

**Statement of Sean O'Keefe, Administrator  
National Aeronautics and Space Administration**

**Joint Hearing of the Senate Commerce, Science and Transportation Committee and  
the House Science Subcommittee on Space and Aeronautics**

**February 12, 2003**

Good morning.

Thank you Mr. Chairman (Senator McCain), Chairman Boehlert, I appreciate the opportunity to appear before this hearing of the Senate Commerce, Science and Transportation Committee and the House Science Subcommittee on Space and Aeronautics to discuss the tragic loss of the courageous crew of the Space Shuttle *Columbia*, the on-going investigation into this tragedy, and the implications of the loss of *Columbia* to the nation's space exploration efforts.

This morning, eleven days after the accident, our work continues to honor the solemn pledge we've made to the astronaut's families and to the American people that we will find out what caused the loss of the *Columbia* and its crew, correct what problems we find, and do our utmost to make sure this never happens again.

We welcome the joint committee's interest in working with NASA to determine how we can learn from this tragic accident so that we may continue advancing the Nation's research and exploration objectives in space while at the same time striving to ensure that we make human spaceflight as safe as possible.

Throughout NASA's forty-five years of serving the public interest, Congress has been our partner, helping us achieve the goals outlined in NASA's congressionally authorized charter. This charter compels NASA to:

- Explore, use, and enable the development of space for human enterprise.
- Advance scientific knowledge and understanding of the Earth, the Solar System, and the Universe and use the environment of space for research.
- Research, develop, verify, and transfer advanced aeronautics, space, and related technologies.

With the support of Congress, NASA has amassed a record of significant achievements that have tangibly improved the lives of all Americans. And when we have erred, you have helped us right our course.

This morning you'll be asking tough questions. And that's as it should be. Believe me, none of the questions you will ask can be any tougher than those we are asking ourselves.

I can assure you, however, that whatever determinations are reached regarding the cause of the accident, you will find that complacency is not one of them. An ethos of safety is evident throughout the agency. For example last year we temporarily halted Shuttle flight operations when tiny cracks of less than two inches were discovered in metal liners used to direct the fuel flow inside propellant lines on two separate orbiters. We did not fly again until that problem was corrected. Now to signal our continuing commitment to rewarding such diligence, we also made it a point to praise a very young examiner, a fellow named David Strait, a young contractor employee who discovered the cracks. Other flight decisions made throughout the year were made with the goal of operational safety being paramount. And from working with the dedicated employees who keep the Shuttle flying safely I know they have the utmost regard for the enormity of that duty.

This week, at NASA Centers throughout the country and in the field, with the support of more than 2000 people from more than 20 federal agencies, state and local organizations, the important work of data analysis and recovery operations is continuing. We should all be extremely proud of the work that is being conducted by these dedicated public servants. President Bush observed last week, “The people of NASA are being tested once again. In your grief, you are responding as your friends would have wished—with focus, professionalism, and unbroken faith in the mission of this agency. Captain (Dave) Brown was correct: America’s space program will go on.” We intend to maintain that professionalism he referred to, until we reach conclusion and beyond.

This morning, to help frame our discussion, I’d like to review for you the significant actions NASA has taken since the morning of the accident in accord with our contingency plan. In addition to articulating notification or first response procedures, defining the roles and responsibilities of mishap response and mishap investigation teams, the plan specifies selection of persons outside of NASA to head an independent, seasoned accident investigation team.

And while we did not foresee this tragedy, our response has unfolded as we had planned and prepared for in that contingency plan that we had hoped to never have to activate. This plan was one of the many positive outcomes from the terrible loss of the Space Shuttle *Challenger* seventeen years ago. So we developed the plan shortly after that and have updated it before every flight. And a contingency was simulated for this very event just three months ago.

### **First Response: Saturday February 1, 2003**

When we first became aware of the problems with STS-107, I was waiting at the Space Shuttle Landing Strip at the Kennedy Space Center at Cape Canaveral on Saturday morning, February the first. At 8:59 a.m. eastern time, we lost communications with the *Columbia*.

At 9:16 the countdown arrival clock reached zero and there was no signal or sign of the *Columbia*. Captain Bill Raddy, our Associate Administrator for Space Flight, and a

former astronaut, declared a spaceflight contingency and activated the Recovery Control Center at the Kennedy Space Center.

At that point, Bill Readdy and I departed the landing strip and headed to the Launch Control Center.

