

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



February 26, 2014

TO: Associate Administrator for Human Exploration and Operations
Mission Directorate

FROM: Administrator

SUBJECT: Endorsement of the International Space Station Extravehicular Activity Suit
Water Intrusion High-Visibility Close Call Investigation Report – Case
Number S-2013-199-00005

I have received and reviewed the subject mishap investigation report as well as participated in an in-person oral debrief of the investigation conducted by you and the Senior Member of the Mishap Investigation Board, Chris Hansen, and I accept the findings and recommendations of the board and the contents of your letter of endorsement.

I want to commend all involved in the Extravehicular Activity (EVA) 23 incident – EV2 Luca Parmitano, the International Space Station (ISS) Intravehicular Activity crew, and the ISS ground EVA team for recognizing the seriousness of the anomaly during EVA 23, calling for termination of the EVA in a timely manner and getting Luca back into the airlock and resupplied without harm. The teams also need to be commended for the preflight training and preparation that allowed for the EVA to be efficiently terminated without further incident or injury. I also was impressed with the recovery efforts to regain contingency EVA capability that was executed safely and without incident in order to allow completion of the two contingency EVAs in December.

However, I am concerned about the cultural factors that may have fed into this incident, including a growing atmosphere akin to a “normalization of deviance.” As a factor that was previously identified in both of our Space Shuttle disasters that resulted in the loss of two crews and their Space Shuttle orbiters, *Challenger* and *Columbia*, we all understand the importance of addressing any indication of this type of atmosphere before it can take hold. As you appropriately identified in your endorsement, we had allowed ourselves to “stop being hungry” to always go to whatever lengths needed to find the root causes of any and all anomalies no matter how simple. In our exuberance to get the job done, we allowed ourselves to accept or commonly accepted causes for small anomalies – perhaps because it was more convenient to do so. We need to look for other counter intuitive causes for these problems. This is really difficult to do.

Aeronautics and spaceflight are inherently hazardous endeavors and requires all of us in our community to stay vigilant and inquisitive by constantly questioning commonly accepted principles or conceptions. As we pass on our expertise and experience to our NASA-

contractor human exploration team members - whether commercial partners or our own Space Launch System and Multi-Purpose Crew Vehicle providers - it is our responsibility to provide them with the best example of willingness to accept risk, but a determination to not move on from any anomaly until we fully understand it or have suitable mitigations in place should it recur.

As the person ultimately responsible for all that we do as the NASA family, I implore you and all our leadership team to welcome risks in the things that we do and the missions we conduct because that is how we push the boundaries of our achievement. At the same time, however, as leaders, we must emphasize, in the strongest terms for everyone that contributes to our missions, not to be complacent in our quest to ensure the safety of our crewmembers and teams on the ground, and to always ask "is there another answer or another cause" outside the commonly accepted rationale. In this way, we learn how to detect subtle cues and be a more efficient and effective and, ultimately, a safer community.

I look forward to visiting each of our Centers to encourage our shared commitment to making the impossible possible; to always becoming a more effective Agency where safety is our watchword; and to encourage the positive aspects of our culture demonstrated in the course of these events.

A handwritten signature in black ink, appearing to read "CF Bolden Jr." with a stylized flourish at the end.

Charles F. Bolden Jr.

National Aeronautics and Space Administration

Headquarters
Washington, DC 20546-0001



February 26, 2014

Reply to Attn of: Human Exploration and Operations Mission Directorate

TO: Administrator

FROM: Associate Administrator for Human Exploration and Operations

SUBJECT: Endorsement of the International Space Station Extra Vehicular Activity Suit Water Intrusion High-Visibility Close Call Investigation Report – Case Number S-2013-199-00005

On January 16, 2014, the Mishap Investigation Board, (MIB) delivered the final report I requested on the International Space Station (ISS) Extra Vehicular Activity (EVA) Suit Water Intrusion High-Visibility Close Call. The appropriate National Aeronautics and Space Administration (NASA) officials have reviewed and endorsed the report (Enclosures 1 - 3). Receipt of those endorsement letters were completed by February 10, 2014, and the comments/recommendations of the endorsers were carefully evaluated and accepted. I concur that the report has been prepared as directed by my appointment letter and meets all of the requirements specified in NPR 8621.1B.

A corrective action plan addressing all recommendations within the report and the endorsements shall be developed and submitted for my approval within 15 days of receipt of this memorandum. All proximate cause(s), root cause(s), contributing factors, and recommendations of the MIB, as stated in the mishap investigation report, shall be considered.

As noted in the report, all of the data required to determine the root cause associated with the hardware has not been captured and evaluated. The ISS program will complete this work. The program will modify the corrective action plan based on findings developed from the root cause. The results of this activity will be tracked in the Safety and Mission Success Review and Flight Readiness Review process. I do not plan on reconvening the MIB unless something is discovered in the completion of the root cause process that would dramatically alter its recommendations.

