



Office of Inspector General
Washington, DC 20546-0001

September 28, 2007

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

FROM: Assistant Inspector General for Auditing

SUBJECT: Final Memorandum on Observations on the Review and Approval of
Glenn Research Center's Relocation of the Cryogenic Components
Laboratory Facility (Report No. IG-07-027, Assignment
No. A-06-002-01)

We are providing this final memorandum for management review and additional comment. We received, through the Office of Inspector General (OIG) hotline, a complaint alleging that NASA grossly mismanaged Space Act Agreements (SAAs) between Glenn Research Center (Glenn) and the City of Cleveland, Ohio (the City), relating to Cleveland's airport expansion project. Because of the allegations, we initiated an audit of SAA 10, which was for the construction of the Cryogenic Components Laboratory (CCL) facility at Plum Brook Station, about 50 miles away from Glenn. The CCL facility includes Cell #1,¹ Cell #2,² densification area, proof test area, test control, and common support systems.

The City considered expansion of its airport vital to the economic development of the City and Northeastern Ohio and requested that NASA transfer part of Glenn to the City: a 40-acre parcel of land, referred to as the "South 40." NASA agreed to the transfer if the City would pay all necessary costs to relocate the South 40's various storage buildings and loose equipment and rebuild five facilities, including the CCL facility.

Our objective was to evaluate the allegations regarding the management of the CCL facility's construction under SAA 10 and to determine whether NASA had a valid mission need for the CCL facility. Details of the audit's scope and methodology are in Enclosure 1.

Executive Summary

Requirements for the CCL Facility Did Not Materialize until 4 Years after the Decision to Construct. In July 2007, Glenn reported that the CCL facility was needed to support the Constellation Program. Specifically, on July 24, 2007, the Project Manager,

¹ A test cell dedicated to the development of cryogenic liquid oxygen systems.

² A test cell dedicated to the development of cryogenic liquid hydrogen systems.

Purge and Hazardous Gas Project, in the Launch Systems Project Office at Glenn, provided an "intent to test" memorandum. That memorandum states that the Project Manager intends to use Cell #2 to conduct developmental testing of the Crew Launch Vehicle Upper Stage purge system and hazardous gas detection system starting in January 2008 for 6 months.

However, in August 2003, when Glenn entered into the agreement with the City for the construction of the CCL facility at Plum Brook Station, Glenn had no plans to use the new CCL facility once it was operational and did not have a valid operational requirement, as required by NASA Procedures and Guidelines (NPG) 8820.2C, "Facility Project Implementation Handbook," April 28, 1999.³ The Glenn Chief Counsel stated that identifying a mission requirement before constructing the CCL facility was not Glenn's primary consideration. Instead, the primary consideration was whether NASA could reasonably expect to need the capability of the CCL facility at any point in the future. According to the Glenn Chief Counsel, since Glenn officials could not determine that NASA would never need the CCL facility, they decided that the CCL facility should be constructed. The Chief, Glenn Project Management Branch, estimated that the City expended \$17.4 million to design and construct the CCL facility.

Glenn Accepted the CCL Facility Knowing It Was Not Complete. NASA granted the City the license to operate the runway on the South 40 on August 3, 2004, even though the CCL was not physically complete and fully operational, as required by SAA 10 paragraph III.A.2. The City opened the runway for use that same month. In December 2004, after the runway was in use, the City certified that the CCL facility was complete. However, Glenn determined that the CCL facility was not physically complete and was not operational. Glenn did not accept the CCL facility in December 2004 and actively worked with the City to resolve facility construction issues during calendar years 2005 and 2006. However, Glenn had lost much of its bargaining power once the City was granted the license to operate the runway on the South 40.

During calendar year 2005, the Chief, Glenn Project Management Branch, stated that Glenn came to the realization that the City would not provide any additional funding and determined that the most prudent course of action was to close out the airport expansion project. In June 2005, Glenn began determining what impediments remained to closing the SAA. SAA 10, section VI.C, outlines the procedures that Glenn and the City were required to follow to resolve disputes under the SAA. If the Steering Committee (a group composed of Glenn and City officials, which met every other week or as necessary and whose function included anticipating and addressing potential problems) was unable to resolve issues, those issues were to be referred to the Glenn Director and the Mayor for final resolution. In a July 12, 2005, Steering Committee meeting, Glenn officials stated that they would begin preparing SAA 13 for full and final release of the construction projects under the airport expansion project.

³ This guidance was superseded on October 7, 2003, but was the guidance in effect at the time Glenn entered into SAA 10 for the construction of the CCL facility in August 2003.

In a letter dated December 30, 2005, the Glenn Director stated that the City had fulfilled its obligations under three SAAs and that the purpose of the letter was to establish completion milestones and to grant final acceptance and release to the City for SAAs 3 (preparation of final design packages), 9 (Central Chemical Storage Facility), 10, and 11 (site preparation for runway construction). Under the letter, Glenn accepted ownership and responsibility for all facilities, systems, and equipment, including any necessary maintenance and repairs.

Glenn formalized the terms of the December 30, 2005, letter in SAA 13, September 29, 2006. Under SAA 13, Glenn released the City from responsibility for any additional funding for the design, relocation, or construction of properties covered by the SAAs. Glenn assumed full financial responsibility for further costs related to the airport expansion project. Under SAA 13, Glenn accepted the CCL facility knowing that the facility was not physically complete and fully operational.

Glenn Will Have to Use Appropriated Funds If There Is a Need to Complete the CCL Facility. Glenn did not fully inspect the CCL facility to determine the extent of work needed to complete it before the contractors restarted work. Glenn officials stated that the contractors were tasked to fix problems as they were identified. As of August 31, 2007, the Chief, Glenn Project Management Branch, estimated that \$909,000 was needed to complete the CCL facility by January 2008 based on known deficiencies and projected unknown deficiencies. The CCL Facility Manager stated that the cost estimates were based on the current status and short-term projections and did not include any allowance for contingencies or unplanned costs and delays due to latent defects, warranty issues, etc.

