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STS-107

Report #21

Monday, Feb. 3, 2003 - 7:00 p.m. CST

Mission Control Center, Houston, Texas

NASA engineers continued to review data and recover debris from the Space Shuttle Columbia today as the analysis of what caused the orbiter to break up Saturday en route to landing continued.

Space Shuttle Program Manager Ron Dittmore told an afternoon briefing that several teams of engineers are making progress in their study of data and video from Columbia's launch and entry, but cautioned that it is a "massive job" requiring round-the-clock efforts to piece together the events that led to a loss of communications with the Shuttle over north central Texas 16 minutes prior to touchdown.

Still, Dittmore said NASA would pause Tuesday for a memorial ceremony at the Johnson Space Center at 1:00 p.m. EST to honor the lives and the memory of Columbia's astronauts, Rick Husband, William McCool, Dave Brown, Kalpana Chawla, Mike Anderson, Laurel Clark and Ilan Ramon. President and Mrs. Bush will join NASA Administrator Sean O'Keefe at JSC for the memorial which is closed to the public, but which will be broadcast on NASA Television.

Dittmore said the memorial represents an opportunity to take time to remember the sacrifice of the astronauts, to mourn them and to "remember our friends."

Dittmore offered additional and refined information regarding the timeline of events that led to Columbia's breakup on Saturday (all times CST):

- At 7:52 a.m. CST, three-left main gear brake line temperature sensors showed an unusual rise in the left wheel well area.
- At 7:53 a.m., a fourth left brake line strut actuator temperature sensor showed a 30-40 degree rise in temperature over a five-minute period,

slightly higher than reported yesterday.

- At 7:55 a.m., A fifth left brake line main gear sensor showed a sharp rise in temperature.

- At 7:57 a.m., left wing temperature sensors failed "off-scale low", meaning no further data was being received on the ground.

- And at 7:59 a.m., just before communications was lost with Columbia, there was evidence of drag on the aerosurfaces of the left wing, causing two out of four yaw steering jets in that area of the Shuttle to fire for 1.5 seconds to counteract the increased drag.

Dittemore said more time will be needed to retrieve an additional 32 seconds of data acquired by ground computers after communications was lost with Columbia to see if it is useful to the inquiry. He said engineers would go directly to the Tracking and Data Relay Satellite System ground station hub in White Sands, New Mexico to collect and analyze that data in its pristine form.

Although the investigative teams have a "high interest" in the left hand wheel well area of Columbia, Dittemore cautioned that a temperature increase there does not indicate that a structural problem occurred as a factor in the vehicle's breakup. In fact, Dittemore said the data suggests that "something else" may have been happening at the time, not indicative of a structural breach.

Responding to inquiries regarding a piece of foam insulation which fell off Columbia's external fuel tank about 80 seconds after launch that struck the left wing of the Shuttle, Dittemore said imagery analysis showed that the foam measured about 20 inches by 16 inches by 6 inches and weighed about 2.67 pounds. He reiterated that engineering analysis conducted during the flight concluded for NASA managers that although the foam might have caused some structural damage to the wing area, it would not have been sufficient to cause a catastrophic event.

"There is some other missing link contributing to this event," Dittemore said. "We are extremely interested in seeing any debris that may have fallen upstream of the main impact area," referring to any additional debris which might be recovered in an area to the west of Texas.

Earlier today, former President George H.W. Bush and Mrs. Barbara Bush visited the International Space Station flight control room at the Johnson Space Center, Houston, TX to pay their respects to the flight controllers and to the Expedition 6 crew aboard the orbital complex.

The former president told Expedition 6 Commander Ken Bowersox, Flight Engineer Nikolai Budarin and NASA ISS Science Officer Don Pettit that President Bush relayed his "full confidence in the space program" in a conversation with the elder Bush Sunday. The former president told the

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crew the men and women of NASA were showing "great courage" in the wake of the accident.

Bowersox, Budarin and Pettit spent the day preparing for the docking of a Russian Progress resupply vehicle to the ISS Tuesday at 9:50 a.m. EST. The new cargo ship, which contains a ton of food, fuel and supplies for the crew, was successfully launched Sunday from the Baikonur Cosmodrome in Kazakhstan. NASA TV coverage of the Progress docking to the ISS begins at 9 a.m. CST Tuesday.

The next STS-107 Accident Response briefing will be held on Tuesday, Feb. 4 at NASA Headquarters in Washington at 4:30 p.m. EST. Status reports will be issued as developments warrant.

NASA TV is on AMC-2, Transponder 9C, vertical polarization at 85 degrees west longitude, 3880 MHz, with audio at 6.8 MHz.

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Report #03-044

SHUTTLE COLUMBIA ACCIDENT PRESS CONFERENCE SCHEDULE CHANGED

Robert Mirelson

Headquarters, Washington February 3, 2003

(Phone: 202/3580-1600)

Eileen Hawley

Johnson Space Center, Houston

(Phone: 281/483-5111)

RELEASE: 03-044

SHUTTLE COLUMBIA ACCIDENT PRESS CONFERENCE SCHEDULE CHANGED

The press conference schedule for Tuesday, Feb. 4, 2003 has changed.

There will not be a NASA Headquarters press conference at 11:30 a.m. EST on Feb. 4. It has been cancelled out of respect for the Space Shuttle Columbia crew memorial service and to allow NASA employees to watch the tribute.

There will not be a 4:30 EST press conference at the Johnson Space Center tomorrow. The 4:30 EST press conference for Feb. 4, 2003 will be in the NASA Headquarters auditorium, 300 E Street SW, Washington.

The press conference will feature questions from reporters at participating NASA centers and will be broadcast live on NASA Television. There will be an 11:30 a.m. EST press conference at NASA Headquarters and a 4:30 p.m. press conference at the Johnson Space Center on Wednesday, Feb. 5, 2003.

NASA TV is available on AMC-2, transponder 9C, C-Band, located at 85 degrees west longitude. The frequency is 3880.0 MHz. Polarization is vertical and audio is monaural at 6.8 MHz.

Additional information is available on the Internet at:

<http://www.nasa.gov>

<http://spaceflight.nasa.gov>

-end-

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Date: Mon, 3 Feb 2003 12:37:10 -0500
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Robert Mirelson
Headquarters, Washington

February 3, 2003

RELEASE: 03-041

NASA ANNOUNCES CORRECTED PROCEDURE FOR FILING DAMAGE CLAIMS

NASA is accepting claims from individuals who may have suffered damage due to the Space Shuttle Columbia mishap. Any person desiring to file a claim should complete U.S. Government Standard Form 95, "Claim for Damage, Injury, or Death" and send it to the closest of these NASA offices.

Office of the Chief Counsel
NASA Johnson Space Center
Mail Code: AL
2101 NASA Road 1
Houston, TX 77058
(281) 483-3021

Office of the General Counsel
NASA Headquarters
Mail Code: G
300 E St., SW
Washington, DC 20546
(202) 358-2450

Office of Chief Counsel
NASA Stennis Space Center
Mail Code: CA00
Building 1100

Stennis Space Center, MS 39529
(228) 688-2164

For more information on filing a claim, including
downloadable forms, call any of the above offices or go to:

www.hq.nasa.gov/ogc/general_law/torttext.html

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Subject: NEWS CONFERENCE WITH INTERNATIONAL SPACE STATION CREW

Date: Fri, 7 Feb 2003 19:15:02 -0500

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Robert Mirelson

Headquarters, Washington Feb. 7, 2003

(Phone: 202/358-1600)

Eileen Hawley

Johnson Space Center, Houston

(Phone: 281/483-5111)

NOTE TO EDITORS: 03-013

NEWS CONFERENCE WITH INTERNATIONAL SPACE STATION CREW

Reporters will have a chance to discuss activities aboard the International Space Station with the Expedition 6 crew during a news conference on Tuesday, Feb. 11, starting at 9:34 a.m. EST. The news conference is expected to last about 35 minutes with available video and audio from the Station.

Expedition Six Commander Ken Bowersox, Flight Engineer Nikolai Budarin and NASA Station Science Officer Don Pettit are in the third month of their mission. Bowersox, Budarin and Pettit are continuing their scientific research on board the Space Station.

The news conference, which will be broadcast on NASA Television, will enable multi-center question and answer capability for reporters at NASA centers. NASA TV is on GE-2, Transponder 9C, vertical polarization at 85 degrees west longitude, 3880 MHz, with audio at 6.8 MHz.

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McCombs Mike L GS-14 30SW/SES, 11:17 PM 2/7/2003 +0000, FW: AF Photos on loss of shuttle

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Stark William H GS-13 14AF/SE
<William.Stark@vandenberg.af.mil>
Subject: FW: AF Photos on loss of shuttle
Date: Fri, 7 Feb 2003 23:17:29 -0000
X-MS-TNEF-Correlator:
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-----Original Message-----

From: Aulabaugh, Stanley E [<mailto:stanley.e.aulabaugh@lmco.com>]
Sent: Friday, February 07, 2003 12:39 PM
To: "Ol" George' Meyer (E-mail); Lacombe, George A; Mike McCombs (E-mail);
Bircher, Steven J; Michael. Pulgine (E-mail); Patzman, Laurence S
Subject: FW: AF Photos on loss of shuttle

-----Original Message

Air Force imagery confirms Columbia wing damaged
BY CRAIG COVAULT
AVIATION WEEK & SPACE TECHNOLOGY/aviationnow.com
PUBLISHED HERE WITH PERMISSION
Posted: February 7, 2003

High-resolution images taken from a ground-based Air Force tracking camera in southwestern U.S. show serious structural damage to the inboard leading edge of Columbia's left wing, as the crippled orbiter flew overhead about 60 sec. before the vehicle broke up over Texas killing the seven astronauts on board Feb. 1.

According to sources close to the investigation, the images, under analysis at the Johnson Space Center in Houston, show a jagged edge on the left inboard wing structure near where the wing begins to intersect the fuselage. They also show the orbiter's right aft yaw thrusters firing, trying to correct the vehicle's attitude that was being adversely affected by the left wing damage. Columbia's fuselage and right wing appear normal. Unlike the damaged and jagged left wing section, the right wing appears smooth along its entire length. The imagery is consistent with telemetry.

The ragged edge on the left leading edge, indicates that either a small structural breach -- such as a crack -- occurred, allowing the 2,500F reentry heating to erode additional structure there, or that a small portion of the leading edge fell off at that location.

Either way, the damage affected the vehicle's flying qualities as well as allowed hot gases to flow into critical wing structure -- a fatal combination.

It is possible, but yet not confirmed, that the impact of foam debris from the shuttle's external tank during launch could have played a role in damage to the wing leading edge, where the deformity appears in USAF imagery.

If that is confirmed by the independent investigation team, it would mean that, contrary to initial shuttle program analysis, the tank debris event at launch played a key role in the root cause of the accident.

Another key factor is that the leading edge of the shuttle wing where the jagged shape was photographed transitions from black thermal protection tiles to a much different mechanical system made of reinforced carbon-carbon material that is bolted on, rather than glued on as the tiles are.

This means that in addition to the possible failure of black tile at the point where the wing joins the fuselage, a failure involving the attachment

mechanisms for the leading edge sections could also be a factor, either related or not to the debris impact. The actual front structure of a shuttle wing is flat. To provide aerodynamic shape and heat protection, each wing is fitted with 22 U-shaped reinforced carbon-carbon (RCC) leading-edge structures. The carbon material in the leading edge, as well as the orbiter nose cap, is designed to protect the shuttle from temperatures above 2,300F during reentry. Any breach of this leading-edge material would have catastrophic consequences.

The U-shaped RCC sections are attached to the wing "with a series of floating joints to reduce loading on the panels due to wing deflections," according to Boeing data on the attachment mechanism.

"The [critical heat protection] seal between each wing leading-edge panel is referred to as a 'tee' seal," according to Boeing, and are also made of a carbon material.

The tee seals allow lateral motion and thermal expansion differences between the carbon sections and sections of the orbiter wing that remain much cooler during reentry.

In addition to debris impact issues, investigators will likely examine whether any structural bending between the cooler wing structure and the more-than-2,000F leading edge sections could have played a role in the accident. There is insulation packed between the cooler wing structure and the bowl-shaped cavity formed by the carbon leading-edge sections.

The RCC leading-edge structures are bolted to the wing using Inconel fittings that attach to aluminum flanges on the front of the wing.