We arrived at the Launch Control Center thirteen minutes later. At 9:29 a.m. we activated the Contingency Action Plan for Space Flight Operations. Through the White House Situation Room, we notified the President as well as other senior staff of the loss of communication. In addition, members of Congress and the Government of Israel were notified. Homeland Security Secretary Tom Ridge and the National Security Council were also made aware of the situation and were present there in the Situation Room that morning. Secretary Ridge then began assessing the possibility that this situation was terrorism-related. Shortly after, he made a determination that it was highly unlikely terrorism was involved. Secretary Ridge then announced that the Federal Emergency Management Agency would be the lead Federal agency for the recovery effort on the ground.

Meanwhile, the family members of the *Columbia* astronauts were escorted from the landing strip to the astronaut's crew quarters. Later that morning, at about 11:30, we met with the families at the crew quarters at Kennedy Space Center to express our condolences, offer any and all support we could give, and assure them that we would offer that support throughout this entire ordeal, and stated our commitment to find the cause of the accident, fix the problems we find, and continue the work that their loved ones had started.

Data at all the NASA sites and contractors were impounded at 10:00 a.m. and the Headquarters Action Team in Washington, D.C. was activated with NASA personnel moving immediately to their duty stations.

By 10:30, an hour after the contingency plan had been activated, the Mishap Response Team convened to assess the preliminary data and focus on the location of the crew compartment through the Rescue Coordination Center at Langley Air Force Base in Virginia. The Rapid Response Team was activated for deployment to Barksdale AFB in Louisiana that day.

### **Columbia Accident Investigation Board**

The process of initiating the Columbia Accident Investigation Board began about 10:30 a.m. on Saturday, February 1st, one hour after the contingency plan was activated. I placed a call to NASA Deputy Administrator Fred Gregory, again also a former astronaut, who was at NASA Headquarters in Washington. Mr. Gregory then began calling the Columbia Accident Investigation Board members, which are specified by position in the contingency action plan.

At 1:15 p.m. that afternoon I made a brief televised statement expressing our “national regrets” for the tragic accident and informed the public about the appointment of the Columbia Accident Investigation Board.

The Accident Investigation Board was formally activated during the NASA Mishap Investigation Team teleconference which occurred at 5:00 p.m. that afternoon, Saturday, February 1<sup>st</sup>, less than eight hours after the event.

By 6:00 p.m. during a teleconference with the White House Situation Room, we briefed officials from the Department of Homeland Security, the Federal Emergency Management Agency, the Department of Defense, the FBI, and the Federal Aviation Administration about the current status of the accident investigation.

At 6:40 that evening staff members of the National Transportation Safety Board departed Washington and traveled to Barksdale Air Force Base in Louisiana to assist as part of the Mishap Investigation Team. That day. They were later made available to the Columbia Accident Investigation Board.

On Sunday, February the second, the Accident Investigation Board, chaired by retired U.S. Navy Admiral Hal Gehman, held its first meeting at Barksdale AFB, less than 30 hours after the accident. We also began the practice of twice daily briefings at Headquarters in Washington and at the Johnson Space Center in Houston.

Membership in the Columbia Accident Investigation Board consists of persons selected for their positions in heading civil and military offices with responsibilities for aerospace safety accident investigations and related skills. Many have been chief investigators on major accidents and between them the Board members have the experience of some 50 major investigations to draw upon. Quite simply, the people who are now on the Board are some of the best in the world at what they do, and they were activated immediately.

You have our assurance that this distinguished Board will be able to act with genuine independence. When the Board assembled, it modified its Charter to eliminate any reference to NASA directing the administration of the investigation. So the framework that was contained in the contingency plan was modified and will continue to be to assure the independence of this board. NASA accepted the changes to the Charter without objection, as I will continue to do in the future as well for any changes they propose. Further, the NASA Inspector General, Robert Cobb is an observer on the Columbia Accident Investigation Board, having arrived on Monday, February 3<sup>rd</sup>. He will help assure the independence of the Board as he reports both to the President and to the Congress under the terms of the Inspector General Act.

There are some additional details about the Columbia Accident Investigation Board and its activities that I think are important to note. The Board has taken over hardware and software releases of NASA so that we cannot alter anything unless the Board approves. We have already begun to honor document requests from the Board, as we have all along, and have also supplied additional documents to the Board which were not requested but

we believe may be helpful to their work as we move along. And finally, the Board has instructed NASA to conduct a fault tree analysis that it intends to independently validate to look at all the possible causes that could have occurred and to examine those in a very methodical way, which they then in turn will independently validate.

