



SEP 29 2003

W

TO: A/Administrator

FROM: W/Inspector General

SUBJECT: Failures in Cost Estimating and Risk Management Weaknesses in Prior Space Launch Initiative; IG-03-023, Final Management Letter

We examined failures in cost estimating and weaknesses in the discontinued Space Launch Initiative, the 2nd Generation Reusable Launch Vehicle Program (the "Program"). While the Agency is taking steps to address the failures and weaknesses going forward, NASA management must be ever mindful of the lessons learned with not only the successor Orbital Space Plane and Next Generation Launch Vehicle programs, but with all of the Agency's major programs.

NASA omitted routine costs from the Program's cost estimate and that the Program lacked an effective continuous risk management process. Specifically, NASA did not include \$2.1 billion in contractor general and administrative costs, contractor fee, funding reserve, and Headquarters and Center assessments for program management support costs in its 1999 cost estimate for the program. Additionally, NASA did not maintain supporting documentation to show how the costs in the estimate had been calculated. These conditions occurred because NASA had not established procedures to require inclusion of the cost elements in the estimate, documentation of the estimate, or validation of the estimate by an independent cost review.

Also, we found several weaknesses in the Program's risk management process. First, the Program Office Risk Management Board had not reviewed about half of the 124 program-level risks to determine whether the risks were valid and to initiate action to research, monitor, accept, or mitigate the risks. The risks were not reviewed because the Program Risk Manager did not present the program risks to the Program Risk Management Board. Second, the two main engine propulsion project offices lacked complete documentation on continuous risk management activities for program-level risks managed internally by NASA SLI officials. The project offices explained that these actions were not taken because neither the project offices nor SLI management used the database to manage risks. Third, the Ground Operations Project Office did not track program-level risks as required because the project office was unaware that it was responsible for those risks. Finally, the Program risk management database, the primary

tool used to identify, plan, and track NASA risks, was not consistently used or maintained by program and project personnel and, therefore, was not reliable for managing risks. SLI management did not require its use because the database had several deficiencies that limited how effectively it could be used as a tool to manage risks.

The Deputy Chief Financial Officer for Resources (Comptroller) and the Chief Engineer have been working on jointly established procedures to improve cost estimates. Process improvements are being documented in the drafts of NPG 7120.5C and the NASA Cost Estimating Handbook. In addition, the Associate Administrator for Aerospace Technology stated that the Orbital Space Plane and the Next Generation Launch Technology Programs are implementing continuous risk management processes compliant with NPG 8000.4. Both Programs have selected new risk management database software that does not have the deficiencies of the former software. Management is taking steps to ensure that all Program employees have access and use the software.

Management's planned or implemented actions are responsive to the recommendations. However, we asked management to provide additional comments identifying specific corrective actions planned or taken and estimated completion dates for those that were not provided in the response.

My Assistant Inspector General for Auditing has been authorized to release this as a final management letter of the Office of Inspector General. If you have any questions concerning the report, please contact me at 358-1220.



Robert W. Cobb

Enclosure

Management Letter on Failures in Cost Estimating and Risk Management Weaknesses in the Prior Space Launch Initiative

National Aeronautics and
Space Administration

Office of the Inspector General
Washington, DC 20546-0001



SEP 29 2003

Reply to Attn of: W

TO: AE/Chief Engineer
B/Deputy Chief Financial Officer for Resources (Comptroller)
R/Acting Associate Administrator for Aerospace Technology
MSFC/DA01/Director, Marshall Space Flight Center

FROM: W/Assistant Inspector General for Auditing

SUBJECT: Final Management Letter on Failures in Cost Estimating and Risk
Management Weaknesses in Prior Space Launch Initiative
Assignment Numbers A-01-049-01 and A-01-049-02
Report Number IG-03-023

NASA restructured the Space Launch Initiative (SLI) in November 2002, replacing the 2nd Generation Reusable Launch Vehicle (RLV) Program with the Orbital Space Plane (OSP) and the Next Generation Launch Technology (NGLT) Programs. Although the 2nd Generation RLV Program was terminated during our audit, we are issuing this letter to relate cost estimating and risk management conditions we found prior to the restructure. The Agency should ensure that these conditions are corrected as NASA formulates the two new programs.

