

Office of Inspector General
Washington, DC 20546-0001



FEB 20 2007

TO: Associate Administrator for Institutions and Management
Director, Glenn Research Center

FROM: Assistant Inspector General for Auditing

SUBJECT: Addendum to Final Memorandum on Observations on the Review and
Approval of Glenn Research Center's Relocation of the Altitude
Combustion Stand Facility (Report No. ML-07-001, November 2, 2006)

We requested additional management comments on the subject final memorandum because we did not consider the original comments responsive to our recommendations that the Agency 1) determine whether there is a valid mission need for the ACS and 2) consider halting construction of the ACS pending such a determination. We received additional management comments on December 11, 2006 (see the Enclosure).

The Associate Administrator for Institutions and Management stated that NASA would use an ongoing Exploration Systems Mission Directorate's study to assess the current need for continuing the ACS relocation. The Associate Administrator also stated that it is the Agency's opinion that the project is past the "point of no return" from a cost perspective and the only responsible approach is to continue construction of the ACS facility. We acknowledge that it is no longer cost-effective to stop construction given that the estimated cost of termination now exceeds the cost of completion. Therefore, we are closing this recommendation.

Although events overtook our recommendation, the Agency's failure to comply with its own procedural requirements and ensure the appropriate use of resources remains troubling. Since 1999, NASA has had several opportunities but has been unable to validate, in accordance with NASA procedural requirements, an operational requirement for rebuilding the ACS facility. NASA has argued that it has a fiduciary duty to protect taxpayers' interests by preserving an existing operational capability and that absent proof that the capability could be of no possible future use, proceeding with construction of ACS facility is justified. In our view, just the reverse is true. Constructing facilities in the absence of a demonstrated need not only violates NASA requirements, but constitutes the breach of the fiduciary duty the agency argues it is upholding.

Perhaps most concerning is the apparent belief that once NASA has built a facility to meet requirements for certain capabilities, that those requirements continue on indefinitely and justify the construction of replacement facilities years later without due consideration of whether there is a continuing need. There is no fiduciary duty to preserve capabilities that are no longer needed. There is a fiduciary duty to keep from

investing in unneeded facilities, and this duty provides the underpinning for the requirements that NASA did not follow in constructing the ACS facility.

A summary of management's additional comments on Recommendations 1 and 2 and our evaluation of those comments follow.

Recommendation 1

In our draft memorandum, we recommended that the Associate Administrator for Institutions and Management immediately assess and determine, in accordance with NASA Procedural Requirements, whether there is a valid mission need for the ACS facility.

In NASA's September 22, 2006, response to the draft memorandum, the Associate Administrator for Institutions and Management concurred, stating that NASA agrees that the mission need for the ACS should be reexamined immediately. The Associate Administrator provided an executive summary of a comprehensive facilities study completed in March 2006, which examined existing facility capability relevant to Crew Exploration Vehicle (CEV) program needs. According to the Associate Administrator, the study concluded that, while testing capabilities exist to conduct flight verification tests for the program's systems, appropriately equipped component test facilities are still needed for developmental testing and to minimize schedule conflicts. The Associate Administrator stated that the executive summary supported the need for component testing for which the ACS facility was uniquely suited.

We did not consider the comments responsive. We noted in our evaluation of management's response that the Associate Administrator did not articulate a plan for assessing the need for the ACS facility. We reviewed the comprehensive facilities study that the Associate Administrator referred to, "Crew Exploration Vehicle (CEV) Propulsion Plan - Volume 1 Development," May 4, 2006, which was prepared by the Glenn Research Center (Glenn) CEV Project Office. The plan does not specifically address the need for the ACS facility and does not evaluate the capabilities of the ACS facility related to CEV engine test requirements; therefore, it does not satisfy the intent of our recommendation.

The Associate Administrator, in additional comments dated November 30, 2006, stated that the Exploration Systems Mission Directorate's Advanced Capabilities Division has initiated a Test Planning Study that will assess current and future needs of the Constellation Program and will identify potential test facilities, evaluate their availability, and identify gaps so that critical facilities usage can be planned. The Associate Administrator stated that this study, scheduled for completion by December 15, 2006, would specifically assess the current need by NASA for continuing the ACS relocation. As of January 25, 2007, the Facilities Engineering and Real Property (FERP) staff was unable to provide the study.

