National Aeronautics and Space Administration

Office of Inspector General
Washington, DC 20546-0001

January 27, 2009

TO: Associate Administrator, Exploration Systems Mission Directorate
Chief Engineer

FROM: Assistant Inspector General for Auditing

SUBJECT: Addendum to Final Report on More Stringent Entrance Criteria Needed for Project Life-Cycle Reviews (Report No. IG-09-004; Assignment No. A-07-011-01)

We requested that the Chief Engineer provide additional comments on the subject final report because we did not consider the initial comments responsive to Recommendation 1. We received additional comments on November 25, 2008 (see the Enclosure). Although the comments provided a more comprehensive explanation of the Chief Engineer's position on modifying NASA Procedural Requirements (NPR) 7123.1A, "NASA Systems Engineering Processes and Requirements," March 26, 2007, they did not satisfy the intent of our recommendation. However, we subsequently worked with the Chief Engineer, who proposed a corrective action that adequately addresses our intent and resolves the recommendation. Therefore, the recommendation is resolved but will remain open pending completion of the corrective action.

Recommendation 1

In our draft report, we recommended that the Chief Engineer revise NPR 7123.1A's internal life-cycle review entrance criteria to require the project to update the life-cycle review's technical products with known changes to the technical baseline resulting from engineering analysis cycle assessments.

In its October 10, 2008, response to the draft report, NASA management did not concur with the recommendation and stated that the actual events show that the current policy is effective. We disagreed and requested additional comments on the final report.

The Chief Engineer submitted additional comments on November 25, 2008, stating that he still does not concur with the recommendation to modify NPR 7123.1A. The Chief Engineer stated that he does not believe that the Office of Inspector General understands the purpose of the life-cycle review process in general and the System Definition Review (SDR) in particular. According to the Chief Engineer, the life-cycle review process is intended to provide the Decision Authority with an independent assessment of the maturity and quality of work done and to provide a systems level review and assessment. For the life-cycle reviews prior to the Preliminary Design Review, which are the System

Requirements Review and the SDR, the most important aspects are the top-down flow of requirements and responsive plans and concepts. Further, the Chief Engineer stated that the SDR in particular is meant to inform the Decision Authority of the project's readiness to proceed to the next life-cycle phase.

According to the Chief Engineer, the Orion Project met all of the SDR entrance criteria and seven of the nine success criteria. Prior to the SDR, the Orion Project management informed the Decision Authority that the Project's reference design concept did not meet the mass and power allocation, which was one of the success criteria. Project management proposed a plan to address the gaps (the "Point of Departure" [POD] review) and proceeded with the SDR. The Chief Engineer emphasized that the policy contained in NPR 7123.1A and executed for the Orion Project worked exactly as intended, that is, departures from best practice guidelines were identified, a plan to address the issues was developed, and management was fully informed of the risks and mitigation plans. In addition, the Chief Engineer stated that, "[g]iven that the policy and process achieved their goals, implementing the IG's recommendation would constrain management's prerogative to make an informed decision and achieve no useful purpose."

We disagreed with the Chief Engineer's rationale for not implementing our recommendation. We met with the Chief Engineer on January 6, 2009, to discuss Recommendation 1 and our view that the life-cycle review process could be improved by implementing our recommendation. During that discussion, the Chief Engineer agreed to reevaluate our position. Subsequently, the Chief Engineer offered an alternate plan of action that meets the intent of our recommendation. Specifically, the Chief Engineer agreed to revise NPR 7120.5D, Section 2.5, "Program and Project Reviews," to include a paragraph directing that an assessment be conducted by the Standing Review Board (SRB) Chair and program/project manager to determine the readiness of the program or project to proceed into the life-cycle review. The assessment results will be briefed to the cognizant authorities to include any deviations and significant issues identified and actions recommended to address them. The Decision Authority will determine the proper course of action so that requirement changes since the last life-cycle review and significant issues identified by the SRB Chair/management assessment are addressed prior to the completion of the life-cycle review.

The Chief Engineer's proposed action adequately addresses the issues that led to our recommendation. Specifically, (1) the SRB be involved early in the process and able to provide an independent opinion to the Decision Authority on the program or project's readiness for review, (2) appropriate personnel be made aware of significant issues with regard to the design or design approach and its ability to meet the review objectives, and (3) the Decision Authority will have timely and full knowledge of significant issues prior to beginning the life-cycle review, will document how the review is to proceed, and will determine how those issues will be addressed prior to the completion of the life-cycle review. Therefore, the recommendation is resolved but remains open until we review the revisions to the NPR.

We appreciate the courtesies extended during our audit. If you have any questions, or need additional information, please contact Mr. Ray Tolomeo, Mission Programs and Projects Director, at 202-358-7227.

/signed/
Evelyn R. Klemstine

Enclosure

Management's Additional Comments

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

November 25, 2008

Reply to Attn of: Office of the Chief Engineer

TO: Assistant Inspector General for Auditing

FROM: Chief Engineer

SUBJECT: More Stringent Entrance Criteria Needed for Project Life-Cycle Reviews (Report No. IG-09-004, October 31, 2008)

The following is our followup response to Recommendation 1 of the subject report: *The Chief Engineer should revise NPR 7123.1A's internal life-cycle reviews' entrance criteria to require the project to update the life-cycle review's technical products with known changes to the technical baseline resulting from engineering analysis cycle assessments.*

The Inspector General (IG) believed our original response to this action was non-responsive, and requested the Chief Engineer to reconsider his position and provide additional comments with regard to requiring projects to update the life-cycle review's technical products with known changes to the technical baseline resulting from engineering analysis cycle assessments.

Our response is as follows:

The Chief Engineer still does not concur with the IG recommendation to modify NPR 7123. With all due respect, the IG has failed to understand the purpose of the life cycle review process in general and the System Design Review (SDR) in particular. As explained in detail in previous communications with the IG, the life cycle review process is intended to provide the cognizant Decision Authority with an independent assessment of the maturity and quality of the work done. Life cycle reviews are also meant to provide a systems level review and assessment. For the reviews prior to the Preliminary Design Review, the most important aspects are the top down flow of requirements and responsive plans and concepts. The maturity of the individual detailed products is less important provided the products are good enough to allow the systems level assessment. The SDR in particular is meant to inform the Decision Authority at KDP B of the project's readiness to proceed into Phase B toward the Preliminary Design Review. The Orion Project at its SDR met all of the entrance criterion and fully met 7 of the 9 success criteria. Near the beginning of the SDR review process, the project and the Technical Authorities informed the Agency Management, including the Decision Authority, that the remaining 2 would be only partially met, in particular, that the reference design concept did not meet the mass and power allocations.

A plan was proposed and approved prior to KDP B to address the gaps. It is an important distinction that at the SDR, the reference design concept is NOT a detailed design which will be built but is used as a reference to assess the plans and requirements flow down and as a starting point for evolution of the design as the technical knowledge improves. The reference design concept used to begin the SDR review process met these objectives. The policy contained in NPR 7123 and executed for Orion worked exactly as intended, that is, departures from best practice guidelines were identified, a plan to address the issues was developed and management was fully informed of the risks and mitigation plans. Prior to and at KDP B, management approved proceeding with the overall plan, including the mitigation activities. Given that the policy and process achieved their goals, implementing the IG's recommendation would constrain management's prerogative to make an informed decision and achieve no useful purpose.

If you have any questions about this response, please feel free to contact me.

Michael G. Ryschkewitsch

cc:
Office of Internal Controls and Management Systems/Mr. Roberts