The initial NASA Mission Management Team (MMT) assessment of the debris impact made Jan. 18, two days after launch, noted "The strike appears to have occurred on or relatively close to the "wing glove" near the orbiter fuselage.

The term "wing glove" generally refers to the area where the RCC bolt-on material is closest to the fuselage. This is also the general area where USAF imagery shows structural damage.

The second MMT summary analyzing the debris hit was made on Jan. 20 and had no mention of the leading-edge wing glove area. That report was more focused on orbiter black tiles on the vehicle's belly. The third and final summary issued on Jan. 27 discusses the black tiles again, but also specifically says "Damage to the RCC [wing leading edge] should be limited to [its] coating only and have no mission impact." Investigators in Houston are trying to match the location of the debris impact with the jagged edge shown in the Air Force imagery.

Columbia reentry accident investigators are also trying to determine if, as in the case of the case of Challenger's accident 17 years ago, an undesirable materials characteristic noted on previous flights -- in this case the STS-112 separation of external tank insulation foam debris -- was misjudged by engineers as to its potential for harm, possibly by using analytical tools and information inadequate to truly identify and quantify the threat to the shuttle. As of late last week, NASA strongly asserted this was not the case, but intense analysis on that possibility continues.

The shuttle is now grounded indefinitely and the impact on major crew resupply and assembly flights to the International Space Station remain under intense review.

Killed in the accident were STS-107 Mission Commander USAF Col. Rick Husband; copilot Navy Cdr. William McCool; flight engineer, Kalpana Chawla; payload commander, USAF Lt. Col. Michael Anderson; mission specialist physician astronauts Navy Capt. Laurel Clark and Navy Capt. David Brown and Israeli Air Force Col. Ilan Ramon.

"We continue to recover crew remains and we are handling that process with the utmost care, the utmost respect and dignity," said Ronald Dittmore, shuttle program manager.

No matter what the investigations show, there are no apparent credible crew survival options for the failure Columbia experienced. With the ISS out of reach in a far different orbit, there were no credible rescue options if even if wing damage had been apparent before reentry -- which it was not.

If, in the midst of its 16-day flight, wing damage had been found to be dire, the only potential -- but still unlikely -- option would have been the formulation over several days by Mission Control of a profile that could have, perhaps, reduced heating on the damaged wing at the expense of the other wing for an unguided reentry, with scant hope the vehicle would remain controllable to about 40,000 ft., allowing for crew bailout over an ocean.

Reentry is a starkly unforgiving environment where three out of the four fatal manned space flight accidents over the last 35 years have occurred.

These include the Soyuz 1 reentry accident that killed cosmonaut Vladimir Komarov in 1967 and the 1971 Soyuz 11 reentry accident that killed three cosmonauts returning after the first long-duration stay on the Salyut 1 space station.

The only fatal launch accident has been Challenger in 1986, although Apollo astronauts Gus Grissom, Ed White and Roger Chaffee were killed when fire developed in their spacecraft during a launch pad test not involving launch.

No other accident in aviation history has been seen by so many eyewitnesses than the loss of Columbia -- visible in five states.

Telemetry and photographic analysis indicate the breakup of the historic orbiter took place as she slowed from Mach 20-to-18 across California, Nevada, Arizona and New Mexico with the loss of structural integrity 205,000 ft. over north central Texas where most of the debris fell.

The science-driven STS-107 crew was completing 16 days of complex work in their Spacehab Research Double module and were 16 min. from landing at Kennedy when lost. Landing was scheduled for 8:16 a.m. CST.

Abnormal telemetry events in the reentry began at 7:52 a.m. CST as the vehicle was crossing the coast north of San Francisco at 43 mi. alt., about Mach 20.

The orbiter at this time was in a 43-deg. right bank completing its initial bank maneuver to the south for initial energy dissipation and ranging toward the Kennedy runway still nearly 3,000 mi. away.

That initial bank had been as steep as about 80 deg. between Hawaii and the California coast, a normal flight path angle for the early part of the reentry. The abnormal events seen on orbiter telemetry in Houston indicate a slow penetration of reentry heat into the orbiter and damage on the wing, overpowering the flight control system. Key events were:

- * 7:52 a.m. CST: Three left main landing gear brakeline temperatures show an unusual rise. "This was the first occurrence of a significant thermal event in the left wheel well," Dittmore said. Engineers do not believe the left wheel well was breached, but rather that hot gasses were somehow finding a flow path within the wing to reach the wheel well.
- * 7:53 a.m. CST: A fourth left brakeline strut temperature measurement rose significantly -- about 30-40 deg. in 5 min.
- * 7:54 a.m. CST: With the orbiter over eastern California and western Nevada, the mid-fuselage mold line where the left wing meets the fuselage showed an unusual temperature rise. The 60F rise over 5 min. was not dramatic, but showed that something was heating the wing fuselage interface area at this time. Wing leading edge and belly temperatures were over 2,000F. While the outside fuselage wall was heating, the inside wall remained cool as normal.
- * 7:55 a.m. CST: A fifth left main gear temperature sensor showed an unusual rise.
- * 7:57 a.m. CST: As Columbia was passing over Arizona and New Mexico, the orbiter's upper and lower left wing temperature sensors failed, probably

indicating their lines had been cut. The orbiter was also rolling back to the left into about a 75-deg. left bank angle, again to dissipate energy and for navigation and guidance toward Runway 33 at Kennedy, then about 1,800 mi. away.

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"Columbia, Houston, UHF comm. check" he repeated every 15-30 sec., but to no avail. In central Texas, thousands of people at that moment were observing the orbiter break up at Mach 18.3 and 207,000 ft.

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FW AF Photos on loss of shuttl

Investigation.

Theron M Bradley Jr., NASA's Chief Engineer; and Bryan D. O'Connor, NASA's Associate Administrator are providing NASA's support to the board for Safety and Mission Assurance.

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More information about NASA is on the Internet at:
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Buckingham-1, Bruce, 02:24 PM 2/10/2003 -0500, ASTRONAUT SPOUSES & CHILDREN RELEASE

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To: "1 'ksc-news_release@kscnews.ksc.nasa.gov' (E-mail)" <ksc-news_release@kscnews.ksc.nasa.gov>
Subject: ASTRONAUT SPOUSES & CHILDREN RELEASE STATEMENT
Date: Mon, 10 Feb 2003 14:24:48 -0500
X-Mailer: Internet Mail Service (5.5.2653.19)

Glenn Mahone/Robert Mirelson
Headquarters, Washington Feb. 08, 2003
(Phone: 202/358-1600)

RELEASE: 03-060

ASTRONAUT SPOUSES & CHILDREN RELEASE STATEMENT

The Astronaut Spouses Group released the following statement on Friday, Feb. 7.

"We, the spouses and children of the NASA astronaut corps, would like to thank the people of the world from the bottom of our hearts for the incredible outpouring of support and love that you have shown us in our time of deep grief.

"NASA centers have been overwhelmed with cards, letters, emails, and phone calls from you expressing your concern and support. We have also received hundreds of personal calls, emails, flowers, food, and cards at our homes. The makeshift shrine in front of the Johnson Space Center is overflowing with flowers, signs, and balloons from well wishers from all over the world. Memorial services throughout the world have honored our dear friends. You, our brothers and sisters of the world community, have been a tremendous source of comfort and love to us and we are so grateful. We are deeply mourning our dear friends Rick, Willie, Mike, Kalpana, Ilan, Laurel, and Dave and we ask that you continue to keep their parents, wives, husbands, and children in your thoughts and prayers.

"We would also like the world community to know that as terrible and as difficult as this journey has been and will

continue to be for all of our families, we cannot stress enough how blessed and honored we feel to be counted as members of the NASA family. We proudly support the noble goals and objectives of NASA and we will continue to support NASA in its finest and its darkest hours. It is our deepest hope that you also will continue to share in our belief and support of NASA's dreams. We believe NASA is a beacon of hope and light to all nations, for NASA has proven beyond the shadow of a doubt, that peoples from all races, genders, cultures, religions, and political backgrounds can transcend those differences and become the closest of friends. And these friends will continue to pursue space exploration and scientific discovery for the single purpose of helping and furthering all of mankind. Thank you for your love and support.

"The husbands, wives, and children of the NASA Astronaut Corps."

-end-

* * *

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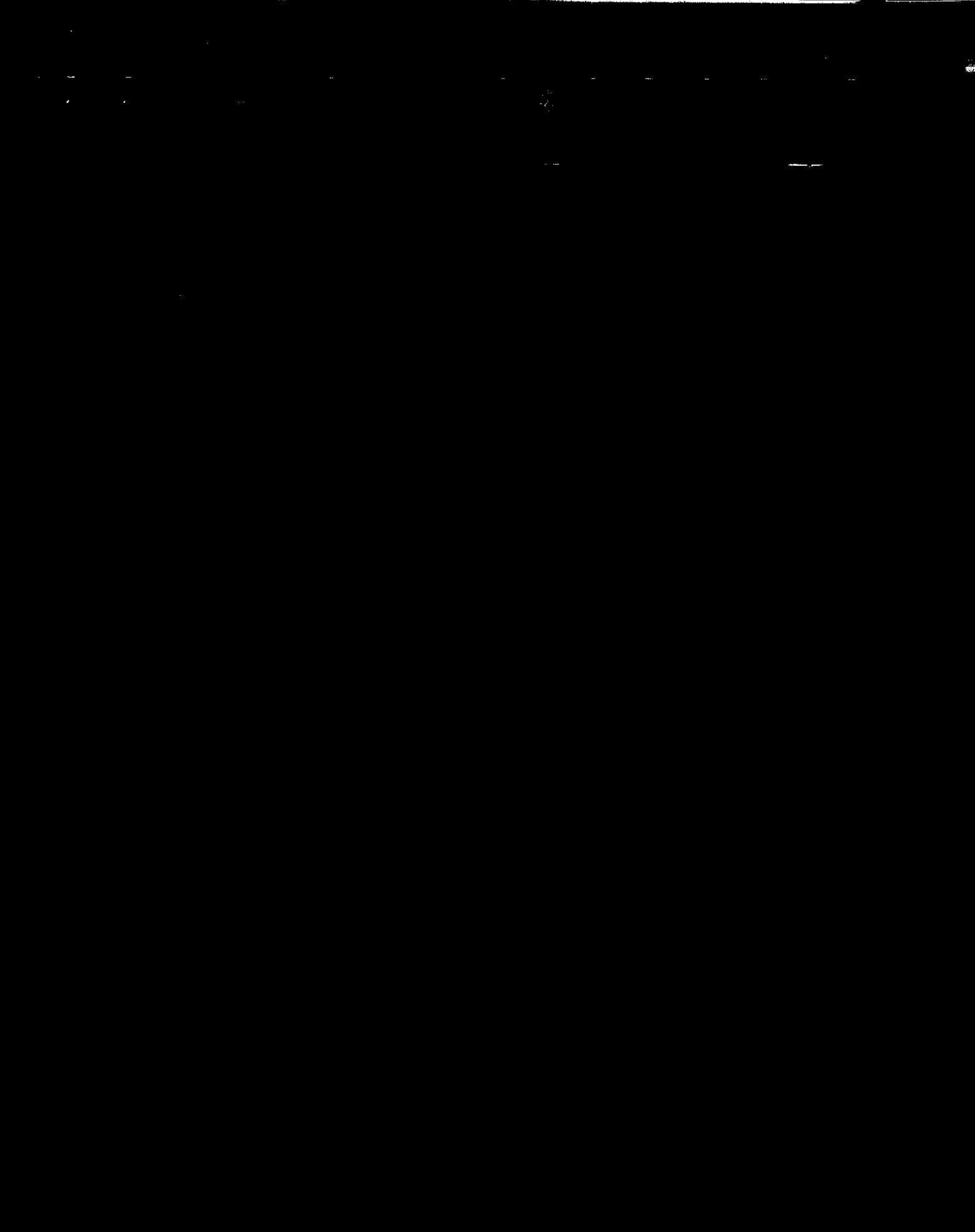
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Buckingham-1, Bruce, 09:48 AM 2/10/2003 -0500, NASA ADMINISTRATOR ADDRESSES REPORTER

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Subject: NASA ADMINISTRATOR ADDRESSES REPORTERS DURING NEXT COLUMBIA ACCIDENT BRIEFING
Date: Mon, 10 Feb 2003 09:48:31 -0500
X-Mailer: Internet Mail Service (5.5.2653.19)

Glenn Mahone/Bob Jacobs
Headquarters, Washington Feb. 10, 2003
(Phone: 202/358-1600)

RELEASE: 03-061

**NASA ADMINISTRATOR ADDRESSES REPORTERS
DURING NEXT COLUMBIA ACCIDENT BRIEFING**

NASA Administrator Sean O'Keefe will take reporters' questions today at 3 p.m. EST during the next Space Shuttle Accident Briefing from NASA Headquarters in Washington. The briefing will be carried live on NASA Television from the Headquarters' main auditorium.