The CCL facility sat idle from December 2004, when the City granted Final Acceptance to the contractor, until September 2006, when Glenn brought in contractors to restart work on the facility. As of August 2007, Cells #1 and #2 were not complete. The Chief, Glenn Project Management Branch, stated that Glenn's first priority is to complete the Altitude Combustion Stand facility and close out four SAAs and then use the remaining City funds to work on the CCL facility. The Chief estimated that they will use \$308,000 of City funding to complete Cell #2. The Chief estimated that they needed \$601,000 to complete Cell #1; however, there is insufficient City funding and, therefore, Glenn plans to mothball the facility. If Glenn determines that there is a need to complete the CCL facility, it will have to use appropriated funds because the remaining City funds are not sufficient to complete all of the airport expansion project's outstanding tasks.

Management Actions. We did not make any recommendations concerning identifying an operational requirement for the CCL facility because in July 2007, 4 years after SAA 10 was signed, Glenn identified a requirement for the facility. We reported a similar issue 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). In that memorandum we reported that Glenn had begun construction of the Altitude Combustion Stand facility without a valid mission requirement.

Our July 31, 2007, draft of this memorandum recommended that the Glenn Director fully inspect the CCL facility to determine the extent of work needed to complete it and the estimated cost for completion. In addition, we recommended that the Glenn Director prepare a functional requirements statement for any future facility projects. The statement should define the capability; evaluate options to meet the need; and identify the mission, operations, or research and development or institutional tasks requiring the capability.

In commenting on the draft of this memorandum, the Associate Administrator for Institutions and Management concurred with our recommendations but did not fully agree with the findings that led to the recommendations. (See Enclosure 3 for the full text of management comments.)

Although the Associate Administrator concurred with both recommendations, we do not consider his comments on Recommendation 1 to be fully responsive because they do not address the need to adequately inspect the CCL facility and to prepare a cost estimate for completion of the entire facility. Glenn estimated that it needed \$909,000 to complete the CCL facility. However, without fully inspecting the facility, Glenn does not know whether \$909,000 is a realistic estimate. We request additional comments on Recommendation 1 in response to this final memorandum.

Background

In May 1997, Glenn and the City entered into a memorandum of understanding for the transfer of land owned by Glenn. The City considered the airport expansion vital to the economic development of the area and requested that Glenn transfer the South 40 to the City. Glenn agreed to the transfer if the City would pay all necessary costs to relocate the South 40's various storage buildings and loose equipment and rebuild five facilities, including the CCL facility. Glenn entered into the memorandum of understanding and 13 SAAs with the City relating to the airport expansion project. The SAAs provide details for the relocation of certain facilities and equipment located on Glenn property. A summary of the 13 SAAs is in Enclosure 2.

The memorandum of understanding stipulates that the five rebuilt facilities were to be in operational condition prior to transferring ownership of the South 40 to the City. One of the facilities that the City agreed to rebuild for Glenn was the CCL facility. In August 2003, Glenn and the City entered into SAA 10 to construct the CCL facility, which the City was to fund. Work to be performed under SAA 10 included relocating CCL Cells #1 and #2, the Propellant Densification Test Site and Proof Pressure Test Cell, and Cryogenic Gas Vessels from the South 40 to Plum Brook Station. According to SAA 10, paragraph III.A, the City—not Glenn—was responsible for managing the construction of the CCL facility.

NPG 8820.2C, chapter 2, provided guidance for establishing the requirements for planning and development of a facility project.⁴ Specifically, NPG 8820.2C,

⁴ NPG 8820.2C was in effect from April 28, 1999, until October 7, 2003.

section 2.1.1, required a functional requirements statement that defined the capability; evaluated options to meet the need; and identified the mission, operations, or research and development or institutional tasks requiring the capability.

NASA Procedural Requirements (NPR) 8820.2E, "Facility Project Implementation Guide," October 7, 2003, chapter 2, provides current guidance for NASA's facilities program, including project funding. This guidance superseded NPG 8820.2C.

The Associate Administrator for Institutions and Management serves as the principal integrator and advisor to the Administrator and Deputy Administrator on policy and management of real property assets and institutional operations. The Assistant Administrator for Infrastructure and Administration and the Director, Facilities Engineering and Real Property (FERP) Division, serve as the strategic advisors to Agency and Center management on real property issues, to include approval of all Construction of Facilities projects.

Facility Construction Began before Operational Requirement Was Identified

In July 2007, Glenn reported that the CCL facility was needed to support the Constellation Program. Specifically, on July 24, 2007, the Project Manager, Purge and Hazardous Gas Project, in the Launch Systems Project Office at Glenn, provided an "intent to test" memorandum. That memorandum states that the Project Manager intends to use Cell #2 to conduct developmental testing of the Crew Launch Vehicle Upper Stage purge system and hazardous gas detection system starting in January 2008 for 6 months.

Prior to the July 2007 memorandum, no operational requirement had been identified for the CCL facility. Furthermore, in August 2003, when Glenn entered into SAA 10 with the City for the construction of the CCL facility at Plum Brook Station, Glenn did not have a valid operational requirement and had no plans to use the new CCL facility once it was operational. SAA 10, paragraph III.B.18, states: "After Final Acceptance NASA shall place the CCL Project into Standby status." In addition, Glenn was unable to provide either a functional requirements statement in accordance with NPG 8820.2C, section 2.1.1, or other documentation containing the information that should have been in a functional requirements statement.

The Glenn Chief Counsel stated that identifying a mission requirement before constructing the CCL facility was not Glenn's primary consideration. In an e-mail on June 21, 2007, the Glenn Chief Counsel stated:

[T]here was no documentation generated in 1997, 2001, or 2003 supporting a specific mission requirement for CCL. Throughout the negotiations with the City of Cleveland, the sole question relevant to NASA's legal entitlement to have the CCL capability relocated was, "Can it be reasonably concluded that NASA will never have a future mission requirement for the CCL capability?" Since representatives from both programs and facilities unanimously answered that question in the negative, no further documentation was required to assert the legal right of U.S. Taxpayers to have their investment in the existing CCL capability preserved and protected.

We also contacted FERP officials to determine if they had any documentation to support approval of the CCL facility construction. They provided the following documentation:

- NASA Form 1509, “Facility Project-Brief Project Document,” executed in May 2002. NASA uses Form 1509 to authorize construction projects. While the form indicated that Glenn had concurrence from the former Office of Aerospace Technology and approval from FERP, no specific NASA mission was identified as requiring the CCL facility. The form merely states: “The City of Cleveland will pay all costs involved in the relocation on a timeline that does not compromise NASA’s mission.”
- “Record of Decision for Proposed Replacement Runway, Runway Extension and Associated Development at Cleveland Hopkins International Airport, Cleveland, Ohio,” November 8, 2000. This document states that relocation of the CCL Cells #1 and # 2 to the new CCL facility will be scheduled so that the new facility can be activated within 6 months of facility closure. However, Glenn had not used the old CCL Cells #1 and #2 since 1994.

