



Chronology of KSC and KSC Related Events for 2002

Elaine E. Liston

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FOREWORD

This 2002 Chronology is published to describe and document KSC's role in NASA's progress.

Materials for this Chronology were selected from a number of published sources. The document records KSC events of interest to historians and other researchers. Arrangement is by date of occurrence, though the source cited may be dated one or more days after the event.

Materials were researched and prepared for publication by Archivist Elaine E. Liston.

Comment on the Chronology should be directed to the John F. Kennedy Space Center, Archives, LIBRARY-E, Kennedy Space Center, Florida, 32899. The Archivist may also be reached by e-mail at Elaine.Liston-1@ksc.nasa.gov, or (321) 867-1515.

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JANUARY

January 4: NASA and the Air Force reduced security restrictions at three Space Coast bases Friday for the first time in almost four months. Patrick Air Force Base, Cape Canaveral Air Force Station and Kennedy Space Center have operated at their second-highest alert status since reopening after Sept. 11. Friday's announcement drops that status one notch, but will have little effect on how people and vehicles are admitted onto the installations, NASA and Air Force spokesmen said. Web posted. (2002). [Air Force, NASA Reduce Security at Cape Canaveral Spaceport [Online]. Available WWW: <http://www.space.com/> [2002, January 5].]

January 7: NASA Administrator Sean O'Keefe begins a tour of agency field centers this week with a trip to NASA's Langley Research Center, Hampton, Va., on Thursday, Jan. 10. Administrator O'Keefe continues his tour Jan. 17 with a visit to NASA's Johnson Space Center (JSC) in Houston. O'Keefe was sworn in Dec. 21 as the agency's 10th chief, following his confirmation by the U.S. Senate on Dec. 20. President George W. Bush nominated him for the position Nov. 14. The NASA Administrator plans to visit all the agency's field centers in the coming weeks. ["New NASA Administrator Begins Field Center Tour," **NASA News Release #N02-02**, January 7, 2002.]

January 8: Robert Gray, a space pioneer who arrived at Cape Canaveral in 1956 with advent of the Vanguard rocket project died Tuesday. He was 78. Robert Gray served as launch director for 146 unmanned mission from Cape Canaveral, as deputy launch director for five Apollo and Skylab flights and led the first Space Shuttle Projects Team at Kennedy Space Center. He also ran KSC's first branch of space station development. ["Vanguard rocket pioneer Gray dies," **Florida Today**, January 10, 2002, p 3B.]

◆ Effective immediately, the Joint Performance Management Office (JPMO) has changed its name to Cape Canaveral Spaceport Management Office, CCSMO. E-mail. (2002). [JPMO Name Change [JBOSC Postmaster]. January 8, 2002.]

January 10: NASA postponed shuttle Columbia's repair mission to the Hubble Space Telescope by a week, to Feb. 28, in an anticipated move Thursday, officials said. The agency's oldest orbiter will wait while engineers prepare a new reaction wheel for the orbiting telescope, Kennedy Space Center spokesman Jack King said. The device is one of four that carefully points the \$2 billion observatory at targets light years away. Managers hoped to launch Columbia on Feb. 21, but the spare wheel would not have been ready. Tests will be completed on the device and its duplicate before they are trucked to KSC and loaded into the orbiters. ["Shuttle mission to repair Hubble reset for Feb. 28," **Florida Today**, January 11, 2002, p 1A.]

January 14: NASA officials are considering cutting the space shuttle's yearly flight rate enough that it could require layoffs at Kennedy Space Center. The issue is subject to lively debate among NASA and industry officials, politicians and analysts. But the outcome could affect the job market on the Space Coast, home to about 12,000 government and contract workers. A reduction to four or five missions a year "may or may not result in layoffs," said Kennedy Space Center Shuttle Integration Manager Dave King. "We don't know what that means quite yet." KSC contractors recently said they have no plans for layoffs, and said they are comfortable with the shuttle launch schedule. They also argue they already run a lean operation. Regardless of the flight rate, there's no shortage of work for technicians on hand, King said. ["Shuttle cuts may cost jobs," **Florida Today**, January 15, 2002, p 1A & 5A.]

◆ When a small group of space-industry workers walked off the job in December, they hoped to return to work the next day. Now, more than a month later, they are still waiting to go back to work. The group of 10 workers from the Transport Workers Union of America Local 525 are out of work after becoming embroiled in a contract dispute with their employer, Maytag Aircraft Corp. Since the workers temporarily walked out, the company has refused to take them back and brought in replacement workers. The group of union workers includes eight fuel haulers – whose duties include fueling emergency aircraft and other equipment at Patrick Air Force Base and Kennedy Space Center – a dispatcher and an accountant. The union has asked the labor board to order the company to put the employees back to work. The workers'

contract expired July 31, shortly after Maytag came in as a subcontractor at Patrick and the Space Center, replacing United Paradyne Corp. ["Worker lockout continues at KSC," **Florida Today**, January 15, 2002, p 1C & 3C.]

◆ The NASA OIG reviewed Kennedy Space Center's use of photographic and video services in response to allegations of waste submitted to several members of Congress, the General Accounting Office, NASA, and the NASA OIG. Wasteful duplication of Government resources occurs when photographers from more than one contract are on hand to take similar images of an engineering activity. These incidents occur most often when one set of contractors is tasked to provide support to the public affairs office, while other photographers and/or videographers are tasked to support their contracts' engineering activities. We found that while such duplication is relatively infrequent, it does occur from time to time. We determined that some image-gathering could be consolidated to satisfy both public affairs and engineering requirements. This process should not be costly or difficult to implement because the major contracts that provide images services to Kennedy issue electronically generated work orders that can be readily coordinated. In response to the OIG's recommendation, Kennedy management agreed to revise its procedures for acquiring photographic and video services to minimize duplication and maximize share use of images. ["NASA Agrees to Reduce Duplication of Photographic and Video Services at Kennedy Space Center," **NASA News Release #2002-038**, January 14, 2002.]

January 15: Sean O'Keefe was formally sworn in as NASA Administrator by Vice President Dick Cheney Tuesday. The ceremony was held in the Langley (IMAX) theater at the National Air and Space Museum. 450 people were in attendance. A reception in the museum's exhibit area beneath a swarm of rockets followed. Both events were by invitation only and involved heavy security procedures – standard fare these days in Washington. Web posted. (2002). [Sean O'Keefe Sworn in Amidst the Rockets [Online]. Available WWW: <http://www.spaceref.com/> [2002, January 15].]

◆ Shuttle Update: Columbia – In the Orbiter Processing Facility (OPF), aft closeout operations were completed over the weekend and forward closeouts are in progress in preparation for rollover Wednesday to the Vehicle Assembly Building for space vehicle mate. The orbiter will be checked for weight and balance and center of gravity today. Atlantis – The Shuttle main engines were installed yesterday. Removal of the aft hand Orbiting Maneuvering System (OMS) pod to inspect the fittings of attach point No. 5 was delayed due to additional requirements to verify the weight of OMS propellants onboard. Endeavour – Post-flight servicing continues on Endeavour in the OPF. The vehicle's Forward Reaction Control System (FRCS) was removed to replace and retest a forward firing thruster that failed during the recently completed STS-108 mission. Preparation work is under way for removal of the heat shields and main engines next week. Discovery – the orbiter is in temporary storage in a high bay of the Vehicle Assembly Building awaiting a decision for the structural inspection and modification down period. Discovery is scheduled to return to the OPF in mid-January. ["Columbia being prepped for rollover to VAB and stacking," **KSC Countdown**, January 15, 2002.]

◆ A U.S. Air Force military communications satellite was launched Tuesday evening at 7:30 p.m. Eastern (0030 GMT) from Cape Canaveral aboard a Titan 4. Web posted. (2002). [Titan 4 Lofts Milstar: Defense Orbital Switchboard Now Complete [Online]. Available WWW: <http://www.spacedaily.com/> [2002, January 16].]

◆ The High Energy Solar Spectroscopic Imager (HESSI), scheduled to be launched aboard a Pegasus XL vehicle from Cape Canaveral Air Force Station Jan. 24, could be delayed 7-10 days. No details were available. The primary mission objective of HESSI is to explore the basic physics of particle acceleration and energy release in solar flares. ["HESSI Launch Tentative," **KSC Countdown**, January 15, 2002.]

January 18: Space Shuttle Columbia, newly renovated and being prepared for flight, was lifted into position Friday to mate with its other components. Columbia is scheduled to launch at 6:52 a.m. Feb. 28 on a mission to service the Hubble Space Telescope. Inside the 52-story Vehicle Assembly Building, Columbia will be hoisted to the rafters and lowered vertically to the external tank and solid-fueled boosters. Columbia, the only orbiter too heavy to carry new segments to Alpha, is to rendezvous with the telescope

during an 11-day servicing mission. ["Renovated Columbia mates with other flight components," **Florida Today**, January 19, 2002, p 1B.]

◆ Retired *Florida Today* columnist and Lockheed engineer Milt Salamon died Friday afternoon at Cape Canaveral Hospital. He was 75. From 1974 until his retirement in August, Salamon tickled the pages of *Florida Today* with his gentle wit and understated observations of life on the Space Coast. (This writer particularly enjoyed Salamon's reporting on KSC and all the little bits of trivia associated with the space program.) Salamon slowed down in the last few years, but he still went to observe a few shuttle launches and landings. ["Columnist Milt Salamon, 75, dies," **Florida Today**, January 19, 2002, p 1B & 2B.]