William Readdy, Associate Administrator for Space Flight, and Michael Kostelnik, Deputy Associate Administrator for the International Space Station and Space Shuttle programs will join Administrator O'Keefe.

Reporters at participating NASA field centers will be able to ask questions. NASA Headquarters is located at 300 E Street, SW, Washington.

NASA Television is broadcast on AMC-2, transponder 9C, C-Band, located at 85 degrees West longitude. The frequency is 3880.0 MHz. Polarization is vertical and audio is monaural at 6.8 MHz. The briefing will also be available on the Internet at www.nasa.gov.

-end-

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McCombs Mike L GS-14 30SW/SES, 11:17 PM 2/7/2003 +0000, FW: AF Photos on loss of shuttle

From: McCombs Mike L GS-14 30SW/SES <Mike.McCombs@vandenberg.af.mil>

To: Alfonso Brenda L Contr/DET9 Tecolote Research

<Brenda.Alfonso2@vandenberg.af.mil>,
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Thompson David Col 30SW/SE

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Newman Thelma M GS-11 30SW/SE

<Thelma.Newman@vandenberg.af.mil>,
Stark William H GS-13 14AF/SE

<William.Stark@vandenberg.af.mil>

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Date: Fri, 7 Feb 2003 23:17:29 -0000

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-----Original Message-----

From: Aulabaugh, Stanley E [<mailto:stanley.e.aulabaugh@lmco.com>]

Sent: Friday, February 07, 2003 12:39 PM

To: "Ol" George' Meyer (E-mail); Lacombe, George A; Mike McCombs (E-mail);

Bircher, Steven J; Michael. Pulgine (E-mail); Patzman, Laurence S

Subject: FW: AF Photos on loss of shuttle

-----Original Message

Air Force imagery confirms Columbia wing damaged
BY CRAIG COVAULT
AVIATION WEEK & SPACE TECHNOLOGY/aviationnow.com
PUBLISHED HERE WITH PERMISSION
Posted: February 7, 2003

High-resolution images taken from a ground-based Air Force tracking camera in southwestern U.S. show serious structural damage to the inboard leading edge of Columbia's left wing, as the crippled orbiter flew overhead about 60 sec. before the vehicle broke up over Texas killing the seven astronauts on board Feb. 1.

According to sources close to the investigation, the images, under analysis at the Johnson Space Center in Houston, show a jagged edge on the left inboard wing structure near where the wing begins to intersect the fuselage. They also show the orbiter's right aft yaw thrusters firing, trying to correct the vehicle's attitude that was being adversely affected by the left wing damage. Columbia's fuselage and right wing appear normal. Unlike the damaged and jagged left wing section, the right wing appears smooth along its entire length. The imagery is consistent with telemetry.

The ragged edge on the left leading edge, indicates that either a small structural breach -- such as a crack -- occurred, allowing the 2,500F reentry heating to erode additional structure there, or that a small portion of the leading edge fell off at that location.

Either way, the damage affected the vehicle's flying qualities as well as allowed hot gases to flow into critical wing structure -- a fatal combination.

It is possible, but yet not confirmed, that the impact of foam debris from the shuttle's external tank during launch could have played a role in damage to the wing leading edge, where the deformity appears in USAF imagery.

If that is confirmed by the independent investigation team, it would mean that, contrary to initial shuttle program analysis, the tank debris event at launch played a key role in the root cause of the accident.

Another key factor is that the leading edge of the shuttle wing where the jagged shape was photographed transitions from black thermal protection tiles to a much different mechanical system made of reinforced carbon-carbon material that is bolted on, rather than glued on as the tiles are.

This means that in addition to the possible failure of black tile at the point where the wing joins the fuselage, a failure involving the attachment

mechanisms for the leading edge sections could also be a factor, either related or not to the debris impact. The actual front structure of a shuttle wing is flat. To provide aerodynamic shape and heat protection, each wing is fitted with 22 U-shaped reinforced carbon-carbon (RCC) leading-edge structures. The carbon material in the leading edge, as well as the orbiter nose cap, is designed to protect the shuttle from temperatures above 2,300F during reentry. Any breach of this leading-edge material would have catastrophic consequences.

The U-shaped RCC sections are attached to the wing "with a series of floating joints to reduce loading on the panels due to wing deflections," according to Boeing data on the attachment mechanism.

"The [critical heat protection] seal between each wing leading-edge panel is referred to as a 'tee' seal," according to Boeing, and are also made of a carbon material.

The tee seals allow lateral motion and thermal expansion differences between the carbon sections and sections of the orbiter wing that remain much cooler during reentry.

In addition to debris impact issues, investigators will likely examine whether any structural bending between the cooler wing structure and the more-than-2,000F leading edge sections could have played a role in the accident. There is insulation packed between the cooler wing structure and the bowl-shaped cavity formed by the carbon leading-edge sections.

The RCC leading-edge structures are bolted to the wing using Inconel fittings that attach to aluminum flanges on the front of the wing.

The initial NASA Mission Management Team (MMT) assessment of the debris impact made Jan. 18, two days after launch, noted "The strike appears to have occurred on or relatively close to the "wing glove" near the orbiter fuselage.

The term "wing glove" generally refers to the area where the RCC bolt-on material is closest to the fuselage. This is also the general area where USAF imagery shows structural damage.

The second MMT summary analyzing the debris hit was made on Jan. 20 and had no mention of the leading-edge wing glove area. That report was more focused on orbiter black tiles on the vehicle's belly. The third and final summary issued on Jan. 27 discusses the black tiles again, but also specifically says "Damage to the RCC [wing leading edge] should be limited to [its] coating only and have no mission impact." Investigators in Houston are trying to match the location of the debris impact with the jagged edge shown in the Air Force imagery.

Columbia reentry accident investigators are also trying to determine if, as in the case of the case of Challenger's accident 17 years ago, an undesirable materials characteristic noted on previous flights -- in this case the STS-112 separation of external tank insulation foam debris -- was misjudged by engineers as to its potential for harm, possibly by using analytical tools and information inadequate to truly identify and quantify the threat to the shuttle. As of late last week, NASA strongly asserted this was not the case, but intense analysis on that possibility continues.

The shuttle is now grounded indefinitely and the impact on major crew resupply and assembly flights to the International Space Station remain under intense review.

Killed in the accident were STS-107 Mission Commander USAF Col. Rick Husband; copilot Navy Cdr. William McCool; flight engineer, Kalpana Chawla; payload commander, USAF Lt. Col. Michael Anderson; mission specialist physician astronauts Navy Capt. Laurel Clark and Navy Capt. David Brown and Israeli Air Force Col. Ilan Ramon.

"We continue to recover crew remains and we are handling that process with the utmost care, the utmost respect and dignity," said Ronald Dittmore, shuttle program manager.

No matter what the investigations show, there are no apparent credible crew survival options for the failure Columbia experienced. With the ISS out of reach in a far different orbit, there were no credible rescue options if even if wing damage had been apparent before reentry -- which it was not.

If, in the midst of its 16-day flight, wing damage had been found to be dire, the only potential -- but still unlikely -- option would have been the formulation over several days by Mission Control of a profile that could have, perhaps, reduced heating on the damaged wing at the expense of the other wing for an unguided reentry, with scant hope the vehicle would remain controllable to about 40,000 ft., allowing for crew bailout over an ocean.

Reentry is a starkly unforgiving environment where three out of the four fatal manned space flight accidents over the last 35 years have occurred.

These include the Soyuz 1 reentry accident that killed cosmonaut Vladimir Komarov in 1967 and the 1971 Soyuz 11 reentry accident that killed three cosmonauts returning after the first long-duration stay on the Salyut 1 space station.

The only fatal launch accident has been Challenger in 1986, although Apollo astronauts Gus Grissom, Ed White and Roger Chaffee were killed when fire developed in their spacecraft during a launch pad test not involving launch.

No other accident in aviation history has been seen by so many eyewitnesses than the loss of Columbia -- visible in five states.

Telemetry and photographic analysis indicate the breakup of the historic orbiter took place as she slowed from Mach 20-to-18 across California, Nevada, Arizona and New Mexico with the loss of structural integrity 205,000 ft. over north central Texas where most of the debris fell.

The science-driven STS-107 crew was completing 16 days of complex work in their Spacehab Research Double module and were 16 min. from landing at Kennedy when lost. Landing was scheduled for 8:16 a.m. CST.

Abnormal telemetry events in the reentry began at 7:52 a.m. CST as the vehicle was crossing the coast north of San Francisco at 43 mi. alt., about Mach 20.

The orbiter at this time was in a 43-deg. right bank completing its initial bank maneuver to the south for initial energy dissipation and ranging toward the Kennedy runway still nearly 3,000 mi. away.

That initial bank had been as steep as about 80 deg. between Hawaii and the California coast, a normal flight path angle for the early part of the reentry. The abnormal events seen on orbiter telemetry in Houston indicate a slow penetration of reentry heat into the orbiter and damage on the wing, overpowering the flight control system. Key events were:

- * 7:52 a.m. CST: Three left main landing gear brakeline temperatures show an unusual rise. "This was the first occurrence of a significant thermal event in the left wheel well," Dittmore said. Engineers do not believe the left wheel well was breached, but rather that hot gasses were somehow finding a flow path within the wing to reach the wheel well.
- * 7:53 a.m. CST: A fourth left brakeline strut temperature measurement rose significantly -- about 30-40 deg. in 5 min.
- * 7:54 a.m. CST: With the orbiter over eastern California and western Nevada, the mid-fuselage mold line where the left wing meets the fuselage showed an unusual temperature rise. The 60F rise over 5 min. was not dramatic, but showed that something was heating the wing fuselage interface area at this time. Wing leading edge and belly temperatures were over 2,000F. While the outside fuselage wall was heating, the inside wall remained cool as normal.
- * 7:55 a.m. CST: A fifth left main gear temperature sensor showed an unusual rise.
- * 7:57 a.m. CST: As Columbia was passing over Arizona and New Mexico, the orbiter's upper and lower left wing temperature sensors failed, probably

indicating their lines had been cut. The orbiter was also rolling back to the left into about a 75-deg. left bank angle, again to dissipate energy and for navigation and guidance toward Runway 33 at Kennedy, then about 1,800 mi. away.

* 7:58 a.m. CST: Still over New Mexico, the elevons began to move to adjust orbiter roll axis trim, indicating an increase in drag on the left side of the vehicle. That could be indicative of "rough tile or missing tile but we are not sure," Dittmore said. At the same time, the elevons were reacting to increased drag on the left side of the vehicle, the left main landing gear tire pressures and wheel temperature measurements failed. This was indicative of a loss of the sensor, not the explosion or failure of the left main gear tires, Dittmore believes. The sensors were lost in a staggered fashion.

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"Our landscape has changed," Heflin said. "The space flight business today is going to be much different than yesterday.

"It was different after the Apollo fire, it was different after Challenger."

Columbia, the first winged reusable manned spacecraft first launched in April 1981, was lost on her 28th mission on the 113th shuttle flight.



FW AF Photos on loss of shuttl

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Subject: STS-107 MCC Status Report #23
Date: Thu, 6 Feb 2003 13:28:42 -0500
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STS-107

Report #23

Wednesday, February 5, 2003 - 7:00 p.m. CST

Mission Control Center, Houston, Texas

The search for clues about what caused Columbia's breakup during reentry Saturday, and the hunt for key debris from the orbiter, expanded today with recovery teams deployed in California and Arizona.

Four days after Columbia broke apart 16 minutes prior to landing, Space Shuttle Program Manager Ron Dittmore said the inquiry into the cause for Columbia's demise is "picking up speed". But Dittmore said efforts to draw any new information from an additional 32 seconds of data acquired by ground computers following the loss of voice communications with Columbia have so far been unsuccessful.

In a briefing, Dittmore said the engineering evaluation teams are focusing their attention on "something other" than insulating foam on Columbia's external tank that fell off 80 seconds after launch striking the left wing, as the reason for the accident.