We determined that neither document defined the capability that the CCL facility would have; evaluated options to meet the need; or identified the mission, operations, or research and development or institutional tasks requiring the capability that the CCL facility would have as required by NPG 8820.2C, section 2.1.1. FERP and the Office of Aerospace Technology approved the project, as evidenced by the Form 1509 executed in May 2002.

NASA Policy Directive (NPD) 8800.14B, “Policy for Real Property Management,” November 1, 2002,⁵ paragraph 1, states: “Centers will manage their real property to ensure that it is available to perform their assigned mission. Centers will also identify, plan, and implement options to eliminate unnecessary real property.” Glenn’s participation in the airport expansion project provided an opportunity for Glenn to eliminate unnecessary facilities at no cost to NASA, but instead Glenn chose to have the City construct an unneeded facility to replace a facility that had not been used since 1994.

Glenn Accepted the CCL Facility Knowing It Was Not Complete

NASA granted the City the license to operate the runway on the South 40 on August 3, 2004, even though the CCL facility was not physically complete and fully operational, as required by SAA 10, paragraph III.A.2.

According to SAA 10, paragraphs III.A.1 and III.A.2, the City was responsible for managing construction of the CCL facility. As the responsible party, the City issued the contracts for the design and construction of the facility. While Glenn was not a party to the contracts, SAA 10, paragraph VI.B, required Glenn and the City to assign personnel to a Steering Committee, to meet every other week or as necessary and whose function

⁵ This guidance expired in July 2004, but was the guidance in effect at the time Glenn entered into SAA 10 for the construction of the CCL facility in August 2003.

included anticipating and addressing potential problems. The Steering Committee met regularly and discussed outstanding issues, such as staffing, financial reporting, and impediments to meeting the construction schedule. In addition, SAA 10, paragraph III.B.15, required Glenn and the City to meet about 65 days prior to the contractual substantial completion date (August 28, 2004) to jointly plan, track, and execute the tasks necessary to reach timely completion of the CCL facility. At that meeting, held on May 17, 2004, the City requested that Glenn partially accept the CCL facility. Glenn stated that it would not accept any portion of the CCL facility until the City met the governing conditions of SAA 10, which were to be physically complete and fully operational.

SAA 10, section VI.C, outlines the procedures that Glenn and the City were required to follow to resolve disputes under the SAA. The resolution process included formally referring disputed issues to the Steering Committee. If the Steering Committee was unable to resolve the dispute, then the disputed issue would be referred to the Glenn Director and the Mayor. SAA 10, paragraph VI.C.4, states that

the Center [Glenn] Director shall determine in good faith whether any aspect of the unresolved issue(s) will adversely affect NASA's ability to accomplish its mission or will result in a greater expenditure of NASA funds than would otherwise have been incurred. To the extent that the Center Director so determines, or to the extent that City's position on the issue(s) is otherwise unacceptable to NASA, the unresolved aspects of the issue(s) shall be referred back to City's representatives on the Steering Committee.

Paragraph VI.C.5 continues:

Upon referral to City's representatives on the Steering Committee pursuant to Section VI(C)(4) directly above, said representatives shall present any unresolved aspects of the issue(s) to the Mayor of the City, who shall then determine whether the City is able and/or willing to assume any associated risk and/or cost as acceptable consideration for acquiring access/title to the South 40.

Although the SAA required the City to provide a physically complete and fully operational facility, NASA granted the City the license to operate the runway on the South 40 on August 3, 2004. The City opened the runway for use that same month. Glenn continued to work with the City to resolve CCL facility completion issues despite having little bargaining power.

In a November 16, 2004, letter, the City stated that it declared the CCL facility to be substantially complete on November 8, 2004. The City included a "punchlist" of 74 defects, 43 (58.1 percent) of which had not been corrected. The City characterized the items as "minor punchlist items not impacting the Project's intended function." The list of defects included circuit breaker handles missing; communication racks that were missing routers; and heating, ventilating, and air conditioning system modifications that were not complete.

The Steering Committee met again on November 22, 2004, to discuss the City's actions, and Glenn officials stated that Glenn's understanding was that project construction work

would continue in earnest until the end of the calendar year. The City acknowledged that it had granted the Certificate of Substantial Completion without Glenn approval. SAA 10, paragraph VII.D.2, specifically required Glenn approval. City officials stated that the contractor was only going to work until December 8, 2004, and the City Director of Port Control stated that the City had no more money for any of the projects under the airport expansion project. The Steering Committee minutes noted that “several contentious issues remain that prevent NASA from approving substantial completion.” For example, the following issues were on the Glenn punchlist⁶ but not on the City punchlist:

LH2-105 [liquid hydrogen] capped instead of flanged. Major issue. LH2 line is shown on drawings as being flanged such that test equipment can be easily attached. Vendor supplied welded end cap meaning that the cap must be cut off, a product flange welded on, VJ [vacuum jacketed] jacket re-established, and piping segment complete retested.

* * * * *

Haskel pump repaired. Haskel pump has been found to be leaking. Must be factory repaired.

In a letter dated November 30, 2004, Glenn notified the City that Glenn would not approve the City’s request for substantial completion and would not grant approval until the CCL facility “is operationally suitable for its intended use” as defined by SAA 10. In addition, the letter states “further unilateral action by the City involving final acceptance will be considered by NASA to be a termination of SAA-10 by the City.”

In a February 1, 2005, letter, the City notified Glenn that it had accepted the CCL facility on December 7, 2004, and provided the Certificate of Final Acceptance to the contractor. The City requested that Glenn sign the Certificate of Final Acceptance and “please acknowledge that City has fulfilled all obligations under SAA-10, so that SAA-10 may be closed.” In its response on March 11, 2005, Glenn stated that it would not agree to the City’s February 1 request until all obligations of Glenn and the City were completed. The letter states that “SAA-10, CCL at Plum Brook Station, is not complete and contentious issues remain unresolved by the City in accordance with NASA letter of November 30, 2004.”