We conducted this audit to evaluate planning and management of the SLI, which formerly consisted of the 2nd Generation RLV Program (Enclosure 1 contains details on our scope and methodology). At an estimated cost of \$4.85 billion for program formulation (through fiscal year 2006), the 2nd Generation RLV Program represented a substantial investment toward replacing the Space Shuttle. We considered the SLI a high-risk program because of its high value and because it followed a series of similar advanced technology programs that were unsuccessful.

1999 SLI Cost Estimate Did Not Include All Costs

NASA did not include contractor general and administrative costs, contractor fee, funding reserve, and Headquarters and Center assessments for program management support costs in its cost estimate for program formulation which would have resulted in an additional \$2.1 billion in costs. The cost estimate, prepared in 1999 to support NASA's fiscal year (FY) 2001 budget request, was not subsequently updated to include the omitted cost elements. As the Lead Center for Space Transportation, the Marshall

Space Flight Center led the effort to prepare the estimate. Additionally, NASA did not maintain supporting documentation to show how the costs in the estimate had been calculated. These conditions occurred because NASA had not established procedures to require inclusion of the cost elements in the estimate, documentation of the estimate, or validation of the estimate by an independent cost review. Consequently, NASA had to allocate portions of the total approved program funding for these costs, thereby reducing program content. In particular, program officials had determined in FY 2002 that funding was sufficient to pursue only one of the two planned competing architectures to the preliminary design review scheduled for FY 2006. Had NASA continued the 2nd Generation RLV Program, the early elimination of competing architectures would have diminished the Program's ability to successfully develop the technology needed to replace the Space Shuttle.

The Agency has recently initiated improvements to address weaknesses in its cost estimating process for programs and projects previously identified by the General Accounting Office and the NASA Office of Inspector General. The improvements include reestablishing an independent cost estimating capability in the Office of the Chief Financial Officer, authorizing additional positions at Headquarters and the Centers to improve the capability to perform program analysis and budget development, and preparing a cost-estimating handbook. However, the improvements do not address the specific conditions cited in this letter.

Recommendations, Management Response, and Evaluation of Management Response

Recommendation 1

The NASA Deputy Chief Financial Officer for Resources (Comptroller) and the NASA Chief Engineer should jointly establish procedures to identify the cost elements to be included in program and project cost and budget estimates, to document the estimates, and to ensure that the estimates are validated by an independent cost review.

Management Response. Concur. Management stated that significant improvements to the Agency's cost estimating process have already been initiated. The Chief Financial Officer and the Chief Engineer's Office are jointly establishing procedures to improve cost estimates in order to correct the deficiencies that occurred in the SLI Program. These procedures are documented in the drafts of NPG 7120.5C and the NASA Cost Estimating Handbook that have an estimated completion date of September 30, 2003. Improved cost estimates is also being addressed by the Agency's Full Cost Initiative and the Integrated Financial Management Program. The complete text of management's response is in Enclosure 3.

Evaluation of Management Response. Management corrective actions are responsive to the recommendation. The recommendation is resolved but will remain undispositioned and open until agreed-to corrective actions are completed.

Recommendation 2

The Associate Administrator for Aerospace Technology, pending the establishment of procedures, should coordinate with the NASA Deputy Chief Financial Officer for Resources (Comptroller) and the NASA Chief Engineer to ensure that cost and budget estimates for new programs include all applicable cost elements, that support for the estimates is documented, and that the estimates are independently validated.

Management Response. Concur. Management stated that the Associate Administrator for Aerospace Technology will coordinate with the NASA Deputy CFO and the NASA Chief Engineer to ensure that all programs have accurate and fully documented budget estimates. In addition, independent reviews will be performed to validate these cost estimates.

