National Aeronautics and Space Administration

Office of the Administrator
Washington, DC 20546-0001

September 11, 2019

Dr. Patricia Sanders
Chair
NASA Aerospace Safety Advisory Panel
Washington, DC 20546

Dear Dr. Sanders:

Enclosed is NASA's response to the Aerospace Safety Advisory Panel (ASAP) Recommendation 2019-02-01, Required Transition to Next Generation Extravehicular Mobility Units (EMU). This recommendation resulted from the ASAP 2019 Second Quarterly Meeting held at NASA Marshall Space Flight Center on April 25, 2019.

Please do not hesitate to contact me if you or the Panel would like further background on this response.

I look forward to receiving continued advice from the ASAP that results from your important Quarterly and Insight fact-finding meetings.

Sincerely,

Jim Bridenstine

James F. Bridenstine
Administrator

Enclosure:
2019-02-01: Required Transition to Next Generation Extravehicular Mobility Units (EMU)

NASA Aerospace Safety Advisory Panel Recommendation

2019-02-01 Required Transition to Next Generation Extravehicular Mobility Units (EMU)

Findings:
The ASAP has become increasingly concerned with the risk posture that NASA has adapted with the current Extravehicular Mobility Units (EMUs) used in International Space Station (ISS) operations, and it has concluded that the current EMUs are now outside their design life.

Recommendation:
NASA should begin an immediate transition to a next-generation Extra Vehicular Activity (EVA) suit system [Extravehicular Mobility Units (EMUs)], before the risk to EVA becomes unmanageable.

Rationale:
It is an undeniable fact that the 40-year-old EMUs used in ISS operations are reaching the end of their useful life. The Panel reviewed the increasing challenges of difficult upgrade efforts, loss of component vendors over time, lack of critical refurbishment parts, and life extension analyses that will grow in uncertainty as the suit hardware continues to age. Over the years, the Panel has commented on the highly innovative and often heroic approach that NASA has taken to devise EMU component upgrades and suit life extensions; it has also noted the small but productive steps accomplished by the development program for the next-generation xEMU prototype. The current plan is to extend EMU use to 2028; however, it is increasingly apparent that the usable life of the current EVA suits is limited. The Panel encourages NASA to step back from day-to-day management issues to view this urgent issue from a broader, more holistic outlook. The problem does not lie simply in the fact that the suits are old; the fact that manufacturers of several critical suit components, including the very fabric of the suits, have now gone out of business, creates real urgency for transitioning to new EVA suit systems. New suits are needed not only for future space exploration, but also for its current space activities. NASA cannot maintain the necessary, ongoing low-Earth orbit (LEO) operations without fully functional EVA suits.

NASA Response:
NASA Concurs with the ASAP recommendation. Although NASA has and continues to take steps to ensure safe and available EVA capability in the near term using the current EMU hardware, there is a clear need to transition to an updated suit design. Significant development efforts have been pursued in recent years that can be used to enable such a transition, and in 2017, NASA embarked upon an effort to develop and demonstrate the new xEMU suit design via on-orbit EVA's on the ISS. NASA's plans, given the agency's priorities and missions at the time, were delivered to the U.S. Congress via response to the 2017 NASA Transition Authorization Act, Advanced Space Suit Capability Plan. NASA has also articulated plans for improvements in development of the next generation of suits via the agency's response to the Inspector General Report No. IG-17-018.

Today, as the Agency's plans for the Gateway vehicle and Lunar Surface human landing missions mature, NASA has conducted an assessment and determined that use of the Agency's xEMU design as the basis for an Agency-wide fleet of suits is the most appropriate path forward. The xEMU will provide a significant new level of EVA capability including increased fault tolerance and greater exploration extensibility. Through this holistic approach, NASA will broaden the supplier base while reducing intellectual property restrictions and addressing supplier availability/supportability concerns. Furthermore, this approach will provide common training hardware and infrastructure that allows astronauts to train for the same U.S. EVA suit regardless of which program, vehicle, or destination they are flying to while also sharing common spares and backup units for use across all programs using EVA. This approach supports the ISS program in the near term by enabling a transition from the current EMU to the new xEMU fleet. This transition can begin with the planned demonstration of the xEMU on ISS and allow for an intentional overlap of the current ISS EMU's with the new xEMU units so as to provide continuous capability.

In preparation for this, NASA is demonstrating key xEMU life support system capabilities on ISS in a payload scheduled to launch this year. In parallel with flight and operation of the precursor payload on ISS, NASA will complete assembly of the first high-fidelity xEMU unit this coming January. Through this payload and extensive ongoing development work, NASA is reducing schedule and technical risks to enable the suit transition on ISS. The transition can be completed by the mid 2020s while balancing the risks and expected challenges of bringing online the new system before retiring the heritage system. This phased approach also allows NASA to prioritize development and production for Lunar Surface capability, including the initial 2024 landing, with the longer-term needs of outfitting Gateway in the late 2020s and any other human spaceflight needs as they arise in the future.