

NASA AEROSPACE SAFETY ADVISORY PANEL

National Aeronautics and Space Administration

Washington, DC 20546

Lieutenant General Susan J. Helms, *Chair*

Sept 12, 2024

The Honorable Bill Nelson

Administrator

National Aeronautics and Space Administration

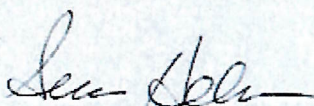
Washington, DC 20546

Dear Senator Nelson:

The Aerospace Safety Advisory Panel (ASAP) held its 2024 Third Quarterly Meeting in-person at NASA's Johnson Space NASA Langley Research Center, July 30 – August 1, 2024. We greatly appreciate the participation and support that were received from NASA's leadership, the subject matter experts, and the support staff.

The Panel submits the enclosed Minutes resulting from the public meeting for your consideration.

Sincerely,



Susan J. Helms, Lt Gen (Ret), USAF

Chair

Enclosure

AEROSPACE SAFETY ADVISORY PANEL

Public Meeting

August 1, 2024

Hybrid

2024 Third Quarterly Meeting Report

ASAP Panel Member Attendees

Lieutenant General Susan J. Helms, USAF (Ret), Chair

Mr. William Bray

Dr. Amy Donahue (*virtual*)

Mr. Paul S. Hill

Mr. Charlie Precourt

Mr. Kent Rominger

Dr. Mark N. Sirangelo

Dr. Richard S. Williams, MD, FACS

ASAP Staff and Support Personnel Attendees

Ms. Carol Hamilton, NASA ASAP Executive Director

Ms. Lisa Hackley, NASA ASAP Administrative Officer

Ms. Ashley Mae, Tom & Jerry, Inc, Technical Writer

Appendix A – Teleconference Attendees

Ms. Carol Hamilton, Aerospace Safety Advisory Panel (ASAP) Executive Director, called the meeting to order at 1:00 p.m. eastern daylight-saving time (EDT) and welcomed everyone to the ASAP's Third Quarterly Meeting of 2024, held at the National Aeronautics and Space Administration's (NASA) Langley Research Center (LaRC). Ms. Hamilton noted that the Federal Registry Notice gave the public the opportunity to send safety-related statements or to make comments prior to the scheduled meeting.

Lieutenant General (LTG) Susan J. Helms, United States Air Force (USAF)(Ret), chair, began by thanking Ms. Trina Dyal, Deputy Center Director, and Ms. Christina Guldin, Acting Deputy Safety and Mission Assurance Director, for their hospitality at LaRC. LTG Helms emphasized Langley's significant contributions to human spaceflight and its enduring impact on NASA's missions and their commitment to safety and mission assurance, emphasizing the importance of maintaining rigorous safety standards in all ongoing and future projects. LTG Helms also gave welcome to the Panel's newest member, Mr. Charlie Precourt.

Mr. Kent Rominger thanked the personnel of LaRC for a wonderful tour of the facilities, providing those who attended with an up-close look at the cutting-edge technology and research being conducted. The tour underscored the Center's pivotal role in NASA's history and its ongoing contributions to aeronautics, sciences, and exploration.

Dr. Donahue discussed safety culture, which is a focus of the ASAP, as directed by its charter. She emphasized the importance of shared values and behaviors related to risk. Safety culture, a

part of the broader organizational culture, involves shared values, beliefs, and behaviors related to risk. It is shaped by the organization's incentives which dictate what is considered acceptable behavior.

The ASAP is particularly interested in whether NASA's culture has the right safety focus. This includes understanding the behaviors that are valued, tolerated, modeled, and rewarded, as well as ensuring that the workforce feels free to express concerns without fear of retribution. The Panel also evaluates how NASA manages dissent, especially during high-stress, high-uncertainty situations. Although policies and programs specific to risk assessment and decision-making are examined, much of ASAP's focus on safety culture is embedded in broader fact-finding activities. Discussions with NASA often naturally include perspectives on safety and risk, reflecting the high priority these issues hold for the Agency's leaders.

Past discussions have included the Agency's culture surveys and the next survey is scheduled for this upcoming fall. These surveys are crucial as they reveal variations in culture across NASA's various Centers and programs, allowing leaders to pinpoint areas of strength and weakness. The survey's questions on safety culture provide longitudinal insights, and new questions are being considered to assess the overall health of NASA's culture in promoting safety. Additional focused surveys, such as those conducted at Langley, help understand workforce stress levels and their impact on safety engagement. These surveys and other forums for engagement are valuable surveillance mechanisms and communication tools, signaling to the workforce that leadership values their input and concerns.

Dr. Donahue recognized NASA's efforts to maintain a robust safety culture amid the inherent risks of space exploration. The Panel observed that NASA is handling complex risk assessments through inclusive and respectful deliberations, fostering a healthy safety culture that supports risk-informed decision-making.