Evaluation of Management Response. Management corrective actions, to the extent identified, are responsive to the recommendation. However, the intent of this recommendation is for the Enterprise to take necessary corrective actions, in coordination with the NASA CFO and Chief Engineer, to ensure cost estimates for new Enterprise programs, such as OSP and NGLT, do not have the deficiencies of the SLI cost estimate, but include all known costs, are properly documented, and are independently validated. Management did not comment on the specific corrective actions taken or planned on the cost estimates for these or other new Enterprise programs. Therefore, we request management provide additional comments, within 30 days of this report, identifying the specific corrective actions taken or planned to ensure validity of cost estimates for other Enterprise programs, including OSP and NGLT, as well as the estimated completion date for such corrective actions. The recommendation is resolved but will remain undispositioned and open until agreed-to corrective actions are completed.

Risk Management Weaknesses

The 2nd Generation RLV Program Office had not effectively implemented a continuous risk management process. NASA Procedures and Guidelines (NPG) 8000.4, "Risk Management Procedures and Guidelines," defines continuous risk management as a systematic decision-making process that efficiently identifies, analyzes, plans, tracks, controls, communicates, and documents risks. Risks are the combination of the probability that a program or project will experience an undesired event and the consequences, impact, or severity of the undesired event, were it to occur. Also, risks can occur at the program, project, or task level. Examples of risks include cost overruns, schedule slippages, safety mishaps, health problems, malicious activities, environmental impacts, and failures to achieve a needed scientific or technological breakthrough. Continuous risk management is essential to sound management and vital to safety and mission success.

We found several weaknesses in the Program's risk management process. First, the Program Office Risk Management Board had not reviewed about half of the 124 program-level risks to determine whether the risks were valid and to initiate action to research, monitor, accept, or mitigate the risks. Some risks that were significant threats

to the Program included inadequate budget, insufficient personnel/staffing, and failure to successfully develop required technology in main engines and thermal protection systems. Second, the two main engine propulsion project offices lacked complete documentation on continuous risk management activities for program-level risks managed internally by NASA SLI officials. Third, the Ground Operations Project Office did not track program-level risks as required. Finally, the Program risk management database, the primary tool used to identify, plan, and track NASA risks, was not consistently used or maintained by program and project personnel and, therefore, was not reliable for managing risks. Enclosure 2 contains details on these weaknesses.

In response to our audit and the Program's self-evaluation, the Program began updating its risk management process and planned to select new risk database software. Additional improvements are needed to ensure that the Orbital Space Plane and the Next Generation Launch Technology Programs have an effective risk management process.

Recommendations, Management Response, and Evaluation of Management Response

The Associate Administrator for Aerospace Technology should ensure that the Orbital Space Plane and the Next Generation Launch Technology Programs:

Recommendation 3. Implement a continuous risk management process as required by NPG 8000.4, including reviewing risks in a timely manner and properly documenting risk management activities.

Management Response. Concur. The OSP and NGLT Programs are implementing continuous risk management processes compliant with NPG 8000.4. An estimated completion date for both final risk management plans is October 31, 2003. The NGLT Program is operating under the Advanced Space Transportation Program (ASTP) risk management system in the interim.

Evaluation of Management Response. Management corrective actions are responsive to the recommendation. The recommendation is resolved but will remain undispositioned and open until agreed-to corrective actions are completed.

Recommendation 4. Select risk management database software that does not have the limitations of the current database and require all program and project personnel to use the database.

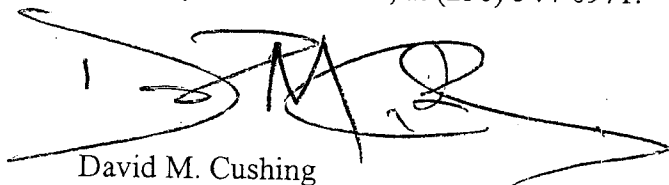
Management Response. Concur. The OSP Program has selected the database currently utilized by the ISS Program (ISS Risk Management Application) to meet the requirements of the OSP Program, as well as allow seamless integration of OSP risks into the ISS Program. We will ensure that all Program employees have access to the software and the Program Office will send a letter to all these employees conveying the need to use the software.

