



**Office of Inspector General**  
Washington, DC 20546-0001

**JAN 09 2007**

**TO:** Manager, Space Shuttle Program

**FROM:** Assistant Inspector General for Auditing

**SUBJECT:** Final Memorandum on the Review of T-0 Access Stair Trucks Located at Dryden Flight Research Center (Report No. ML-07-004; Assignment No. S-07-003-00)

The Office of Inspector General (OIG) has completed a review of allegations made concerning the T-0 Access Stair Trucks located at Dryden Flight Research Center (Dryden). The review was initiated in response to a March 23, 2006, hotline complaint. (See Enclosure 1 for details on the review's scope and methodology.)

The complainant alleged that United Space Alliance (USA) management pressured its employees and NASA personnel into changing the results of a risk assessment performed on the T-0 Access Stair Trucks to avoid the cost of replacing those trucks. According to the complainant, the stair trucks had deteriorated to the point that they could cause serious injury to ground support personnel and damage to a Space Shuttle orbiter. In response to the complaint, we evaluated the following five allegations:

1. The stair trucks were not properly maintained.
2. Due to the age and design of the stair trucks, they are inherently unstable and could fall into or strike an orbiter, causing injury to personnel and damage to the orbiter.
3. USA management pressured the risk assessment team into lowering its risk assessment scores for the stair trucks in order to cover up a high operating risk.
4. USA management removed data from the risk assessment and ordered the assessment destroyed and removed from the Ground Operations Safety, Quality, and Mission Assurance (SQ&MA) Web site.
5. USA management based its decision not to purchase new stair trucks solely on cost, without considering the safety of personnel or the orbiter.

### ***Executive Summary***

Of the five allegations, we partially substantiated one allegation and found the remaining four to be unsubstantiated. Specifically, as to the four unsubstantiated allegations, we found that the stair trucks received proper maintenance, that they were not inherently unsafe, that there was no pressuring of the risk assessment team to lower its risk

assessment scores, and that decisions were not based solely on cost. For the one allegation that we partially substantiated (Allegation 4), we determined that USA management removed from the stair truck risk assessment the recommendation that NASA procure new stair trucks for Dryden. USA management stated that the recommendation was removed because a risk assessment is a risk management tool, often used, as in this case, to support or reject a proposed action. We agree with that rationale. However, a signed document is a record of what the signatories endorsed and USA personnel should not have revised the document without evidencing the fact of the revision and whether the revision was consented to by the signatories. Because the signatories were ultimately notified of the revision and because the customer of the document, the Engineering Review Board (ERB),\* was made fully aware of the respective positions of all concerned, we found no evidence of fraud in the revision of the document. Regardless, USA management should have allowed the risk assessment team sufficient time to review and comment on the revision and its effect on the overall risk assessment prior to making the revision and disseminating the risk assessment.

We recommended that the Space Shuttle Program (SSP) Manager verify that USA implements procedures to ensure that employees and managers are prohibited from altering any signed document without ratification by all signatories. Management's comments on a draft of this memorandum (see Enclosure 2) are responsive and the recommendation is closed.

### ***Background***

A stair truck is a movable set of stairs, often mounted on a vehicle, that is routinely used in commercial aviation to allow passengers and crew to enter and exit an aircraft. The SSP uses stair trucks to permit ground support access to the orbiter during de-servicing operations. The SSP's T-0 Access Stair Trucks are located at Dryden and the Kennedy Space Center (Kennedy), which are the two primary landing sites for the orbiter.

In December 2005, the SSP ERB initiated a Ground Operations Risk Assessment (GORA) in support of funding discussions to procure new Dryden T-0 Access Stair Trucks. According to the USA Internal Operating Procedure (IOP) IOP-0354500-038, "Procedure for Performing Risk Assessments (RA)," November 28, 2005, a GORA is a "high-level risk assessment that analyzes the impact of applicable risks associated with completing a specified task or project and is generally used to compare two or more methods of accomplishing the task or process." For the Dryden stair trucks, the GORA was conducted to identify and prioritize the risks associated with the use of the trucks through the end of the SSP. The results of the risk assessment were used by the ERB as a factor in deciding whether or not to replace the trucks.