According to the Chief, Glenn Project Management Branch, from March to June 2005, the Glenn Deputy Director met privately with the Director of Port Control. The Chief stated that Glenn tried to get the City to pay to correct selected punchlist items; however, the City continually refused to provide any additional funding. The Chief stated that Glenn came to the realization that the City would not provide any additional funding and determined that the most prudent course of action was to close out the airport expansion project.

In June 2005, Glenn began determining what impediments remained to closing the SAAs. In a July 12, 2005, Steering Committee meeting, Glenn officials stated that they would

⁶ Glenn personnel prepared punchlists when they conducted facility walkthroughs.

begin preparing SAA 13 for full and final release of the construction projects under the airport expansion project.

In a December 12, 2005, letter, the City requested that Glenn sign the Certificate of Final Acceptance for the CCL facility. The letter states:

The City will be delivering “red to black” record drawings for the SMIRF [Small-scale Multi-purpose Research Facility], CCSF [Central Chemical Storage Facility], and CCL projects in accordance with the schedule previously agreed upon. With the delivery of these drawings, all open issues between the City and NASA relating to the NASA’s relocation projects have been resolved. I am sure you will agree that there is no need to enter into another Space Act to document these matters.

The only remaining requirement is for NASA to evidence acceptance of the work performed under SAA-9 and SAA-10. Toward that end, please sign the enclosed acceptance certificates which will confirm NASA’s acceptance of SAA-9 [Central Chemical Storage Facility] and SAA-10.

In Glenn’s response, dated December 30, 2005, the Glenn Director agreed that the City had fulfilled its obligations under the memorandum of understanding and the SAAs and that the purpose of the letter was to establish completion milestones and to grant final acceptance and release to the City for SAAs 3 (preparation of final design packages), 9 (Central Chemical Storage Facility), 10, and 11 (site preparation of the South 40 for runway construction). Under the letter, the Glenn Director accepted ownership and responsibility for all facilities, systems, and equipment, including any necessary maintenance and repairs. In addition, the letter documents “NASA’s determination that, although not all requirements are complete, adequate consideration has been provided by the City” and that Glenn would not seek any additional funding from the City. The letter states that Glenn’s grant of final acceptance and release was subject to City compliance with six conditions. One of the six conditions was to provide the completed record drawings for the CCL facility, which were provided by August 31, 2006. The other five conditions were as follows:

- The City agrees to release Glenn from any further obligations or liabilities required by the memorandum of understanding and the SAAs except for those responsibilities under SAA 4 (transfer of title of the South 40 to the City) and SAA 12 (construction of the Altitude Combustion Stand facility).
- The City agrees to grant to Glenn the right to use all remaining funds transferred pursuant to SAA 12 on any other SAA as necessary to complete the relocation of capabilities and facilities under the airport expansion project. Glenn will account for and return any unspent funds to the City upon completion of all such related effort or on September 30, 2009, whichever first occurs, in accordance with the procedures set forth in SAA 12.
- The City agrees to release Glenn from all reporting requirements except for those required under SAA 12.

- The City agrees to extend the completion requirements for the Altitude Combustion Stand facility until September 30, 2008.
- The City will use reasonable efforts to complete its obligations under SAA 4.

In a July 17, 2006, Steering Committee meeting, Glenn and the City reviewed the terms of the December 30, 2005, letter. The City agreed to the terms of the letter and Glenn recommended issuing SAA 13 to close out all remaining Glenn and City obligations related to the airport expansion project. The City agreed to the other five conditions when the Director of Port Control signed SAA 13 on September 29, 2006. SAA 13 states:

The purpose of this Agreement is to provide for the final acceptance by NASA of all facility relocation and construction projects that were agreed to under SAA's 5, 6, 7, 9, 10 and 11 (as modified by SAA-12); to close out the obligations between the parties set out in SAA's 1, 2, 3, and 8; to execute a release from NASA to the City from obligations under said Space Act Agreements pertaining to the design, relocation and construction of all facilities and equipment . . . This Agreement is appropriate to enter into at this time as NASA has accepted all design, construction and relocation activities related to SAA's 1, 2, 3, 5, 6, 7, 8, 9, 10, and 11 (as modified by SAA-12) . . . the City has substantially completed all design and construction and relocation activities required in SAA's-1, 2, 3, 5, 6, 7, 8, 9, 10, and SAA-11 (as modified by SAA-12).

Under SAA 13, paragraph IV, Glenn

accepts complete responsibility for all facilities, systems and equipment, relocated and constructed under these agreements and for the Altitude Combustion Stand (SAA-12), including their necessary maintenance and repairs. NASA further agrees that it will not seek any additional funding from the City in connection with the aforementioned SAA's or otherwise and hereby releases the City from any further responsibility for design, construction, or relocation of these facilities, systems or equipment. The City agrees to cooperate fully with NASA to enforce any warranty rights the City may have against its contractors for the relocated facilities; provided, however, that the City shall not be required to file suit to enforce any such warranty rights. With the exception of the 30-year Waterline Warranty provided by the City to NASA in Modification No. 1 to the Space Act Agreement Between The City of Cleveland And NASA Glenn Research Center For Daycare/Picnic/Fitness Center Projects, NASA hereby releases the City from any warranty's expressed or implied, including the WARRANTIES OF MERCHANTABILITY AND FITNESS FOR THE INTENDED PURPOSE.

In addition, Glenn released the City from responsibility for any additional funding for the design, relocation, or construction of properties covered by the SAAs. Glenn assumed full financial responsibility for further costs related to the airport expansion project. Under SAA 13, Glenn accepted the CCL facility knowing that the facility was not physically complete and fully operational.

Remaining City Funds May Be Insufficient to Complete Construction of the CCL Facility

As of August 31, 2007, the Chief, Glenn Project Management Branch, estimated that \$909,000 was needed to complete the CCL facility by January 2008 based on known deficiencies and projected unknown deficiencies. In addition, the CCL Facility Manager stated that the cost estimates were based on the current status and short-term projections and did not include any allowance for contingencies. In addition, allowances should be made for unplanned costs and delays due to latent defects, warranty issues, etc. Under SAA 10, paragraph III.A.2, the City was responsible for constructing a fully operational CCL facility. The CCL facility sat idle from December 2004, when the City granted Final Acceptance to the contractor, until September 2006, when Glenn brought in contractors to restart work on the facility. However, Glenn did not fully inspect the CCL facility before the contractors restarted work. Glenn officials stated that the contractors were tasked to fix problems as they were identified.