The NGLT Program requires that the Program and all projects use the Space Transportation Information Network (STIN) risk management database to specify, track, status and display planning of any risks elevated to the Program Level. The STIN database has proven capability and does not have the limitations of the software that was used by the 2nd Generation RLV Program. The complete text of management's response is in Enclosure 3.

Evaluation of Management Response. Management corrective actions taken and planned are responsive to the recommendation. However, we request management provide additional comments, within 30 days of this report, to include an estimated completion date for the agreed-to corrective actions on the OSP Program and to identify the NGLT document that requires use of the STIN risk management database. The recommendation is resolved but will remain undispositioned and open until agreed-to corrective actions are completed.

Management's response also included general comments and additional comments on the risk finding. We address those comments in Enclosure 4.

Please provide us additional written comments on the recommendations no later than October 22, 2003. We appreciate the courtesies and cooperation provided the auditors during the audit. If you have questions, or would like to discuss this matter further, please contact Mr. Dennis Coldren, Associate Director, Strategic Enterprises Directorate, at (281) 483-0730, or Ms. Clara Seger, Project Manager, at (321) 867-4715; or Mr. Jim Linville, Senior Auditor, at (256) 544-0971.



David M. Cushing

4 Enclosures

cc:

ADT/Associate Deputy Administrator for Technical Programs
B/Deputy Chief Financial Officer for Financial Management
BF/Director, Financial Management Division
G/General Counsel
Q/Associate Administrator for Safety and Mission Assurance
JM/Director, Management Assessment Division

Scope and Methodology

We performed audit fieldwork at NASA Headquarters, Marshall Space Flight Center, Kennedy Space Center, and Johnson Space Center from January to November 2002. To determine whether the SLI budget estimate and funding were adequate, we reviewed documentation on the budget estimate for completeness and accuracy and traced amounts to other budget documents. We discussed the procedures for preparing the estimate with Program and NASA financial management officials.

To determine whether the Program's risk management process was effective, we reviewed NASA and Program guidance for continuous risk management. We then discussed implemented procedures with the Program Manager and project managers at the various Centers. We reviewed the SLI Program Risk Management Plan and the risk management plans for the six highest value contracts. Our risk review focused on those risks managed internally by NASA SLI Program and project officials, rather than risks managed by NASA contractors. We accessed the risk management database and selected a judgmental sample of risks for detailed review. We discussed risk management activities with the respective managers and reviewed supporting documentation. We performed the audit in accordance with generally accepted government auditing standards.

Details on Risk Management Weaknesses

Risks Not Reviewed. As of August 2002, according to the risk management database, the SLI Program Office had not reviewed 58 (47 percent) of the 124 program-level risks that project offices had entered into the database. Thirty-five (60 percent) of the 58 risks were classified as high risks and had been awaiting review for about 10 months or longer. The Program Risk Management Board, chaired by the Program Manager, is responsible for reviewing program-level risks to determine whether they are valid and to initiate appropriate action. The risks were not reviewed because the Program Risk Manager did not present the program risks to the Program Risk Management Board. The Risk Manager explained that he did not present the risks because funds were not available to pay for all mitigation projects and the risk management process was being realigned.

Risks Not Recorded and Documentation Not Prepared. Two of four propulsion project offices had not recorded risks managed internally by NASA SLI project officials in the Program risk database. Project officials also had not prepared adequate documentation to show how these risks were classified, what had been done to manage these risks, whether the planned approaches for managing these risks were effective, and what future activities were needed to control the risks. The project offices explained that these actions were not taken because neither the project offices nor SLI management used the database to manage risks. Further, the Ground Operations Project had not tracked the status of program-level risks because the project office was unaware that it was responsible for those risks.