While it is encouraging that the Agency has agreed to address the need for the facility, it does not diminish the importance of the finding that NASA was unable to provide the

validated operational requirement used to support the design and construction of the ACS facility. As stated in our “Final Memorandum on Observations on the Review and Approval of Glenn Research Center’s Relocation of the Altitude Combustion Stand Facility” (Report No. ML-07-001, November 2, 2006), there have been four events that should have triggered a validation of the operational requirement for the ACS facility if one existed. Specifically, in

- 1999, when the facility was initially envisioned;
- 2002, when the first NASA Form 1509, “Facility Project-Brief Project Document,” was signed in May;
- 2004, after the announcement of “The President’s Vision for U.S. Space Exploration” in January; and
- 2005, when the second NASA Form 1509 was signed in December.

The Associate Administrator also stated the Agency anticipates that the Test Planning Study will support the need for the ACS facility. While encouraging that the Agency anticipates that it may ultimately have a need for this \$25.3 million facility, it does not justify the original decision to proceed with design and construction in violation of NASA procedural requirements. The Associate Administrator did not address what actions the Agency would take if the study does not support the need for the ACS facility.

Management’s commitment to assess the need for the ACS facility is responsive. The recommendation is resolved and will be closed after we review the results of the assessment.

Recommendation 2

In our draft memorandum, we recommended that the Associate Administrator for Institutions and Management consider halting further construction until a determination is made in accordance with applicable criteria that the facility supports a valid mission need.

In NASA’s September 22, 2006, response to the draft memorandum, the Associate Administrator concurred, stating that NASA considered halting construction of the ACS facility; however, NASA determined that the ACS facility capability does support valid mission needs and that there was no benefit to be gained by halting construction.

We did not consider management comments responsive. We noted in our evaluation of management’s response that the contractor had billed for 38.4 percent of the contract costs and, if Glenn were to terminate the project, that Glenn could return up to \$8.5 million to the City and avoid spending \$3.6 million to complete the ACS facility and also avoid estimated annual operating costs of about \$159,000.

The Associate Administrator, in additional comments dated November 30, 2006, stated that his position had not changed. In addition, the Associate Administrator asserted that the work being done with respect to the ACS facility is not a new construction project but is the relocation of a pre-existing NASA capability and that NASA management remains responsible for preserving and protecting that capability on behalf of the U.S. taxpayers who paid for it. The Associate Administrator stated that, unless it can be conclusively demonstrated that there is no longer a need for such capability, fiduciary responsibility necessitates that NASA protect Federal taxpayers' legal right to a fully functional, relocated ACS. The Associate Administrator further stated:

To definitively conclude that the ACS capability can be of no possible future use to the Federal government would require substantially greater analysis than has been done to date. A definitive analysis would require an interagency team to compile a comprehensive list of projected future needs for altitude testing across the Federal government along with the contemporaneity of those needs. The team would then have to plot those projected needs against the specific test capabilities of all the various facilities that the Final Memorandum identifies similar to the ACS. Finally, the team would have to compare the operating and long-term maintenance costs of those facilities to the respective costs of the relocated ACS. Since the relocated ACS is a completely refurbished facility, it is highly likely that, if there were found to be duplicative capacity, that such an analysis will argue for the closure of facilities other than ACS. In any event, absent such an analysis we can only conclude that halting the relocation of the ACS capability, and thereby effectively allowing its uncompensated diminution, would irresponsibly compromise the continued availability of a valuable Federal asset.

Ironically, the kinds of activities that the Associate Administrator states would be needed to conclude there is no possible future use for the ACS are the steps that the Agency should have taken prior to proceeding with design and construction, but failed to do.

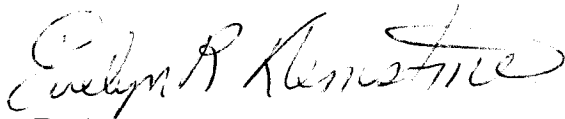
Contrary to the Associate Administrator's statement, there is no fiduciary responsibility to preserve capabilities that are no longer needed or for which a requirement does not exist. We recognize that the ACS facility is part of a complex contractual arrangement with the City of Cleveland. However, the Rocket Engine Test Facility* has been shut down since 1995, indicating that NASA did not have a need for the capabilities of that facility. In addition, FERP personnel stated that as recently as December 2005 none of the Mission Directorates were willing to approve the construction of the ACS by signing the NASA Form 1509. Spending \$25.3 million to rebuild a facility for which NASA had no valid mission need, regardless of whether the funding came from NASA appropriations or City of Cleveland funds, is the antithesis of exercising sound fiduciary responsibility.

The Associate Administrator also pointed out that halting construction is no longer an option because the projected cost of terminating the contract is now estimated to exceed the cost of completing construction. Completion of the ACS facility, including work in progress, is now beyond 60 percent. The Associate Administrator stated that it is the

* One of the facilities rebuilt as part of the Airport Expansion Project. The Rocket Engine Test Facility consisted of three discrete test stands. Glenn requested, however, that the City of Cleveland rebuild only one of the test stands (the B-stand, to be called the ACS facility).