The Chief, Glenn Project Management Branch, estimated that the City spent about \$17.4 million to design and construct the CCL facility—\$2.8 million on the design, \$1.1 million for the construction management fee, and \$13.5 million for construction. However, the Chief stated that his staff had to estimate the costs based on bid information because the City was under no legal obligation to provide actual cost data and Glenn officials determined that it was not appropriate to ask for it.

The CCL facility is composed of the following components:

- CCL Cell #1 – A test cell dedicated to the development of cryogenic liquid oxygen systems.
- CCL Cell #2 – A test cell dedicated to the development of cryogenic liquid hydrogen systems.
- Densification Area – A 5,000-square-foot concrete paved area for the installation of packaged densification systems.
- Proof Test Area – A remote asphalt paved area for the proof testing of high-pressure containment systems.
- Test Control – A 7,500-square-foot control facility.
- Common Support Systems and Miscellaneous – Storage and pumping system for the liquid hydrogen and liquid oxygen and audio and video monitoring capabilities.

As of August 2007, Cells #1 and #2 were not complete. In June 2007, the Chief, Glenn Project Management Branch, stated that the remaining City funds may be sufficient to complete Cell #2 but not to complete Cell #1. The Chief stated that Glenn's first priority was to complete the Altitude Combustion Stand facility and then use the remaining City

funds to work on the CCL facility. The Chief stated that Glenn planned to mothball Cell #1 and, if there were insufficient City funds to complete Cell #2, then it would mothball Cell #2 as well. As a result of the Launch Systems Project Office at Glenn's stated intent to use Cell #2, Glenn was working on completing Cell #2. As of August 21, 2007, Glenn had been unable to identify an operational requirement for Cell #1.

Management's Comments on the Finding and Evaluation of Management's Comments

Management's Comments on the Finding. Management stated that although the CCL facility was not operational at the time of the SAA 13 release in September 2006, the scope of the CCL project was essentially completed by the City's construction contractor as designed by the City's Architect/Engineer, with the exception of some punchlist items. The primary work effort since the completion of construction has been to address issues that developed during the CCL facility's Research Systems Validation and Acceptance Criteria (RSVAC) and commissioning process. Management stated that all of the RSVAC and CCL commissioning work has been managed within the balance of City funding. In addition, with the exception of environmental remediation, NASA appropriated funds have not been used for the airport expansion project.

On August 31, 2007, Glenn management estimated that it had \$2.2 million of City funding available to complete all tasks under the airport expansion project and prioritized all remaining tasks. The lowest priority component of the CCL facility is the completion of Cell #1. As of August 21, 2007, there was no identified testing program for Cell #1.

Evaluation of Management's Comments. Management stated that the CCL facility was essentially complete when SAA 13 was signed in September 2006. However, neither Cell #1 nor Cell #2 was complete at that time. In addition, only \$2.2 million of City funding remains to complete the airport expansion project. The Chief, Glenn Project Management Branch, provided a prioritized listing of incomplete tasks as of August 31, 2007. However, as shown by the following table, the remaining \$2.2 million of City funding is not sufficient to complete all remaining tasks under the airport expansion project.

Cost to Complete Tasks Under the Airport Expansion Project (data provided by Chief, Glenn Project Management Branch)	
<u>High Priority Tasks to be Completed</u>	<u>Glenn Estimate to Complete</u>
Altitude Combustion Stand facility construction costs	\$1,535,000
SAA 6, 7, 9, and 11 Closeout*	86,000
Altitude Combustion Stand facility RSVAC checkout process	250,000
CCL facility Cell #2 completion	308,000
Total	\$2,179,000
<u>Low Priority Tasks</u>	
CCL facility Cell #1 completion	\$ 601,000
Gated storage area	366,000
West area restoration	164,000
Total	\$1,131,000
<p>* SAA 6: Construction and relocation of the daycare center, the fitness center, and a picnic pavilion. SAA 7: Construction and relocation of the Small-scale Multi-purpose Research Facility. SAA 9: Construction and relocation of the Central Chemical Storage Facility and miscellaneous storage areas. SAA 11: Site preparation of the South 40 for runway construction; specifically, removal of existing NASA facilities, environmental remediation, filling existing ravines to runway grade elevation, and Altitude Combustion Stand facility salvage activities.</p>	

The Chief, Glenn Project Management Branch, explained that any City funds remaining after the completion of the Altitude Combustion Stand facility; SAAs 6, 7, 9, and 11; and Cell #2 would be used to complete the low priority tasks. However, if the estimates to complete the high priority tasks are accurate, then Glenn will not have sufficient City funding to complete Cell #1. As of August 21, 2007, there was no identified requirement for Cell #1, and Glenn was planning to mothball it. If Glenn identifies a requirement for Cell #1, then Glenn would have to use about \$601,000 of NASA appropriated funds to complete the facility. In addition, if Glenn determines that there is a need to complete the gated storage area and the west area restoration, then Glenn would have to use about \$530,000 of NASA appropriated funds to do so.

Recommendations, Management's Response, and Evaluation of Management's Response

Recommendation 1. We recommended that the Glenn Director fully inspect the CCL facility to determine the extent of work needed to complete it and the estimated cost for completion.

Management's Response. The Associate Administrator for Institutions and Management concurred, stating that inspection of the CCL facility is already occurring as an integral part of the RSVAC checkout process. This process has been underway since June 2006, when the CCL commissioning project was commenced by Glenn. Commissioning plans and cost estimates are updated monthly as a regular part of the project management process, so the extent of the work needed to complete the project is assessed frequently and adjusted as conditions warrant. In the course of completing the CCL commissioning project, many unanticipated, latent construction defects were uncovered and corrected by Glenn. Other defects are in the correction process and more may be found as the commissioning and certification process continues.

Evaluation of Management's Response. While the Associate Administrator concurred with the recommendation, his comments are only partially responsive because they do not address the need to fully inspect the CCL facility and to prepare cost estimates for facility completion. Management states that it is correcting defects as they are found and adjusting the project cost estimates accordingly. However, as of August 31, 2007, Glenn management estimated that there was only sufficient City funds to complete Cell #2.