Risk Management Database Not Used. Not all projects used the risk management database because SLI management did not require its use. Additionally, not all Program and project personnel could access the database software, *FileMaker Pro*, through the Internet. Further, the database had several deficiencies that limited how effectively it could be used as a tool to manage risks. For example, the software could not provide a comparison of planned and actual completion of mitigation steps and did not contain data fields to show the dates when risks and mitigation plans were approved. The 2nd Generation RLV Program Risk Management Plan required that (1) the Program Office develop, maintain, and update a risk management database that would be used by the Program Office and all projects to identify, plan, and track risks and that (2) all risk information be documented in the database and be accessible to all program and project personnel.

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



July 18, 2003

Reply to Attn of: RS

TO: W/Assistant Administrator Inspector General for Audits

FROM: R/Acting Associate Administrator for Office of Aerospace Technology

SUBJECT: Final Response to the IG Draft Management Letter on Space Launch Initiative: Insufficient Funding and Risk Management Weaknesses in the 2nd Generation Reusable Launch Vehicle Program – Assignment Numbers A-01-049-01 and A-01-049-02

The following is the coordinated final response to the subject draft letter as indicated in the subject title. This letter includes recommendations affecting the NASA Deputy Chief Financial Officer for Resources (Comptroller), the NASA Chief Engineer, the MSFC SLI program office and the Office of Aerospace Technology. All answers have been coordinated with these respective offices and dates have been provided for closing recommendations when possible.

The management letter, as you will note in the response (Enclosure 1), implies that risk management was not being performed by two engine projects because they did not enter their data into the central database. In fact, multiple documents were provided to the audit staff to demonstrate that these projects reported on all their risk management areas on a monthly basis, at quarterly reviews and at daily tag up meetings. Liens and threats documents were presented on a monthly basis to the management team; these were also provided to the auditors. Accordingly, we would ask that relevant sentences identified in the attached response, be removed from the final letter.

If you have any questions pertaining to this draft response, please call Sue Humphrey 202-358-1177.

Lebacqz 7/18/03

Dr. J. Victor Lebacqz

Enclosure

See Enclosure 4
OIG Comment 2

Enclosure 3

cc:
HQ/W/Dana Mellerio
HQ/R/Row Rogacki
HQ/RS/Sue Humphrey

**Office Of Aerospace Technology Response to the Draft Management Letter on
Space Launch Initiative: Insufficient Funding and Risk Management Weaknesses in
the 2nd Generation Reusable Launch Vehicle Program
Assignment Numbers A-01-049-01 and A-01-049-02**

General Comments: During the introduction paragraph, the report stated the SLI program was referred to as a "high-risk" program because it followed a series of unsuccessful programs. The probability of success for the SLI (now OSP) was/is not directly dependant upon the programs / projects referenced. The issues surrounding the technical challenges associated with X33 and X34 have been documented in other reports.

See Enclosure 4
OIG Comment 1

Cost Estimate: We do not dispute that key elements (G&A, fee, reserves and certain other supports costs) were not included in the original estimate and that an independent cost estimate was not performed.

Risk Management: The letter's discussion of the risk management processes of the propulsion projects states that the two main engine project offices lacked complete documentation on continuous risk management, and refers to Enclosure 2 for details. Enclosure 2 of the report states: "Two of the four propulsion project offices had not recorded risks in the risk database and had not prepared documentation to show how risks were classified, what had been done to manage the risks, whether the planned approaches for managing risks were effective, and what future activities were needed to control risks. The project offices explained that the actions were not taken because neither the project offices nor the SLI management used the database to manage risk." It is true that the data was not placed in the SLI risk management database. However, the implication that risk management was not performed by the projects is incorrect (the "actions were not taken" statement shown above in context with the first sentence of the quote "...had not prepared..." implies that no risk management was performed). Continuous risk management was performed by each of the engine projects; however, the data were not placed in the program risk database due to timeliness of and weaknesses in the database software. Risks and their respective mitigation plans/efforts were presented to the management team during other forums including monthly reviews, quarterly reviews, and daily tag-up meetings. Risks were also captured in the "Liens/Threats" presented on a monthly basis to the management team.