I accept the report and its findings and recommendations. Regarding the report's discussion around proximate causes 1 and 3, it is always a challenge to translate today's hindsight into an assessment of the foresight operators should have had in the real time operations environment. With respect to Proximate Cause 1, the teams that diagnosed the existence of water in the helmet during EVA 22 considered the information available at the time and followed the appropriate procedures to assess the anomaly. There are, however, ways to

improve. With respect to Proximate Cause 3, the teams terminated EVA 23 as soon as water above our experience base was detected. The termination call was timely and occurred before the water began to migrate onto the crewmember's face.

We will take a hard look at our operating and contingency procedures in light of this report. Each one of us is reminded to stay 'hungry' and vigilant looking for small cues to future potentially serious problems. We must also not forget what worked well in this event. The preflight training and overall preparation keep this event as a close call. I must commend our astronauts, flight control teams, and their engineering support for their decision-making and actions that kept our crew safe during this EVA. We will all learn from this close call.

I want to thank Chris Hansen and his Board members for a thorough investigation and generating the mishap investigation report of an event that took place on orbit. The MIB has fulfilled all of the Board requirements and members are hereby dismissed from all Board-affiliated duties.



William H Gerstenmaier

Enclosures

cc:

HQ/Mr. Roe

/Mr. Wilcutt

/Mr. Schumann

/Mr. Fullerton

/Dr. Williams

/Mr. Lightfoot

/Mr. Radzanowski

/Mr. Scimemi

JSC/Mr. Hansen

/Mr. Foreman

/Dr. Rajula

/Ms. Terrell

/Dr. Ulissey

/Mr. Armstrong

/Mr. Byerly

/Mr. Blum

/Mr. Suffredini

GSFC/Mr. Pellicciotti

NSC/Mr. Phillips

/Mr. O'Connor

/Ms. French

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



January 29, 2014

Reply to Attn of:

Office of Safety and Mission Assurance

TO: Associate Administrator for Human Exploration and Operations

FROM: Chief, Safety and Mission Assurance

SUBJECT: Endorsement of the International Space Station (ISS) EVA Suit Water Intrusion High-Visibility Close Call Investigation Report - Case Number S-2013-199-00005

I have reviewed the Mishap Investigation Board (MIB) report of the International Space Station (ISS) EVA Suit Water Intrusion High-Visibility Close Call, and I endorse the report as written. I concur that the report has been prepared as directed by the appointment letter and meets all of the requirements specified in NPR 8621.1, NASA Procedural Requirements for Mishap and Close Call Reporting, Investigating, and Recordkeeping.

I concur with the findings and recommendations and make the following comments about the mishap investigation and the report:

Throughout the investigation, the MIB worked with the ISS program, providing investigation findings in real time to advise the program as it prepared for the EVAs conducted in December 2013. I commend both the MIB and the ISS program for this proactive effort.

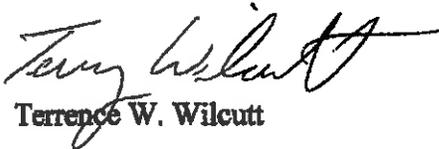
As noted in the report, all of data required to determine root cause associated with the hardware has not been captured and evaluated. The ISS program's failure investigation report should be packaged with the MIB report to present a complete picture of the investigation. The ISS program's failure investigation findings will need to be integrated with the findings given in this report to understand the totality of what went wrong and what should be done to prevent future mishaps. However, with the release of this report, the ISS program can begin the formal work of developing and implementing corrective actions to address findings and recommendations.

It is important to note that each individual finding and recommendation cannot be viewed in isolation, and that there should be no hierarchical priority interpreted based on the order that the findings and recommendations are listed in the mishap investigation report. The ISS program should categorize the findings and recommendations from both the MIB report and the ISS program's failure investigation into logical groupings and develop a comprehensive corrective action

plan that addresses the total set of activities in a manner that is logically structured to support the mission of the ISS and to prevent future mishaps.

Moving forward, I expect the responsible organizations to respond to the findings and recommendations from both the MIB investigation and the ISS program's failure investigation. The responses and corrective action plan will be evaluated per NPR 8621.1, NASA Procedural Requirements for Mishap and Close Call Reporting, Investigating, and Recordkeeping.

Please convey my thanks to the MIB for completing the investigation and generating the mishap investigation report. In keeping with NASA policy, please attach this endorsement to the top of the mishap investigation report and publish/distribute it as part of the report.