Glenn needs to fully inspect Cell #1 and Cell #2 and prepare cost estimates so that Glenn is aware of the extent of the deficiencies and how much funding will be needed to complete the entire CCL facility. Should Glenn determine that NASA appropriated funds will be needed to complete either Cell #1 or Cell #2, Glenn should submit an updated NASA Form 1509 and a NASA Form 1510, "Facility Project Cost Estimate," to FERP for review and approval as required by NPR 8820.2E, paragraph 2.5.3, and NPD 7330.1G, "Approval Authorities for Facility Projects," October 19, 1999, paragraph 1(c). We request that management provide additional comments in response to this final memorandum that address fully inspecting the CCL facility and preparing cost estimates for completing the entire facility.

Recommendation 2. We recommended that the Glenn Director prepare a functional requirements statement, in accordance with NPR 8820.2E, for any future facility projects. The statement should define the capability; evaluate options to meet the need; and identify the mission, operations, or research and development or institutional tasks requiring the capability.

Management's Response. The Associate Administrator for Institutions and Management concurred, stating that Glenn has in the past and will in the future fully comply with NASA policy on all facility projects, including the CCL project. A Project Requirements Document, February 23, 2001, and a NASA Form 1509 were prepared for the CCL project in accordance with NASA policy and provided to the OIG for review.

In addition, management stated that a functional requirements statement “applies to Construction of Facilities⁷ projects greater than \$500,000 rather than ‘any future construction project’.” The primary purpose of a functional requirements statement is to support the Center’s own project approval and decision-making process. Accordingly, the recommendation that the Center Director submit the functional requirements statement for review is not appropriate.

Evaluation of Management’s Response. The comments are responsive in that the Associate Administrator agreed to comply with NASA policy on all future facility projects. We modified the wording of the recommendation to delete the requirement to submit a functional requirements statement. In addition, we replaced the word “construction” with the word “facility” to alleviate confusion between facility projects and projects constructed using “Construction of Facilities” appropriated funds.

We acknowledge that Glenn did prepare a Project Requirements Document. However, while the document that Glenn prepared outlines the scope of the project and defines the capability that the new CCL facility was anticipated to have, the document does not include an evaluation of options to meet the need or identify the mission, operations, or research and development or institutional tasks requiring the capability as required by NPR 8820.2E, paragraph 3.3.4.

We acknowledge that NPR 8820.2E does not require that the functional requirements statement be submitted to NASA Headquarters and, therefore, the requirement “to submit” the statement was deleted from the recommendation. Although we agree that the CCL facility project is not a “Construction of Facilities” project within the meaning of NPR 8820.2E, the CCL facility project is a facility project within the meaning of NPR 8820.2E and, therefore, the guidance for facility projects should have been followed. NPR 8820.2E, paragraph 3.3.1, requires that a functional requirements statement be prepared for all facility projects regardless of dollar value. Specifically, NPR 8820.2E, Appendix A, defines a facility project as

the consolidation of applicable specific individual types of facility work including related collateral equipment, which is required to reflect all of the needs. Generally, they are related to one facility, which have been or may be generated by the same set of events or circumstances, which are required to be accomplished at one time in order to provide for the planned initial operational use of the facility or a discrete portion thereof.

There is no minimum dollar amount associated with the determination of a facility project. NPR 8820.2E, paragraph 2.5.3.2, states that a

NASA Form 1509, Facility Project - Brief Project Document, must be approved in accordance with NPD 7330.1 . . . prior to starting work on any facility project with an

⁷ According to NPR 8820.2E, Appendix A, a “Construction of Facilities” projects is a congressional appropriation which provides funding for the revitalization projects (repair, rehabilitation, and modification of existing facilities); the construction of new facilities; the acquisition of related collateral equipment; environmental compliance and restoration activities; the design of facilities projects; and advanced planning related to future facility needs.

estimated cost of \$50,000 or more. NASA Form 1510, Facility Project Cost Estimate, is required to accompany the 1509 for each facility project estimated to cost \$75,000 or more. The documents should be prepared by the organization requesting approval in accordance with the instructions in paragraph 2.6, Budget/Approval Documentation, and Appendix C, Forms and Instructions. For discrete projects [per NPR 8820.2E, paragraph 2.1.1—facility projects exceeding \$1.5 million], the facility cost estimate listed on the approved NASA Form 1509 is the maximum that can be expended on the project without further approval. The increase must be approved in accordance with the authority delegated by NPD 7330.1 . . . before additional obligations may be incurred.

Although management disagreed with some aspects of the original recommendation, we believe that management's comments meet the intent of the recommendation as modified. The Associate Administrator agreed to fully comply with NASA policy on all future facility projects. Therefore, we consider this recommendation to be resolved and closed.

We request additional management comments on Recommendation 1 in response to this final memorandum. The additional comments should address inspecting the CCL facility and preparing cost estimates for the facility's completion. We request that management provide a single, coordinated Agency response by October 29, 2007.

We appreciate the courtesies extended the 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

3 Enclosures

cc:

Deputy Administrator

Associate Deputy Administrator

Associate Administrator

NASA Office of General Counsel

Assistant Administrator for Infrastructure and Administration

Director, Facilities Engineering and Real Property Division

Glenn Chief Counsel

Scope and Methodology

We performed fieldwork at NASA Headquarters, Glenn, and Plum Brook Station from November 2005 through September 2007 in accordance with generally accepted government auditing standards. We reviewed documentation dated from May 1997 through September 2007. Specifically, we reviewed

- NPG 8820.2C, "Facility Project Implementation Handbook," April 28, 1999;
- NPR 8820.2E, "Facility Project Implementation Guide," October 7, 2003;
- NPD 8800.14B, "Policy for Real Property Management," November 1, 2002;
- NPD 1050.1G, "Authority to Enter Into Space Act Agreements," November 21, 2003;
- NASA Advisory Implementing Instructions 1050-1, "Space Act Agreements Manual," November 21, 2003;
- the memorandum of understanding for the airport expansion project and the files for the associated 13 SAAs, dated November 27, 1998, to September 29, 2006;
- NASA Form 1509, "Facility Project-Brief Project Document," executed in May 2002; and
- "Record of Decision for Proposed Replacement Runway, Runway Extension and Associated Development at Cleveland Hopkins International Airport, Cleveland, Ohio," November 8, 2000.

In addition, we reviewed meeting minutes of the Steering Committee, which includes representatives from Glenn and the City, and correspondence between Glenn and the City. We also reviewed quarterly financial reports, cost estimates, and invoices to summarize SAA funding and trace transfers of funds among SAAs. We toured the CCL facility in November 2005 and on May 4, 2007, and discussed its status with Glenn and Plum Brook Station personnel to verify that the CCL was incomplete and nonoperational. We obtained a copy of the "License For The Use Of NASA-Held Real Property by the City of Cleveland, Department of Port Control," executed on August 3, 2004, which granted the City the license to operate the runway prior to the official transfer of land from NASA to the City.