January 23: Space Shuttle Columbia did not rollout to the launch pad because problems developed on the treaded machine that was to carry it, a NASA spokesman said. A bearing in the steering mechanism on the crawler transporter failed, leaving a tread set slightly out of alignment. The crawler has to set the launch platform and shuttle within 1/8 of an inch, so there are not simple adjustments crawler drivers can make to compensate for the steering problem. United Space Alliance engineers spent the day trying to fix the right front set of treads and were slated to try to roll Columbia to the pad on Thursday. The delay will not set back Columbia's Feb. 28 launch. ["Crawler glitch delays shuttle rollout," **Florida Today**, January 24, 2002, p 1B.]

◆ Edmond Gormel's role at the Florida Space Authority is "to facilitate economic activity." A behind-the-scenes part of the change from the agency formerly known as Spaceport Florida Authority is a push to fill the authority's oversight board with people from as far away from Cape Canaveral as possible. The governor's last appointment, a year ago, was Ken Ford, director of the Institute of Human and Machine Cognition at the University of West Florida in Pensacola. Two other vacancies remain. There are competing bills that would restructure the Spaceport Florida Authority board. At the same time, Air Force attorneys have told the Space Authority that federal representatives from the Kennedy Space Center, the Air Force and the Naval Ordnance Test Unit will have to give up their voting privileges on the Spaceport Management Council, which recommends new projects to the Space Authority. Gormel is trying to keep federal agencies involved as non-voting members of the council. ["Space Authority leans toward board without KSC workers," **Florida Today**, January 24, 2002, p 2B.]

January 24: Shuttle Columbia, stacked to begin its mission, is waiting while mechanics try to repair the baseball infield-sized crawler transporter that is supposed to carry Columbia to launch pad 39A. The crawler developed steering problems that locked one of its tread sets out of alignment. Mechanics worked on the machine but could not replace a faulty bearing in time to move the shuttle Thursday. They also are inspecting the vehicle's three other treadsets. The crawlers, built on-site at Kennedy Space Center in the mid-1960s, are the only vehicles large enough to lift a launch-ready shuttle and its platform and carry the 12 million pounds 3 ½ miles to the oceanside launch complex. The move will be Columbia's first to the launch pad since July 1999, when it lofted the Chandra X-ray telescope into space. ["NASA delays rollout at least 2 more days," **Florida Today**, January 25, 2002, p 1B.]

January 28: Hundreds attended a memorial service Monday at the Astronaut Memorial Plaza in Titusville, Florida, to observe a moment of silence for the seven astronauts who 16 years ago were on the fatal flight of space shuttle Challenger. On Sunday, relatives and veterans of the Apollo 1 mission gathered nearby at the launch pad where three astronauts died 35 years ago during a countdown test. Web posted. (2002). [Fallen Challenger, Apollo astronauts remembered [Online]. Available WWW: <http://www.cnn.com/> [2002, January 28].]

◆ Space Shuttle Columbia rolled out to launch pad 39A for its scheduled launch on Feb. 28. Columbia was supposed to roll out last Wednesday but was delayed several days when the crawler transporter's steering mechanism stuck. The delay will not set back the launch date, NASA spokesman Bruce Buckingham said. ["Crawler inches Columbia to pad," **Florida Today**, January 29, 2002, p 1A & 6A.]

January 29: Arthur Andersen "did not meet professional standards" in its audit of NASA's 1999 financial statements, which included a \$644 million error, according to a General Accounting Office report issued last year. The GAO report could complicate Andersen's ability to withstand a review of its work as a

federal contractor, said Steve Schooner, a George Washington University law professor who specializes in government contracting. An Andersen spokesman, Patrick Dorton, said NASA's inspector general agreed with the results of Andersen's audit. Web posted. (2002). [Andersen's '99 Audit of NASA Criticized [Online]. Available WWW: <http://www.washingtonpost.com/> [2002, January 29].]

◆ The final replacement part for the \$2 billion Hubble Space Telescope arrived at Kennedy Space Center on Tuesday for the Feb. 28 repair mission by shuttle Columbia. The astronauts who will install the component, part of a complex steering mechanism for the observatory, flew in Tuesday to the center for a dress rehearsal for the countdown and more training. The part, called a reaction wheel, is one of four that point the telescope at objects thousands of light-years away. ["Hubble repair crew lands at space center," **Florida Today**, January 30, 2002, 1B.]

January 30: A brown powder on six envelopes disrupted a Kennedy Space Center office building Wednesday morning. The substance was found to be harmless, though officials do not yet know what it is, NASA spokesman Bruce Buckingham said. NASA workers on the fifth floor of the Operations Support Building next to the Vehicle Assembly Building found the substance on six invitations from an New Jersey-based Galaxy Scientific Inc. to a workshop on aging aircraft. ["Powder on envelopes closes KSC building," **Florida Today**, January 31, 2002, p 1B.]

January 31: The High Energy Solar Spectroscopic Imager (HESSI) is currently on schedule to launch Tuesday, Feb. 5, from Cape Canaveral Air Force Station. The launch vehicle is the Pegasus XL, which is carried underneath the Orbital Sciences L-1011 aircraft to approximately 39,000 feet over open ocean, where it is released. The primary mission objective is to explore the basic physics of particle acceleration and energy release in solar flares. ["HESSI on track for launch Feb. 5," **KSC Countdown**, January 31, 2002.]

◆ NASA Administrator Sean O'Keefe and the White House today announced a number of key nominations and appointments in an effort to fill open positions within the space agency. The President announced his intention to nominate former NASA astronaut and Assistant Deputy Administrator, Major General Charles F. Bolden, U.S. Marine Corps, as NASA's next Deputy Administrator. Bolden, 55, currently serves as the Commanding General, 3rd Marine Aircraft Wing. A veteran of four Space Shuttle flights, Bolden was pilot on STS-61C in 1986 and STS-31 in 1990, and was the mission commander on STS-45 in 1992. That same year, he was appointed Assistant Deputy Administrator at NASA Headquarters in Washington, a position he held until 1994, when he was named commander of STS-60. He left the space program having logged more than 680 hours in orbit. As Deputy Administrator, Bolden will serve as the chief operating officer for the agency and report directly to the Administrator. He will be responsible for directing and managing many of the programs and day-to-day operations and activities at NASA. ["White House, NASA Administrator Move To Fill Key Agency Positions," **NASA News Release #02-18**, January 31, 2002.]

During January: The U.S. Air Force 45th Space Wing will issue a request for proposals this month for commercial airborne security patrols to help protect the U.S. unmanned launch operations at Cape Canaveral and NASA shuttle operations at Kennedy Space Center. ["Commercial Cape Security," **Aviation Week & Space Technology**, January 7, 2002, p 17.]

FEBRUARY

February 1: South African businessman Mark Shuttleworth is not considered a space tourist. He is a Spaceflight Participant under NASA's new designation for astronauts paying their own way into orbit. Shuttleworth and future non-professional astronauts must also undergo background checks that could disqualify them for reasons ranging from habitual alcohol and drug use to memberships in organizations that question "the integrity of an International Space Station partner or agency." The requirements is meant to avoid flying someone offensive to the nationals involved in the effort, Chief Astronaut Charles Precourt said. It took about two years to develop the formula, according to Mike Hawes, deputy associate administrator for the International Space Station. There are no plans to fly tourists on American shuttles, Hawes said. ["Standards established for tourists on space station," **Florida Today**, February 1, 2002, p 9A.]

◆ Rick Abramson, manager of the Kennedy Space Center Visitor Complex for Delaware North Parks Services, has been promoted to oversee the company's visitor services at parks nationwide. Abramson said Friday he has been tapped by Delaware North Parks to become vice president of operations for the Buffalo, N.Y.-based company. During his tenure at Kennedy Space Center, Abramson has guided the company's sometimes controversial \$130 million expansion and redevelopment of the Visitor Complex, which is an ongoing effort. ["Delaware North promotes KSC Visitor Complex chief," **Florida Today**, February 2, 2002, p 1C.]

February 4: The proposed 2003 budget for NASA would scale back spending on the international space station and space shuttle but promote the development of nuclear technology in space. Unveiled Monday, the Bush administration proposal offers \$15 billion to the space agency, \$500 million more than 2002. Most NASA missions would receive slightly larger budgets in the new fiscal year, with to major exceptions. Space station Alpha, the subject of intense criticism for billions in cost overruns, would lose roughly \$230 million over its 2002 allotment of \$1.7 billion. The space shuttle program, which Bush administration budget documents scold for inefficient safety upgrades, would received about \$65 million less than its \$3.3 billion last year. The White House plan would consider outsourcing many shuttle jobs to private contractors, and even sell off some of the shuttle hardware. Sean O'Keefe, the new NASA chief, declined to speculate on the number of federal jobs that might be lost due to competitive outsourcing. Web posted. (2002). [NASA budget cuts human flight, pushes nukes [Online]. Available WWW: <http://www.cnn.com/> [2002, February 4].]

February 5: After completing detailed, independent cost and risk assessments, the agency has decided to perform Space Shuttle Orbiter Major Modifications (OMM) at NASA's Kennedy Space Center (KSC) in Florida. Since the inception of the Space Shuttle program, the Palmdale Manufacturing Facility in California has served as the manufacturing site for all orbiters, in addition to the primary location for performing periodic maintenance and safety upgrades. However, beginning immediately with the Space Shuttle Discovery, which is scheduled for its periodic structural inspection and maintenance period in early spring, the work will be moved to KSC. NASA Headquarters' Office of Space Flight made the decision following an extensive review. While it was determined that either KSC or Palmdale could support the current Space Shuttle launch schedule, keeping two modification facilities active to support four orbiters is no longer feasible in today's fiscal environment. Program managers believe significant infrastructure savings would be realized performing the major modifications in Florida. Shifting work to KSC would also minimize risk. "This decision reflects NASA's primary goal of maintaining safety as its primary objective and then evaluating cost savings and risks associated with that decision," NASA Administrator Sean O'Keefe said. "It is obvious that in the current fiscal environment, it makes more sense to perform this work at the launch site for the foreseeable future." The decision was reached after evaluating site selection criteria established by the Office of Space Flight, which included cost and risk, manifest impacts, shuttle flight schedule, management and workforce skills and experience, major modification performance in the past and present, facility utilization and centralization of operations. While both KSC and Palmdale could support the OMM, managers determined keeping both active to support four orbiters is no longer practical or feasible given the current shuttle manifest and budget environment. ["Kennedy Space Center to Perform Shuttle Modifications," **NASA News Release #02-22**, February 5, 2002.]