"It does not make sense that a piece of (foam) debris caused the loss of Columbia and its crew," Dittmore added. He reiterated Columbia tried to compensate for increased drag on its left wing in the seconds prior to its breakup, firing steering jets to right itself. But Dittmore said of Columbia, "it was doing well, but it was losing the battle."

As the engineering analysis continued, the remains of Columbia's astronauts were flown to Dover Air Force Base, Delaware, where identification of the astronauts will be completed. At the conclusion of the forensic analysis, the remains will be released to the families for burial.

In an earlier briefing, Michael Kostelnik, NASA's Associate Administrator

for International Space Station and Space Shuttle, said the recovery operations are moving ahead "full steam", involving 2500 people nationwide from federal and local agencies. Kostelnik said NASA has added a task force to integrate the work between numerous engineering teams that are reviewing over Columbia's data and the Columbia Accident Review board, chaired by retired Navy Admiral Harold Gehman, Jr.

Kostelnik said that although a relatively small percentage of Shuttle debris has been recovered so far, segments of large components such as Columbia's nose cone and main engines have been found. The focus of the recovery effort and the data analysis, according to Kostelnik, continues to be Columbia's left wing area, although no element of the orbiter has been exonerated in the ongoing inquiry.

Aboard the International Space Station, Expedition 6 Commander Ken Bowersox, Flight Engineer Nikolai Budarin and NASA ISS Science Officer Don Pettit spent the day unloading the Russian Progress resupply ship that docked to the ISS Tuesday, carrying one ton of food, fuel and supplies.

Pettit unstowed replacement parts for the Microgravity Science Glovebox from the Progress and installed them in the facility in the Destiny laboratory in an effort to revive the Glovebox that has been dormant since November following a power failure.

Pettit powered up the Glovebox, but a circuit breaker in the system popped and payload controllers told Pettit to shut it down so they can evaluate its current status.

On Thursday, NASA Television will broadcast a memorial ceremony for Columbia's astronauts from National Cathedral in Washington, D.C. at 10:00 a.m. EST.

The next STS-107 Accident Response briefing will be held on Thursday at 4:30 p.m. EST from the Johnson Space Center, Houston, also on NASA TV, with multi-center question and answer capability for reporters at NASA centers.

NASA TV is on AMC-2, Transponder 9C, vertical polarization at 85 degrees west longitude, 3880 MHz, with audio at 6.8 MHz.

Status reports will be issued as developments warrant.

###

NASA Johnson Space Center Mission Status Reports and other information are

available automatically by sending an Internet electronic mail message to majordomo@listserver.jsc.nasa.gov. In the body of the message (not the subject line) users should type "subscribe hsfnews" (no quotes). This will add the e-mail address that sent the subscribe message to the news release distribution list. The system will reply with a confirmation via e-mail of each subscription. Once you have subscribed you will receive future news releases via e-mail.

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Status reports and other NASA publications are available on the World Wide Web at: <http://www-pao.ksc.nasa.gov/kscpao/kscpao.htm> .

Buckingham-1, Bruce, 09:51 AM 2/14/2003 -0500, NASA SEEKS HELP FROM SKY WATCHERS

Mailing-List: contact ksc-news_release-help@kscnews.ksc.nasa.gov; run by ezmlm

X-No-Archive: yes

list-help: <mailto:ksc-news_release-help@kscnews.ksc.nasa.gov>

list-unsubscribe: <mailto:ksc-news_release-unsubscribe@kscnews.ksc.nasa.gov>

list-post: <mailto:ksc-news_release@kscnews.ksc.nasa.gov>

Delivered-To: mailing list ksc-news_release@kscnews.ksc.nasa.gov

Delivered-To: moderator for ksc-news_release@kscnews.ksc.nasa.gov

From: "Buckingham-1, Bruce" <Bruce.Buckingham-1@nasa.gov>

To: "1 'ksc-news_release@kscnews.ksc.nasa.gov' (E-mail)" <ksc-news_release@kscnews.ksc.nasa.gov>

Subject: NASA SEEKS HELP FROM SKY WATCHERS

Date: Fri, 14 Feb 2003 09:51:10 -0500

X-Mailer: Internet Mail Service (5.5.2653.19)

Allard Beutel

Headquarters, Washington

Feb. 13, 2003

(Phone: 202/358-0951)

Kylie Moritz

Johnson Space Center, Houston

(Phone: 281/483-5111)

NOTE TO EDITORS: n03-017

NASA SEEKS HELP FROM SKY WATCHERS

NASA is still seeking help from the American public to supply video and still images of the Space Shuttle Columbia on its return flight to Earth. There has been a great public response, but more material will help the investigation of the Columbia accident.

Columbia glided across the western U.S. just before sunrise Saturday, February 1. The Shuttle flew just north of San Francisco around 6:50 a.m. PST and broke up over eastern Texas around 8:00 a.m. CST. Any imagery, especially video, of the Shuttle's path might aid the Columbia Accident Investigation Board in determining the cause of the accident.

Media and private citizens who have video or still images of Columbia's entry path are encouraged to send it to investigators. Videotapes and photos will not be returned. For more information call:

Johnson Space Center Emergency Operations Center
(Phone: 281/483-3388)

Mail videotapes to:

NASA Johnson Space Center

Mail Code JA17
2101 NASA Road 1
Houston, Texas 77058

Email digital images to: columbiainages@nasa.gov

-end-

* * *

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or you can (un)subscribe on the World Wide Web at: <http://kscnews.ksc.nasa.gov/>

Status reports and other NASA publications are available on the World Wide Web at: <http://www-pao.ksc.nasa.gov/kscpao/kscpao.htm> .

Martha Wetherholt, 08:12 PM 2/6/2003 -0500, Fwd: STS-107 Commemorative Shirts

X-Authentication-Warning: spinoza.public.hq.nasa.gov: majordom set sender to owner-code-q using -f

X-Sender: mwetherh@mail.hq.nasa.gov

X-Mailer: QUALCOMM Windows Eudora Version 4.3.2

Date: Thu, 06 Feb 2003 20:12:41 -0500

To: code-q@lists.hq.nasa.gov, pboldon@hq.nasa.gov,
John Kelly <jkelly@hq.nasa.gov>, aparra@csc.com,
paul.curto@hq.nasa.gov, rosalyne.strickland@msfc.nasa.gov,
C.E.NILES@LaRC.NASA.GOV, sharyl.a.butler1@jsc.nasa.gov,
Burton.C.Sigal@jpl.nasa.gov, cchow@mail.arc.nasa.gov,
Darrell.Thomas-1@ksc.nasa.gov, Ken.cross@dfrc.nasa.gov,
James.Kania-1@ksc.nasa.gov, christopher.m.ramsay@nasa.gov,
Janice.Hill-1@ksc.nasa.gov, Cynthia.C.Calhoun@grc.nasa.gov,
pboldon@hq.nasa.gov, mark.a.markovich1@jsc.nasa.gov,
S.M.Gayle@jpl.nasa.gov, aparra@csc.com, Susan.J.Sekira.1@gsfc.nasa.gov,
Wesley.D.Sweetser@ivv.nasa.gov,
"Michael P. Binder" <mbinder@reality-alt.com>

From: Martha Wetherholt <mwetherh@hq.nasa.gov>

Subject: Fwd: STS-107 Commemorative Shirts

Sender: owner-code-q@lists.hq.nasa.gov

Anyone here at Code Q interested? I might be willing to coordinate it - next week -- if there is an interest.

We should pool together if anyone wants one.

Martha

X-Sender: llover@popserve.grc.nasa.gov

Date: Thu, 6 Feb 2003 10:09:34 -0500

To: "Recipient.List.Suppressed": ;, @nasa.gov

From: "Ann P. Over" <Ann.P.Over@nasa.gov>

Subject: STS-107 Commemorative Shirts

Date: Tue, 4 Feb 2003 06:11:38 -0800 (PST)

From: LEE EARLEY <leeondeck@prodigy.net>

Subject: STS-107 Commemorative

To: lilly.a.keller@lmco.com

Many people have asked for a commemorative shirt for the STS-107 mission. Here is an order form, and artist sketch of the design. (It may get some more tweaking)

There will only be two printing deadlines.

Please share this with you coworkers, and see if there is any interest.

We look forward to processing your orders.

Lee
ON DECK

Content-Type: application/x-msexcel; name="STS-107 Comm.xls"
Content-Description: STS-107 Comm.xls
Content-Disposition: attachment; filename="STS-107 Comm.xls"

Jack Lekan John.F.Lekan@nasa.gov
NASA John H. Glenn Research Center (216) 433-3459 Office
at Lewis Field (216) 433-3790 Fax
Mail Stop 77-7
21000 Brookpark Road
Cleveland, Ohio 44135

~~~~~  
Ann P. Over/Microgravity Science   (216) 433-6535 (Fax 3-8050)  
NASA Glenn Research Center, M.S. 77-5 (Rm. 228)  
~~~~~



STS-107 Comm.xls

***** ~~~~~ *****

Martha S. Wetherholt
NASA HQ Code QS

mwetherh@hq.nasa.gov
(202) 358 - 0470
(202) 358 - 3104 FAX

***** ~~~~~ *****

X-Authentication-Warning: spinoza.public.hq.nasa.gov: majordom set sender to owner-code-q using -f

X-Sender: mwetherh@mail.hq.nasa.gov

X-Mailer: QUALCOMM Windows Eudora Version 4.3.2

Date: Fri, 07 Feb 2003 14:28:54 -0500

To: code-q@lists.hq.nasa.gov, pboldon@hq.nasa.gov,
John Kelly <jkelly@hq.nasa.gov>, aparra@csc.com,
paul.curto@hq.nasa.gov, rosalyne.strickland@msfc.nasa.gov,
C.E.NILES@LaRC.NASA.GOV, sharyl.a.butler1@jsc.nasa.gov,
Burton.C.Sigal@jpl.nasa.gov, cchow@mail.arc.nasa.gov,
Darrell.Thomas-1@ksc.nasa.gov, Ken.cross@dfrc.nasa.gov,
James.Kania-1@ksc.nasa.gov, christopher.m.ramsay@nasa.gov,
Janice.Hill-1@ksc.nasa.gov, Cynthia.C.Calhoun@grc.nasa.gov,
pboldon@hq.nasa.gov, mark.a.markovich1@jsc.nasa.gov,
S.M.Gayle@jpl.nasa.gov, aparra@csc.com, Susan.J.Sekira.1@gsfc.nasa.gov,
Wesley.D.Sweetser@ivv.nasa.gov,
"Michael P. Binder"

From: Martha Wetherholt <mwetherh@hq.nasa.gov>

Subject: Fwd: STS-107 Commemorative Shirts

Sender: owner-code-q@lists.hq.nasa.gov

FYI:

Just in case you're interested, I just received the (final version) of the order form from the On-Deck company in Florida for STS-107 commemorative shirts. **As indicated on the order form, proceeds from this will go to the Astronauts Memorial Fund.**

Martha

Anyone here at Code Q interested? I might be willing to coordinate it - next week -- if there is an interest.

We should pool together if anyone wants one.

Martha

X-Sender: llover@popserve.grc.nasa.gov

Date: Thu, 6 Feb 2003 10:09:34 -0500

To: "Recipient.List.Suppressed": ;, @nasa.gov

From: "Ann P. Over" <Ann.P.Over@nasa.gov>

Subject: STS-107 Commemorative Shirts

Date: Tue, 4 Feb 2003 06:11:38 -0800 (PST)

From: _

Subject: STS-107 Commemorative

To: lilly.a.keller@lmco.com

Many people have asked for a commemorative shirt for the STS-107 mission. Here is an order form, and artist sketch of the design. (It may get some more tweaking)

There will only be two printing deadlines.
Please share this with you coworkers, and see if there is any interest.

We look forward to processing your orders.