In addition, we interviewed personnel in the

- Glenn Office of Chief Counsel,
- Glenn Resource Analysis and Management Office,
- Glenn Project Management Branch,
- Glenn Technology Transfer and Partnership Office,
- Plum Brook Station Cryogenic Test Complex, and

- NASA Headquarters Office of the General Counsel.

To determine the last time that NASA used the CCL facility to conduct tests, we obtained information from the Glenn Historical Office and the Glenn Facilities Division. We also obtained CCL facility test logs.

Computer-Processed Data

We relied on various types of computer-processed data during the audit. We obtained and analyzed Microsoft Excel spreadsheets and Power Point charts that contained information on funding amounts, cost estimates, and timelines. While we could not determine whether the data was wholly reliable or accurate, we do not believe that discrepancies in the data would have had a material effect on either our findings or conclusions.

Review of Internal Controls

We reviewed internal controls over Glenn's management of SAA 10 for the airport expansion project. We found internal control weaknesses that resulted in Glenn accepting a nonoperational CCL facility, as discussed in this memorandum.

Prior Coverage

During the last 5 years, the Government Accountability Office and the NASA Office of Inspector General have not issued any reports on the management of SAAs at Glenn, except for the memorandum that we issued during the course of this audit, "Final Memorandum on Observations on the Review and Approval of Glenn Research Center's Relocation of the Altitude Combustion Stand Facility" (ML-07-001, November 2, 2006), which is available over the Internet at <http://www.hq.nasa.gov/office/org.hq/audits/reports/FY07/index.html>. The Addendum to that memorandum is also available over the Internet.

Summary of SAAs

Glenn and the City signed a memorandum of understanding on May 30, 1997, under which 13 SAAs were issued.

SAA 1, November 27, 1998, was for preliminary engineering and site studies to relocate facilities and equipment in the South 40.

SAA 2, October 2, 2000, was for the final design of facilities that did not require a preliminary engineering report under SAA 1; specifically, the Central Chemical Storage Facility, the daycare center, the fitness center, the picnic pavilion, miscellaneous support service areas, and the Liquid Hydrogen Transfer Station.

SAA 3, March 1, 2001, was for the preparation of final design packages for preliminary engineering reports completed on the relocation of the

- Small-scale Multi-purpose Research Facility and CCL Cell #7,
- B-Stand,
- Cryogenic Gas Vessels,
- CCL Cells #1 and #2, and
- Propellant Densification Test Site and Proof Pressure Test Cell.

SAA 4, December 18, 2002, was for the transfer of the title for the South 40 from NASA to the City.

SAA 5, January 5, 2002, was for the construction and relocation of two projects: the contractors' "trailer row" and the Liquid Hydrogen Transfer Station.

SAA 6, July 25, 2002, was for the construction and relocation of the daycare center, the fitness center, and a picnic pavilion.

SAA 7, July 25, 2002, was for the construction and relocation of the Small-scale Multi-purpose Research Facility.

SAA 8, November 15, 2002, was for the mitigation of environmental impacts of aircraft flyovers from the new runway.

SAA 9, June 19, 2003, was for the construction and relocation of the Central Chemical Storage Facility and miscellaneous storage areas.

SAA 10, August 20, 2003, was for the construction and relocation from the South 40 to the CCL Complex at Plum Brook Station of CCL Cells #1 and #2 and the Propellant Densification Test Site and Proof Pressure Test Cell.

SAA 11, August 5, 2003, was for site preparation of the South 40 for runway construction; specifically, removal of existing NASA facilities, environmental

remediation, filling existing ravines to runway grade elevation, and Altitude Combustion Stand facility salvage activities.

SAA 12, July 13, 2004, was for the relocation and construction of the Altitude Combustion Stand facility.

SAA 13, September 29, 2006, provided final acceptance by NASA of all facility relocation and construction projects that were agreed to under SAAs 5, 6, 7, 9, 10, and 11 (as modified by SAA 12); closed out the obligations in SAAs 1, 2, 3, and 8; executed a release by NASA to the City from obligations under the SAAs pertaining to the design, relocation, and construction of all facilities and equipment; and modified SAA 12. In addition, SAA 13 provided for the extension of the term of the license agreement for the City to operate the runway until September 30, 2007, in anticipation of the transfer of the South 40 to the City.

Management's Comments

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



August 21, 2007

Reply to Airmail

Facilities Engineering and Real Property Division

TO: Assistant Inspector General for Auditing

FROM: Associate Administrator for Institutions and Management

SUBJECT: Response to Draft Memorandum on Observations on the Review and Approval of the Glenn Research Center's (GRC) Relocation of the Cryogenic Components Laboratory (CCL) Facility (Assignment No. A-06-002-01)

In response to your draft memorandum dated July 31, 2007, entitled "Observations on the Review and Approval of the Glenn Research Center's Relocation of the Cryogenic Components Laboratory Facility," the Office of Infrastructure and Administration, Facilities Engineering and Real Property Division and GRC have reviewed the recommendations and are providing the consolidated agency response herein.

We concur with the Office of the Inspector General (OIG) recommendations as set forth in the subject draft memorandum, and implementation of those recommendations. Clarifications and additional comments are also provided below.

Recommendation 1: GRC Director fully inspect the CCL facility to determine the extent of work needed to complete it and the estimated cost for completion.

Response: Inspection of the CCL facility is already occurring as an integral part of the Research Systems Validation and Acceptance Criteria (RSVAC) check-out process. This process has been under way since June 2006, when the CCL Commissioning project was commenced by NASA. The RSVAC defined for the project is an integrated systems testing process that includes rigorous piping system cleanliness testing, GRC Pressure Systems Office review of the piping systems and documentation, and correction of construction deficiencies in preparation for research testing. Commissioning plans and cost estimates are updated monthly as a regular part of the project management process, so the extent of the work needed to complete the project is assessed frequently and adjusted as conditions warrant. The most recent technical completion summary is reflected in Enclosures 1 and 2.