◆ A new spacecraft Tuesday became the first U.S. satellite devoted solely to studying high-energy particles from solar flares, which are massive explosions from the sun's surface. The High Energy Solar Spectroscopic Imager satellite launched on an Orbital Sciences-built Pegasus XL rocket high above the clouds over the Atlantic Ocean at 3:58 p.m. Tuesday, and it safely entered its orbit about 10 minutes later. ["Pegasus launches satellite," **Florida Today**, February 6, 2002, p 3A.]

◆ The TDRS-I satellite arrived at KSC Feb. 5 and was taken to the Spacecraft Assembly and Encapsulation Facility-2 to undergo processing. The latest in communications satellites is scheduled for launch March 8 from Cape Canaveral AFS aboard a Lockheed Martin Atlas IIA rocket. ["TDRS-I arrives at KSC for pre-launch processing," **KSC Countdown**, February 7, 2002.]

February 7: Two days after NASA's decision to consolidate shuttle operations in Florida, space contractors are chafing at relations with the state agency created to keep them here. The NASA contractors are pressing for control of the Florida Space Authority and want to rent a \$4 million authority hangar for \$1 a year. They also want the authority to finance a \$24 million retrofit to add work stands, bridges, an overhead crane and special hydraulics to the building. The Florida Space Authority – which last fall changed its name from the Spaceport Florida – answers to Pam Dana, Gov. Jeb Bush's director of tourism, trade and economic development. She said she doesn't believe there is a problem. Dana said there could be a conflict of interest if authority supervisors vote on issues that affect their own companies or, even worse, their competitors. But she suggested she is finding middle ground with Rep. Carlos Lucasa and Sen. Burt Sanders. The pressure on the state Space Authority also comes from United Space Alliance, NASA's prime contractor for the space shuttle program, which has a seat on the authority board. "I think the goal, regardless of how it's done, is to make everything as cooperative as possible," USA spokeswoman Kari Fluegel said. But to ensure it can readily support at least four shuttle flights a year, USA would like to supplement the three shuttle hangars in use at Kennedy with a fourth, owned by the Space Authority. It would take at least 10 months to renovate the existing hangar. The authority built the hangar for \$4 million to store the X-33, an experimental rocket meant to lead the way for VentureStar, a reusable spaceship that could take off, orbit and land on its own power. NASA killed the program in March 2001. ["Space contractors upset with authority," **Florida Today**, February 8, 2002, p 1A & 8A.]

February 8: Kennedy Space Center Director Roy Bridges and representatives from Florida space-related companies, legislators, agencies and academia will attend this year's Space Industry Day Feb. 12 - 13, at the State Capitol Building in Tallahassee. This year's theme is "Florida's Future is Space." Space Industry Day is an annual event held in Tallahassee designed to increase awareness of the nation's space program and its importance in Florida. It allows industry leaders to express their appreciation for Florida's continued support for space enterprises. This year the space industry will focus on the tangible benefits and diversified economy the space program offers our State. Special events and exhibits will help show how math, science and space-related education are the backbone of Florida's technical workforce. ["NASA/KSC Supports Space Industry Day In Tallahassee," **NASA News Release #08-02**, February 8, 2002.]

February 12: NASA Administrator Sean O'Keefe today named Jefferson D. Howell, Jr., as the new Director for NASA's Johnson Space Center (JSC) in Houston, effective April 1. ["NASA Administrator Names Retired Marine General to Lead Johnson Space Center," **NASA News Release #02-26**, February 12, 2002.]

◆ NASA Administrator Sean O'Keefe today selected space veteran and NASA astronaut Dr. Shannon W. Lucid as the agency's next Chief Scientist. ["NASA Astronaut Dr. Shannon Lucid, Selected as Chief Scientist," **NASA News Release #02-27**, February 12, 2002.]

◆ A potentially faulty device for the Hubble Space Telescope and concerns over lubricated bolts threaten shuttle Columbia's Feb. 28 liftoff date, NASA and United Space Alliance officials said Wednesday. The problems are not enough to delay the launch yet, but have eaten up almost all of the spare time in Columbia's preparation schedule. Columbia's crew of seven astronauts is to install a wealth of new parts on the orbiting observatory during the 11-day flight, but scientists at Goddard Space Flight Center in Greenbelt, Md., said one of the pieces may not work. Engineers are suspicious of a replacement reaction

wheel destined for Hubble. The 23-inch diameter, 100-pound device was tested at Goddard Space Flight Center before it was shipped to Florida, but there were some questionable test results that were blamed on faulty equipment. A replacement wheel is due at KSC Saturday and will be put aboard Columbia on Sunday. ["Shuttle launch hinges on glitches," **Florida Today**, February 14, 2002, p 1B.]

February 14: NASA's new administrator landed at Kennedy Space Center on Thursday with little fanfare for his first trip to the agency's main launch base. Sean O'Keefe, who took over NASA less than two months ago, spent the afternoon huddled behind closed doors with shuttle managers reviewing the Feb. 28 mission of Columbia to repair the Hubble Space Telescope. "It's your determination whether it's safe to fly, (and) I wanted to get a sense of that deliberative process," O'Keefe told the session, NASA spokesman George Diller said. The administrator listened for more than an hour of the eight-hour session, paying particular attention to questions about several bolts that hold three hydraulic power units in place. Engineers want to find out if the lubricated bolts could wiggle loose and cause a leak of hydraulic fluid. Diller said more tests are planned to settle the question. O'Keefe has toured seven other NASA centers already. A tour of KSC begins tomorrow with a trip to launch pad 39A where Columbia awaits launch. He is scheduled to take a half-hour helicopter tour of the sprawling base and its neighbor Cape Canaveral Air Force Station. ["O'Keefe to address KSC employees," **Florida Today**, February 15, 2002, p 1B.]

February 15: NASA Administrator Sean O'Keefe Friday promised common-sense management for the agency and a renewed focus on discovery after touring Kennedy Space Center. Calling the center's workforce "energetic, enthusiastic and focused," O'Keefe was non-committal about how a lower shuttle flight rate and tight budgets could affect their jobs. "As an agency, my objective to make these decisions collaboratively and everybody's going to be aware what the implications are," he said. So far, O'Keefe's major decision added 235 new jobs at Kennedy Space Center by moving shuttle overhauls to Florida from California to save \$30 million. As with that decision, O'Keefe said he would make similar calls to save money and operate more efficiently. O'Keefe is also looking into returning Defense Department and other payloads to the shuttle fleet that have been restricted since the Challenger accident in 1986. "There should not be an artificial severance," between civilian and military missions, O'Keefe said. While officials try to decide how to beef up the shuttle's launch schedule, the main hurdle for the agency remains the cash-strapped International Space Station. O'Keefe came back from his tour of the launch pad wide-eyed about the center and the machines it watches over. "This is clearly the center many Americans recognize," he said. He walked around the gray gantry leading to shuttle Columbia during the tour, including the White Room, where suited astronauts climb into the orbiters before launch. O'Keefe will be at KSC again in two weeks for Columbia's Feb. 28 launch. ["O'Keefe cautious on future of NASA," **Florida Today**, February 16, 2002, p 1B & 7B.]

February 20: On this date, 40 years ago, John Glenn became the first American astronaut to orbit the Earth. Web posted. (2002). [40 years later, first American in orbit remembers all [Online]. Available WWW: <http://www.cnn.com/> [2002, February 19].]

◆ Making its debut performance, the Atlas 3B rocket flew into space Thursday morning. The rocket ferried the Echostar 7 direct television satellite into geosynchronous orbit at 7:43 a.m. from Cape Canaveral Air Force Station. The successful mission clears the way for a May 9 launch of the new Atlas 5 rocket, built by Lockheed Martin and provided by International Launch Services. The next unmanned launch from the Cape will be the Atlas 2A rocket with NASA's Tracking and Data Relay Satellite. They are scheduled to take off March 9. Meanwhile, the Atlas 5 will move onto its launch pad March 4 for the first of three dress rehearsals. ["Successful Atlas 3B launch opens door for new rocket," **Florida Today**, February 22, 2002, p 1B.]

◆ Pre-launch operations for Shuttle Columbia remain on schedule for the planned liftoff at 6:48 a.m. EST on Thursday, Feb. 28. At the launch pad, the complement of HST flight hardware was installed into Columbia's payload bay Feb. 18 and electrical connections with the orbiter established. An end-to-end test is scheduled for Friday, Feb. 22, between the flight hardware in Columbia's payload bay at KSC, the Space Telescope Operations Control Center at Goddard SFC, and Mission Control in Houston, to verify the ability of controllers on the ground to monitor the status of the flight hardware in the payload bay while Columbia is on-orbit. Payload closeouts are scheduled to begin next weekend. The STS-109 flight crew

will arrive at KSC early Monday, Feb. 25, and the final countdown will begin 10 a.m. Monday. ["Pad launch preparations include end-to-end test for Columbia," **KSC Countdown**, February 21, 2002.]

