

Out of space? NASA delays relaunching of shuttle flights

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4 May 2005

The announcement April 29 of a two-month delay in the resumption of space shuttle flights is a warning sign of a deeper crisis in the US space program. While NASA Administrator Michael D. Griffin said the flight of Discovery would be rescheduled for mid-July, the problems that caused the delay could lead to an indefinite grounding of the shuttle fleet.

It has become increasingly clear in the two years since the destruction of the Columbia during reentry on February 1, 2003, that the US space program suffers from technical and organizational flaws so severe as to foreclose any possibility of a safe return to manned space shuttle launches in the foreseeable future.

Last Friday's announcement was the third time that NASA has pushed back the launch of Discovery, the first space shuttle flight since the Columbia disaster. Shuttle program officials blamed the latest delay on re-engineering required to prevent ice buildup on the outside of the line leading into the shuttle booster rocket's huge fuel tank, which stores liquid hydrogen at temperatures several hundred degrees below zero.

Testing suggested that large ice chunks could shake loose from the fuel line during launch and slam into the skin of the shuttle, resulting in damage analogous to that caused by the piece of foam insulation that broke off during the launch of Columbia. That damage to the leading edge of the Columbia's wing is believed to have caused the disintegration of the shuttle during reentry.

Shuttle engineers are now working to rig up a heater for the outside of the fuel tank to prevent ice buildup, with installation and troubleshooting expected to take several weeks. As a result, the shuttle would not be ready to launch during the next time window, from May 22 to June 3, forcing a postponement to the next available slot, July 13 to 31.

There are several constraints that limit the launch dates. These include the Discovery's mission to the

International Space Station, which requires a trajectory placing it in high Earth orbit, and NASA's decision to launch only in the daytime rather than at night, to insure maximum visibility in assessing damage to the spacecraft during launch. The Columbia investigation was hampered because the launch was at night, reducing the quality of the videotape used to monitor the shuttle's skin.

NASA engineers have been especially concerned about joints in the fuel line, which allow the fuel line to contract without damage as the super-cold liquid flows through it. (The fuel tank contains liquid oxygen at a temperature of minus 297 degrees Fahrenheit and liquid hydrogen at minus 423 degrees.) Ice can form on the outside, and chunks as large as five inches by two inches broke loose during testing. Deputy shuttle program director N. Wayne Hale said that during launch, "A piece of ice that big going three times the speed of sound can do some serious damage."

In his comments to the press, Hale tried to minimize the significance of the delay. "After a great deal of testing and analysis, we have been able to cross about 175 potential debris sources off our concerned list," he said. "There are still three or four more items to work on. We'll take a few more weeks to deal with them."

Behind this effort to present the delay as routine, there are troubling indications of the kind of systemic failure that produced the Columbia tragedy. Lower-level engineers at NASA were so concerned about the internal procedures for handling safety concerns that they leaked documents to the *New York Times* last week showing that top officials were relaxing safety standards previously established as requirements for a return to space.

A lengthy article in the April 22 edition of the *Times* cited internal documents showing that "NASA officials have loosened the standards for what constitutes an acceptable risk of damage from the kind of debris that led to the disintegration of the shuttle Columbia as it was

returning from space two years ago.”

The *Times* said that among experts who reviewed the documents, “a small but forceful minority say they worry that NASA is repeating a practice that contributed to the Columbia disaster: playing down risks to continue sending humans into space”

Specifically, the documents suggest that NASA was seeking to justify a return to space shuttle flights even though it could not fully meet the safety goals set by the independent board that investigated the Columbia accident. The agency made at least three changes in statistical methods used to assess the risks of debris, according to one document, “because we cannot meet” the previous standards.

The piece of foam that struck the left wing of the Columbia during its liftoff is estimated to have weighed 1.67 pounds. Since then, tests have shown that a fragment as small as 0.023 pounds could cause catastrophic damage. NASA’s goal is to insure that no fragment larger than 0.01 pounds, about one sixth of an ounce, strikes the shuttle skin.

One of the internal documents leaked to the *Times*, co-authored by John Muratore, the manager of systems engineering and integration for the shuttle program, suggests shifting from traditional worst-case situation estimates to “our best estimate of actual conditions,” or relaxing safety margins outright, from about 1-in-800 chance of failure to an estimated 1-in-40.

NASA officials responded to the *Times* report by denying they were “moving the goal posts” on safety standards to insure a favorable launch decision. At the same time, they postponed the scheduled May 15 launch of Discovery to May 22, the prelude to the subsequent two-month postponement.

The space shuttle engineers who leaked the documents to the press demanded their names be withheld, in fear of retribution. The Columbia investigation board found that NASA executives maintained an internal regime that suppressed criticism and the voicing of safety concerns. In the week between the launching of Columbia and its fiery breakup, several lower-ranking engineers expressed concern about damage from the foam impact during liftoff, but their input was ignored, and top officials rejected a request that US spy satellites be used to inspect the shuttle’s underside.

In the wake of the report of the board investigating the Columbia disaster, NASA appointed a task force headed by Richard Covey and Thomas Stafford, both former astronauts, to monitor progress in compliance with the

report’s 15 major recommendations.

The seven astronauts scheduled to fly aboard Discovery said they wanted assurances from the task force before going ahead with the launch. At a press conference last month at the Johnson Space Center, mission commander Eileen Collins said, “If we ever get to the point where a recommendation is not fulfilled in anyone’s mind, we are not going to fly until we are ready to fly.” She added, “We learn more by taking risks [but] we don’t want to take silly risks.”

But by mid-April, the Covey-Stafford group said that only eight of the major safety recommendations had been implemented. They canceled a public hearing scheduled for March because NASA had not supplied the required data. Last week, a final session of the task force with NASA officials, scheduled for May 4-6, was postponed indefinitely.

In his first news conference after being installed as NASA administrator, Michael Griffin said the Discovery might take place without final approval by the Covey-Stafford task force. “I don’t believe that technical decisions are a voting matter,” he said. “Stafford-Covey will have their criteria; the line managers in charge of the program will have theirs.”

The real issue, however, is political. The Bush administration has placed considerable pressure on NASA to resume space shuttle flights, as part of its emphasis on space as the “high ground” in military operations. The enormous lifting capacity of the space shuttle has been utilized primarily for placing sophisticated satellites in orbit to provide military surveillance and intelligence.

This is what underlies the grandiose White House proclamations about resuming manned space flight operations to the Moon and ultimately Mars: scientific exploration for its own sake, which can be accomplished far more effectively by instruments carried on unmanned probes, is being downgraded in favor of the manned flights required to make use of space for military purposes.



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