LTG Helms brought attention to the NASA Engineering and Safety Center (NESC) which was established in 2003 in response to the Columbia accident. Operating under NASA Chief Engineer, Mr. Joe Pellicciotti, this matrixed organization of about 1,100 people provide independent assessments of technical issues for NASA programs and projects, fostering a safety culture focused on engineering and technical excellence. Mr. Tim Wilson, NESC Director, gave an excellent overview, during the Panel's fact-finding, of their risk assessment work model, organizational structure, leadership, and technical expertise. Based on the projects and technical analyses reviewed over many years, the ASAP has found significant value in the role of the NESC.

Mr. William Bray stated that having started his civilian career at a Navy organization, serving as the independent assessment agency for the Navy, he recognizes the value of an objective perspective for a decision maker and NESC provides that view for NASA. It was encouraging to hear that the NESC's evolution has led to more direct engagement with various programs and offices during their investigation and analysis. This openness in dialogue and debate from the start enhances their objectivity and ensures that their findings and recommendations are better accepted and integrated into the programs' risk management activities and projects.

LTG Helms handed the meeting over to Mr. Rominger for discussion of Boeing's Starliner Crew Flight Test (CFT). Starliner faces two primary issues: helium leaks and service module (SM) reaction control system (RCS) thruster failures. There are five helium leaks, including one at launch, most likely originating from the RCS thruster valve flange interface. Preliminary analysis indicated that there was sufficient helium to support the deorbit profile even at the worst leak rates. Mr. Rominger stated that NASA and Boeing were actively analyzing data and worst-case scenarios to inform a comprehensive CFT SM integrated risk assessment for return acceptance decisions.

Additionally, five RCS thrusters failed during the rendezvous. One thruster was deselected for the remainder of the flight, while the other four were re-selected. Significant testing at NASA's White Sands facility is underway to understand the causes of the degraded performance. Despite progress, considerable work, including more testing and analysis, remains.

The ASAP Panel observed that NASA's Commercial Crew Program (CCP) was following disciplined processes to address the issues, utilizing extensive resources across the Agency. The Panel also noted a healthy safety culture, with team members openly discussing and debating the most prudent paths forward.

LTG Helms pointed out that Mr. Paul Hill observed the Starliner's Flight Test Readiness Review (FTRR). She extended the Panel's gratitude to NASA for their continued support in allowing the Panel to observe these critical risk and safety milestone events. These observations have been invaluable in helping the Panel understand NASA's risk management approaches and culture, especially in high-stress scenarios. In the face of on-going testing, analysis, and evolving CFT challenges, the Panel will be very interested in better understanding the path forward for Starliner's certification.

Mr. Bray discussed how the ASAP conducted a fact-finding session with Ms. Cathy Koerner, Associate Administrator (AA) of the Exploration Systems Development Mission Directorate (ESDMD), and Ms. Lakiesha Hawkins, Deputy Program Manager (PM) of Moon to Mars (M2M), along with their teams. The M2M program celebrated their one-year organizational anniversary on May 5, 2024, and the ASAP commended their rapid formation, talent acquisition, and accomplishments. The ASAP observed good organizational stability, esprit de corps, and a solid understanding of their mission's complexity and importance, emphasizing safety and engineering discipline. The connection from the campaign to individual Artemis missions and programs strengthens with each meeting, particularly noting improvements in the enterprise risk management process.

Mr. Bray highlighted recent key accomplishments including the Joint Extravehicular Activity (EVA) and Human Surface Mobility Test Team (JETT) 5 testing which tested Artemis technology in lunar-like terrain, and the first Crew Health and Performance Exploration Analog (CHAPEA) event, which placed four crew members in isolation for 378 days to simulate Mars missions and understand crew health and performance.

Artemis II is progressing with key hardware deliveries and integration, notably the Core Stage 2 roll-out from the Michoud Assembly Facility to the Vehicle Assembly Building (VAB). Three

critical path items are being tracked for Artemis II: the Crew Module (CM) battery, heat shield, and the Exploration Ground Systems (EGS) Emergency Egress System (EES). An independent review team (IRT) is assessing the heat shield issue, and NASA awaits their report.

Artemis III continues to advance hardware deliveries and test events toward the Human Landing System (HLS) concept of operations (CONOPS) demonstration in 2025. For Artemis IV, Mobile Launcher 2 has made significant progress as it transitions to the construction phase. The ASAP encourages NASA to ensure campaign and mission objectives are well-aligned and that aggregate risk is balanced and acceptable from mission to mission.

Dr. Richard Williams addressed low-Earth orbit (LEO) operations and human health risks. The Panel met with Dr. J.D. Polk, NASA Chief Health and Medical Officer, and Mr. David Baumann, Director of the Human Research Program (HRP), to address questions from the last annual report. The Office of the Chief and Health and Medical Officer (OCHMO), HRP, and the Human Health and Performance Directorate at Johnson Space Center (JSC) are closely coordinated to mitigate human health and performance risks for exploration-class missions. OCHMO oversees the health of NASA's workforce, including spaceflight crew, defining health risks and maintaining performance standards. HRP, an applied research program funded by the Space Operations Mission Directorate (OSMD), informs these standards and mitigates risks through research. This effort is integrated through the Health and Medical Technical Authority Human System Board at JSC, focusing research on human spaceflight operations. Strategic and tactical risk reduction research is managed by said board, addressing major hazards such as space radiation, isolation, distance from Earth, lack of gravity, and the hostile space environment.