February 22: The 40th Anniversary of John Glenn's historic Friendship 7 flight on Feb. 20, 1962, the first of America's orbital space flights, will be celebrated at the Kennedy Space Center Visitor Complex, and co-hosted by the Astronaut Scholarship Foundation. Special events will take place throughout the day and evening at the Visitor Center to celebrate 40 years of Americans in Orbit. Beginning at about 7 p.m. EST, NASA TV will broadcast "An Evening With the Mercury Astronauts" live from the Saturn V Center at Kennedy Space Center. Coverage of the event will continue throughout the evening and include recent interviews with John Glenn and Wally Schirra. Apollo 13 Commander Jim Lovell, chairman of the Astronaut Scholarship Foundation, will serve as the master of ceremonies. Other Mercury astronauts attending, in addition to Glenn and Schirra, are Scott Carpenter and Gordon Cooper. All will be at the KSC Visitor Complex to celebrate and reminisce about their contributions to the space program. ["Mercury Astronauts To Celebrate 40 Years of Space Flight at KSC," **NASA News Release #13-02**, February 22, 2002.]

February 24: Delaware North Parks Services, the Buffalo, N.Y.-based company that operates the Visitor Complex under a contract with NASA, has requested proposals for a new attraction from several companies. Delaware North is waiting for their ideas, then, with NASA's help, will select the best proposal for the park's next major project. One consideration will be NASA's rules for the types of attractions allowed at the Visitor Complex. Exhibits and attractions must help "tell the NASA story," said Delaware North spokesman Dan LeBlanc. "This will be a major attraction that will change the face of Kennedy Space Center." The Visitor Complex draws more than 2 million people a year, making it Brevard County's most popular tourist attraction. ["KSC plans new attraction," **Florida Today**, February 25, 2002, p 1C & 2C.]

February 25: George F. Page, deputy director of Kennedy Space Center (KSC) from July 1982 until his retirement in October 1984, died Feb. 26, 2002. During the course of his aerospace career, George Page was involved in all of the U.S. human space flight programs from Mercury to the Space Shuttle. He was 77. "All of us at KSC are saddened by the loss of George," said KSC Director Roy Bridges. "His leadership set the standard of excellence, and his contribution to human space flight continues to be felt with each successive mission. We are thankful for his great legacy." From 1952 to 1963, before joining NASA, Page's professional experience included five years as a launch operations engineer with General Dynamics Corp. and six years as a flight test engineer with the Westinghouse Electric Corp. Page joined NASA in June 1963 as a spacecraft test conductor on the Gemini Program. He then became the chief spacecraft test conductor for Gemini and Apollo launch operations and was chief of the Spacecraft Operations Division for Apollo, Skylab, and Apollo-Soyuz Test Project launch operations. He also served as director of Expendable Vehicles Operations and director of Cargo Operations. During his tenure as director of KSC Shuttle Operations beginning in 1979, he was the launch director for the first three Space Shuttle missions. Page was born in Pittsburgh, Pa., and attended school in Harrisburg, Pa. After service in the Army Air Corps during World War II, he earned a bachelor's degree in Aeronautical Engineering at Pennsylvania State University in 1952. He is survived by his wife Lois, three children, and six grandchildren. ["George F. Page, Former Deputy Director of KSC, Dies," **NASA News Release #16-02**, February 25, 2002.]

◆ Countdown clocks around Kennedy Space Center will begin ticking backwards this morning, leading to the launch of the most complex shuttle mission attempted so far. The 11-day mission to repair the Hubble Space Telescope calls for five consecutive spacewalks, and a risky procedure to replace the telescope's power system. The process requires astronauts to turn off the observatory and hope it comes back to life. Commander Scott Altman, pilot Duane Carey and astronauts John Grunsfeld, Nancy Currie, James Newman, Richard Linnehan and Michael Massimino were to fly to KSC this morning. The crew has altered its sleep patterns to coincide with the 6:48 a.m. launch time Thursday, February 28. ["Columbia countdown begins today," **Florida Today**, February 25, 2002, p 3A.]

February 27: The launch of space shuttle Columbia was postponed Wednesday due to the projected 38 degree temperature at the launch pad on Thursday – the margin of acceptable limit combined with

predicted wind speed and relative humidity. Waiting an addition 24 hours protects the option for possible back-to-back launch opportunities under more favorable conditions. The launch window on Friday is 6:22 – 7:24 a.m. EST. [“STS-109 rescheduled for Friday, March 1,” **KSC Countdown**, February 28, 2002.]

◆ New NASA Administrator Sean O’Keefe on Wednesday defended the Bush administration’s decision to stop construction on the International Space Station in two years, leaving the orbiting outpost short on crew and scientific research capabilities. O’Keefe, who has visited all 10 NASA centers in the eight weeks since he was sworn in, said the administration is focused on completing the core of the station in the next two years and will consider further expansion at a later date. Faced with the projected \$4.8 billion cost overrun, the Bush administration last year announced the federal government would pull back from a commitment to build a full-blown research facility and instead halt work at a point called “core complete,” leaving the station capable of supporting just three crew members and a fraction of the originally intended research. [“NASA chief defends space station plan,” **Florida Today**, February 28, 2002, p 7A.]

March

March 1: After waiting a day for warmer weather, space shuttle Columbia blasted off early Friday on a pre-dawn mission to renovate the Hubble Space Telescope. The seven-member crew headed to the fueled spaceship under extraordinarily tight security to guard against possible terrorist attack. It was balmy than Thursday morning, when near-freezing temperatures forced a one-day delay. The mercury was in the 50s for Friday's try, with low clouds the only concern. Columbia, fresh from a two-year overhaul, is loaded with new scientific, power and steering parts for Hubble. NASA considers this the most complicated Hubble servicing mission yet because of the heavy workload and a pair of unprecedented spacewalking jobs. Web posted. (2002). [Shuttle lifts off on Hubble mission [Online]. Available WWW: <http://www.cnn.com/> [2002, March 1].]

◆ It took a little extra effort, but NASA this weekend bridged a nearly seven-and-a-half billion mile span to make contact with Pioneer 10, a plucky space probe that first left Earth's gravitational pull more than 30 years ago. On Friday, scientists at the NASA Jet Propulsion Laboratory's (JPL) Deep Space Network in Goldstone, Calif., sent a signal to the spacecraft, which is still hurtling toward the fringes of the solar system. Twenty-two hours later, at 1:47 p.m. EST, researchers at the network's facility in Madrid, Spain, carefully monitoring a 70-meter dish antenna, heard Pioneer's response. "We are overjoyed that we still have the spacecraft," said Robert Hogan, chief of NASA Ames Research Center's Space Projects Division, where the Pioneer project is managed. "As an eternal optimist, I was confident it would succeed. Pioneer 10 has been discounted in the past, but somehow it always manages to land on its feet," recalled Pioneer 10 Project Manager Dr. Larry Lasher of Ames, located in California's Silicon Valley. "This success is a testament to good solid design." "From Ames Research Center and the Pioneer Project, we send our thanks to the many people at the Deep Space Network and JPL who made it possible to hear the spacecraft signal again," said Pioneer 10 Flight Director David Lozier. NASA previously lost contact with Pioneer 10 in August 2000, but made contact again in April of last year by switching the spacecraft to a different communications mode. NASA most recently made contact with the spacecraft on July 9, 2001. Launched on March 2, 1972, Pioneer 10, built by TRW Inc., Redondo Beach, Calif., is now 7.4 billion miles from Earth. Pioneer 10 was the first spacecraft to pass through the asteroid belt and the first to make direct observations and obtain close-up images of Jupiter. During its tour of the Jovian system, Pioneer 10 also charted Jupiter's intense radiation belts, located the planet's magnetic field, and established that Jupiter is predominantly a liquid planet. In 1983, it became the first man-made object to leave the solar system when it passed the orbit of Pluto, the most distant planet from the Sun. The spacecraft continued to make valuable scientific investigations in the outer regions of the solar system until its science mission ended on March 31, 1997. Pioneer 10's weak signal continues to be tracked by the Deep Space Network as part of an advanced concept study of communications technology. The probe was also used to help train flight controllers how to acquire radio signals from space. Pioneer 10 is headed toward the constellation Taurus, where it will pass the nearest star in the constellation in about two million years. "Pioneer 10 has performed much better than expected," added Hogan, who is also a member of the original launch team for the spacecraft. "It's amazing that it's lasted this long." Scientific data received from Pioneer 10's Geiger-Tube Telescope instrument is analyzed by original principal investigator Dr. James Van Allen of the University of Iowa, who discovered the Earth's radiation belts bearing his name. Based on the previous data received, Van Allen concluded that galactic cosmic radiation is being moderated by the Sun's influence, meaning Pioneer 10 has not yet crossed the boundary into interstellar space. ["An Early NASA Pioneer Still On The Job In Deep Space," **NASA News Release #02-44**, March 4, 2002.]

March 2: After some fast-paced trouble-shooting, NASA concluded Saturday that a cooling-system blockage aboard space shuttle Columbia is not serious enough to warrant an early end to the Hubble Space Telescope overhaul mission. The problem surfaced shortly after Columbia and its seven-member crew lifted off early Friday on the 11-day mission. A small piece of debris, perhaps dislodged by the violent launch, became trapped in a coolant loop in one of two radiator systems that chill vital electronic gear. The blockage degraded the fluid flow in one of the systems, prompting mission managers to consider calling the shuttle crew back to Earth in case the second cooling system might encounter a similar problem. After an around-the-clock assessment by several groups of engineering experts, Columbia's mission management

team concluded Saturday such a drastic action was unnecessary. ["NASA: Glitch won't short-circuit shuttle mission," **Orlando Sentinel**, March 3, 2002, p A4.]

