

National Aeronautics and Space Administration
Office of the Administrator
Washington, DC 20546-0001



August 24, 2015

The Honorable Lamar S. Smith
Chairman
Committee on Science, Space, and Technology
U.S. House of Representatives
Washington, DC 20515

Dear Chairman Smith:

Thank you very much for your letter of August 4, 2015 regarding the recent space launch failures of June 28, 2015 and October 28, 2014. I appreciate your sincere commitment to our Nation's leadership in space and NASA has always shared that commitment. I am pleased for the opportunity to address your concerns. I would also mention that on August 3, 2015, Vice Admiral Joe Dyer, Chairman of the Aerospace Safety Advisory Panel (ASAP) provided a written response related to concerns that we were treating SpaceX differently than Orbital ATK with respect to our oversight of the respective accident investigations to Mr. Chris Shank, Policy Director of the House Science, Space, and Technology Committee. I think you will find Vice Admiral Dyer's response is in basic agreement with the contents of my letter following.

First and foremost, I want to assure you that NASA is performing an independent analysis of the Space Exploration Technologies (SpaceX) SpX-7 ("CRS-7") launch failure. For the Orbital ATK failure, we chose to establish a formal Independent Review Team (IRT) to, as you pointed out, "amplify the learning for the NASA teams." While it may not have been as visible, we chose to do a similar thing for the SpaceX failure, conducting an independent review, but using existing mechanisms that were already in place. Note that due to this misunderstanding, many of the questions posed were written under an incorrect premise that NASA is not conducting an independent review of the SpX-7 accident; therefore, we have attempted to answer the spirit of those questions.

Decision to Stand-Up an IRT for the Orbital ATK Antares Orb-3 Launch Failure

Since the Orbital ATK Antares launch was conducted under a Federal Aviation Administration (FAA) license, the Antares launch failure was not considered a NASA mishap. The process for conducting a launch failure investigation under a FAA-licensed launch is codified in 14 CFR 417.111. Under the International Space Station (ISS) Commercial Resupply Services (CRS) contract, NASA must be allowed to participate in a CRS provider's Accident Investigation Board (AIB). At the prerogative of the contractor, in this case Orbital ATK, NASA was also provided a voting membership in their AIB. However, to accomplish the spirit of conducting an independent investigation by which to

inform and amplify the learning for the NASA team, the Associate Administrator (AA) for the Human Exploration and Operations Mission Directorate (HEOMD) established a NASA-led IRT. NASA Procedural Requirement (NPR) 8621.1, *NASA Procedural Requirements for Mishap and Close Call Reporting, Investigating, and Recordkeeping* guided the thinking of the HEOMD AA and his decision to form such an independent review. The HEOMD AA also consulted with the NASA Chief of Safety and Mission Assurance in making this decision [Questions 9-13]. As stated previously, the ultimate goal of the IRT was to amplify the learning for the NASA team. It would provide a validation of the contractor-led AIB efforts to ascertain technical root cause, define corrective actions, and inform the Agency's risk posture to support a return-to-flight in an ISS cargo resupply capacity. The decision to create an IRT also avoided any limitations on NASA's ability to understand the launch failure data and analysis [Question 2]. Although the U.S. Air Force (USAF) is not performing their own independent review of the Orb-3 accident, they requested participation in the NASA IRT, which was granted. NASA and the USAF have a history of collaboration and sharing launch vehicle related information and data [Question 14].

Decision that NASA Launch Services Program (LSP) will serve the Function of the IRT for the SpX-7 Launch Failure