## **Recovery Operations**

On Sunday, the NASA Mishap Investigation Team was on the ground and working with local officials in Texas and Louisiana. The State of Texas activated 800 members of the Texas National Guard to assist with the retrieval of debris. And I'm eternally grateful to Gov. Rick Perry for his immediate response within hours of our request.

By Tuesday, there were nearly 200 NASA and NASA contractor personnel working recovery operations in Texas, Louisiana, Arizona, and California. They were part of the more than 2000 people from Federal Emergency Management Agency, Environmental Protection Agency, FBI, the Department of Defense, the Department of Transportation, U.S. Forest Service, Texas National Guard, Louisiana National Guard, and state and local authorities working to locate, document, and collect debris.

By Wednesday, the astronauts' remains were transported to Dover Air Force Base in Delaware. At Dover, NASA Deputy Administrator Fred Gregory, a former astronaut, and a ceremonial honor guard were present to pay our respects to the seven fallen astronauts.

Throughout the week, we were able to make steady progress in our effort to recover debris from the accident. We have thus far recovered upwards of 12,000 elements of debris. The search effort, as you know from our press conferences, is a large, complex and on-going effort with hundreds of square miles, with challenging weather and terrain conditions. Indeed, the graphic that's up now is that 500-mile swath from the Dallas-Ft. Worth area to just south of Shreveport, Louisiana and in and around the Lufkin, Texas area. We are very grateful that no one was injured on the ground as a result of flying debris from the accident and we are working with our agency partners to assure recovery operations remain safe as we continue this effort.

Throughout the course of this activity I've also briefed the President and the Vice President on a near daily basis to advise and apprise them of all the progress we're making as well as the cooperation of all the Federal agencies who have been extremely participating in this effort.

The Federal Emergency Management Agency command post was set up in Lufkin, Texas on Saturday, the first of February, and has been operating non-stop since then. Debris collection activities began at Barksdale Air Force Base on Sunday, February the second. Yesterday, we began transporting debris on trucks to the Kennedy Space Center where they will be assembled and analyzed as part of the comprehensive accident investigation directed by the Gehman Board. I visited Texas and Louisiana this past Saturday to get my own assessment of the operation and more importantly to personally thank the

volunteers in addition to all the Federal, state and local public servants who have been working so tirelessly to support the debris recovery effort.

### **Space Shuttle Status**

Let me touch briefly on the Space Shuttle fleet as it is today. *Discovery* is continuing to undergo major inspections and upgrades which will be completed by April of 2004. *Atlantis* is currently assembled and stacked in the Vehicle Assembly Building at the Kennedy Space Center for STS-114 the next mission due to have or planned to have been flown. *Endeavor* the third of the orbiters, is in the Orbiter Processing Facility and being prepared for STS-115 which was scheduled a couple months later.

The next Shuttle mission, STS-114, was to have been to the International Space Station in March. That mission, commanded by Col. Eileen Collins, U.S. Air Force, and I met with her on Friday to further advise that the mission is on hold until we understand the causes of the Columbia accident and are able to resolve any issues identified. At this time we don't know how long it will be before we can resume Shuttle flights. We will only know when the Columbia Accident Investigation Board concludes its work and presents its findings to all of us.

*Columbia* was the first Orbiter in the Shuttle fleet, having flown 28 successful missions or just over a quarter of its certified life of 100 flights. In February 2001, a little over a year ago, *Columbia* completed a major scheduled eighteen-month overhaul and update of its systems, a process we call Orbiter Major Modifications. The STS-107 mission was *Columbia's* second flight following that major overhaul and a successful servicing mission that had been conducted—the first one was to the Hubble Space Telescope in March 2002. So this was the second flight after it had been nearly completely rebuilt.

Prior to the loss of *Columbia* and her crew, the projected Shuttle flight rate was five per year starting in 2004, and funding is requested for that flight rate in the budget the President just submitted last week. The flight rate will be adjusted as needed of course once we determine when we can return to flight safely.

### **International Space Station Status**

The crew of the International Space Station is of course deeply saddened by the loss of *Columbia* and her crew – as are all of our partners and people around the world. I spoke with International Space Station crew members Ken Bowersox, the commander, United States Navy, Don Pettit, who's our science officer aboard, and Nikolai Budarin who's a cosmonaut engineer on Sunday, February 2<sup>nd</sup> for the first time in our discussion to inform them about the accident and how we are proceeding. Despite the tragedy, the crew is continuing its busy schedule of work.

The day after the loss of STS-107, our Russian partners conducted a successful planned launch of an unmanned, autonomous Progress resupply vehicle to the Station. The

provisions carried on Progress 10P should provide the crew sufficient supplies to maintain normal operations through June 2003 in the summer.