March 4: NASA Administrator Sean O'Keefe today named Frederick D. Gregory as the Associate Administrator for Space Flight, placing him permanently in charge of the agency's Human Exploration and Development of Space Enterprise. Gregory, 60, has served as Acting Associate Administrator for the office since December, when he replaced Joseph H. Rothenberg, who retired. "I am pleased Fred agreed to make this commitment to what is one of the most important positions within NASA," said Administrator O'Keefe. "He brings great experience and leadership to this office, and his commitment to safety is vital as our human space flight program moves forward." Astronaut William F. Readdy will remain in the critical senior leadership position of Deputy Associate Administrator for Space Flight with expanded responsibilities over major programs, operations and management of the Human Exploration and Development of Space Enterprise. Before accepting his appointment in the Office of Space Flight, Gregory was the Associate Administrator for Safety and Mission Assurance. The veteran astronaut was the senior executive responsible for the safety and reliability of all NASA programs. Gregory was selected as an astronaut in 1978, after a distinguished career with the U.S. Air Force. He logged nearly 7,000 hours in 50 types of aircraft, including 550 combat missions over Vietnam. At NASA, Gregory logged more than 455 hours in space during three Space Shuttle missions. In 1985, he served as pilot on board Challenger during STS-51B. Gregory was mission commander for STS-33 in 1989 and STS-44 in 1991. "This is an exciting time for the Office of Space Flight and this agency," said Gregory. "I deeply appreciate Administrator O'Keefe's confidence in me, and I will work to meet his objectives to make space exploration safe and more affordable, and to involve the public in the benefits and excitement of human space flight." Gregory has been awarded the Defense Superior Service Medal, two Distinguished Flying Crosses, the Defense Meritorious Service Medal, the Meritorious Service Medal, 16 Air Medals, The Air Force Commendation Medal and three NASA Space Flight medals. His honors also include the NASA Distinguished Service Medal, the NASA Outstanding Leadership Award, the National Society of Black Engineers Distinguished National Scientist Award, the George Washington University Distinguished Alumni Award and an "Ira Eaker Fellow" by the Air Force Association. ["NASA Administrator Names Gregory Associate Administrator for Space Flight," **NASA News Release #02-43**, March 4, 2002.]

◆ The TDRS-I satellite has been stacked with its launch vehicle, the Lockheed Martin Atlas-Centaur rocket, on pad 36-A, Cape Canaveral Air Force Station. The time of launch extends from 5:39 – 6:19 p.m. EST. The second in a new series of telemetry satellites, TDRS-I replenishes the existing on-orbit fleet of six spacecraft. The TDRS System is the primary source of space-to-ground voice, data and telemetry for the Space Shuttle. It also provides communications with the International Space Station and scientific spacecraft in low-Earth orbit such as the Hubble Space Telescope. This new advanced series of satellites will extend the availability of TDRS communications services until about 2017. ["TDRS-I ready for launch March 8 from CCAFS," **KSC Countdown**, March 5, 2002.]

March 6: Shuttle Update: Atlantis rolled over to the Vehicle Assembly Building yesterday to begin stacking with the solid rocket boosters and external tank. Atlantis is scheduled to fly on mission STS-110, an assembly flight to the International Space Station, on April 4. It will be carrying the S0 truss, the center section of the truss assembly, and the Mobile Transporter, a link between the Integrated Truss structure and Mobile Remote Servicer as well as truss translation capability for the Mobile Servicing System. ["Atlantis in VAB to start stacking for the launch April 4," **KSC Countdown**, March 7, 2002.]

March 7: NASA's Kennedy Space Center, Fla., has added \$36.6 million of new work to the existing agency-wide Consolidated Space Operations Contract (CSOC) with Lockheed Martin Space Operations Co. of Houston. Under the modification to the contract issued today, the contractor will continue work on the development of the Checkout and Launch Control System (CLCS) at Kennedy Space Center by providing for the Scout Software Delivery, software that controls the CLCS. The work under the contract will continue through June 30, 2003. Previous deliveries of CLCS software and hardware have been covered under the CSOC since Oct. 1, 1999. The CLCS will replace the Launch Processing System with current hardware and software. CLCS program objectives are to ensure continued safe and dependable shuttle launch support for the duration of the program, reduce shuttle operational costs and provide building blocks for future endeavors. The initial CSOC contract, worth \$1.9 billion over five years, was awarded

through competitive procurement and began on Oct. 1, 1998. The contract provides for mission support services to field centers throughout NASA. After the five-year base effort, the contract includes options totaling \$1.54 billion for a five-year extension to Dec. 31, 2008. ["NASA Modifies Space Operations Contract To Include Scout Software Delivery," **NASA News Release #c02-g**, March 7, 2002.]

March 8: An Atlas 2A rocket carrying a National Aeronautics and Space Administration Tracking and Data Relay Satellite lifted off from Cape Canaveral Air Force Station at 5:59 p.m. Friday. Weather remained clear for launch. The available launch time began at 5:39 p.m., but managers decided to wait for 20 extra minutes to verify that everything was OK with ground lines to the blockhouse near the launch pad. The satellite, TDRS-I, will provide communication links for space shuttles, the international space station and other science spacecraft circling Earth. ["NASA satellite heads for orbit," **Orlando Sentinel**, March 9, 2002, p A17. "Atlas 2A lugs NASA satellite into orbit," **Florida Today**, March 9, 2002, p 1B.]

March 12: Shuttle Columbia returned to Earth on Tuesday after an 11-day, 4 million-mile journey during which astronauts gave the Hubble Space Telescope awesome new powers. They left behind an orbiting observatory able to generate more power and see farther than ever before. Columbia landed at Kennedy Space Center before dawn. Less than four hours later, Atlantis crept slowly to launch pad 39B for a scheduled April 4 flight to space station Alpha. Atlantis will carry the first new piece to the outpost since last summer, and host the first astronaut to fly seven times, Jerry Ross. The events gave KSC a preview of the next couple of months when NASA flies back-to-back missions in April and May. Another mission by Columbia awaits in July, followed by a September flight. ["Triumphant return," **Orlando Sentinel**, March 13, 2002, p A17. "Columbia rolls in; Atlantis rolls out," **Florida Today**, March 13, 2002, p 1A & 2A.]

◆ Shuttle Update: Atlantis rolled out to Launch Pad 39B Tuesday morning as Columbia was rolling to the Orbiter Processing Facility from the SLF. Atlantis is undergoing final processing operations for its April 4 launch on mission STS-110, the 13th assembly flight to the International Space Station. Columbia is undergoing analysis of a freon coolant loop that displayed degraded performance during the flight. Columbia is next scheduled to fly on STS-107, a research mission, in July 2002. Prelaunch preparations continue to run smoothly with Endeavour in the Orbiter Processing Facility, preparing for the STS-111 mission in May. That mission is another assembly flight to the Space Station and will also rotate resident crews, returning Expedition 4 to Earth after five months. ["Shuttle in, Shuttle out: Atlantis at pad while Columbia moves into OPF after landing," **KSC Countdown**, March 14, 2002.]

March 13: The following is a statement by NASA Administrator Sean O'Keefe after being advised of a White House decision to withdraw the nomination of Major General Charles F. Bolden, U.S. Marine Corps, as the agency's next Deputy Administrator. "We are disappointed that General Bolden isn't able to join NASA at this time. His impeccable credentials as an astronaut and military aviator made him an excellent selection. However, at this critical juncture in our nation's history, we must understand how vital it is for America to focus all its military resources on the immediate national security imperatives. "Senior military leaders of General Bolden's caliber are a rare and precious resource. The Marines are very fortunate to be able to keep him among their ranks. Given the ongoing war on terrorism and the imperative expressed by the Secretary of Defense that all uniformed military personnel serve to advance the President's objectives to win the war, we fully support the President's decision." Bolden, 55, currently serves as the Commanding General, 3rd Marine Aircraft Wing in San Diego. As a NASA astronaut, Bolden piloted Space Shuttles on STS-61C in 1986 and STS-31 in 1990. He commanded two missions, STS-45 in 1992 and STS-60 in 1994. Over the course of his four space flights, Bolden logged more than 680 hours in orbit, assisted in deploying the Hubble Space Telescope and commanded the first mission that included a Russian cosmonaut. ["Deputy Administrator Nomination Withdrawn," **NASA News Release #02-49**, March 13, 2002.]

◆ NASA should start planning upgrades to shuttle safety and improve its infrastructure as though the spacecraft were going to fly another 15-20 years, NASA's independent Aerospace Safety Advisory Panel said in its annual agency appraisal. Calling current budgets and plans inadequate, the volunteer committee of aerospace experts said the agency continues putting off safety upgrades and repairs to key facilities at Kennedy Space Center and other bases, on the assumption that a replacement shuttle is on the horizon. Although current safety procedures work well, the board members said problems likely will develop as

machinery wears out and engineers retire. Shuttle Columbia first flew in April 1981. The fleet just completed its 108th mission. ["NASA must plan shuttle upgrades," **Florida Today**, March 14, 2002, p 3A.]

March 14: Inspections Thursday discovered the location of the debris that clogged a cooling line and briefly threatened shuttle Columbia's just-completed Hubble Space Telescope servicing mission. During the 11-day mission that ended March 12, flight controllers had a pretty good idea where the flow of Freon was blocked, but until ultrasound and x-ray inspections were performed on the plumbing no one could say for sure. With one loop working fine and the clogged line working well enough, mission managers decided they could deal with the situation and allowed the mission to continue. Within hours of Columbia's touchdown at Kennedy Space Center technicians took the vehicle back to its hangar. Web posted. (2002). [Inspections Reveal Location of Debris Inside Columbia Cooling Line [Online]. Available WWW: <http://www.space.com/> [2002, March 15].]