Like the Orbital ATK Antares launch, the SpX-7 launch was conducted under an FAA license, and was therefore not considered a NASA mishap; however, in the case of the Falcon 9, the LSP has two contract launch service task orders in place with SpaceX under our NASA Launch Services II (NLS II) contract for the launch of two high-value payloads on the Falcon 9 launch vehicle. NASA's NLS II contract allows NASA to stand up its own independent review or assessment team for an anomaly or launch failure of a launch vehicle directly applicable to an on-contract launch service, and the commercial launch service provider is contractually bound to support and cooperate with NASA's independent team. In addition, NASA Policy Directive (NPD) 8610.7 *Launch Services Risk Mitigation Policy for NASA-Owned and/or NASA-Sponsored Payloads/Missions*, and NPD 8610.23 *Launch Vehicle Technical Oversight Policy* are incorporated into the NLS II contract. NPD 8610.7 requires a post-flight assessment be performed by LSP of every launch of every vehicle certified or in the process of being certified for use under the NLS-II contract. Per this NPD, "[r]esolution of all flight anomalies and mission failures is required by the launch service contractor with Launch Service Program (LSP) technical evaluation and disposition" [emphasis added]. NPD 8610.23 calls out specific data, products, processes, events, etc. into which LSP shall be provided insight by the commercial launch provider and lists specific events and items over which LSP has approval authority [Question 8].

Since extensive independent analysis was already underway due to the standard practices, policies, and contract requirements described above, and since LSP is in a unique position to accomplish an efficient and effective independent review, the AA for HEOMD believed that LSP's investigation would lead to an in-depth understanding of the events. Not only was this the most efficient use of NASA resources, but it also afforded a single

interface for providing data and other products from SpaceX and its subcontractors in support of all three NASA Programs interested in SpaceX launch services: the LSP, the Commercial Resupply Services Program and the Commercial Crew Program. The AA for HEOMD also factored in the level of inclusion being afforded to LSP by SpaceX and felt confident that this approach would provide an efficient, effective, and independent assessment of the data. This is documented in a Memorandum for the Record dated August 3, 2015 [Question 9]. As in the case of the Orb-3 accident, the AA for HEOMD consulted with the NASA Chief of Safety and Mission Assurance regarding the need for an IRT. It was the AA for HEOMD's discretion to decide that the LSP effort would serve the function of an independent review team [Question 10-11].

Through this independent review effort, NASA will benefit from the "continuous learning" afforded by analysis of the data, findings, and rationale which will enhance our knowledge of the Falcon 9 systems, as well as our understanding of SpaceX's launch-related processes [Question 1]. Since there has been no decision to forego an independent review of the SpX-7 accident, there has been no consideration by NASA of any factors such as the financial impact on contractors associated with the delay of the Jason-3 or commercial resupply missions [Question 15]. As with Orb-3, the USAF is also participating as an observer in the SpaceX Accident Investigation Team (AIT), and may be conducting some independent analysis. NASA LSP is "leading" the independent review effort because of the existing contracts NASA has for high-value missions to be flown on the SpaceX Falcon 9 launch vehicle, and because the next Government launch utilizing the Falcon 9 will be a NASA mission. NASA and the USAF have a history of collaboration and sharing launch-vehicle-related information and data. NASA is sharing, and will continue to share, our findings with the USAF; however, each agency will need to make its own independent engineering judgments from the data to match a given mission risk posture [Question 14].

Independent Reviews

In both the Orb-3 and SpX-7 accident investigations, NASA has significant insight into the findings and rationale developed by the contractors. In addition, the Government is being afforded access to all data and physical evidence, as well as access to the contractor teams in support of both independent review team efforts. Specifically, the mechanisms under which these interactions have been agreed to are found in the NLS-II and CRS contracts. Both accidents fall under the CRS contract. Like NLS-II, this contract is also a commercial launch service, but is more akin to a "delivery-on-orbit" launch service that relies on the commercial launch provider. NASA's mission assurance efforts under CRS were focused on ISS proximity operations rather than on the launch vehicle. This was a conscious choice by NASA for the CRS program in an effort to reduce costs and allow the commercial launch provider broad latitude to innovate [Question 5]. As mentioned above, NPD 8610.23 is a contractual requirement in the NLS-II contract, and calls out specific data, products, processes, events, etc. into which LSP shall be provided insight by the commercial launch provider. In addition, the NPD lists specific events and items over

which LSP has approval authority [Question 8]. Although different mechanisms are being utilized, NASA is still conducting an independent review of the two failures.