### ***Allegations***

***Allegation 1: The stair trucks were not properly maintained. Unsubstantiated.***

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\* The ERB addresses and makes decisions concerning informal, formal, and risk review activities and functions associated with Shuttle Ground Operations.

Dryden stair truck maintenance and inspection records demonstrated the existence of a viable maintenance program. The records indicated that maintenance, non-destructive inspections, and life-cycle testing were routinely scheduled and performed. In addition, the maintenance and inspection checklists were signed by the technician who performed the work, stamped by an inspector, and approved by the site manager and contracting officer's technical representative. We found no indication that the maintenance was not performed as scheduled.

***Allegation 2: Due to the age and design of the stair trucks, they are inherently unstable and could fall into or strike an orbiter, causing injury to personnel and damage to the orbiter. Unsubstantiated.***

The Dryden stair trucks are approximately 28 years old (1978, Ford, Model F-350) and are designed with a high center of gravity that could be unstable in certain situations. Instability could occur if the trucks were driven with the stairs extended, the outriggers were improperly deployed or retracted, the truck loads exceeded weight limits, or the trucks were operated during periods of high wind or severe weather. A driver's unfamiliarity with the vehicle controls, coupled with an unanticipated horizontal movement, could result in injury to personnel or damage to the orbiter. We found that the engineering and procedural controls in place were commensurate with the recognized risks of orbiter servicing operations, with one exception. That exception was operator training—specifically, ground operations personnel were trained only on the Kennedy stair trucks. The Kennedy stair trucks are newer and of a different make and model (2000, International, Model 4700). In addition, the outriggers do not deploy and retract angularly, as do the Dryden trucks, but operate vertically in a telescopic motion. This functional difference is an improvement over the Dryden trucks in that it provides greater stability by minimizing horizontal movement. Since the Dryden truck outriggers deploy at an angle and do not strike the ground uniformly, the possibility exists that the truck could be pulled away from, or pushed toward, the orbiter. Training specific to operating the Dryden trucks would decrease the risk of ground operations causing damage to the orbiter.

During our review, NASA and USA took corrective action to enhance the training on the Dryden stair trucks. An initial training course was held at Dryden on May 17, 2006, to train the stair truck operators, and USA revised its "On the Job Training Standard (OJTS)," "T/O Staircase Vehicles" (CN 193, ORB 5004 LSK, Rev: D), September 19, 2006, and the accompanying checklist, "TR193 T-0 Access Vehicle," April 24, 2006, to reflect the differences between the Kennedy and Dryden stair trucks.

***Allegation 3: USA management pressured the risk assessment team into lowering its risk assessment scores for the stair trucks in order to cover up a high operating risk. Unsubstantiated.***

We interviewed the GORA team members, who stated that the initial risk assessment scores were changed, but not as a result of pressure from USA management. According to a risk assessment team member, subsequent to the submission of the initial risk assessment, USA management requested that the assessment team provide better

documentation and clearer rationale for some of the risk scores. The GORA team prepared a revised assessment that contained lower risk assessment scores than the initial assessment. Because USA is responsible for the risk assessment process, we believe that USA management acted appropriately and within its authority by requesting additional failure-mode criteria and supporting analysis in accordance with IOP-0354500-038.

***Allegation 4:** USA management removed data from the risk assessment and ordered the assessment destroyed and removed from the Ground Operations Safety, Quality, and Mission Assurance (SQ&MA) Web site. **Partially Substantiated.***

The initial risk assessment containing the higher risk score was signed by the GORA team on January 18, 2006. The revised assessment containing the lower risk score was signed on March 1, 2006. That revised assessment also contained a GORA team recommendation to procure new stair trucks at Dryden. USA management notified the GORA team on March 14, 2006, by e-mail, that the recommendation to procure new stair trucks had been removed from the March 1, 2006, assessment. USA management stated that the recommendation was removed because a risk assessment is a risk management tool, used to support or reject a business case.