◆ Brig. Gen. Donald Pettit, commander of the 45th Space Wing, announced his retirement this week. A change of command at Patrick Air Force Base will take place in June. Web posted. (2002). [Patrick leader announces retirement [Online]. Available WWW: <http://www.floridatoday.com/> [2002, March 14].]

March 18: The threat of terrorism has prompted NASA to guard its shuttle launch times for the foreseeable future, agency officials said Monday. NASA will not publicize its launch times until 24 hours before liftoff, said Kennedy Space Center spokesman Bill Johnson. Instead, the agency will dictate a four-hour window when the liftoff will occur. "It was something our Office of Security thought was necessary to protect the shuttle and astronauts," NASA spokesman Mike Braukus said, adding the Sept. 11 terrorist attacks were the catalysts for the change. ["NASA to withhold shuttle launch times," **Florida Today**, March 19, 2002, p 1A & 2A.]

March 19: The S5 truss segment of the International Space Station (ISS) arrived last week at the Kennedy Space Center Shuttle Landing Facility aboard the "Supper Guppy" transport aircraft. This truss segment is a mirror image of the P5 truss segment that arrived for processing at Kennedy Space Center in July 2001. The S5 truss segment is a 10 ½ by 15-foot aluminum structure that will weigh 3,900 pounds when fully processed. S5 will attach to the starboard side of the S4 truss and will be the 10th truss attached to the ISS as part of a total 11-truss, girder like structure that will ultimately extend the length of a football field. S5 is scheduled for launch in October 2003 on Mission STS-118 (13A.1). ["Fifth starboard truss segment for ISS arrives at KSC for 2003 mission," **KSC Countdown**, March 19, 2002.]

March 20: Government and private auditors testified Wednesday that NASA has operated for years with an antiquated accounting system, making it almost impossible to track how billions of public dollars are spent. Since 1990, the General Accounting Office, Congress's investigative arm, warned lawmakers the space agency was headed for trouble without a modern financial management system. Last year, Price Waterhouse Coopers took over as NASA's independent auditor and determined the agency could not accurately account for expenses, property, equipment and materials. The core of a \$835 million new integrated management system could be in place by June 2003 with the final pieces in place by 2005, two years earlier than previously projected, said Paul Pastorek, NASA's newly appointed general counsel. Web posted. (2002). [Panel: NASA Can't Manage Funds [Online]. Available WWW: <http://www.space.com/> [2002, March 21].]

March 21: Astronauts likely will replace a troublesome wrist joint on space station Alpha's robotic arm during a May mission that will be delayed to make room for the new assignment. The crew of shuttle Endeavour, due to fly May 6, probably will wait until late May for their launch, giving spacewalkers time to train for the work, and engineers at Kennedy Space Center and Johnson Space Center a chance to prepare the replacement joint for launch. There is not enough time to fix it before Atlantis carries up a truss segment April 4, said space station program manager Tommy Holloway. ["Robot arm woes delay May mission," **Florida Today**, March 22, 2002, p 1B.]

◆ Shuttle update: Atlantis is on the pad. The Rotating Service Structure will be moved to the parked position on Friday for the Auxiliary Power Unit (APU) hot fire. Endeavour is in the Orbiter Processing Facility (OPF) undergoing final checkouts for the STS-111 launch in May. The Integrated Hydraulic/Flight

Control test and payload bay closeouts are in work. In the OPF, the payload doors of Columbia have been opened and work is underway to remove the Hubble payload components onboard. X-ray and ultra-sound testing of freon coolant loops No. 1 and No. 2 are continuing. ["Orbiter processing in full swing at pad and OPF," **KSC Countdown**, March 21, 2002.]

March 23: Apollo pioneer Thomas J. Kelly, the "father of the lunar module," died Saturday. Kelly was the chief engineer for the lunar module, the spindly spacecraft that carried pairs of astronauts to the surface of the moon and back to the orbiting spacecraft. Kelly, 72, died at his Long Island, N.Y., home, Northrop Grumman spokesman John Vosilla said. ["Father of the lunar module' dies," **Florida Today**, March 26, 2002, p 3B.]

March 24: Beaten and battered by years in the harsh Space Coast environment, Kennedy Space Center's monumental Vehicle Assembly Building is showing its age. The 52-story structure needs a \$200 million face-lift during the next 10 years, according to Michael Wetmore, deputy director of shuttle processing. In addition to the Vehicle Assembly Building work, another \$400 million is needed for other shuttle improvements. The rest of the center needs \$114 million in improvements for its shuttle support buildings. Other NASA field centers dealing with the shuttle require about \$286 million in modernization. Recent years have seen minor stop-gap additions to the Vehicle Assembly Building such as temporary ceilings that catch flaking concrete before it falls on shuttles and other equipment, Wetmore said. Rebuilding the roof would cost \$26.5 million and take about five years. NASA spends about \$30 million a year maintaining equipment at Kennedy Space Center. KSC gets most of the attention because it maintains \$2 billion worth of shuttle facilities, not to mention four irreplaceable orbiters. Many expect the 21-year-old spacecraft to fly through 2020. Wetmore said NASA would try to wring repair funds out of its current budget. NASA's Aerospace Safety Advisory Panel said NASA should get additional money from Congress to make the improvements, rather than rearranging the agency's budget. ["Panel: NASA needs to repair buildings," **Florida Today**, March 25, 2002, p 1B.]

March 26: NASA managers meeting at Kennedy Space Center affirmed plans to launch space shuttle Atlantis on April 4 to deliver a massive truss to the International Space Station. The 11-day flight of Atlantis marks the first time in the 21-year history of the space shuttle program that NASA will not announce the launch time for a civilian mission. The space agency will only say liftoff will occur sometime between 2 and 6 p.m. EST, with the precise launch time to be announced officially about 24 hours in advance. The unprecedented step was taken for security reasons, NASA said. Web posted. (2002). [Shuttle Atlantis to launch station truss next week [Online]. Available WWW: <http://www.spaceflightnow.com/> [2002, March 26].]

March 28: The April 18 launch of the Aqua-EOS spacecraft from Vandenberg AFB is under review. The Aqua project is evaluating a battery cell concern that has postponed planned fueling of the spacecraft. The decision whether to proceed with the fueling will be made on Monday, April 1, following a meeting to evaluate test results. ["Launch date for Aqua-EOS from VAFB under review," **KSC Countdown**, March 28, 2002.]

March 31: More than 100 companies across the country will mark a significant milestone April 4, with the launch of space shuttle Atlantis: The shuttle is getting a new lift – three improved Main Engines that will make the world's only reusable launch vehicle safer and more reliable than ever before. Companies in 17 states provide parts and materials for the Shuttle's "new" Main Engines. The enhanced engines – called Block II Main Engines – incorporate an improved high-pressure fuel turbopump with a stronger integral shaft/disk and tougher bearings. A single Block II Main Engine was demonstrated in July 2001 on the STS-104 mission, and again on the STS-108 mission in December 2001. The upcoming mission marks the first time the Shuttle will be powered by three of the new engines. Web posted. (2002). [Shuttle gets new lift to orbit [Online]. Available WWW: <http://www.spaceflightnow.com/> [2002, March 31].]

During March: Interest is growing in an open seat for sale on the Soyuz taxi flight to the International Space Station this fall, with would-be travelers lining up at Moscow's Institute for Biomedical Problems for a 14-day battery of tests designed to clear them for spaceflight. Lori Garver, a former NASA associate administrator and National Space Society head who is raising sponsorship funds, has gotten a tentative go-

ahead. Meanwhile, Wally Funk, a former flight instructor who trained with NASA's original Mercury 7 astronauts, has agreed to buy a \$2-million ticket on a as-yet-unbuilt tourist rocket that would fly from the South Pacific Kingdom of Tonga. ["Space Tourists," Aviation Week & Space Technology, April 1, 2002, p 19.]

◆ In his first Hill appearance since becoming NASA administrator, Sean O'Keefe, a former comptroller at the Pentagon, tells the House Science Committee of some things he wants to do to straighten out the space agency's books. Henceforth, the costs of shuttle flights other than those that go to the space station will be picked up by the projects requiring the missions, instead of coming out of the human space flight account. There are many ways to figure the cost of a shuttle flight, and O'Keefe didn't say how the charge will be figured. But it's bound to help the cash-strapped shuttle and station efforts since, traditionally, many projects using the shuttle have paid on the costs directly associated with their payloads. Meanwhile, O'Keefe says the shuttle – which once was to fly every other week – will conduct only four missions a year from here on out. ["Count down," Aviation Week & Space Technology, March 4, 2002, p 21.]

◆ NASA's Kennedy Space Center and USAF's Cape Canaveral Air Force Station continue to maintain tight security for potential terrorist attack against unmanned launch vehicles and the space shuttle – both especially vulnerable when fueled on their launch pads. During the March 1 launch of the shuttle Columbia for its Hubble servicing mission, F-15s patrolled the immediate Kennedy area while F-16s flew over central Florida. A USAF air defense radar, especially suited to low-altitude threats, was also positioned at the Cape and used in connection with FAA radar surveillance. A 30-mi.-dia. No-fly zone was established around Kennedy; another restricted zone, extending 30-40 mi. from the Cape, could be occupied only by aircraft using a discrete transponder code. Army Apache attack helicopters also patrolled the area to thwart any potential ground attack. F-15 combat air patrols are also being flown over the Cape in connection with unmanned launch operations. In addition, the Air Force Technology Applications Center (AFTAC) at nearby Patrick AFB – which assesses nuclear, chemical and biological threat data – has been clad in armor plates to protect it from any car or truck bombs that might be detonated on Route A1A, which passes within about 500 ft. of the facility. ["Cape Security Remains Tight," Aviation Week & Space Technology, March 18, 2002, p 19.]