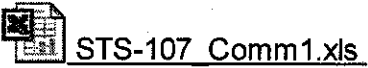
Lee
ON DECK

Content-Type: application/x-msexcel; name="STS-107 Comm.xls"
Content-Description: STS-107 Comm.xls
Content-Disposition: attachment; filename="STS-107 Comm.xls"

--

Jack Lekan
NASA John H. Glenn Research Center
at Lewis Field
Mail Stop 77-7
21000 Brookpark Road
Cleveland, Ohio 44135
John.F.Lekan@nasa.gov
(216) 433-3459 Office
(216) 433-3790 Fax

~~~~~  
Ann P. Over/Microgravity Science (216) 433-6535 (Fax 3-8050)  
NASA Glenn Research Center, M.S. 77-5 (Rm. 228)  
~~~~~



***** ~~~~~ *****

Martha S. Wetherholt
NASA HQ Code QS

nwetherh@hq.nasa.gov
(202) 358 - 0470
(202) 358 - 3104 FAX



***** ~~~~~ *****

InfoCom, 09:16 AM 2/6/2003 -0500, Special Notice - Memorial Service Programs Available in Code

Date: Thu, 6 Feb 2003 09:16:11 -0500 (EST)

X-Authentication-Warning: spinoza.public.hq.nasa.gov: majordom set sender to owner-headquarters using -f

Subject: Special Notice - Memorial Service Programs Available in Code P

From: InfoCom <infocom@hq.nasa.gov>

Sender: owner-headquarters@lists.hq.nasa.gov

This message is being transmitted to all NASA HQ employees.

Point of Contact: Lovella Penny, Code P, 358-4791

MEMORIAL SERVICE PROGRAMS NOW AVAILABLE IN CODE P

NASA employees who would like a program for today's Memorial Service for the Crew of the Space Shuttle Columbia may pick up copies in the Office of Public Affairs (Rm. 9P37). For details, contact Lovella Penny, 358-4791.

This "Special Notice" is being transmitted by InfoCom, Code CI-3, HQ Information Technology & Communications Division. For more information on InfoCom services, call 358-2299 or 358-4817, or visit the InfoCom web page at <http://www.hq.nasa.gov/hq/infocom>

Date: Wed, 5 Feb 2003 17:34:29 -0500 (EST)

X-Authentication-Warning: spinoza.public.hq.nasa.gov: majordom set sender to owner-headquarters using -f

Subject: Heads Up 2/06/03

From: InfoCom <infocom@hq.nasa.gov>

Sender: owner-headquarters@lists.hq.nasa.gov

Thursday, February 6, 2003

NASA FAMILY INVITED TO STS-107 CREW MEMORIAL

Thursday, February 6, 10 a.m. EST, Washington National Cathedral.

NASA Headquarters civil service and contractor employees are invited to attend a special memorial service honoring the crew of STS-107. Busses providing round-trip transportation depart from Headquarters at 7:45 a.m. You will be screened through magnetometers, and you must show a valid NASA ID badge for admittance. If you are arriving by Metro or some other means, please arrive no later than 8:15 a.m. (It is preferred that you don't bring pagers and cell phones to the service.) The ceremony will be broadcast on NASA Television (Internal Channels 3 and 24) and on the Internet at <http://www.nasa.gov>

Office of Public Affairs, 358-1750.

INFORMATION ON COLUMBIA AND THE STS-107 CREW

The latest information on Columbia and the STS-107 crew will be posted at <http://www.nasa.gov/columbia>

TOASTMASTERS MEETING POSTPONED

The February 6 Toastmasters meeting is being postponed until Thursday, February 20. Ledetria Beaudoin, 358-0991.

IT SERVICES REMAIN AVAILABLE THIS WEEKEND

The power outage scheduled for the NASA HQ Building this weekend, February 8-9, has been cancelled. Therefore, normal IT services and operations will be provided this weekend. IT Help Desk, 358-HELP (4357) or 1-866-4NASAHQ (462-7247).

GODDARD CENTER DIRECTOR'S COLLOQUIUM

Wednesday, February 12, 10-11:30 a.m., Building 3 Goett Auditorium, GSFC. Presentation by Walker Lee Evey, former Program Manager of the Pentagon Renovation Program on "Overcoming Daunting Odds Rebuilding the Pentagon After September 11th." For details, see <http://workforce.gsfc.nasa.gov/b2c1.html>
Gail Williams, 301-286-0159.

ETHICS TRAINING MAKE-UP SESSIONS

- Wednesday, February 12, 2:30 p.m.
- Thursday, February 13, 9 a.m.

- Tuesday, February 18, 9 a.m.
- Friday, February 21, 9 a.m.

All sessions in the auditorium. Ethics training is also offered online at <https://solar.msfc.nasa.gov> (These training sessions may be rescheduled due to press conferences in the auditorium.)
Laurie Rafferty, 358-2028.

SECRETARIAL/CLERICAL AWARDS

Friday, February 14 - nomination deadline. Employees classified as secretaries, clerks, assistants, or technicians are eligible. Submit award nominations to Marian Beverly, Code CP. For details and forms, see <http://www.hq.nasa.gov/hq/hqsec.htm> Marian Beverly, 358-2318.

AGENCY TRAINING CLASSES

- February 25-28, Hampton, Virginia. Systems Management 86.
- March 18-20, MSFC. Systems Requirements 56.
- March 31-April 10, Wallops, Virginia. Project Management 62.
- April 7-9, MSFC. Space Launch and Transportation 4.

For details and APPL nomination forms, see

http://appl.nasa.gov/career_dev/classroom_training/schoolhouse_home.htm

To register, fax a completed APPL form to Sheila Jackson, 301-286-0845.

NASA SCHOLARSHIP APPLICATIONS DUE

Friday, March 21 - application deadline. NASA College Scholarship Fund, Inc., invites eligible NASA dependents pursuing a course of study in the science or engineering field to apply for scholarships. Completed forms and supporting material must be received by March 21. For details and forms, see <http://iscpeople.isc.nasa.gov/nasascholarship.htm> and contact Terri Robinson, 358-4500.

HOT TOPICS

- NASA Home Page: <http://www.nasa.gov>
- NASA Budget for FY 2003: http://www.nasa.gov/budget/budget2003_index.html
- Freedom to Manage (F2M): <http://www.f2m.nasa.gov>
- Educator Astronaut Web Site: <http://edspace.nasa.gov>
- NODIS Document Library: http://nodis3.gsfc.nasa.gov/library/main_lib.html
- NODIS Document Management System:
<http://nodis-dms.gsfc.nasa.gov/dms/dms.cfm> (NASA Employees Only)
- HQ Core Financial Web Site: <http://corefinancial.hq.nasa.gov>
- Directory of HQ Service Contacts:
<http://www.hq.nasa.gov/office/codec/service-contacts.doc>
- Job Opportunities: <http://www.nasajobs.nasa.gov>
- Approved Widely-Attended Gatherings (WAGs):
http://www.hq.nasa.gov/ogc/general_law/ethics/waglog03.html

- Training Information: <http://ohr.gsfc.nasa.gov/DevGuide/Hq/hqtrngopps.htm>
- Computer Training Center (CTC):
<http://www.hq.nasa.gov/office/codec/codeci/ctc/ctc.htm>
- Safety: <http://www.hq.nasa.gov/hq/safety.htm>
- NASA OIG: <http://www.hq.nasa.gov/office/oig/hq>
- IT Security:
<http://www.hq.nasa.gov/office/codec/codeci/security/security.htm>
(NASA HQ ONLY)
- ODIN Services: <http://www.odin.hq.nasa.gov>
- HQ ISO 9000: <http://hqiso9000.hq.nasa.gov> (NASA HQ ONLY)
- ISEM Services: <http://www.isem.hq.nasa.gov>
- VITS: <http://www.hq.nasa.gov/office/codec/codeci/services/vits.htm>
- Exchange Council: <http://www.hq.nasa.gov/exchange>
- HQ Bulletin Online: http://www.hq.nasa.gov/hq/infocom/bulletin_online.htm
- VoTS: <http://www.nisn.nasa.gov/vots>
- IT Notices: <http://www.hq.nasa.gov/office/codec/codeci/whatsnew/itnote.htm>
- 2003 Calendar Orders: <http://www.hq.nasa.gov/hq/calinfo.htm>
- National Air & Space Museum programs/events:
<http://www.nasm.si.edu/nasm/pa/nasmnews/newshome.htm>

"Heads Up" is published every Tuesday and Thursday by InfoCom, Code CI-3, HQ Information Technology & Communications Division. Submit articles 5 working days before your requested publication date.

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X-No-Archive: yes
list-help: <mailto:ksc-news_release-help@kscnews.ksc.nasa.gov>
list-unsubscribe: <mailto:ksc-news_release-unsubscribe@kscnews.ksc.nasa.gov>
list-post: <mailto:ksc-news_release@kscnews.ksc.nasa.gov>
Delivered-To: mailing list ksc-news_release@kscnews.ksc.nasa.gov
Delivered-To: moderator for ksc-news_release@kscnews.ksc.nasa.gov
From: "Buckingham-1, Bruce" <Bruce.Buckingham-1@nasa.gov>
To: "1 'ksc-news_release@kscnews.ksc.nasa.gov' (E-mail)" <ksc-news_release@kscnews.ksc.nasa.gov>
Subject: STS-107 MCC Status Report #19
Date: Sat, 1 Feb 2003 19:44:13 -0500
X-Mailer: Internet Mail Service (5.5.2653.19)

STS-107

Report #19

Saturday, February 1, 2003 - 7:00 p.m. CST

Mission Control Center, Houston, Texas

The Space Shuttle Columbia and its seven astronauts were lost today when the vehicle broke up over north central Texas during its reentry from orbit.

Communications were lost with Columbia and its crew at around 8:00 a.m. CST, while the shuttle was traveling about 18 times the speed of sound at an altitude of 207,000 feet. Columbia was 16 minutes from landing at the Kennedy Space Center when flight controllers at Mission Control lost contact with the vehicle. Columbia was returning from a 16-day scientific research mission, its 28th flight, which launched on January 16.

Aboard Columbia were Commander Rick Husband, completing his second flight, Pilot William McCool, wrapping up his first mission, Mission Specialists Dave Brown, also completing his first mission, Kalpana Chawla, on her second flight, Laurel Clark, a first-time space traveler, Payload Commander Mike Anderson, ending his second flight, and Payload Specialist Ilan Ramon of the Israel Space Agency, on his first flight.

Prior to the loss of communications with Columbia, the shuttle's return to Earth appeared perfectly normal. After assessing some wispy fog near the shuttle's three-mile long landing strip at KSC before dawn, Entry Flight Director Leroy Cain gave approval for the firing of the shuttle's braking rockets to begin its descent from orbit.

Husband and McCool began the deorbit burn to allow Columbia to slip out of orbit at 7:15 a.m. CST. There was no indication of anything abnormal with Columbia's reentry until the last communications between Mission Control and the crew.

At Columbia's intended landing site, NASA Administrator Sean O'Keefe and Associate Administrator for Space Flight William Readdy met with the families of the astronauts to offer their condolences, vowed to uncover the cause of the accident and press ahead with the Shuttle program.

"This is indeed a tragic day for the NASA family, for the families of the astronauts who flew on STS-107, and likewise is tragic for the nation," said O'Keefe.

"We have no indication that the mishap was caused by anything or anyone on the ground," O'Keefe added.

In a briefing, Chief Flight Director Milt Heflin said that around 7:53 a.m. CST, just minutes before communications were lost with Columbia, flight controllers detected indications of a loss of hydraulic system temperature measurements associated with Columbia's left wing, followed three minutes later by an increase in temperatures on the left main gear tires and brakes. At 7:58 a.m., flight controllers noted a loss of bondline temperature sensor data in the area of the left wing followed a minute later by a loss of data on tire temperatures and pressures for the left inboard and outboard tires.

After several attempts to try to contact Columbia, Cain declared a contingency, whereby flight controllers began preserving documentation regarding the entry phase of the flight. Recovery forces fanned out from Texas to Louisiana to try to recover debris that will be pertinent to the mishap investigation.

Space Shuttle Program Manager Ron Dittmore said several teams have been organized to gather data for analysis and will report to an external investigation board that was appointed by Administrator O'Keefe. Dittmore added that no specific orbiter debris or crew remains have been positively identified at this time, and that there is no leading theory for the cause of the accident.

Dittmore said the processing of other shuttles at the Kennedy Space Center for future launches has been temporarily halted to enable engineers to review data regarding vehicle processing and to focus attention on capturing all pertinent information involving Columbia's prelaunch preparations.

NASA managers will be meeting on a regular basis to begin reviewing data associated with Columbia's investigation. The next status briefing from the Johnson Space Center is tentatively scheduled from the Johnson Space Center, Houston, TX at 12:00 p.m. CST Sunday. It will be seen on NASA Television with two-way question and answer capability for reporters from NASA centers.

NASA TV can be found on AMC-2, Transponder 9C, vertical polarization at 85 degrees West longitude, 3880 MHz, with audio at 6.8 MHz.

