using this method. Previously, NASA had used cooperative agreements to implement relatively small programs, mostly science-related efforts at academic institutions.

In terms of potential usefulness, the X-33 cooperative agreement limited NASA's exposure to cost growth and allowed industry to embark on such a program at relatively modest investment. NASA's industry partners assumed the risk of cost growth in exchange for the prospect of a competitive edge and potential economic benefits.

However, as we indicated at the hearing, the business-related assumptions initially underlying industry's willingness to assume the risk of cost growth did not remain valid. The anticipated demand for commercial launch services did not materialize. Eventually, program cost growth, difficulties developing the needed technologies, and weakened launch market projections undermined the anticipated economic benefits. Since NASA's cooperative agreement policy limited its contribution to a fixed amount, the X-33 Program, in effect, took on aspects of a fixed-price contract for basically a research and development program.

2. What was the reason behind NASA's aggressive and rapid-style management of the X-33 and X-34 programs?

The 1994 White House Space Policy established a goal to make a decision on the full-scale development of a single-stage-to-orbit reusable launch vehicle by the end of calendar year 2000. To meet this goal, NASA implemented the Reusable Launch Vehicle Program, incorporating a "fast-track" management approach and "new ways of doing business." A key element was the creation of industry-led partnerships. NASA believed that private industry, with limited government involvement, would be able to develop these vehicles, which incorporated new and unproven technologies, more rapidly, cheaply, and quickly than could be done by NASA using its traditional acquisition approach.

3. Your written testimony stated that NASA plans to generate adequate program cost estimates for gauging management reserves in the 15 to 20 percent range as a way of avoiding problems encountered in the X-vehicle programs. You expressed concern as to NASA's timeliness in preparing these cost estimates. Why?

In May 2001, NASA awarded the first contracts under the 2nd Generation Reusable Launch Vehicle Program. At the time of our testimony, we reported that the program manager planned to update the cost estimates this summer before NASA conducts a separate, independent technical review and cost estimate in September 2001. We believe that program cost estimates should have been completed and available prior to the award of any contracts in order to adequately assess the reasonableness of contractor proposals and the sufficiency of reserves set aside to meet the risk

inherent in these proposals. NASA's own program guidance requires that such cost estimates be prepared before proceeding into program implementation.

Other NASA programs, such as the International Space Station and the Propulsion Module Project, have also experienced schedule delays and incurred additional costs due to design changes and program management problems. Timely and realistic cost estimates and budgets would help ensure potential risks are identified and the cost to resolve such risks is included in the project plan. Further, adequate reserves help protect the funding of other ongoing programs that otherwise might be used to cover the cost growth.

4. How much did the lessons learned in the Young report influence NASA's management style regarding the restructured X-34 Program?

The Young report² was a NASA-initiated study assessing the causes of the failure of two missions to Mars--the Mars Climate Orbiter and the Mars Polar Lander--and other deep space missions. It would be difficult to quantify the extent that the Young report or any of NASA's internal reports influenced a particular change to the X-34 Project. We did find that NASA restructured the plan for the X-34 Project in response to both X-34 Project technical reviews and other internal assessments of NASA programs, including reports of the failed Mars missions, the Shuttle wiring problems, as well as an assessment of NASA's approach to executing its "Faster, Better, Cheaper" projects. X-34 Project management reviewed these reports and assessments, identified common problems, and took corrective measures to prevent the same problems from reoccurring with the X-34 Project. For example, NASA consolidated the X-34 vehicle and engine projects under one NASA manager and relegated the contractor to a more subordinate role. The restructured plan also added several risk mitigation tasks.

If you have any questions about this letter or need additional information, please call me on (202) 512-4841. Copies of this letter are also available on GAO's homepage at <http://www.gao.gov>. Key contributors to this letter included Jerry Herley, Noel Lance, Carlos Garcia, Charles Malphurs, and Cristina Chaplain.

Sincerely yours,



Allen Li
Director, Acquisition and Sourcing Management

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² *Mars Program Independent Assessment Team Summary Report*, March 14, 2000.