Progress resupply flights to the International Space Station by our Russian partner will continue as scheduled. The next flight is scheduled for June, 2003. We are working with Rosaviakosmos, the Russian Aviation and Space Agency officials, to determine what we want to place on the flight to make sure we make the best use of the space available. In addition, a regularly scheduled Soyuz crew transport vehicle exchange is planned already for launch in April 2003 as it had been prior to February 1<sup>st</sup>.

Study teams formed almost immediately after the accident to assess the impact on the International Space Station. These teams are focused on how we will first sustain the Station; second, continue to assemble the Station, as it is not yet complete; and third, maximize the utilization of this unique research platform. We have kept our International Space Station partners informed of our recovery efforts. Further, we met with our international partners just last week and continue to each day and plan future meetings in the weeks ahead to develop an International Space Station partner plan.

We can maintain a permanent crew on the International Space Station as long as is necessary with support from Soyuz and Progress flights. The International Space Station is stable and has sufficient propellant to maintain its orbit for at least a year without support from the Space Shuttle. But the nearer term issue for crew support beyond June is water. The International Space Station cannot support a crew of three after June with the currently planned support from Progress. As a consequence, we are discussing with our international partners the possibility of changing the April Soyuz flight from a taxi mission to a crew exchange mission, as well as the feasibility of adding Progress resupply flights. I want to really emphasize that there have been no decisions made and we are examining all options at present.

I have talked to the Expedition Six crew that Captain Bowersox now commands now on-orbit, and they have expressed determination and desire to do what ever is necessary to continue their research and deal with any changes in the crew rotation schedule that may be necessary.

### **Integrated Space Transportation Plan**

As we look forward to determine our Nation's best course of action in responding to the *Columbia* accident, I'd like to point out that NASA has developed an Integrated Space Transportation Plan, which was submitted by the President to the Congress in November as an amendment to the Fiscal Year 2003 federal budget. So three months ago, that plan was presented at that time. The Integrated Space Transportation Plan can help us address many of the near term issues we are facing, even though it was developed prior to the loss of *Columbia*.

The plan reflects the tight coupling required across the Space Station, Space Shuttle, and the Space Launch Initiatives. It is intended to ensure that necessary access to the

International Space Station can be supported for the foreseeable future. It consists of three major program elements: the Space Shuttle, the Orbital Space Plane, and Next Generation Launch Technology.

- This new plan makes investments to **extend Shuttle's operational life** for continued safe operations.
- The Orbital Space Plane is designed to **provide a crew transfer capability as early as possible** to assure access to and from the International Space Station.
- And The Next Generation Launch Technology Program **funds next generation reusable launch vehicle technology** in areas such as propulsion, structures, and operations.
- This initiative will focus on the Orbital Space Plane and Next Generation Launch Technology, including Third Generation reusable launch vehicle efforts.

Now the 2003 budget amendment that the President submitted last November, 2002 also proposed adding funds to International Space Station reserves to assure that we could successfully reach the milestone of U.S. core complete and maintain progress on long-lead items for enhanced research aboard the Space Station and the continued build out of that remarkable research laboratory platform.

### **Science and Research Objectives**

Space flight is a means to an end and at NASA that end is research, exploration, discovery and inspiration. The crew of STS-107 were engaged in a wide array of scientific research that could be conducted nowhere else but in space, and had significant potential benefits for the public. Columbia's crew took great pride in their research aimed at fighting cancer, improving crop yields, developing fire-suppression techniques, building earthquake-resistant buildings, and understanding the effects of dust storms on weather. As was reported by the media, "*Columbia* had a cargo of human ingenuity."

The crew of the International Space Station is also conducting research now that cannot be conducted anywhere else. Thus far, more than sixty experiments spanning across such scientific disciplines as human physiology, genetics, plant biology, earth observations, physics, and cell biology have been conducted on the International Space Station. From these experiments scientists are learning better methods of drug testing, and about dynamic models of human diseases, the physics of fundamental processes in manufacturing, antibiotic synthesis, and changes in Earth climate, vegetation, and crops.

The International Space Station is the centerpiece initiative of human space flight at NASA. Our objectives in this regard are very clear. First, we will keep on-orbit International Space Station crews safe. Second, we intend to keep the International Space Station continuously occupied in order to assure the reliability of the Station itself. And third, we intend to return to assembly as soon as we are able to return the shuttle fleet to safe operations, and complete the research goals set for ourselves and our international partners.