Agency's opinion that the project is past the "point of no return" from a cost perspective and the only responsible approach is to continue construction of the ACS facility. We acknowledge that it is not cost-effective to stop construction now.

We appreciate the courtesies extended the audit staff during the review. If you have any questions, or need additional information, please contact Ms. Catherine Schneider, Financial and Institutional Management Director, at 202-358-3789 (catherine.schneider@nasa.gov), or Mr. Ashton Coleman, Project Manager, at 202-358-3860 (ashton.coleman@nasa.gov).



Evelyn R. Klemstine

Enclosure

cc:

Administrator

Deputy Administrator

Associate Administrator

NASA Office of General Counsel

Assistant Administrator for Infrastructure and Administration

Director, Facilities Engineering and Real Property Division

Director, Management Systems Division

Chief Counsel, Glenn

Management's Additional Comments

National Aeronautics and
Space Administration
Headquarters
Washington, DC 20546-0001



November 30, 2006

Ready to Attach

Facilities Engineering and Real Property Division

TO: Assistant Inspector General for Auditing
FROM: Associate Administrator for Institutions and Management
SUBJECT: Final Memorandum on Observations on the Review and Approval of Glenn Research Center's Relocation of the Altitude Combustion Stand Facility (ACS) (Report No. ML-07-001)

This memorandum is in response to the subject Office of the Inspector General (OIG) memorandum dated November 2, 2006, requesting additional comments by November 20, 2006. Much of the relevant historical basis of the development of the ACS project has been omitted from the Final Memorandum, but in the interest of expediting resolution, this response is limited to the specific requests made of the Associate Administrator for Institutions and Management regarding the following recommendations.

Recommendation 1: The previous response was cited as unresponsive due to the absence of an articulated plan for conducting an assessment of mission need. The OIG requests that the Associate Administrator provide a timeline and statement of objective for the reexamination of the need for the ACS facility.

Response: The statement of objective and timeline for this re-examination is detailed in the attached Exhibit A, and is summarized as follows:

1. The Exploration Systems Mission Directorate's, Advanced Capabilities Division has initiated a Test Planning Study that will assess current project needs as well as the future needs of Constellation; and will identify potential test facilities, evaluate their availability and identify gaps so that critical facilities usage can be logically planned. This study will among other things, specifically assess the current need by NASA for continuing the relocation of the Altitude Combustion Stand.
2. The timeline for completion of this study is on or about December 15, 2006.

We can report that this study is nearing completion, and we anticipate that it will establish the basis of need for the ACS facility.

Recommendation 2: The OIG requests that the Associate Administrator for Institutions and Management reconsider his position and provide additional comments by November 20, 2006.

Response: As requested, we have again reconsidered our position, and the following is the result of our reconsideration and our additional comments. Because we can identify no additional factor that would justify a different conclusion, we have no basis for altering our original position. We continue to believe that our responsibility to preserve and protect Federal resources requires that we continue construction of the relocated ACS capability while we address the issues raised in the Final Memorandum.

The Final Memorandum does not dispute the Associate Administrator's conclusion that any construction delay would seriously jeopardize completion of the project. To the contrary, it appears to endorse as a desired outcome the inability to complete the relocation that would almost certainly result from the unrecoverable increases in construction costs consequent to halting the relocation. The only argument offered to support the request for reconsideration, articulated on pages nine and ten of the Final Memorandum, appears to be that because GRC can terminate the Space Act Agreement 12 and presumably negotiate some type of termination settlement that returns money to the City, it should do so.

However, given the fundamental nature of the transaction at issue and the analytical data currently available, we must in good conscience continue to maintain the opposite position.

The work currently being done with respect to ACS is not a new construction project. It is the relocation of a pre-existing NASA capability. NASA management remains responsible for preserving and protecting that capability on behalf of the U.S. taxpayers who paid for it. Unless it can be conclusively demonstrated that there is no longer a need for such capability, that fiduciary responsibility necessitates that we err on the side of protecting Federal taxpayers' legal right to a fully functional, relocated ACS.

To definitively conclude that the ACS capability can be of no possible future use to the Federal government would require substantially greater analysis than has been done to date. A definitive analysis would require an interagency team to compile a comprehensive list of projected future needs for altitude testing across the Federal government along with the contemporaneity of those needs. The team would then have to plot those projected needs against the specific test capabilities of all the various facilities that the Final Memorandum identifies similar to the ACS. Finally, the team would have to compare the operating and long-term maintenance costs of those facilities to the respective costs of the relocated ACS. Since the relocated ACS is a completely

refurbished facility, it is highly likely that, if there were found to be duplicative capacity, that such an analysis will argue for the closure of facilities other than ACS. In any event, absent such an analysis we can only conclude that halting the relocation of the ACS capability, and thereby effectively allowing its uncompensated diminution, would irresponsibly compromise the continued availability of a valuable Federal asset.