In response to the March 14, 2006, e-mail, five of the GORA team members sent e-mails to USA management objecting to the removal of the recommendation. One of the team members stated that the risk assessment results, in part, were based on the recommendation being included in the assessment. In addition, one team member specifically objected to USA changing the document after the signatures were affixed. USA responded to these concerns in a subsequent e-mail, stating that additional signatures were not being requested because the removal of the recommendation did not affect the risk score. However, that subsequent e-mail requested that the signatories concur or nonconcur with the removal of the recommendation and include a rationale for any nonconurrence. The GORA team presented its concerns and recommendation during the March 15, 2006, ERB meeting.

We believe that USA should not have removed the risk assessment team's recommendation without prior approval from the GORA team members. A signature indicates the signer's endorsement or approval of the information contained in a document. Any subsequent changes to that document should be approved by all signatories.

USA management subsequently requested concurrence with the revision and did not attempt to hinder discussion of the revision at the ERB meeting. However, the alteration of final, executed, documents, regardless of intent, is not a good business practice and can create a distrust of management and their actions. To prevent such a situation from recurring, NASA should take steps to ensure that USA implements procedures to ensure that revisions are not made to signed documents without ratification by the signatories.

Regarding the destruction and removal of the initial risk assessment, we found no evidence to suggest that the initial assessment was destroyed, as we were able to obtain all iterations of the assessment. The initial risk assessment was removed from the

SQ&MA Web site in compliance with SQ&MA procedures, which state that only the finalized risk assessment should be posted on the Web site. According to USA, those procedures will be revised to require that a change history for all risk assessments be posted on the SQ&MA Web site.

***Allegation 5:*** *USA management based its decision not to purchase new stair trucks solely on cost, without considering the safety of personnel or the orbiter.*  
***Unsubstantiated.***

The decision not to procure new trucks was made by the ERB after considering the risk assessment and the results of operational testing on the stair trucks. The testing was conducted May 17, 2006, in response to a GORA team member's concerns over the potential for horizontal movement prior to and during outrigger deployment. The test team concluded that any horizontal movement was insignificant and did not pose an impact danger to the orbiter. The results of the testing were presented to the ERB, which decided that the Dryden trucks would continue to be used. Because the Shuttle Landing Site at Edwards Air Force Base (Dryden is located within the confines of the Air Force Base) is only used if the Kennedy landing site is untenable, it is highly probable that these stair trucks will see limited use through the 2010 end date for the SSP.

### ***Recommendation, Management's Response, and Evaluation of Management's Response***

**Recommendation.** The Space Shuttle Program Manager should verify that USA implements procedures to ensure that employees and managers are prohibited from altering any signed document without ratification by all signatories.

**Management's Response.** The SSP Manager concurred, stating that USA would revise its Ethics and Business Conduct Policy by incorporating the following wording in "USA Functional Policy and Procedure C-01-01, Rev. 8, Ethics and Business Conduct, Section h, Product Integrity":

Management is obligated and accountable for maintaining the integrity of, and managing company business processes. When individual employees or groups/teams adhere to the scope of an assigned task, the signed document and/or produced product shall not be altered without ratification by all signatories.

The SSP Manager also stated that NASA would continue to monitor USA's performance to ensure that the policy and procedure is implemented. If any negative performance is noted, it will be appropriately judged during the award fee evaluation.

**Evaluation of Management's Response.** We consider the SSP Manager's comments to be responsive. On December 18, 2006, USA revised its policy to comply with NASA direction. As a result, we consider this recommendation to be closed.

We appreciate the courtesies extended our staff during the review. If you have any questions, or need additional information, please contact Ms. Carol N. Gorman, Space Operations and Exploration Director, at 202-358-2562 or me at 202-358-2572.

A handwritten signature in black ink, reading "Evelyn R. Klemstine". The signature is fluid and cursive, with a large, sweeping flourish at the end.