To accomplish these aims, we need to create a long-term crew return capability to complement and augment the Soyuz vehicles now provided by our Russian partners. We intend to build that new return capability to create a new crew transfer system that will allow us to rotate crews on the International Space Station independent from the Space Shuttle.

We also firmly believe that extending the operational life of the remaining Shuttle fleet is a good investment because it will help maximize the science return from the International Space Station.

We designed our Integrated Space Transportation Plan to ensure that we had the coordinated resources to exploit the unique research environment of space and the International Space Station in the near, mid-, and long-term. We thought the plan was a good one when we proposed it and we believe that it is not only valid today but even more compelling to pursue. While we believe this plan is a good one we will reexamine as necessary in light of the investigative findings of *Columbia*.

## **Moving Forward**

Just over a week ago – although it seems more like a lifetime – the President spoke so eloquently and powerfully at the Johnson Space Center Memorial Service in Houston, Texas. And he said:

"The cause of exploration and discovery is not an option we choose; it is a desire written in the human heart. We are that part of creation which seeks to understand all creation. We find the best among us, send them forth into unmapped darkness, and pray they will return. They go in peace for all mankind, and all mankind is in their debt."

The noble purposes described in the President's words frame all that we do and how we do it. These purposes drive our mission goals, which are:

To understand and protect our home planet; To explore the Universe and search for life; and, To inspire the next generation of explorers as only NASA can.

And even while our nonstop work to recover from this terrible tragedy and to continue safe operations on the International Space Station will be our chief focus in the days and weeks and months ahead, the American people should know that we will also press ahead with our other activities to achieve these important goals.

This Centennial of Flight year we are launching the Mars Exploration Rovers, the Mars Express spacecraft, the Space InfraRed Telescope Facility, and a number of Earth Science spacecraft and instruments, as well as continuing our work to help improve aviation security on behalf of our Homeland Defense.

In these activities and in all we do at NASA, we strive for unmatched excellence. And when it comes to human space exploration, those margins are razor thin. And we know we are graded on an extremely harsh curve. For us, ninety-six percent to ninety-nine percent is not an "A." One hundred percent is the minimum passing grade.

Despite this harsh truth, we know the lesson from this terrible accident is not to turn our backs on exploration because it is hard or risky. John Shedd once said about the age of ocean exploration, "A ship in safe harbor is safe, but that is not what ships are built for." Human history teaches us that in exploration, after accidents like this occur, we learn from them and further reduce risks, although we must honestly admit that risks can never be eliminated. President John F. Kennedy observed once some 41 years ago, speaking about our fledgling space program at that time, "All great and honorable actions are accompanied with great difficulties, and both must be enterprised and overcome with answerable courage."

The immediate task before our agency is clear. We will find the problem that caused the loss of *Columbia* and its crew, we will fix it, and we will return to flight operations that are as safe as humanly possible in pursuit of knowledge. We have no preconceptions about what caused the failure was or what it will take to make sure it never happens again. We have an independent accident investigation board of truly outstanding and eminently qualified individuals and they, and only they alone, will determine the cause of the accident and its remedy - no matter where it leads. We are ready and willing to support the addition of any experts that Admiral Gehman deems necessary to the effective conduct of the Board's investigations.

Part of my job as Administrator is to remind folks of what NASA does and what we are capable of doing. It's a responsibility I take very seriously. At the same time I am saddened beyond words for the loss of the seven outstanding men and women of STS-107, I am also very proud and humbled by the focus, dedication and professionalism of the NASA family and all those throughout the country who are assisting in this challenging recovery effort.

Today, February 12 is also the birthday of President Lincoln. And some of his words, spoken for an entirely different purpose, have come to mind this past week:

"It is rather for us to be here dedicated to the great task remaining before us – that from these honored dead we take increased devotion to that cause for which they gave the last full measure of devotion."

We have an opportunity here and now to learn from this loss, and renew the boundless spirit of exploration present at NASA's beginning. We will do this by being accountable to the American people for our failings and, we hope, credible and compelling in pursuit of research, exploration, and inspiration for future generations.

Finally, during the 16-day STS-107 mission we had no indication that would suggest a compromise to flight safety. The time it has taken me to present this testimony is about the same amount of time that transpired between when Mission Control first noticed anomalies in temperature measurements and the accident.

I just paused for a few seconds. That's the same amount of time that transpired from Mission Control's last communication with the crew and our loss of signal with the heroic *Columbia* astronauts.

May God bless the crew of STS-107.

Chairman McCain, Chairman Boehlert, thank you all very much for your attention.