Also, halting further construction presents a serious financial dilemma as the projected cost of terminating the project is now estimated to exceed the cost to complete construction. As of the date of this memorandum the eighth monthly progress payment application of the construction contractor has been processed and approved for payment. For a stop work order issued December 15, 2006, the completed work and stored materials amount will exceed \$10 Million. This amount plus the updated estimated cost to terminate construction, re-stock materials, settle with the contractor and demolish the uncompleted construction sums to approximately \$17,600,000, including contingencies, which altogether is greater than the current construction contract amount.

Completion of the project, including work in progress, is now beyond 60 percent. In our opinion, the project is past the point-of-no-return from a cost perspective. Accordingly, the only responsible approach is to continue construction of the ACS facility.

Without any undue interruption, the total procurement cost for the ACS relocation remains on track to complete within the current estimate. Should there be any surplus funds, they will be used to complete other unfinished elements of the Airport Projects, in accordance with the terms of SAA-13. Although not anticipated, any remaining amount not needed to complete other relocation projects will be returned to the City.

If you have any questions or wish to discuss this response, please contact Steven Miley, Acting Director for Facilities Engineering and Real Property at 202-358-0493 or Albert Johnson, Acting Deputy for Facilities Engineering and Real Property, at 202-358-1834.


Charles H. Scates

Enclosure

National Aeronautics and
Space Administration
Headquarters
Washington, DC 20546-0001



Re: 031700
TS

September 25, 2006

Exploration Systems Mission Directorate

Memorandum for Record

Subject: Facilities required for Reaction Control System testing and the use of the GRC Altitude Combustion Stand

Within the Exploration Systems Mission Directorate, the Advanced Capabilities Division is comprised of a collection of several Programs that support Vision for Space Exploration objectives. The division, through its programs and projects achieves results validating technologies and providing them to flight projects for incorporation. One of these, the Exploration Technology Development Program, at the Langley Research Center, identifies technological needs and implements projects for focused research, technology development and risk reduction to provide enabling capabilities for subsequent flight systems development within the Constellation Program. One such project is the Propulsion and Cryogenic Advanced Development (PCAD) project. The results of this project will provide important propulsion technologies to several projects in the Constellation, to include the Orion crew exploration vehicle and the lunar lander,

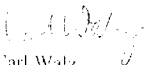
The Glenn Research Center (GRC) was assigned to conduct the PCAD project. The project is chartered, in part, to develop technologically advanced Reaction Control System (RCS) thrusters for future human-rated spacecraft, to include the CEV and the lunar lander. The PCAD project is underway and prospective RCS thrusters are presently being procured. This is an important activity given the Agency's need to obtain test data to demonstrate a high technology readiness level and validate models that will be used to make spacecraft design decisions for the Constellation program.

The RCS thrusters being acquired will undergo a series of tests to determine their performance across all anticipated environments. It is expected that the testing will take the engines beyond the edge of their design points and put the engines through a full envelope of testing so the performance limits of these engines are thoroughly understood. RCS jets operate from the atmosphere to vacuum, from hot to cold environments. In addition, because of the nature of RCS thruster use, testing to high duty cycles is expected, requiring facilities be available for long periods of time. As these are development tests, these thruster designs may fail, requiring repair and then retesting.

Given the needs of the PCAD project and the future needs of Constellation, I have directed the PCAD project to jointly conduct an RCS test planning study with Constellation that will identify potential test facilities, evaluate their availability for PCAD use, and identify gaps so that critical facilities usage can be logically planned.

Such a study will leverage information previously gathered in a CEV Propulsion Test Facility Assessment, issued March 24, 2006. This study will assess specific RCS testing needs for PCAD, will specifically assess the current need by NASA for continuing the relocation of the Altitude Combustion Stand and is to be undertaken immediately. Notwithstanding the assessment, all parties must recognize that testing requirements to meet the needs of the ESMD and the VSE will also continue to evolve.

Given the visibility of the PCAD project and the ongoing process of completing the new ACS facility, this test planning assessment with its recommendation should be briefed jointly to ESMD/Constellation and FSMD/Advanced Capabilities. Upon concurrence, my office will transmit a summary to Charles Scales, Associate Administrator, Institutions and Management, or his designate, in support of the current action. I fully expect the briefing to be completed within the next 60 days.


Carl Walz
Director, Advanced Capabilities
Exploration Systems Mission Directorate