◆ The first U.S. Air Force/Lockheed Martin Atlas V evolved expendable launch vehicle has been rolled out to Pad 41 at Cape Canaveral for propellant loading tests. The transfer to the pad of the first EELV flight vehicle after seven years of planning and development marks the beginning of a new era for U.S. unmanned booster operations. ["World News Roundup," Aviation Week & Space Technology, March 18, 2002, p 20-21.]

APRIL

April 1: The crew of shuttle Atlantis landed at noon Monday at Kennedy Space Center under an overcast sky and a veil of secrecy. Normally NASA buses a small group of reporters and photographers to greet shuttle crews, but the agency did not confirm their arrival until 30 minutes after the astronauts landed. Launch is scheduled for Thursday between 2 and 6 p.m. The agency will announce the exact time Wednesday evening. The forecast calls for a 60 percent chance of acceptable weather. The agency's prior experience with this level of secrecy came when the shuttle carried defense department satellites and experiments into space. The last of those missions launched in December 1992. ["Shuttle crew arrives at KSC," **Florida Today**, April 2, 2002, p 3B.]

◆ Kelvin Manning, lead vehicle manager and Atlantis vehicle manager at Kennedy Space Center, was recently honored as the 2002 Black Engineer of the Year Award for Outstanding Technical Contributions in Government. The vehicle manager received his award Feb. 16 at the 16th Annual Black Engineer of the Year Awards Ceremony at the Baltimore Convention Center. ["KSC Shuttle Vehicle Manager Honored As Black Engineer Of The Year," **NASA News Release #28-02**, April 1, 2002.]

April 3: Shuttle engineers are again poring over a technical issue leading up to launch, but the problem is not expected to delay shuttle Atlantis' Thursday liftoff. A set of motors that close a pair of doors on the orbiter after the external tank is jettisoned is under review because of tests on shuttle Endeavour that saw its mechanism close six seconds slower than the 48-second limit recently, said Ron Dittmore, shuttle program manager. The doors, on the shuttle's belly, protect the bare aluminum connections from the searing heat of re-entering Earth's atmosphere. There is no way for astronauts to close the doors themselves if the mechanism fails in flight. "It just has to work," Dittmore said, pointing out that in tests the covers latched properly, though slower than desired. Atlantis did not experience such problems during its tests. He gave engineers another day to prove the problem does not threaten Atlantis' mission. Kennedy Space Center technicians moved ahead with the countdown to Thursday's launch, scheduled to take place between 2 and 6 p.m. The forecast for Thursday's launch improved slightly Tuesday with forecasters predicting a 70 percent chance of acceptable conditions. ["NASA re-inspects motors that close shuttle doors," **Florida Today**, April 3, 2002, p 1B.]

April 4: A leak of explosive hydrogen fuel grounded shuttle Atlantis Thursday morning, a result of a faulty fuel line leading to the shuttle's external tank. The problem delayed Thursday's planned liftoff until at least Sunday. No one was near the launch pad when the weld broke open on a pipe outside of the platform that support the shuttle at launch. The pipe vents hydrogen fuel away from the shuttle. The cold hydrogen gas passing through the line apparently jarred the joint enough to cause the rupture, Launch Director Mike Leinbach said. Technicians will work around-the-clock to fit a sleeve over the crack in a clamshell arrangement. Welders will seal both ends of the sleeve. NASA hopes to launch the shuttle and its seven-member crew Sunday afternoon between 2 and 6 p.m. The launch would have to wait longer if the pipe has to be removed, Leinbach said. ["Fuel leak keeps Atlantis on ground," **Florida Today**, April 5, 2002, p 1A & 2A.]

◆ The launch of the Aqua-EOS satellite aboard a delta rocket from Vandenberg AFB has been rescheduled for April 26. Flying in an orbit that covers the globe every 16 days, Aqua will provide a six-year chronology of the planet and its processes. Comprehensive measurements taken by its onboard instruments will allow scientists to assess long-term change, identify its human and natural causes and advance the development of models for long-term forecasting. ["Aqua-EOS satellite to assess human impact on Earth," **KSC Countdown**, April 4, 2002.]

April 5: NASA on Friday delayed shuttle Atlantis' launch another day to give engineers and technicians more time to repair a leak on the launch pad and refill the orbiter's fuel tanks. The four-hour launch period is 2 to 6 p.m. Monday. The exact liftoff time will not be announced until Sunday under NASA's security plan. The repair work was expected to take 12 to 16 hours. ["NASA aims for Monday launch of Atlantis," **Florida Today**, April 6, 2002, p 1A & 2A.]

April 6: Welders finished repairing a crack in a hydrogen vent pipe Saturday on shuttle Atlantis' launch platform in preparation for Monday's launch, NASA said. The leaky pipe, which postponed Thursday's launch attempt, will undergo a series of tests to make sure the welded cover holds. The evaluations include running extremely cold gas through the line in a practice of the fueling process on launch day. Technicians expected to refill oxygen and hydrogen tanks inside the orbiter late Saturday after the tests were complete. The weld on the platform gave way soon after large amounts of hydrogen gas from Atlantis' external tank began flowing Thursday, Launch Director Mike Leinbach said. ["NASA crews fix leaking vent pipe," **Florida Today**, April 7, 2002, p 1A.]

April 7: Following a review of weekend repair activities at Launch Pad 39B, mission managers today confirmed Monday, April 8, as the launch date for Shuttle mission STS-110. The preferred launch time is 4:39:31 p.m. EDT. Remaining countdown activities continue on schedule. The planned launch window on Monday extends from 4:34:31 - 4:44:30 p.m. EDT with the preferred launch time reflecting a flight day three rendezvous and docking with the International Space Station. The launch window times will be updated to coincide with the latest orbital position of the Space Station and will be announced at the T-9 minute hold. STS-110 is a scheduled 11-day mission with a planned KSC landing at about 12:42 p.m. on April 19. Work over the weekend was focused on the Mobile Launcher Platform 16-inch hydrogen vent line that began to leak during external tank loading operations for the launch attempt on April 4. The launch was postponed that morning and, following the repairs to the line and subsequent leak checks, rescheduled for April 8. This mission marks the thirteenth Shuttle flight to the International Space Station and the second Shuttle mission this year. Mission STS-110 is the 25th flight of the orbiter Atlantis and the 109th flight overall in NASA's Space Shuttle program. On mission STS-110, the seven-member crew will deliver the S-Zero Truss Segment and the Mobile Transporter to the International Space Station. During the seven days Atlantis will be docked to the Station, four spacewalks will be performed dedicated to truss installation. Work will also begin on the construction of the power and cooling plant that will be needed by future laboratories. The STS-110 crew includes Commander Michael Bloomfield, Pilot Stephen Frick, and Mission Specialists Jerry Ross, Steven Smith, Ellen Ochoa, Lee Morin, and Rex Walheim. ["Shuttle Mission STS-110 Launch Time Announced For Launch on April 8," **NASA News Release #31-02**, April 7, 2002.]

April 8: Shuttle Atlantis roared through a clear sky and blustery winds Monday afternoon with 11 seconds to spare in the launch window to begin the first construction mission to space station Alpha in seven months. Worried about high winds delaying the launch much of the day, controllers ultimately had to solve a last-minute glitch in a ground computer that pushed liftoff to the fringes of Atlantis' five-minute launch window. Atlantis soared spaceward at 4:44 p.m. shortly after Alpha passed over Washington, D.C. "They cut this one as close as they ever do," NASA Administrator Sean O'Keefe said, noting the quick work technicians made to fix the problem. "They make it look like another day at the office." The launch team routinely practices such problems, Launch Director Mike Leinbach said. While Atlantis and its crew of seven waited, an operator reprogrammed the faulty computer in about three minutes to allow the launch. "We had a very interesting final few minutes of the countdown," Leinbach said. "There was no rush about it, just an anticipation of getting it done." ["Atlantis soars with seconds to spare," **Florida Today**, April 9, 2002, p 1A & 3A.]

◆ A trio of new rocket engines designed to be twice as safe and substantially stronger than their predecessors carried Atlantis into orbit Monday. The heart of the improvement is a turbo pump that feeds fuel into a chamber where it is burned to thrust the orbiter from a standstill to 500 mph in seconds, and to 17,500 mph in 8 ½ minutes. The pump is powerful enough to shoot a stream of water 36 miles high and generates 68,660 horsepower – the same as 28 locomotives. The set of blades makes 37,000 turns per minute, 10 times faster than a car engine. The agency began upgrading the pumps and the engines soon after Columbia's first flight in April 1981. A modified oxygen pump was added in 1995, and technicians built engines with larger chambers in 1998. For the new hydrogen pump, engineers replaced a welded casing on the hydrogen fuel pump with a cast version that is screwed together. It is 300 pounds heavier, but stayed together in tests even when whirring blades broke apart. The older pumps flew apart during such failures. It cost NASA \$1 billion to develop and test the new fuel turbo pump and a similar device that handles oxygen instead of hydrogen. The modified oxygen pump first flew in 1995. Atlantis used the first new engine in July. This time, all three engines are new, and all future flights will use the same

arrangement, leaving the older engines to be cannibalized for parts, though some could be put on display. ["Turbo pumps boost safety," **Florida Today**, April 9, 2002, p 1B.]

