Shuttle Disaster Puts NASA Plans in Tailspin

Like a comet of ill omen, the bright white streak of the disintegrating Columbia space shuttle against the blue Texas sky heralded not only disaster but also an unwelcome era for thousands of engineers and scientists around the globe. Beyond the terrible human toll, the 1 February disaster abruptly halted construction of the international space station, cripples life and physical sciences research, and calls into question NASA’s plans to move beyond Earth’s orbit.

The calamity’s timing is bitterly ironic. After a year in charge, NASA Administrator Sean O’Keefe had just set a new agenda for the agency and won the White House stamp of approval. The 2004 budget request, released 48 hours after Columbia’s destruction, envisions a small, winged vehicle to serve as an alternative to the aging shuttle fleet. A host of technology programs would lay the foundation for more aggressive exploration of the solar system — by robots as well as humans. Now the space agency’s focus is far less visionary and far more immediate. “We must find what went wrong, fix it, and move on,” said a shaken William Readdy, NASA space-flight chief. “We must find what went wrong, fix it, and move on.”

early analysis of the calamitous breakup of Columbia focused on an incident that took place 80 seconds after launch, when a piece of foam insulation from the shuttle’s massive external tank bounced off the shuttle’s left wing. But the full story likely will take weeks, months, or even years to emerge. Work has begun on what NASA shuttle chief Ronald Dittemore calls the “painstakingly laborious task” of piecing together all the flight data, orbiter components, and ground-based observations to come up with a coherent picture. An internal NASA team is coordinating that effort. Meanwhile, a panel composed primarily of military personnel along with several NASA officials, led by retired Navy Admiral Harold Gehman Jr., will conduct a review of the events that led to the accident.

The investigation may have widespread consequences. “We have to be concerned about the policy aspects and what is the future of human space flight,” says Representative Sherwood Boehlert (R–NY), chair of the House Science Committee. The issues will range from whether NASA has gone too far in privatizing operation of the shuttle to whether O’Keefe’s push for advanced technology now makes sense. Boehlert’s panel, along with a half-dozen others, will want to weigh in on where a post-Columbia program should go. Virtually every part of NASA will doubtless be examined, reviewed, and rethought.

Challenger’s shadow

This week, as they did 17 years after the Challenger disaster, politicians were quick to express their backing for human space flight. Both Administration and congressional officials agree that more money now will flow NASA’s way. (After Challenger, the agency’s budget doubled over 5 years—not including the $2.1 billion spent on an orbiter replacement.) How much will be spent this time, and for which programs beyond the shuttle, remain to be seen. The recession and ballooning deficits will impose limits. “The world is different,” notes Norrine Noonan, a member of the NASA Advisory Council who worked on NASA issues at the White House in Challenger’s aftermath. “We didn’t have a war looming, the ‘Evil Empire’ was still around, and terrorism was not the national threat.”

There also was not a half-built space station in orbit. Thanks to Russian resupply and crew-transfer vehicles, the shuttle disaster poses no immediate crisis for the crew of three on the international space station. “We are OK for the near term,” says Michael Kostelnik, NASA shuttle and station director. Supplies and life-support materials are plentiful enough until May and June, he said. But with the shuttle fleet grounded, station construction is on hold. O’Keefe had set a goal of February 2004 to complete work on the basic structure of the space station—called “core complete”—and construction had been proceeding well. Just as important, NASA had finally come to grips this past autumn with the station’s mounting costs. Agency officials were confident—until last Saturday—that they could move beyond core complete and build the remainder of the station, allowing for a crew of six or seven. The current crew of three is too small to conduct substantial science efforts, according to several panels that have recently reviewed the program.

NASA officials insist that three shuttles
are enough to complete work on the station. They may have to be enough. After Challenger, there were still substantial structural spares available. But today, spares are hard to come by, and NASA is in the midst of closing the Downey, California, facility where the orbiters were built and overhauled in favor of concentrating maintenance work at Kennedy Space Center.

More likely than replacing the shuttle, according to agency and congressional sources, NASA will put strong emphasis on an orbital space plane, a small, winged vehicle that could be launched from an expendable launch vehicle. That plane could serve as a rescue vehicle for the station, relegating the shuttle to cargo carrier. But the proposed vehicle has garnered little enthusiasm on Capitol Hill. “It’s not even on the level of view graphs,” sniffs one congressional staffer. And NASA doesn’t anticipate it would be available before 2012.