On the International Space Station, Expedition 6 Commander Ken Bowersox, Flight Engineer Nikolai Budarin and NASA ISS Science Officer Don Pettit were informed of the loss of Columbia and its crew shortly after a Russian Progress resupply vehicle undocked from the ISS. Filled with discarded items no longer needed on the ISS, the Progress was commanded to deorbit by Russian flight controllers and reentered the Earth's atmosphere.

A new Progress cargo ship will be launched Sunday from the Baikonur Cosmodrome in Kazakhstan at 6:59 a.m. CST (1259 GMT) filled with supplies for the Expedition 6 crew. It is scheduled to dock to the ISS Tuesday morning. ISS program officials say, if necessary, the current resident crew could remain in orbit until late June with the supplies being ferried to the station on the new Progress.

Additional status reports will be issued as new information becomes available.

###

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or you can (un)subscribe on the World Wide Web at: <http://kscnews.ksc.nasa.gov/>

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Subject: STS-107 Statement # 1 -- NASA STATEMENT ON LOSS OF COMMUNICATIONS WITH COLUMBIA
Date: Sat, 1 Feb 2003 17:52:42 -0500
X-Mailer: Internet Mail Service (5.5.2653.19)

Robert Mirelson
Headquarters, Washington
Feb. 1, 2003

RELEASE: 03-030

NASA STATEMENT ON LOSS OF COMMUNICATIONS WITH COLUMBIA

A Space Shuttle contingency has been declared in Mission Control, Houston, as a result of the loss of communication with the Space Shuttle Columbia at approximately 9 a.m. EST Saturday as it descended toward a landing at the Kennedy Space Center, Fla. It was scheduled to touchdown at 9:16 a.m. EST.

Communication and tracking of the shuttle was lost at 9 a.m. EST at an altitude of about 203,000 feet in the area above north central Texas. At the time communications were lost. The shuttle was traveling approximately 12,500 miles per hour (Mach 18). No communication and tracking information were received in Mission Control after that time.

Search and rescue teams in the Dallas-Fort Worth and in portions of East Texas have been alerted. Any debris that is located in the area that may be related to the Space Shuttle contingency should be avoided and may be hazardous as a result of toxic propellants used aboard the shuttle. The location of any possible debris should immediately be reported to local authorities.

Flight controllers in Mission Control have secured all information, notes and data pertinent to today's entry and landing by Space Shuttle Columbia and continue to methodically proceed through contingency plans.

More information will be released as it becomes available.

-end-

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Subject: STS-107 Statement # 2 NASA PRESS CONFERENCE ANNOUNCED
Date: Sat, 1 Feb 2003 17:54:41 -0500
X-Mailer: Internet Mail Service (5.5.2653.19)

Robert Mirelson
Headquarters, Washington

Feb. 1, 2003
1:15 p.m. EST

RELEASE: 03-031

NASA PRESS CONFERENCE ANNOUNCED

A press conference by Space Shuttle Program Manager Ron Dittmore and Chief Flight Director Milt Heflin will take place from NASA's Johnson Space Center, Houston, beginning at 3 p.m. EST today. The briefing will be carried on NASA TV with two-way question and answer capability from other agency centers.

A Space Shuttle contingency was declared earlier this morning in Mission Control when communication was lost with the Space Shuttle Columbia during its return to Earth following a 16-day mission.

Communication and tracking of the shuttle was lost at 9 a.m. at an altitude of about 203,000 feet above north central Texas while traveling approximately 12,500 miles per hour (Mach 18). No communication and tracking information was received in Mission Control after that time.

Flight controllers in Mission Control immediately began the process of securing all information, notes and data pertinent to today's reentry and landing.

NASA TV is on AMC-2, Transponder 9C, vertical polarization at 85 degrees West longitude, 3880 MHz, with audio at 6.8 MHz.

More information will be released as it becomes available. NASA information

is available on the Internet at:

www.nasa.gov

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Subject: STS-107 Statement # 4 -- NASA ASKS FOR HELP WITH COLUMBIA INVESTIGATION
Date: Sat, 1 Feb 2003 18:05:39 -0500
X-Mailer: Internet Mail Service (5.5.2653.19)

Robert Mirelson
Headquarters, Washington

Eileen Hawley
Johnson Space Center, Houston

Feb. 1, 2003
5 p.m. EST

RELEASE: 03-033

NASA ASKS FOR HELP WITH COLUMBIA INVESTIGATION

NASA has established a telephone hotline and electronic mail address for the public to use for reporting information that may help investigators studying today's Space Shuttle mishap.

Anyone who discovers debris from the accident or who has film or video evidence that may be of value to the investigation team is urged to use these contacts. Please avoid contact with any debris, because it may be hazardous as a result of toxic propellants aboard the Shuttle.

Telephone reports should be directed to the following number:

281/483-3388

Text reports and images should be e-mailed to:

nasamitimages@jsc.nasa.gov <<mailto:nasamitimages@jsc.nasa.gov>>

The e-mail address is:

columbiaimages@nasa.gov <<mailto:columbiaimages@nasa.gov>>

All debris is U.S. Government property and is critical to the investigation of the mishap. All debris from the accident is to be left alone and reported to Government authorities. Unauthorized persons found in possession of accident debris will be prosecuted to the full extent of the law.

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Subject: STS-107 Statement # 3 -- STATEMENT BY NASA ADMINISTRATOR SEAN O'KEEFE
Date: Sat, 1 Feb 2003 18:20:34 -0500
X-Mailer: Internet Mail Service (5.5.2653.19)

Robert Mirelson
Headquarters, Washington

Feb. 1, 2003
4 p.m. EST

RELEASE: 03-032

STATEMENT BY NASA ADMINISTRATOR SEAN O'KEEFE

"This is indeed a tragic day for the NASA family, for the families of the astronauts who flew on STS-107, and likewise is tragic for the Nation.

"Immediately upon indication of a loss of communications from STS-107, at a little after 9:00 a.m. this morning, we began our contingency plan to preserve all the information relative to the flight activities.

"I immediately advised the President and the Secretary of Homeland Security, Tom Ridge, at the point after landing was due to have occurred at 9:16 a.m., and spoke to them very briefly to advise them that we had lost contact with the Shuttle orbiter, Columbia, and STS-107 crew. They offered, the President specifically offered, full and immediate support to determine the appropriate steps to be taken.

"We then spent the next hour and a half working through the details and information of what we have received and Bill Readdy, Associate Administrator for the NASA Office of Space Flight, will walk you through the specifics of those operational and technical issues.

"We met with the family members of the astronauts who were here at the Kennedy Space Center and are soon to be departing back to the Johnson Space Center in Houston. The President has called and spoken to the family members

to express our deepest national regrets. We have assured them that we will begin the process immediately to recover their loved ones and understand the cause of this tragedy.

"We have no indication that the mishap was caused by anything or anyone on the ground.

"We assembled a Mishap Investigation Team at a point past the stage that the orbiter was to have landed here at Kennedy Space Center a little after 9:30. That team, in turn, is coordinating on a regular basis on all the facts that are pertaining to this from the Johnson Space Center with help from a Rapid Response Team from here at the Kennedy Space Center, as well participants from the Marshall Space Flight Center in Huntsville, Alabama.

"In addition to these internal efforts, we have appointed a Mishap Investigation Board, an external group of people who are independent from NASA who will be charged with the responsibility to look at all the information that was immediately locked down right after the absence of communications.

"Each of these individuals are Safety and Mission Assurance related officials in other departments of the Federal government, from the Air Force, the Navy, the Department of Transportation, and across the federal expanse. This Investigation Team will be chaired by an individual who is external to the federal agencies and will have the responsibility to coordinate all the information from an external view.

"So we'll be conducting both the internal activity as well as the external review immediately to ascertain the causes and circumstances under which this tragedy occurred.

"We have pulled together all the federal agencies and local governments as well. I have been in discussion several times this morning with Secretary Tom Ridge. The effort is under way to coordinate an understanding of exactly where the orbiter path had taken it from West Texas towards the Kennedy Space Center here in Florida and to make sure that the material on the ground is secured so that the investigation can begin promptly.

"We would urge people who believe they have found any material to stay away from it and to please contact local officials. The local first responder groups for emergency services have been authorized and directed by Secretary Tom Ridge to assist in any way. The Federal Emergency Management Agency is coordinating that effort on behalf of the Department of Homeland Security.

"I was here this morning with the families of the astronauts and their friends. It started out as a pretty happy morning, as we awaited the landing of STS-107. We had highly anticipated their return because we couldn't wait to congratulate them for their extraordinary performance and their excellent

effort on this very important science mission.

"They dedicated their lives to pushing scientific challenges for all of us here on Earth. They dedicated themselves to that objective and did it with a happy heart, willingly and with great enthusiasm.

"The loss of this valued crew is something we will never be able to get over. We have assured the families that we will do everything, everything we can possibly do to guarantee that we work our way through this horrific tragedy.

We ask the members of the media to honor that too. Please respect their privacy and please understand the tragedy that they are going through at this time. We will help the media assure that this will be the case as well.

"We trust the prayers of the Nation will be with them and with their families. A more courageous group of people you could not have hoped to know- an extraordinary group of astronauts who gave their lives-and the families of these crewmembers. They knew exactly the risks. And never, ever did we want to see a circumstance in which this could happen.

"We diligently dedicate ourselves every single day to assuring these things don't occur. And when they do we have to act responsibly, accountably and that is exactly what we will do."

For more information on the Internet:

www.nasa.gov

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Subject: STS-107 Statement # 5 NASA ANNOUNCES SPACE SHUTTLE COLUMBIA ACCIDENT INVESTIGATION BOARD (THE GEHMAN BOARD)
Date: Sun, 2 Feb 2003 11:03:16 -0500
X-Mailer: Internet Mail Service (5.5.2656.59)

Glenn Mahone/Bob Jacobs
Headquarters, Washington

February 2, 2003

RELEASE: 03-034

NASA ANNOUNCES SPACE SHUTTLE COLUMBIA ACCIDENT INVESTIGATION BOARD (THE GEHMAN BOARD)

NASA Administrator Sean O'Keefe today announced the members of the Space Shuttle Mishap Interagency Investigation Board, which will provide an independent review of the events and activities that led up to the tragic loss of the seven astronauts Saturday on board the Space Shuttle Columbia.

The board's first meeting is scheduled for tomorrow at Barksdale Air Force Base in Louisiana.

Retired U.S. Navy Admiral Harold W. Gehman, Jr., who co-chaired the independent commission that investigated the attack on the U.S.S. Cole in Aden, Yemen, Oct. 12, 2000, and once served as the commander-in-chief of U.S. Joint Forces Command, will chair the panel.

"While the NASA family and the entire world mourn the loss of our colleagues, we have a responsibility to quickly move forward with an external assessment to determine exactly what happened and why," said Administrator O'Keefe. "We're honored to have such a distinguished panel of experts, led by Admiral Gehman."

Other members of the investigative board includes:

- * Rear Admiral Stephen Turcotte, Commander, U.S. Naval Safety Center, Norfolk, Va.
- * Major General John L. Barry, Director, Plans and Programs, Headquarters Air Force Materiel Command, Wright-Patterson Air Force Base, Ohio
- * Major General Kenneth W. Hess, Commander, U.S. Air Force Chief of Safety, Kirtland Air Force Base, N.M.

- * Dr. James N. Hallock, Aviation Safety Division Chief, U.S. Department of Transportation, Cambridge, Mass.
- * Steven B. Wallace, Director of Accident Investigation, Federal Aviation Administration, Washington
- * Brigadier General Duane Deal, Commander 21st Space Wing, Peterson Air Force Base, Colo.

Several senior NASA leaders also will be a part of the panel, including G. Scott Hubbard, Director, NASA Ames Research Center, Moffett Field, Calif. Bryan D. O'Connor, NASA Associate Administrator and former astronaut, Office of Safety and Mission Assurance, Headquarters, will serve as Ex-Officio Member, and Theron Bradley, Jr., NASA Chief Engineer, NASA Headquarters, Washington, will be Executive Secretary.

"We need to be responsible, accountable, and extremely thorough in this investigation," added Administrator O'Keefe. "This panel is charged with a most difficult task, but I am confident in their ability, their integrity, and their dedication to doing what's right. Their findings will help push America's space program successfully into the future."