The Panel reviewed HRP's mitigation plans for Mars' mission risks and identified key system capability gaps, such as Earth-independent operations, food systems, physiological effects, vehicle atmospheres, and countermeasures for exercise and sensorimotor issues. Continued research on LEO platforms is essential to address these gaps, highlighting the importance of developing LEO research platforms post-International Space Station (ISS).

Dr. Polk and Mr. Baumann discussed leveraging technologies like 3D printing and artificial intelligence to mitigate risks. The Panel showed particular interest in the CHAPEA Mars analogue mission, anticipating data analysis and findings from this mission. They also emphasized the ongoing transfer of knowledge from NASA's human spaceflight health and medical experience to other agencies and commercial entities. The Panel appreciated the confirmation that continued LEO operations are crucial for human spaceflight risk reduction and looks forward to further engagement with OCHMO.

In closing, LTG Helms addressed the fact that the Panel had not been able to have fact-finding discussions with *NASA 2040*, the SpaceX aspect of the CCP, ISS Programs and operations, EVA Programs, and the ISS transition, but the Panel looked forward to updates soon.

Ms. Hamilton opened the meeting for public comment. No comments were received.

LTG Helms adjourned the ASAP Third Quarterly meeting of 2024 at 2:00 p.m. EDT.

Appendix A
Teleconference Attendees¹

Adrianne Lewis	<i>US GAO</i>	Kristin Van Wychen	<i>US GAO</i>
Amanda Miller	<i>Military.com</i>	Laura Means	<i>NASA</i>
Anton Karalos	<i>KSC</i>	Lauren Grennecke	<i>Boeing</i>
Arpita Dasika	<i>Payload</i>	Loren Grush	<i>Bloomberg</i>
Benjamin Neumann	<i>NASA</i>	Lori Patton Glassen	<i>Boeing</i>
Beverly Casillas	<i>Space Scout</i>	Marcia Smith	<i>SpacePolicyOnline.com</i>
Brittney Coffey	<i>Boeing</i>	Megan Geffner	<i>Boeing</i>
Casey Henderson		Micah Maidenberg	<i>The Wall Street Journal</i>
Catherine Williams	<i>Boeing</i>	Michael Sheetz	<i>CNBC</i>
Cheryl Warner	<i>NASA</i>	Ned Penley	<i>NASA ESDMD</i>
Christine Solga	<i>NASA</i>	Nilusar Ramji	<i>NASA</i>
Danny Lempz	<i>NSF</i>	Pamela Whitney	<i>House Science Committee</i>
Deborah Suscelli	<i>Boeing</i>	Paul Frazier	<i>NASA CLDP Program</i>
Denise Holley	<i>NASA</i>	Philip Sloss	<i>NASASpaceFlight.com</i>
Dillon Clavelle	<i>SpaceX</i>	Ramona Galindo	<i>JSC</i>
Donald Wood	<i>NASA</i>	Rebecca Regan	<i>Boeing</i>
Douglas Gorman	<i>Payload</i>	Richard Rogers	<i>Novelis</i>
Eric Berger	<i>Ars Technica</i>	Samina David	<i>NASA</i>
Erin Kennedy	<i>US GAO</i>	Steve Slysoff	<i>NASA</i>
Gene Mikulka	<i>Talking Space</i>	Tammy Flowers	<i>NASA HOS Programs</i>
James Gannon	<i>NASA</i>	Theodore Kronmiller	<i>Law Office</i>
James Wood	<i>NASA</i>	Tonya Woodbury	<i>US GAO</i>
Janelle Bernales	<i>Boeing</i>	Veronika Fuhrmann	<i>ESA</i>
Jeff Siders	<i>Northrup Grumman</i>	Zudayyah Taylor-Dunn	<i>NASA HQ</i>
Jessica Landa	<i>NASA</i>		
Jimi Russell	<i>NASA</i>		
Joey Roulette	<i>Reuters</i>		
Johnny Nguyen	<i>NASA</i>		
Jose Ramos	<i>US GAO</i>		
Josh			
Joey Kim	<i>GAL</i>		
Katie Kelly	<i>Boeing</i>		
Kerry Steward	<i>NASA</i>		
Kiana Mitchell	<i>Boeing</i>		
Kiersten White	<i>NASA</i>		
Kimberly Schuster	<i>GAL</i>		
Jamie Krauk	<i>NASA</i>		

¹ The names and affiliations are as given by the attendees, and/or as recorded by the teleconference operator.