

Experts warned of potentially catastrophic problems with OceanGate submersible at extreme depths

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Details have emerged that experts made many warnings about the unsafe condition of the OceanGate submersible that suffered an implosion in the North Atlantic and killed all five people on board shortly after it submerged last Sunday.

Major pieces of debris from the 22-foot-long *Titan* vessel, including the tail cone, were found on the ocean floor on Thursday morning about 1,600 feet from the bow of the steamship RMS *Titanic*, which sank to the bottom of the ocean in 1912 and was the subject of the OceanGate expedition.

The debris field of the OceanGate submersible was discovered by a remotely operated vehicle (ROV) and was “consistent with catastrophic loss of the pressure chamber,” according to Rear Admiral John Mauger of the US Coast Guard.

When asked about the possibility of recovering the bodies of the victims of the disaster, Admiral Mauger said he did not have an answer to the question but added, “This is an incredibly unforgiving environment down there on the sea floor.”

Following a Twitter post by the Coast Guard about the discovery by the ROV, OceanGate released a statement saying company co-founder and CEO Stockton Rush, 61; Pakistani businessman Shahzada Dawood, 48, and his son Suleman Dawood, 19; British billionaire and explorer Hamish Harding, 58; and deep sea explorer and *Titanic* expert Paul-Henri Nargeolet, 77, “have been sadly lost.”

The discovery of the debris ended a five-day, around-the-clock international rescue effort to find the vessel. The search for the submersible included the US Coast Guard, US Navy, the Canadian Coast Guard and numerous private entities that covered an area twice the

size of Connecticut in water that was two and a half miles deep.

As of this writing, the website of OceanGate could not be accessed online and KPTV of Portland, Oregon, reported that the Pacific Northwest offices of the company in Everett, Washington, have been closed indefinitely, “while the staff copes with the tragic loss of their team member.”

While neither the Coast Guard nor OceanGate has provided details about the implosion of the vessel, experts on deep sea exploration and the impact of the water pressure at 12,500 feet below the surface where the *Titanic* wreck sits—which measures at approximately 400 atmospheres, or 6,000 pounds per square inch—have given statements to the media on what likely happened.

Bob Ballard, a professor of oceanography at the University of Rhode Island and member of the team that found the *Titanic* wreck in 1985, told ABC News, “I don’t think people can appreciate the amazing energy involved in the destructive process of an implosion. It just takes out and literally shreds everything.”

Eric Fusil, director of the Shipbuilding Hub at the University of Adelaide in Australia, also told ABC that the *Titan* had a composite hull with inbuilt sensors that could withstand high pressures near the seafloor, but any defect could result in a “near instantaneous implosion” in less than 40 milliseconds.

Questions have been raised about the unconventional cylinder-shaped design of the *Titan*, which is a departure from the sphere-shaped cabins used by most submersibles. The sphere is considered the perfect shape of a craft that must withstand the immense water

pressure exerted equally on all areas of the vessel, while the elongated cabin space increases the pressure load in the midsection and increases fatigue and delamination of the hull material.

Additionally, the use of carbon-fiber with titanium endcaps in the construction of the vessel, which OceanGate promoted as a feature making it “more efficient to mobilize than other deep diving submersibles,” as opposed to complete titanium or other metals, has been pointed to as a significant source of the failure of the structure.

On Tuesday, the *New York Times* reported that experts inside and outside OceanGate began ringing alarm bells in January 2018 about the safety of the *Titan* just as the company was preparing to hand the vessel over to its crew for its initial voyages.

Around that time, OceanGate’s director of marine operations, David Lockridge, began working on a report “in which he said the craft needed more testing and stressed ‘the potential dangers to passengers of the *Titan* as the submersible reached extreme depths.’”

Lockridge alleged in a counterclaim lawsuit against OceanGate that he was hired to ensure the safety of all crew and customers of the company during the operations of *Titan*, but when he expressed concerns about the submersible’s hull, his employment was terminated.

Meanwhile, in March 2018 a group of three dozen industry leaders, deep-sea explorers and oceanographers warned OceanGate CEO Rush that the experimental approach of the company and the decision to forgo a traditional assessment of the vessel could lead to potentially disastrous results.

In a letter from the Marine Technology Society, Rush was criticized for refusing to follow industry safety standards while at the same claiming in marketing material published to advertise the *Titan* that the vessel was compliant with “DNV-GL safety standards.”

The industry representatives wrote, “Your representation is, at minimum, misleading to the public and breaches an industry-wide professional code of conduct we all endeavor to uphold” and that “it is our unanimous view that this validation process by a third-party is a critical component in the safeguards that protect all submersible occupants.”

On Friday, the *New York Times* published the

comments of submersible expert Karl Stanley, who was a passenger on OceanGate’s *Titan* with company CEO Rush off the coast of the Bahamas in April 2019.

Stanley said he heard a cracking noise that got progressively louder during the two hours it took for the submersible to plunge more than 12,000 feet during that trip. The following day, Stanley wrote an email to Rush and urged that future expeditions of the vessel be cancelled.

In his email, Stanley wrote, “A useful thought exercise here would be to imagine the removal of the variables of the investors, the eager mission scientists, your team hungry for success, the press releases already announcing this summer’s dive schedule.” Further he stated, “Imagine this project was self-funded and on your own schedule. Would you consider taking dozens of other people to the *Titanic* before you truly knew the source of those sounds??”

In another development which raises questions about what was known early on by the US government about the fate of the OceanGate vessel, the US Navy disclosed that a top secret military acoustic detection system first detected what it suspected was the implosion of *Titan* hours after the submersible began its voyage.

In response to questions from the *Wall Street Journal*, an unnamed senior Navy official said, “The U.S. Navy conducted an analysis of acoustic data and detected an anomaly consistent with an implosion or explosion in the general vicinity of where the *Titan* submersible was operating when communications were lost.”

The statement went on, “While not definitive, this information was immediately shared with the Incident Commander to assist with the ongoing search and rescue mission.” The *Journal* then reported that the Navy asked that “the specific system used not be named, citing national security concerns. It is normally used to detect enemy submarines.”



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