"Currently, NASA is beginning an internal investigation, drawing on the extensive expertise throughout the agency. Public officials for NASA, the Federal Emergency Management Agency, and other federal, state, and local entities are coordinating talents to help find the cause of this tragedy," concluded Administrator O'Keefe

Additional information about the investigation and the STS-107 mission is available on the Internet at:

<<http://www.nasa.gov>>

<<http://spaceflight.nasa.gov>>

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Subject: NASA ANNOUNCES CORRECTED PROCEDURE FOR FILING DAMAGE CLAIMS
Date: Mon, 3 Feb 2003 12:37:10 -0500
X-Mailer: Internet Mail Service (5.5.2653.19)

Robert Mirelson
Headquarters, Washington

February 3, 2003

RELEASE: 03-041

NASA ANNOUNCES CORRECTED PROCEDURE FOR FILING DAMAGE CLAIMS

NASA is accepting claims from individuals who may have suffered damage due to the Space Shuttle Columbia mishap. Any person desiring to file a claim should complete U.S. Government Standard Form 95, "Claim for Damage, Injury, or Death" and send it to the closest of these NASA offices.

Office of the Chief Counsel
NASA Johnson Space Center
Mail Code: AL
2101 NASA Road 1
Houston, TX 77058
(281) 483-3021

Office of the General Counsel
NASA Headquarters
Mail Code: G
300 E St., SW
Washington, DC 20546
(202) 358-2450

Office of Chief Counsel
NASA Stennis Space Center
Mail Code: CA00
Building 1100

Stennis Space Center, MS 39529
(228) 688-2164

For more information on filing a claim, including
downloadable forms, call any of the above offices or go to:

www.hq.nasa.gov/ogc/general_law/torttext.html

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Subject: A STATEMENT FROM THE FAMILIES OF COLUMBIA

Date: Mon, 3 Feb 2003 12:14:50 -0500

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A STATEMENT FROM THE FAMILIES OF COLUMBIA

On January 16th, we saw our loved ones launch into a brilliant, cloud-free sky. Their hearts were full of enthusiasm, pride in country, faith in their God, and a willingness to accept risk in the pursuit of knowledge --- knowledge that might improve the quality of life for all mankind. Columbia's 16-day mission of scientific discovery was a great success, cut short by mere minutes --- yet it will live on forever in our memories. We want to thank the NASA family and people from around the world for their incredible outpouring of love and support. Although we grieve deeply, as do the families of Apollo 1 and Challenger before us, the bold exploration of space must go on. Once the root cause of this tragedy is found and corrected, the legacy of Columbia must carry on --- for the benefit of our children and yours.

Approved by:

Robert Cabana/CA/Director, Flight Crew Operations
Feb. 3, 2003

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InfoCom, 07:45 AM 2/3/2003 -0500, A Message to the NASA Family: Loss of Columbia and Its Crew

Date: Mon, 3 Feb 2003 07:45:26 -0500 (EST)

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Subject: A Message to the NASA Family: Loss of Columbia and Its Crew

From: InfoCom <infocom@hq.nasa.gov>

Sender: owner-headquarters@lists.hq.nasa.gov

This message is being transmitted to all NASA HQ and Center employees.
Point of Contact: Glenn Mahone, Code P, 358-1898.

**A MESSAGE TO THE NASA FAMILY:
The Loss of Columbia and Its Courageous Crew**

The loss of the courageous crew of STS-107 and of the Space Shuttle Columbia has brought tragedy to the NASA family, to the families of these seven heroes and to our Nation.

Our thoughts and prayers are with the families of seven remarkable individuals-Rick Husband, William McCool, Mike Anderson, Dave Brown, Kalpana Chawla, Laurel Clark and Ian Ramon. These explorers performed magnificently and with tremendous spirit on this mission to expand our scientific horizons.

The bond between those who venture into the frontier of space, and those who make spaceflight possible is incredibly strong. Accordingly, our grief is unbearably great. But so is our resolve to do everything we possibly can for the families of the Columbia crew to find out what caused this accident, and to move on to correct what problems we find and make sure this never happens again. We owe them that.

To honor the Columbia crew and the family members who have borne their personal grief with tremendous dignity and courage, President Bush will join us for a memorial service at the Johnson Space Flight Center on Tuesday, February 4 at 12 noon. All badged NASA employees are welcome to attend this event. There will also be a memorial service on Thursday, February 6 at Washington's National Cathedral at 1:00 p.m.

Our nonstop work to recover from this terrible tragedy also honors the astronauts and their families. That work, which began the minute we realized that Columbia and its crew would not safely return home, will be NASA's chief focus in the days and weeks ahead, along with the continued safe operations of the International Space Station.

The work for the accident investigation is ongoing at many locations, and is being supported by federal, state and local government organizations who are helping us collect all the evidence. Their cooperation is greatly appreciated. To help this work we have appointed a NASA Space Shuttle Mishap Investigation Team and an independent investigation board, which will provide an objective review of the events and activities that led up to Saturday's tragedy. Retired U.S. Navy Admiral Harold W. Gehman, Jr., the former Commander in Chief of the U.S. Atlantic Command, who later led the independent commission that investigated the attack on the U.S.S. Cole, will chair the investigative board. The board has already held its first meeting at Barksdale Air Force Base in Louisiana.

In the horrible hours after the loss of Columbia, I saw countless examples of NASA employees pulling together and doing their jobs with the professionalism that the American public expects from this storied agency. And the President has asked me to pass along his appreciation and admiration for the professionalism being displayed by the entire NASA family.

As all of us strive to leave no stone unturned in the accident investigation and recovery efforts, let us also remember our responsibilities to take care of our fellow NASA family members. Our dedicated Employee Assistance professionals are on hand to help should anyone need emotional support in the days ahead. Please feel comfortable in asking for their services if the need arises.

As we search for solace in this challenging time, I have found comfort in the following verse of the Navy Hymn that was written especially for our astronauts:

Eternal Father, King of birth,
Who didst create the heaven and earth,
And bid the planets and the sun
Their own appointed orbits run;
O hear us when we seek thy grace
For those who soar through outer space.

May God bless the crew of STS-107, their families, and the members of the NASA family.

Sean O'Keefe
NASA Administrator

This "Special Notice" is being transmitted by InfoCom, Code CI-3, HQ Information Technology & Communications Division. For more information on InfoCom services, call 358-2299 or 358-4817, or visit the InfoCom web page at <http://www.hq.nasa.gov/hq/infocom>

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Subject: STS-107 MCC Status Report #20
Date: Sun, 2 Feb 2003 21:30:44 -0500
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STS-107

Report #20

Sunday, February 2, 2003 - 8:30 p.m. CST

Mission Control Center, Houston, Texas

Aided by federal and local agencies, NASA stepped up its inquiry into the loss of the Space Shuttle Columbia and its seven astronauts. Multiple investigative teams continue to pore over engineering data in an effort to uncover the cause of the breakup of the orbiter over Texas on Saturday 16 minutes from landing.

Space Shuttle Program Manager Ron Dittmore told an afternoon briefing that a Mishap Response Team is gathering data from numerous engineering teams in the early stages of the investigation and is receiving assistance from the Federal Emergency Management Agency, the National Transportation Safety Board, the Federal Bureau of Investigation and local law enforcement agencies, among others.

Dittmore said that as Commander Rick Husband, Pilot William McCool, Mission Specialists Dave Brown, Kalpana Chawla, Mike Anderson, Laurel Clark and Israeli Payload Specialist Ilan Ramon are mourned, the recovery of debris from Columbia and human remains is being coordinated at Barksdale Air Force Base, La.

Dittmore thanked residents in the areas where debris fell after Columbia's breakup for cooperating in the recovery effort but cautioned them not to handle debris that could contain toxic substances.

Dittmore reconstructed the final minutes of Columbia's flight before communications was lost. He reiterated the failure of four temperature sensors associated with the shuttle's left hand elevons at 7:53 a.m. CST Saturday amidst a 20-30 degree rise in left hand bondline and strut temperatures over a five-minute period near the left wheel well of the orbiter. Columbia was flying over California at the time at an altitude of

about 220,000 feet traveling 21 times the speed of sound.

One minute later, over the region of eastern California and western Nevada, Columbia's mid-fuselage bondline temperatures above the left wing experienced an unusual temperature increase. It rose 60 degrees over a five-minute period. No such temperature increase was noted on the right side of Columbia or in the Shuttle's cargo bay. Columbia was about 212,000 feet above the Earth, flying at Mach 20.

At 7:58 a.m. over New Mexico, telemetry showed a larger than normal drag on the left side of the shuttle, and an indication of an increase in pressure in the left main landing gear tires. Dittmore said the data suggests the tires remained intact. Columbia's altitude was 209,000 feet.

At 7:59 a.m. over west Texas, the data showed Columbia continuing to react to an increased drag on its left side, trying to correct the movement by rolling back to the right. Dittmore said the response of the orbiter was well within its capability to handle such maneuvers.

At that time, seconds before 8 a.m. CST, all communications was lost with Columbia as it flew at an altitude of 207,000 feet, 18 times the speed of sound.

Dittmore indicated that ground computers may contain an additional 32 seconds of data which could provide additional information in the analysis of Columbia's breakup.

He added that the loss of some foam insulation from Columbia's external fuel tank, which struck the shuttle's left wing about 80 seconds after launch was "inconsequential" based on video imagery review conducted by engineering specialists. However, he said nothing has been ruled out as a possible cause for the accident.

Robert Cabana, the Director of Flight Crew Operations at the Johnson Space Center, relayed thanks from the families of the astronauts for the outpouring of support received from around the nation and the world.

Cabana said that the Expedition 6 crewmembers aboard the International Space Station are "grieving" for the loss of Columbia's crew, but are in good spirits as they continue human spaceflight and scientific research aboard the orbital outpost. Cabana said Commander Ken Bowersox, Flight Engineer Nikolai Budarin and NASA ISS Science Officer Don Pettit are preparing for Tuesday's arrival of a Russian Progress cargo ship. Progress 10 was launched this morning from the Baikonur Cosmodrome in Kazakhstan.

On Tuesday, Feb. 4, President and Mrs. Bush will join NASA Administrator Sean O'Keefe at the Johnson Space Center to pay tribute to Columbia's astronauts during a special memorial service. The ceremony to honor

Buckingham-1, Bruce, 09:30 PM 2/2/2003 -0500, STS-107 MCC Status Report #20

Columbia's seven crewmembers is scheduled to begin at 1 p.m. EST and will be broadcast on NASA Television. The service is not open to the public.

The next STS-107 Accident Response briefings are on Monday, Feb. 3 at NASA Headquarters in Washington at 11:30 a.m. EST and at the Johnson Space Center at 4:30 p.m. EST. Status reports will be issued as developments warrant.

NASA TV can be found on AMC-2, Transponder 9C, vertical polarization at 85 degrees West longitude, 3880 MHz, with audio at 6.8 MHz.

###

NASA Johnson Space Center Mission Status Reports and other information are available automatically by sending an Internet electronic mail message to majordomo@listserver.jsc.nasa.gov. In the body of the message (not the subject line) users should type "subscribe hsfnews" (no quotes). This will add the e-mail address that sent the subscribe message to the news release distribution list. The system will reply with a confirmation via e-mail of each subscription. Once you have subscribed you will receive future news releases via e-mail.

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Subject: SPACE SHUTTLE COLUMBIA ACCIDENT BRIEFINGS SCHEDULED

Date: Sun, 2 Feb 2003 19:19:37 -0500

X-Mailer: Internet Mail Service (5.5.2653.19)

Robert Mirelson

Headquarters, Washington

February 2, 2003

(Phone: 202/3580-1600)

Eileen Hawley

Johnson Space Center, Houston

(Phone: 281/483-5111)

RELEASE: 03-040

SPACE SHUTTLE COLUMBIA ACCIDENT BRIEFINGS SCHEDULED

Two briefings are scheduled Monday in NASA's continuing effort to keep the public up-to-date on the latest developments involving the investigation into the tragic accident that killed the seven-member crew of the Space Shuttle Columbia.

The first briefing is scheduled at NASA Headquarters Monday morning at 11:30 a.m. EST. A second briefing is tentatively scheduled for 4:30 p.m. EST from the NASA Johnson Space Center in Houston.

Both briefings will feature questions from reporters at participating NASA centers and will be broadcast live on NASA Television.

NASA TV is available on AMC-2, transponder 9C, C-Band, located at 85 degrees West longitude. The frequency is 3880.0 MHz. Polarization is vertical and audio is monaural at 6.8 MHz.