The construction of the CCL facility was provided by the City of Cleveland's general contractor, and accepted by the City as complete. Although NASA did not agree to accept Substantial Completion of the facility, NASA had previously agreed to accept the responsibility for RSVAC checkout and embarked on the process before the City's contractor departed. Using funding from the Airport Projects, NASA initiated the CCL Commissioning project to bring the facility to operational status and finish the RSVAC testing. In the course of completing the CCL Commissioning project many unanticipated, latent construction defects were uncovered and corrected by NASA. Others are in the correction process, and more may be found as the commissioning and certification process continues.

Recommendation 2: GRC Director prepares and submits a functional requirements statement, in accordance with NASA Procedural Requirements 8820.2E, Facility Project Implementation Guide for any future construction projects. The statement should define the capability, evaluate options to meet the need; and identify the mission, operations, or research and development or institutional tasks requiring the capability.

Revised

Response: GRC has in the past and will in the future fully comply with NASA policy on all facility projects, including the CCL project. A Project Requirements Document (PRD) was prepared for the CCL project in accordance with NASA policy as well as the NASA Form 1509. A copy of the fully executed CCL PRD dated February 2001, has already been provided to the OIG for review; however, it is not among those documents listed as reviewed by the OIG.

As a clarification please note that a functional requirements statement as detailed in NASA Procedural Requirements 8820.2E, Facility Project Implementation Guide applies to Construction of Facilities projects greater than \$500,000 rather than "any future construction project" as stated in Recommendation No. 2. Additionally, the functional requirements statement is not required for submission to NASA Headquarters, but rather has a primary purpose to support the Center's own project approval and decision-making process. Accordingly, the OIG recommendation that the Center Director submit functional requirements statements is not appropriate.

Some additional comments on the findings of the OIG are provided below:

In the Executive Summary section of the OIG report the GRC Chief, Project Management Branch is attributed with a statement that if GRC had known the extent of the work that was incomplete, they would not have granted the City the Certificate of Final Acceptance. We take issue with this statement in two ways: 1) the concept implied in this statement was not considered and has never been the position of the Chief, Project Management Branch, who is the designated NASA Key Official in the Airport Projects Space Act Agreements; and 2) the City's certificates of final acceptance were never signed or endorsed by NASA on any of the Airport Projects, including the CCL project. Space Act Agreement 13 released the City from their responsibility to provide a fully functional facility, not the execution of a final acceptance certificate.

Deleted

The OIG statements regarding the question of the insufficiency of remaining City funding to complete the construction of the CCL facility suggests that some clarification may be needed, as follows:


1. Although the CCL facility was not operational at the time of the Space Act Agreement 13 release, the scope of the CCL project was essentially completed by the City's construction contractor as designed by the City's Architect/Engineer, with the exception of some "punch list" items.

2. The primary work effort since the completion of construction has been to address issues that have developed during the NASA RSVAC and CCL commissioning process as described above. All of the NASA RSVAC and CCL commissioning work has been managed within the balance of City funding.
3. With the exception of environmental remediation, NASA appropriated funds have not been used for the any of the Airport Projects.
4. GRC management has prioritized the remaining City funds for all the Airport Projects, and the remaining amount at this time is approximately \$3.2 Million.
5. The CCL commissioning process has also been prioritized by GRC management to provide the capability to conduct research testing in the CCL facilities most likely to have research customers first and the least likely last (the lowest priority component of the CCL project is the commissioning of Cell #1, the Oxygen capable test cell. At this time, there is no identified testing program for Cell #1.)

One of the concerns identified in the draft report, i.e., that there is no identifiable operational requirement for the facility as a whole, has changed; the CCL facility was recently chosen as the site for the Crew Launch Vehicle, Upper Stage, Purge System and Hazardous Gas Detection System development testing. A Memorandum for Record dated July 24, 2007, documenting this decision is Enclosure 3. Research build-up for development testing in Cell #2 is planned to begin January 2008.

We acknowledge the diligent and thorough collection of the facts relating to the CCL project, and we appreciate the overall accuracy of the observations and the comprehensiveness of the report. With the additional information provided herein, we believe the required corrective actions have been completed, and we request closure of both recommendations 1 and 2.

If you have any questions or wish to discuss this response, please contact James W. Wright, Director, Facilities Engineering and Real Property Division, Office of Infrastructure and Administration or Albert S. Johnson, Acting Deputy, Facilities Engineering and Real Property Division, at 202-358-1090.


 Tom Luedtke
 Associate Administrator for
 Institutions and Management

3 Enclosures

cc:

Assistant Administrator for Infrastructure and Administration/Ms. Dominguez
 Glenn Research Center/Dr. Whitlow

Added

Enclosures
 1 and 2
 omitted

National Aeronautics and
Space Administration
John H. Glenn Research Center
Lewis Field
Cleveland, OH 44135-3191



July 24, 2007

Attn of: ML00

MEMORANDUM FOR THE RECORD

TO: Facility Manager, Cryogenic Components Lab

FROM: Project Manager, Purge and Hazardous Gas Project

SUBJECT: Purge System and Hazardous Gas Detection System Testing

This Memorandum for the Record is to express my intent to accomplish Crew Launch Vehicle (CLV), Upper Stage, Purge System and Hazardous Gas Detection System testing at the Plum Brook Cryogenic Component Lab (CCL) facility. The Purge and Hazardous Gas (HazGas) Detection Systems are being designed by Glenn Research Center to provide the Upper Stage, un-pressurized compartments of the CLV, with a gas purge for thermal conditioning, the prevention of hazardous gas accumulation, and to detect hazardous levels of gases.

Development testing of the systems is planned to begin January 2008, and last approximately six months. The Test Engineer and primary point of contact for the development testing is Mr. Ted Tin. Ted will be working closely with Mr. Bruce Frankenfield, the Purge and HazGas Project Lead Engineer and Mr. Daryl Edwards, providing Project Engineering Support. Regular meetings to discuss and prepare for testing are scheduled for Wednesdays, in Building 86, Room 200E from 9:00 a.m. until 11:00 a.m. through December 2007.

Upon acknowledgement and acceptance of this development testing, I will need a confirmation of facility availability, associated budget requirements, staffing support needs and consumable estimates. I am pleased, on behalf of the Purge and HazGas Project, to submit this intent to test memo and look forward to testing the Purge and Hazardous Gas Systems in your facility.

A handwritten signature in black ink, appearing to read "Carol Tolbert".

Carol Tolbert
PM, Purge and HazGas Project

Enclosure 3