

Spacesuits are leaking water and NASA is holding off any spacewalks until they can solve the problem

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NASA's Matthias Maurer carries out a spacewalk outside the ISS on March 23, 2022. At the end of the EVA, water was discovered pooling inside his helmet. Credit: NASA

NASA's spacesuits are getting old. The extra-vehicular mobility units—EMUs for short—were designed and built for spacewalks outside

NASA's space shuttles, which flew for the last time in 2011. Nowadays, the EMUs are an integral part of maintaining and upgrading the International Space Station (ISS) exterior, providing the crew with the ability to live and work in the vacuum of space for extended periods of time (spacewalks regularly last from 6 to 8 hours). However, at the end of the most recent spacewalk on March 23, NASA astronaut Kayla Barron discovered water in the helmet of German astronaut Matthias Maurer while she helped him remove the suit.

In microgravity, water can bead up in clumps and cling to the face and eyes, causing serious danger to the astronaut inside a leaking suit. As a precaution and preventative measure, future spacewalks have been put on hold.

At a press conference on May 17, NASA officials shared details of the decision to pause upcoming Extravehicular Activities (EVAs). "Until we understand better what the causal factors might have been during the last EVA with our EMU, we are no-go for nominal EVA," said Dana Weigel (Deputy Manager, Space Station Program). "We won't do a planned EVA until we've had a chance to really address and rule out major system failure modes."

There were four upcoming EVAs scheduled for 2022, two each in August and November. These spacewalks were meant to carry out upgrades to the station's power systems, but now will only go ahead after careful inspection of the malfunctioning suit.

So far, they've yet to find the cause of the problem. "We're looking for any obvious signs of contamination or fouling or something else that might have gotten into our system. We're not seeing that yet," said Wiegel.

New spacesuit designs are in the works, but these are tailored towards

EVAs on the lunar surface for the upcoming Artemis program. And with the ISS due for retirement in the [next decade](#) (currently set for 2031), the likelihood of new EMUs for the ISS is small. According to a 2017 Office of the Inspector General report, eighteen EMUs were manufactured during the shuttle era, and of these, eleven remain, four of which are on the station, while the rest are used on the ground for testing and training.

That doesn't mean we won't see any more EVAs in the near future. Further testing might find the source of the fault, and additional precautions could enable the EVA schedule to proceed. Water samples from the failed suit will be returned to Earth for analysis—any identifiable contaminants they find will help determine where the leak originated.

In the last decade, there have already been several upgrades to the EMUs to protect against water, which is required in the suits for both drinking and cooling. An absorbent pad was added to the back of the astronaut's head in 2014, as well as a breathing tube, for use in the event that water covers the astronaut's mouth and nostrils. These changes were instigated by a close call in 2013, when astronaut Luca Parmitano found his helmet filling with water, making it difficult to see and breathe. He had to cut his spacewalk short and return to the safety of the station to deal with the dangerous situation before it cut off his airways.

For the near future, while the investigation proceeds, NASA says it would consider using the EMUs if necessary in an emergency situation.

"Depending upon what has failed and what the risk is to the spacecraft and to the mission overall, we'll look at where we are with the investigation, where we are with the additional mitigations that we're putting in place and we'll specifically make a call based on the contingency and where we are at the given moment," Wiegel said.

In addition, the Sokol spacesuits used by Russian crew members aboard the ISS still function (Russian cosmonauts last performed an EVA on April 28), providing a secondary option in case the need for an emergency EVA arises.

Additional absorption pads for installation into the EMU helmets arrived at the ISS aboard the Boeing Starliner last week, which made its first-ever successful docking with the ISS during an uncrewed test flight on May 20th. What additional EMU upgrades are required will become clear as the investigation continues.

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