

NASA spacesuits over budget, tight on timeline: audit

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Expedition 48 crew members Kate Rubins and Jeff Williams (R) of NASA outfit spacesuits inside of the Quest airlock aboard the International Space Station in 2016

The United States is in a hurry to send people to Mars by the 2030s, but a key question remains for these deep space explorers: what will they wear?

An audit report out Wednesday by the NASA Office of the Inspector General found that the US space agency has spent lots of money and time on developing new spacesuits, but has little to show for it.

"Despite spending nearly \$200 million on NASA's next-generation spacesuit technologies, the Agency remains years away from having a flight-ready spacesuit," said the report.

The white, bulky spacesuits worn mainly by US and European astronauts when they float outside the International Space Station "were developed more than 40 years ago and have far outlasted their original 15-year design life."

Each suit has been refurbished over the years, with new features like glove warmers, improved helmet cameras and lights.

But the suits have suffered an increasing number of problems, such as water leaking inside the helmets.

In 2013, the helmet of Italian spacewalker Luca Parmitano's suit began filling with water, an emergency that risked drowning him.

He quickly ended his spacewalk and returned to the space station to remove his headpiece. He was rattled but unharmed.

Among other concerns raised by the report, just 11 of the original 18 life-support backpacks, known as extravehicular mobility units (EMU) and which keep astronauts alive in the vacuum of space, still work.

"The inventory may not be adequate to last through the planned retirement of the ISS" in 2024, said the report.

New designs needed

Even beyond these technical mishaps, NASA's current gear would simply not be suitable for deep space.

Next-generation spacesuits need to have better dust shields and more flexible hip sections so people can wear them while walking on the ground, whether inside a spaceship or on alien terrain.

They will also need stronger radiation protection, and adjustments for going to the toilet on long-duration missions.

NASA last year announced a "Poop Challenge," asking inventors to produce their best in-suit ideas for whisking away urine and stool, hands-free, for up to six days.



Italian astronaut Luca Parmitano is seen in a NASA TV image from 2013 after a leak in his helmet while on a spacewalk

Among the winners was a physician who was inspired by surgical techniques that use small openings for his design, which included a small crotch-based airlock through which diapers and other sanitary items could be passed.

Currently astronauts wear a diaper during spacewalks and journeys from Earth to space.

Changing plans

Another complication? The United States keeps changing its mind on its next space destination.

NASA has spent \$135.6 million on suits that could be worn on the Moon, but that program, called Constellation, was cancelled during the Barack Obama administration.

Still, NASA continued to fund "a contract associated with the Constellation Program after... a recommendation made by Johnson Space Center officials in 2011 to cancel the contract," said the report.

"Rather than terminate the contract, NASA paid the contractor \$80.8 million between 2011 and 2016 for spacesuit technology development, despite parallel development activities being conducted within NASA's Advanced Exploration Systems Division."

More than \$51 million has also been spent on the Advanced Space Suit Project, and \$12 million on the Orion Crew Survival System, for suits that could be worn into deep space.

But any of these would need to be tested aboard the ISS prior to its scheduled retirement in 2024.

And NASA is squeezed on time and money, having reduced the funding dedicated to spacesuit development in favor of other priorities such as an in-space habitat, the report said.

"Given the current development schedule, a significant risk exists that a next-generation spacesuit prototype will not be sufficiently mature in time to test it on the ISS prior to 2024."

Even if the Orion Crew Survival System spacesuit is ready as planned by March 2021, that leaves just five months until the first crew mission beyond low-Earth orbit, scheduled for August 2021 aboard the Orion spaceship.

The audit urged NASA to come up with a "formal plan for design, production, and testing" that aligns with the goals of the US space agency, crew needs, and the planned retirement of the ISS in 2024.

It also called for studies to compare the cost of maintaining the current spacesuit and developing and testing a next-generation spacesuit.

The report said NASA "concurred with our recommendations and described its corrective actions," and that the matter would be considered resolved once the actions were verified.

Spacesuits have kept humans alive since 1965, when they were first worn by Soviet cosmonaut Alexei Leonov and months later, by US astronaut Edward White as they ventured outside space capsules that orbited the Earth.

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