Evelyn R. Klemstine

2 Enclosures

cc:

Associate Administrator for Space Operations  
Chief, Safety and Mission Assurance  
Director, Dryden Flight Research Center  
Director, Kennedy Space Center  
Director, Management Systems Division

## **Scope and Methodology**

We conducted this review from April 2006 through November 2006 in response to a hotline complaint received in March 2006 concerning the Dryden T-0 Stair Trucks. The objective of our review was to determine whether the allegations contained in the complaint could be substantiated.

We interviewed the GORA team members who represented USA Integrated Landing Operations; NASA Landing Operations; Safety, Quality, and Mission Assurance management; USA Reliability; USA and NASA Safety Engineering; and USA and NASA Heavy Equipment Systems Engineering. We accompanied those personnel and contractor maintenance personnel during a routine inspection of the stair trucks and witnessed the contractor personnel perform preventative maintenance on the trucks.

We collected, reviewed, and analyzed documents dated from 1980 through 2006 related to Dryden landing operations. Specifically, we reviewed the Dryden T-0 Stair Truck risk assessment, USA risk assessment procedures, engineering test data concerning the stability of the Dryden stair trucks, USA training procedures and records, USA ethics policies and procedures, USA's operating procedure on the Engineering Review Board and contractor operating and maintenance instructions and records. We also reviewed the stair truck maintenance records for content and completeness.

This review was conducted in accordance with the President's Council on Integrity and Efficiency, Quality Standards for Inspections.

# Management's Comments

National Aeronautics and  
Space Administration  
**Lyndon B. Johnson Space Center**  
2101 NASA Parkway  
Houston, Texas 77058-3698



December 18, 2006

Reply to Attn of MG-06-023

TO: NASA Headquarters  
Attn: Assistant Inspector General for Auditing

FROM: MA/Manager, Space Shuttle Program

SUBJECT: Response to Draft Memorandum on the Review of T-0 Access  
Stair Trucks Located at Dryden Flight Research Center  
(Assignment No. S-07-003-00)

We appreciate the opportunity to review and provide comments to the subject draft memorandum. We have thoroughly reviewed the allegations and recommendation found in your memorandum and are providing the following response to the findings. We also acknowledge that no safety issues were substantiated during your review.

**"Allegation 4:** USA management removed data from the risk assessment and ordered the assessment destroyed and removed from the Ground Operations Safety, Quality, and Mission Assurance (SQ&MA) Web site. Partially Substantiated"

**Recommendation:** "The Space Shuttle Program Manager should verify that USA implements procedures to ensure that employees and managers are prohibited from altering any signed document without ratification by all signatories."

**Response:** Concur.

United Space Alliance (USA) is founded on, and adheres to, their strict Ethics and Business Conduct Policy. To remove any confusion in the policy and to provide additional clarification, USA will incorporate the following wording in USA Functional Policy and Procedure C-01-01, Rev. 8, Ethics and Business Conduct, Section h, Product Integrity: "Management is obligated and accountable for maintaining the integrity of, and managing company business processes. When individual employees or groups/teams adhere to the scope of an assigned task, the signed document and/or produced product shall not be altered without ratification by all signatories."

NASA has surveillance responsibility to monitor USA's performance to ensure the acceptability and compliance with contract requirements, and determination whether their program, policies, and processes are functioning as intended in accordance with



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the terms of the contract. As such, we will continue to provide the necessary insight to ensure that USA has implemented policies and procedures that prohibits employees and managers from altering signed documents without ratification by all signatories. If negative performance is noted by NASA, it will be appropriately judged during the award fee evaluation.

We consider actions being taken sufficient to address this finding, and recommend closure of this recommendation. If you have any questions, please contact the Audit Liaison Representative at 281-483-4220.



N. Wayne Hale, Jr.

cc:  
See List

## cc:

AA/M. L. Coats  
 AB/R. D. Cabana  
 AC/R. K. Gish  
 CA/E. Ochoa  
 DA/G. A. Flynt  
 EA/S. J. Altemus  
 EA4/B. G. Swan  
 LM/P. K. Kidwell  
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