NASA this week asked for nearly a half-billion-dollar increase in its $15 billion budget for 2004, most of which would go to advanced propulsion and power programs and a human research initiative designed to create what O’Keefe calls “stepping-stones” for humans leaving orbit. Some of that technology would be used for an ambitious robotic mission to Jupiter’s three big, icy moons. But the focus on shuttle safety could drain enthusiasm—and money—from such efforts.

Scientists Mourn Many Losses

Plant biologist Fred Sack knew something was wrong when NASA officials began herding researchers at the Kennedy Space Center in Florida onto buses. “People knew it didn’t look good; it took a while to sink in, and then, one by one, people started crying.” Instead of greeting the Columbia’s return, scientists such as Sack are confronted with a double loss—that of astronauts they knew personally and the data they had worked so hard to collect.

Columbia was a flying Noah’s ark of rats, crickets, and fish for biological studies, and it also was packed with experiments for a dozen other disciplines. The seven astronauts worked around the clock for 16 days to complete a multidisciplinary research program involving 32 payloads and 52 investigations put together by more than 70 researchers from more than a dozen nations. A quarter of the total scientific payloads were European, ranging from studies of pulmonary and cardiovascular health in orbit to protein crystallization. More than 100 European investigators had set up camp at the nearby Florida Institute of Technology. “All the biology experiments relied on samples returned to us” at the end of the mission, says Enno Brinkmann, the European Space Agency’s senior biologist, who was in Florida awaiting Columbia’s return. “It was a total loss for biology.” Sack, from Ohio State University in Columbus, was studying the effects of gravity on moss growth.

Others were more fortunate. “We did the experiment, and we got almost all of our data relayed to the ground to do the analysis,” says Robert Berg, a physicist at the National Institute of Standards and Technology in Gaithersburg, Maryland. The computers containing the data on his study of xenon in microgravity were impounded as part of the investigation, but he was confident they would be returned soon. In addition, Earth-observation pictures, including those taken of dust storms by Israeli astronaut Ilan Ramon, were downloaded before Columbia’s loss.

“We were able to get a tremendous amount of data back,” says William Readdy, NASA’s space-flight chief. “There will be a tremendous scientific harvest from this mission.” And that, he adds, is a fitting memorial.

With reporting by Daniel Clery, David Malakoff, and Elizabeth Pennisi.

Research disaster

Along with taking the lives of seven astronauts, the disaster destroyed the only space shuttle outfitted for conducting dedicated science missions. The remainder of the fleet is set aside exclusively for building the $100 billion space station with its Russian, European, Japanese, and Canadian partners. In Columbia’s hold was a unique $100 million research module called Spacehab, which served as the focus for the mission’s 59 scientific experiments performed during the 16-day mission (see sidebar). No other shuttle science missions were officially planned, but researchers were hoping to convince NASA to conduct at least one more. “This is the end of an era; Columbia was the only thing available for research other than the space station,” says Joan Vernikos, former head of NASA’s biological research program.

But Mary Kicza, the new chief of biological and physical sciences, and her staff already are looking at alternatives, including placing experiment equipment aboard Russian Progress modules. And NASA may gain new interest in European talks with Russia about launching automated capsules, called Foton, which can conduct space-based experiments and parachute back to Earth.

The Russian Space Agency may provide the European Space Agency (ESA) with two Foton flights, one for biology and one for physical sciences. The first could fly as early as 2004, with a second following in 2006, says Werner Rieselmann, head of microgravity payloads at ESA’s facility in Noordwijk, the Netherlands. Other cooperative efforts are likely to blossom as NASA scrambles to keep the space station functioning and the research community from walking away—assuming that there is additional money.

Everything hinges on how long it takes to understand the Columbia failure, and then how long it will take to make any modifications to the shuttle fleet. “Our journey into space will go on,” President George W. Bush pledged hours after the incident. What form that journey will take depends on the results of the accident investigation under way.

With reporting by Charles Seife and Daniel Clery.