See Enclosure 4
OIG Comment 2

At the time the engine projects were initiated, the program database had significant weaknesses and did not satisfy the project risk management needs. The projects initiated continuous risk management at contract ATP. The engine projects proactively implemented continuous risk management and used it as a management tool over the life of the projects. Each of the propulsion projects developed risk management approaches that provided the data necessary to manage the project. In the case of the engine projects, these approaches took advantage of existing contractor systems to minimize cost while maximizing the continuous risk management effectiveness. Risk management data were developed and maintained in project databases and actions were taken to satisfy the

See Enclosure 4
OIG Comment 2

requirement for project continuous risk management. As the SLI database became more functional over the life of the program, the engine projects did not place the risk management data into the SLI database because there was no reasonable method for getting the project risk management data into the SLI system short of repeating the data from the project database by manual entry of copious amounts of data. Had the projects manually entered the existing data, maintenance of the database would have required continuous manual entry of significant amounts of data that existed in the project system.

MSFC determined that manual transfer of the risk data added no value since the project managers had implemented existing contractor systems for managing both technical and programmatic risks. Manual entry of the data into the SLI database would have only served to populate a database not used by the project (or the program) and was not in the best interest of the Government. Risk management status and issues were provided monthly to the program through the established reporting system. In conclusion, the report should not imply that the projects were delinquent in application of continuous risk management. Accordingly, it is recommended that the implication of no risk management by the engine projects be removed from the report by restructuring the two sentences cited.

The SLI management team was cognizant of the problems with the risk management process in place under the original 2nd Generation RLV program and recognized the importance of having an integrated risk management process before the OIG began this phase of their audit. Prior to the restructuring of the SLI into today's current organization, the team had initiated the transformation to an integrated risk management structure. The approach was to develop an integrated risk management process based upon a proven system. The ISS Risk Management Application (IRMA) was selected and will be tailored to the needs of the OSP.

RECOMMENDATION 1

The NASA Deputy Chief Financial Officer for Resources (Comptroller) and the NASA Chief Engineer should jointly establish procedures to identify the cost elements to be included in program and project cost and budget estimates, to document the estimates, and to ensure that the estimates are validated by an independent cost review.

Concur:

NASA has already initiated significant improvements to the Agency's cost estimating process. The NASA Cost Estimating Division within the Office of the CFO is the focal point for these initiatives. The process improvements are being documented in the ongoing drafting of NPG 7120.5C and the NASA Cost Estimating Handbook (CEH). The CEH and 7120.5C are addressing the IG issues by instructing the NASA cost estimating community that future estimates should include all expected costs of the sort that were omitted from the SLI estimates. These documents have an estimated

completion date of September 30, 2003. This is also being addressed by the Agency's Full Cost Initiative and the attendant Integrated Financial Management Program (IFMP).

The CFO and the Chief Engineer's Office are jointly establishing procedures to address these issues and are both involved in the 7120.5C improvements and in the Agency's independent evaluation process of projects and programs. Deficiencies as experienced in the SLI program will be corrected in future cost estimates.

RECOMMENDATION 2

The Associate Administrator for Aerospace Technology, pending the establishment of procedures, should coordinate with the NASA Deputy Chief Financial Officer for Resources (Comptroller) and the NASA Chief Engineer to ensure that cost and budget estimates for new programs include all applicable cost elements, that support for the estimates is documented, and that the estimates are independently validated.

Concur:

The Associate Administrator for Aerospace Technology will coordinate with the NASA Deputy CFO and the NASA Chief Engineer to ensure that all programs and projects will have accurate budget estimates that incorporate all elements of the program, that all estimates will be fully documented and independent reviews will be performed to validate these cost estimates.