Specific to the SpX-7 investigation activities, we will have the additional involvement of the Commercial Crew Program representative to provide insight into potential implications to that program. Also for SpX-7, because the Falcon 9 launch vehicle is to be used to launch high-value payloads, for example the upcoming Jason-3 mission, NASA LSP will also review SpaceX's readiness to launch that mission as part of our Flight Readiness Review process, as documented in NPD 8610.24 *Launch Services Program Pre-Launch Readiness Reviews*. Further, LSP will look carefully at the cause(s) for the failure and see if any information learned from the investigation might prompt an examination of other systems on the launch vehicle that could be susceptible to similar or related problems. By maximizing learning from this failure, we can help to ensure that a more reliable launcher is available. Rather than providing less insight into the SpX-7 investigation over the Orb-3 investigation, we are providing direct insight through Commercial Crew personnel involvement and through the LSP Jason-3 pre-launch reviews that will guide our decisions for flight readiness [Question 6]. Both independent reviews will seek to validate the efforts of the contractor-led AIBs. For the SpX-7 investigation, NASA must agree with the findings, recommendations, and implementation for return-to-flight, prior to NASA utilizing that same model launch vehicle for a high-value NASA mission, such as Jason-3 [Question 7].

The material above focuses on the policy and contractual mechanisms for providing NASA the insight and level of access needed to perform our independent reviews. However, an effective way to achieve insight and influence in a contractor-led accident investigation from a mishap on a FAA-licensed launch is for NASA's participation to be viewed as "value added" by the commercial provider. In this way, NASA benefits from the investigation by having NASA personnel directly use analysis and test data and the contractor gets to understand the benefits of different analysis techniques. Ultimately NASA and industry end up with more reliable systems. Similar processes have been followed when heritage commercial launch service suppliers have experienced major anomalies that could have resulted in mission loss. Those heritage supplier launches were not FAA-licensed missions, but there were anomaly investigations led by the contractor with participation from NASA and the USAF which shared the common goal of returning to successful flight [Question 13].

Government Leverage

For Orb-3, in addition to the formal IRT established, NASA has a representative on Orbital ATK's AIB as a voting member. For SpX-7, the NASA representative is not a voting member of SpaceX's AIB. Per 14 CFR 417.111, the contractor does not have to name a Government member, other than the FAA, to be a voting member as part of their AIB. However, for SpaceX, NASA will have leverage under the terms of the NLS-II Contract where NASA will have the right to accept/reject any finding, root cause, and corrective action resulting from SpaceX's board. For the Orb-3 investigation, where NASA has

stood-up an IRT and NASA has a voting member on the AIB, if there is disagreement over root cause, contributing factors, etc., the true leverage of NASA will be when and whether to load our cargo for launch to the ISS [Question 3-4].

Conclusion

In addition to the two memos from NASA you mentioned in your letter (attached here for completeness), I am attaching two additional memos, also from Bill Gerstenmaier, AA for HEOMD, where in one memo he identified the NASA interfaces to the Orbital ATK investigation activities, and in the other he documented the rationale behind use of the LSP organization to serve the function of an IRT for the SpX-7 launch failure investigation.

In closing, I want to thank you for your letter and for communicating your concerns. Please be assured NASA is conducting independent reviews of both Orbital ATK and SpaceX failures and we are committed to sharing our findings with each contractor so they can improve their own knowledge, their own processes, and their own reliability. As always, NASA shares your commitment to our Nation's leadership in space. NASA believes that our leadership will be best maintained through a competitive, innovative, commercial U.S. space transportation industry. As you know, spaceflight is difficult, and while these two recent losses were not welcome, we believe our U.S. commercial space transportation industry will emerge stronger and more competitive from these failures. We have confidence that our commercial suppliers are up to the challenge and will independently review their approaches to return to flight.

Thank you for your interest in this matter. Please do not hesitate to contact me if there are additional questions pertaining to this matter.

Sincerely,

A handwritten signature in black ink, appearing to read 'C. Bolden Jr.', with a long horizontal stroke extending to the right.

Charles F. Bolden Jr.
Administrator

4 Enclosures

cc: The Honorable Eddie Bernice Johnson