Terrence W. Wilcutt

cc:

Chief Engineer/Mr. Bell (Act'g)
Chief Health and Medical Officer/Dr. Williams
Office of Safety and Mission Assurance/Dr. Groen
Mr. Schumann
Mr. Fullerton

GSFC/Mr. Pellicciotti
JSC/Mr. Hansen
Mr. Foreman
Dr. Rajula
Ms. Terrell
Dr. Ulissey
Mr. Armstrong
Mr. Byerly
Mr. Blum
NSC/Mr. Phillips
Mr. O'Connor
Ms. French

National Aeronautics and Space Administration

Headquarters

Washington, DC 20546-0001



February 5, 2014

Reply to Attn of: Office of the Chief Health and Medical Officer

TO: Associate Administrator for Human Exploration and Operations

FROM: Chief Health and Medical Officer

SUBJECT: Endorsement of the International Space Station (ISS) EVA Suit Water Intrusion High-Visibility Close Call Investigation Report - Case Number S-2013-199-00005

I have reviewed the Mishap Investigation Board (MIB) report of the International Space Station (ISS) EVA Suit Water Intrusion High-Visibility Close Call, and I endorse the report as written. I concur that the report has been prepared as directed by the appointment letter and meets all of the requirements specified in NPR 8621.1B, NASA Procedural Requirements for Mishap and Close Call Reporting, Investigating, and Recordkeeping.

I concur with the findings and recommendations and make the following comments about the mishap investigation and the report:

I commend the MIB for its thorough investigation, identification of undesired outcomes, root causes and proximate causes, and recommendations. I also commend both the MIB and the ISS program for immediate and extensive cooperation to enable subsequent operationally necessary EVA activity to be performed safely. I look forward to the eventual identification of the root cause of the hardware failure and resolution of all related issues. This close call re-emphasizes the hazards posed by previously unknown or unseen failures in space flight and the need for constant vigilance to thoroughly investigate all off nominal events in their earliest expression. Periodic recurrent training concerning the imperative nature of such vigilance should be considered.

Please convey my thanks to the MIB for completing the investigation and generating the mishap investigation report. In keeping with NASA policy, please attach this endorsement to the mishap investigation report and publish/distribute it as part of the report.

A handwritten signature in black ink, appearing to read "Richard S. Williams", with a stylized flourish at the end.

Richard S. Williams

cc:

Chief Engineer/Mr. Bell (Act'g)
Office of Safety and Mission Assurance/Mr. Groen
Office of Safety and Mission Assurance/Mr. Schumann
Office of Safety and Mission Assurance/Mr. Fullerton
JSC/Mr. Hansen
 /Mr. Foreman
 /Dr. Rajula
 /Ms. Terrell
 /Dr. Ulissey
 /Mr. Armstrong
 /Mr. Byerly
 /Mr. Blum
GSFC/Mr. Pellicciotti
NSC/Mr. Phillips
 /Mr. O'Connor
 /Ms. French

National Aeronautics and
Space Administration

Headquarters
Washington, DC 20546-0001



February 7, 2014

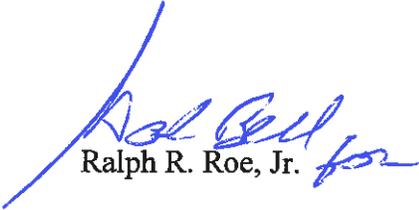
Reply to the Attn of: Office of the Chief Engineer

TO: Associate Administrator for Human Exploration and Operations

FROM: Chief Engineer

SUBJECT: Endorsement of the International Space Station (ISS) EVA Suit Water Intrusion High-Visibility Close Call Investigation Report - Case Number S-2013-199-00005

I have reviewed the Mishap Investigation Board (MIB) report of the International Space Station (ISS) EVA Suit Water Intrusion High-Visibility Close Call, and I endorse the report as written. As noted in the report, all of the data required to determine the root cause associated with the hardware has not been captured and evaluated. It is essential ISS program complete this unfinished work of determining the root cause and document the results in a formal report to be reviewed and endorsed by same parties as this initial report.


Ralph R. Roe, Jr.

cc:
Office of Safety and Mission Assurance/Mr. Wilcutt/Mr. Whitmeyer/Mr. Groen
Office of Safety and Mission Assurance/Mr. Schumann
Office of Safety and Mission Assurance/Mr. Fullerton
Office of Chief Medical Officer/Dr. Williams
Office of the Chief Engineer/Mr. Bullman
JSC/Mr. Hansen

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



February 26, 2014

Reply to Attn of:

General Law Practice Group

TO: Associate Administrator for Human Exploration and Operations

FROM: Senior Attorney

SUBJECT: Review of the International Space Station Suit Water Intrusion EVA Mishap Investigation Board Report

As requested, we have completed our review of the International Space Station Suit Water Intrusion EVA Mishap Investigation Board Report (Report) under NPR 8621.1B, "NASA Procedural Requirements for Mishap Reporting, Investigating, and Recordkeeping." We also reviewed the endorsement pages from the Mishap Investigation Board Appointing Official, the Chief for Safety and Mission Assurance, the Chief Engineer's Office, and the Office of the Chief Health and Medical Officer. As a result of an additional ITAR review conducted at Headquarters, some portions of the Report are now redacted. Based on our review of the redacted Report, we concur in public release of this Report.

If you have any questions about this review, please contact me on (202) 358-2085.

A handwritten signature in blue ink, appearing to read "D. Thomas".

Daniel Thomas