RECOMMENDATION 3

Implement a continuous risk management process as required by NPG 8000.4, including reviewing risks in a timely manner and properly documenting risk management activities.

Concur:

The OSP and NGLT Programs are implementing continuous risk management processes compliant with NPG 8000. An estimated completion date for the both final risk management plans is October 31, 2003. The NGLT program is operating under the Advanced Space Transportation Program (ASTP) risk management system in the interim.

RECOMMENDATION 4

Select risk management database software that does not have the limitations of the current database and require all program and project personnel to use the database.

Concur:

The OSP Program did a survey of existing CRM databases and selected the database currently utilized by the ISS Program as the one which would meet the requirements of the OSP Program, as well as allow seamless integration of OSP risks into the ISS Program. We will ensure that all program employees have access to the software and the program office will send a letter to all these employees conveying the need to use the software.

The NGLT program requires that the program and all projects use the Space Transportation information Network (STIN) risk management database to specify, track, status and display planning of any risks elevated to the Program Level. The STIN database does not have the limitations of the software that was used by the 2nd Generation RLV program, and has proven capability. STIN was used by ASTP prior to the formulation of the NGLT program.

Projects may use STIN for day-to-day project risk management. At the discretion of the project, external databases may also be used for day-to-day risk management. Projects using external databases and associated processes for risk management, must ensure compliance with NPG 8000.4 and NPG 7120.5

OIG Response to Selected Management Comments

Management's response (see Enclosure 3) included general comments on the SLI Program and specific comments relative to the risk finding in the OIG draft management letter. Our evaluation of these comments follows.

Management's Comments. The report stated that the SLI was referred to as a "high-risk" program because it followed a series of unsuccessful programs. The probability of success for the SLI (now OSP) was/is not directly dependent upon the programs/projects referenced.

1. OIG Comments. We considered the SLI a high-risk program because of its high value and because, similar to the X-33 and X-34 Programs, it included development of advanced technologies. The cancellations of those programs as well as the recent restructure of SLI support our evaluation of the programs as high-risk. However, we agree that the probability of success for the SLI was not directly dependent upon the risk on the X-33 and X-34 Programs. We revised the first paragraph of the final management letter to clarify our position.

Management's Comments. Management included comments in the response cover letter and enclosure regarding the implication that risk management was not performed by the two engine projects. Management cited two sentences in Enclosure 2, Details on Risk Management Weaknesses, that they perceive imply no risk management was performed by the two projects because they did not enter their data into the central database. Management stated that while it is true that the data was not placed in the SLI risk management database, the implication that risk management was not performed by the projects is incorrect. Management explained that risks and their respective mitigation plans/efforts were presented to the management team during forums including monthly and quarterly reviews and daily tag-up meetings. Management further explained that, because of the weaknesses in the database software, the projects took advantage of existing contractor systems to minimize cost while maximizing the continuous risk management effectiveness. Management recommended that the implication of no risk management by the engine projects be removed from the report by restructuring the two sentences cited.

2. OIG Comments. NPG 8000.4 states that risk management is an organized, systematic decision-making process that efficiently identifies, analyzes, plans (for the handling of risks), tracks, controls, communicates, and documents risk to increase the likelihood of achieving program/project goals. We did not intend to imply that no continuous risk management activities were performed, but rather to convey that the specific actions discussed, recording and documenting disposition of those risks managed internally by NASA officials, were not effectively performed by the two projects. These actions constitute an important part of the continuous risk management process. Further, we are aware that the two propulsion project offices had contractor supported continuous risk management processes in place and were performing certain continuous

risk management activities. However, it should be recognized that the contractors' risk management support is only one part of the projects' overall risk management process and addresses contractor managed risks, not NASA managed risks. We added language in Enclosure 1, Scope and Methodology, and Enclosure 2, Details on Risk Management Weaknesses, clarifying that our focus and the discussion on risk management relates to NASA internally managed risks.