Additional information is available on the Internet at:

<http://www.nasa.gov>

<http://spaceflight.nasa.gov>

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Status reports and other NASA publications are available on the World Wide Web at: <http://www-pao.ksc.nasa.gov/kscpao/kscpao.htm>.

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Subject: NASA MEMORIAL SERVICE SCHEDULED AT JOHNSON SPACE CENTER
Date: Sun, 2 Feb 2003 19:18:27 -0500
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Glenn Mahone/Bob Jacobs
Headquarters, Washington February 2, 2003
(Phone: 202/358-1898/1600)

Eileen Hawley
Johnson Space Center, Houston
(Phone: 281/483-5111)

RELEASE: 03-37

NASA MEMORIAL SERVICE SCHEDULED AT JOHNSON SPACE CENTER

The President and Mrs. George W. Bush will join NASA Administrator Sean O'Keefe Tuesday afternoon in paying tribute to the brave heroes of the Space Shuttle Columbia crew during a special memorial service at the NASA Johnson Space Center in Houston.

The ceremony to honor NASA astronauts Rick Husband, William McCool, Michael Anderson, Kalpana Chawla, David Brown, Laurel Clark, and Israeli astronaut Ilan Ramon is scheduled to begin at 12:45 p.m. EST in the Central Mall area behind Building One. Gates are scheduled to open at 10 a.m.

This is a private ceremony for family members, friends, and invited guests, along with NASA employees and contractors. The service will be carried live on NASA Television and available on the Internet at www.nasa.gov.

Media access to the memorial service will be restricted with television and still photography access provided on a pool basis.

NASA Television is available on AMC-2, transponder 9C, C-Band, located at 85 degrees West longitude. The frequency is 3880.0 MHz. Polarization is vertical and audio is monaural at 6.8 MHz.

Additional information about the STS-107 crew and the Space Shuttle Columbia is available on the Internet at <http://spaceflight.nasa.gov>.

-end-

* * *

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Date: Tue, 4 Feb 2003 15:59:33 -0500 (EST)

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Subject: Special Notice - NASA Family Invited to STS-107 Crew Memorial

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Sender: owner-headquarters@lists.hq.nasa.gov

This message is being transmitted to all NASA HQ employees.
Point of Contact: Office of Public Affairs, 358-1750.

NASA FAMILY INVITED TO STS-107 CREW MEMORIAL

The entire NASA family at Headquarters is invited to celebrate the lives, achievements, and the ultimate sacrifices made by the brave crew of STS-107 at a special memorial ceremony Thursday, Feb. 6, at 10 a.m. EST, at the Washington National Cathedral.

Vice-President Dick Cheney will join NASA Administrator Sean O'Keefe for the ceremony at the cathedral, which is located at the corner of Massachusetts and Wisconsin Avenues, NW.

A limited number of busses will be available for round-trip transportation, departing from Headquarters at 7:45 a.m. You will be screened through magnetometers, and you must show a valid NASA ID badge for admittance. This includes all civil servant and contractor employees.

Due to limited seating, family members, or additional guests cannot be accommodated.

If you are arriving by Metro or some other means, please arrive no later than 8:15 a.m.

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To: tom-marple,ron-cain
From: "Jonathan B. Mullin" <jmullin@hq.nasa.gov>
Subject: Fwd: A Message to the NASA Family: Loss of Columbia and Its Crew
Cc: pennie-hardesty,hector-suarez
Bcc: len-fuchs,Bridgette-Mullin
Attached:

Updates. Regards, Jon

Date: Mon, 3 Feb 2003 07:45:26 -0500 (EST)

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Subject: A Message to the NASA Family: Loss of Columbia and Its Crew

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Sender: owner-headquarters@lists.hq.nasa.gov

This message is being transmitted to all NASA HQ and Center employees.
Point of Contact: Glenn Mahone, Code P, 358-1898.

A MESSAGE TO THE NASA FAMILY:

The Loss of Columbia and Its Courageous Crew

The loss of the courageous crew of STS-107 and of the Space Shuttle Columbia has brought tragedy to the NASA family, to the families of these seven heroes and to our Nation.

Our thoughts and prayers are with the families of seven remarkable individuals-Rick Husband, William McCool, Mike Anderson, Dave Brown, Kalpana Chawla, Laurel Clark and Ian Ramon. These explorers performed magnificently and with tremendous spirit on this mission to expand our scientific horizons.

The bond between those who venture into the frontier of space, and those who make spaceflight possible is incredibly strong. Accordingly, our grief is unbearably great. But so is our resolve to do everything we possibly can for the families of the Columbia crew to find out what caused this accident, and to move on to correct what problems we find and make sure this never happens again. We owe them that.

To honor the Columbia crew and the family members who have borne their personal grief with tremendous dignity and courage, President Bush will join us for a memorial service at the Johnson Space Flight Center on Tuesday, February 4 at 12 noon. All badged NASA employees are welcome to attend this event. There will also be a memorial service on Thursday, February 6 at Washington's

National Cathedral at 1:00 p.m.

Our nonstop work to recover from this terrible tragedy also honors the astronauts and their families. That work, which began the minute we realized that Columbia and its crew would not safely return home, will be NASA's chief focus in the days and weeks ahead, along with the continued safe operations of the International Space Station.

The work for the accident investigation is ongoing at many locations, and is being supported by federal, state and local government organizations who are helping us collect all the evidence. Their cooperation is greatly appreciated. To help this work we have appointed a NASA Space Shuttle Mishap Investigation Team and an independent investigation board, which will provide an objective review of the events and activities that led up to Saturday's tragedy. Retired U.S. Navy Admiral Harold W. Gehman, Jr., the former Commander in Chief of the U.S. Atlantic Command, who later led the independent commission that investigated the attack on the U.S.S. Cole, will chair the investigative board. The board has already held its first meeting at Barksdale Air Force Base in Louisiana.

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May God bless the crew of STS-107, their families, and the members of the NASA family.

Sean O'Keefe
NASA Administrator

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Jonathan B. Mullin
Manager Operational Safety
Emergency Preparedness Coordinator
Headquarters National Aeronautics and Space Administration
Phone (202) 358-0589
FAX (202) 358-3104
"Mission Success Starts with Safety"

To: ron-cain,tom-marple
From: "Jonathan B. Mullin" <jmullin@hq.nasa.gov>
Subject: Fwd: NASA MEMORIAL SERVICE SCHEDULED AT JOHNSON SPACE CENTER
Cc: pennie-hardesty,hector-suarez
Bcc:
Attached:

Information, Regards, Jon

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Glenn Mahone/Bob Jacobs
Headquarters, Washington
(Phone: 202/358-1898/1600) February 2, 2003

Eileen Hawley
Johnson Space Center, Houston
(Phone: 281/483-5111)

RELEASE: 03-37

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-end-

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Jonathan B. Mullin
Manager Operational Safety
Emergency Preparedness Coordinator
Headquarters National Aeronautics and Space Administration

ron-cain,tom-marple, 07:58 AM 2/3/2003 -0500, Fwd: NASA MEMORIAL SERVICE SCHEDULED AT

Phone (202) 358-0589

FAX (202) 358-3104

"Mission Success Starts with Safety"

To: ron-cain
From: "Jonathan B. Mullin" <jmullin@hq.nasa.gov>
Subject: Fwd: STS-107 MCC Status Report #19
Cc:
Bcc:
Attached:

Notification.Jon

Date: Sun, 02 Feb 2003 12:24:32 -0500
To: tom-marple
From: "Jonathan B. Mullin" <jmullin@hq.nasa.gov>
Subject: Fwd: STS-107 MCC Status Report #19
Cc: stacey-nakamura
Bcc: Mullin_Jonathan

Tom, forwarded as part of the notification and for your information. Regards, Jon
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To: "1 'ksc-news_release@kscnews.ksc.nasa.gov' (E-mail)" <ksc-news_release@kscnews.ksc.nasa.gov>
Subject: STS-107 MCC Status Report #19
Date: Sat, 1 Feb 2003 19:44:13 -0500
X-Mailer: Internet Mail Service (5.5.2653.19)

STS-107
Report #19
Saturday, February 1, 2003 - 7:00 p.m. CST
Mission Control Center, Houston, Texas

The Space Shuttle Columbia and its seven astronauts were lost today when the vehicle broke up over north central Texas during its reentry from orbit.

Communications were lost with Columbia and its crew at around 8:00 a.m. CST, while the shuttle was traveling about 18 times the speed of sound at an altitude of 207,000 feet. Columbia was 16 minutes from landing at the Kennedy Space Center when flight controllers at Mission Control lost contact with the vehicle. Columbia was returning from a 16-day scientific research mission, its 28th flight, which launched on January 16.

Aboard Columbia were Commander Rick Husband, completing his second flight,

Pilot William McCool, wrapping up his first mission, Mission Specialists Dave Brown, also completing his first mission, Kalpana Chawla, on her second flight, Laurel Clark, a first-time space traveler, Payload Commander Mike Anderson, ending his second flight, and Payload Specialist Ilan Ramon of the Israel Space Agency, on his first flight.

Prior to the loss of communications with Columbia, the shuttle's return to Earth appeared perfectly normal. After assessing some wispy fog near the shuttle's three-mile long landing strip at KSC before dawn, Entry Flight Director Leroy Cain gave approval for the firing of the shuttle's braking rockets to begin its descent from orbit.

Husband and McCool began the deorbit burn to allow Columbia to slip out of orbit at 7:15 a.m. CST. There was no indication of anything abnormal with Columbia's reentry until the last communications between Mission Control and the crew.

At Columbia's intended landing site, NASA Administrator Sean O'Keefe and Associate Administrator for Space Flight William Readdy met with the families of the astronauts to offer their condolences, vowed to uncover the cause of the accident and press ahead with the Shuttle program.

"This is indeed a tragic day for the NASA family, for the families of the astronauts who flew on STS-107, and likewise is tragic for the nation," said O'Keefe.

"We have no indication that the mishap was caused by anything or anyone on the ground," O'Keefe added.

In a briefing, Chief Flight Director Milt Heflin said that around 7:53 a.m. CST, just minutes before communications were lost with Columbia, flight controllers detected indications of a loss of hydraulic system temperature measurements associated with Columbia's left wing, followed three minutes later by an increase in temperatures on the left main gear tires and brakes. At 7:58 a.m., flight controllers noted a loss of bondline temperature sensor data in the area of the left wing followed a minute later by a loss of data on tire temperatures and pressures for the left inboard and outboard tires.

After several attempts to try to contact Columbia, Cain declared a contingency, whereby flight controllers began preserving documentation regarding the entry phase of the flight. Recovery forces fanned out from Texas to Louisiana to try to recover debris that will be pertinent to the mishap investigation.

Space Shuttle Program Manager Ron Dittmore said several teams have been organized to gather data for analysis and will report to an external investigation board that was appointed by Administrator O'Keefe. Dittmore

added that no specific orbiter debris or crew remains have been positively identified at this time, and that there is no leading theory for the cause of the accident.

Dittemore said the processing of other shuttles at the Kennedy Space Center for future launches has been temporarily halted to enable engineers to review data regarding vehicle processing and to focus attention on capturing all pertinent information involving Columbia's prelaunch preparations.

NASA managers will be meeting on a regular basis to begin reviewing data associated with Columbia's investigation. The next status briefing from the Johnson Space Center is tentatively scheduled from the Johnson Space Center, Houston, TX at 12:00 p.m. CST Sunday. It will be seen on NASA Television with two-way question and answer capability for reporters from NASA centers.

NASA TV can be found on AMC-2, Transponder 9C, vertical polarization at 85 degrees West longitude, 3880 MHz, with audio at 6.8 MHz.

On the International Space Station, Expedition 6 Commander Ken Bowersox, Flight Engineer Nikolai Budarin and NASA ISS Science Officer Don Pettit were informed of the loss of Columbia and its crew shortly after a Russian Progress resupply vehicle undocked from the ISS. Filled with discarded items no longer needed on the ISS, the Progress was commanded to deorbit by Russian flight controllers and reentered the Earth's atmosphere.

A new Progress cargo ship will be launched Sunday from the Baikonur Cosmodrome in Kazakhstan at 6:59 a.m. CST (1259 GMT) filled with supplies for the Expedition 6 crew. It is scheduled to dock to the ISS Tuesday morning. ISS program officials say, if necessary, the current resident crew could remain in orbit until late June with the supplies being ferried to the station on the new Progress.

Additional status reports will be issued as new information becomes available.

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