◆ It was a summer morning last year when refugees, who had come ashore undetected on the beach at Kennedy Space Center the night before, surprised a security guard when they asked to use his cell phone. Security personnel tracked down and arrested the group of 16 illegal immigrants, but the incident highlighted weaknesses in shoreline security in and around the Space Center. Security there has been beefed up in response to the Sept. 11 terrorist attacks. But now, officials are going a step further, with the Shoreline Intrusion Detection System. When installed in coming months, it will be a permanent security system designed to stop terrorists and other intruders from entering Kennedy Space Center and Cape Canaveral Air Force Station from the Atlantic Ocean on the east or the Banana River on the west. The \$2.6 million system will use motion-detector fencing, radar and thermal-imaging cameras to guard about 30 miles of shoreline surrounding the launch areas for NASA's space shuttles and military and commercial rockets. ["Shores will be secured," **Florida Today**, April 9, 2002, p 1C & 2C.]

April 9: Kennedy Space Center has done much of the testing and launch preparations for station segments. But this time, the launch center sent its own science experiment to the International Space Station. The project will grow wheat in space for about two months. One of the major goals is to test the boxy chamber that will hold the wheat, launched Monday with Atlantis. Scientists want to see whether the wheat produces oxygen through photosynthesis and purifies water through transpiration the same in space as it does on Earth. The KSC-based Photosynthesis Experiment Subsystem Testing and Operation will begin with Apogee wheat plants started on the ground. They will be harvested soon after they reach micro-gravity. Then another generation will be planted. In all, about six plantings will occur. Astronauts will harvest the plants before they reach the seeding phase and freeze the wheat so scientists can study it upon its return to Earth. This is not the first time wheat has orbited Earth. Space-farers grew the crop on Space Station Mir. ["Project will test wheat growth in space," **Florida Today**, April 10, 2002, p 2A.]

◆ The Boeing Co. is vying to keep a lucrative NASA contract at Kennedy Space Center to process payloads sent into space. The outcome could have major implications for the company's local work force. About 1,200 of Boeing's 2,400 employees in Brevard County work under NASA's Payload Ground Operations Contract. The 15 ½-year, \$1.9 billion contract is set to expire June 30. NASA would not say how many companies are bidding for the new contract – renamed Checkout Assembly and Payload Processing Services, or CAPPS. The contract – one of the Space Center's largest – would be a four-year deal with options to extend it by six more years. ["Boeing hopes to keep crucial NASA contract," **Florida Today**, April 10, 2002, p 1C & 2C.]

April 10: Ten black employees who had worked as security supervisors for NASA until a new firm took over the contract in 1998 are claiming in a federal lawsuit they were passed over for white workers. Their suit, in district court in Orlando, claims race discrimination against Space Gateway Support Co., which took over the security contract from EG&G. Mediator Joan Bickerstaff of Melbourne is expected to meet with each side before June 14. ["Ex-staffers say company was biased," **Florida Today**, April 11, 2002, p 3B.]

◆ A reduction in the number of external space shuttle fuel tanks being ordered by NASA will cost 325 workers their jobs at Lockheed Martin Space Systems Co. The tanks are constructed at the Michoud Operations plant in New Orleans, which employs about 2,100 workers. The cut is likely to have a minimal impact on the company's Kennedy Space Center operations. No specific positions have been targeted for elimination yet, said Lockheed spokesman Marion LaNasa. "It could be less than three people" laid off from the Michoud Operation at KSC, but "I wouldn't anticipate any significant impact on that operation at all." ["Lockheed space unit cuts 325 jobs," **Florida Today**, April 11, 2002, p 1C.]

◆ Kennedy Space Center soon will get the first ethanol fueling station on the Space Coast. Vehicles at KSC use close to a million gallons of gasoline and diesel fuel every year. KSC's compressed natural gas vehicles saved 33,000 equivalent gallons of gas in 2001. Getting an ethanol station running would help reduce fuel consumption as the price of gasoline inches higher or becomes less reliable. The Energy Policy Act of 1992 established a national policy to reduce dependence on foreign oil. With this, 75 percent of the

federal agencies' new vehicles must run on alternative fuels, such as natural gas, electricity, biodiesel or ethanol. In 1999, General Services Administration leased about 2,000 vehicles to KSC. Of those, about 150 used compressed natural gas and about 50 ran on ethanol. This year, KSC leases 160 compressed natural gas vehicles and 175 ethanol vehicles. ["KSC plans for alternative fueling station," **Florida Today**, April 21, 2002, p 1B & 2B.]

◆ Glitches this year on a shuttle mission and space station Alpha's robot arm have combined to delay the last three scheduled missions of 2002. Shuttle Columbia's July mission and Atlantis' August flight both were shifted a week to July 19 and Aug. 22, respectively. Endeavour will make the last flight of the year Oct. 6, 17 days later than planned. However, Endeavour's May 31 launch to Alpha may move up one day to allow an extra cushion before the outpost moves into a solar angle that could cause heat damage to the shuttle. Shuttle Program Manager Ron Dittmore previewed the changes recently, saying it would be better to address the group of flights in one swoop than let delays slip in one by one. Workers need the extra week with Columbia to remove contamination in one of its cooling system lines. The blockage emerged an hour after the spacecraft reached orbit last month. ["Repairs delay several missions," **Florida Today**, April 12, 2002, p 1B.]

April 12: NASA will send a teacher to the International Space Station and recruit educator-astronauts as part of a plan to refocus agency goals on science, exploration and education, Administrator Sean O'Keefe said Friday. His announcement resurrects the teacher-in-space program that was shelved after the January 1986 shuttle Challenger accident. The first teacher-in-space candidate, Christa McAuliffe, and her six crewmates were killed in that mission. McAuliffe's backup, Barbara Morgan, 50, will ride a shuttle to the outpost in 2004, turning part of the station into a classroom 250 miles above Earth. Morgan, a former Idaho elementary schoolteacher, now is an astronaut. She has trained and worked at Johnson Space Center since 1998. "NASA has an unfinished mission," O'Keefe said. "It's time for NASA to complete the mission to send an educator to space." ["Teacher to fly into space," **Florida Today**, April 13, 2002, p 1A & 3A.]

April 14: Former NASA manager of the Viking missions to Mars, James S. Martin, Jr., died April 14, in Rising Sun, Md. He was 81. ["Mars Viking Leader, James S. Martin, Jr., Dies," **NASA News Release #02-70**, April 18, 2002.]

April 16: The risks of space flight are as apparent to teacher-turned-astronaut Barbara Morgan as they may be to anyone else, but she does not urge friends or students away from hazardous endeavors. Morgan was Christa McAuliffe's backup for the Challenger mission that killed McAuliffe and her six crewmates Jan. 28, 1986. "If you don't risk a little bit, you're not going anywhere," she said. NASA Administrator Sean O'Keefe cracked open the door Tuesday to the astronaut corps for other non-scientific professions not typically considered, perhaps including artists, writers and journalists. For now, the agency will focus on getting Morgan into space and laying the ground-work for recruiting teachers as astronauts. O'Keefe named the 50-year-old former elementary school teacher to a shuttle mission in 2004, perhaps to teach lessons from space similar to those planned by McAuliffe. ["Former teacher justifies risks for a trip to space," **Florida Today**, April 17, 2002, p 1A & 3A.]

◆ The investigative arm of Congress continues to criticize NASA's accounting practices, saying in a new report that nothing has changed since the agency got a scathing report card late last summer. Looking at NASA's budget request for 2003, the General Accounting Office found that, just like last year, the agency could not provide requested documents to back up its budget requests. The GAO blames NASA's accounting system, which consists of individual sets of books and records at each of the agency's 10 centers across the country. Such stern warnings are expected to continue for the next several years, because NASA is not scheduled to bring any sort of unified accounting system online until 2006. ["NASA accounting again comes up short," **Orlando Sentinel**, April 17, 2002, p A3.]

◆ The Aqua spacecraft remains at the spaceport Systems International payload processing facility on South Vandenberg Air Force Base. Due to difficulties mating the spacecraft to the payload attach fitting (PAF), the spacecraft was expected to be transported to SLC-2 and mated to the Delta vehicle no earlier

than Wednesday, April 17. Launch is now expected the first week of May. ["Aqua-EOS launch rescheduled for early May," **KSC Countdown**, April 16, 2002.]

April 18: With all objectives of the STS-110 mission met, the crew is scheduled to return to KSC aboard Atlantis on Friday, April 19, on the first landing opportunity at 12:26 p.m. EDT. A second landing option is 2:02 p.m. Weather-wise, the forecast looks good for landing. A large high pressure system centered over the Atlantic will dominate the weather picture over Florida through the weekend. ["Daytime landing for Atlantis and crew April 19," **KSC Countdown**, April 18, 2002.]

April 19: Space Shuttle Atlantis and its 7-member crew landed safely at 12:27 p.m., about 4 minutes after its signature sonic booms signaled it impending arrival. The shuttle and crew had been on an 11-day construction mission to mount a \$600 million girder and a \$190 million rail cart at the international space station. ["It's a bird...it's a plane," **Orlando Sentinel**, April 20, 2002, p A3.]

April 23: Engineers at Kennedy Space Center are testing the newest in umbilical technology in support of NASA's Space Launch Initiative (SLI)-a technology development effort to establish reliable, affordable space access. "Umbilicals are the lifeline for any Space Launch Vehicle," said Warren Wiley, KSC's SLI program manager. "Fluids including propellants, pressurization gasses, and cooling systems, power, communications, and instrumentation readings all flow through the umbilical. They are large devices that are manpower intensive to mate, test, and maintain." Traditional umbilical systems release at vehicle lift-off (T-0) and can also take extensive connection time-reducing potential flight rate. The Smart Umbilical Mating System, three years in development by Rohwetter Systems, Oviedo, Fla., and NASA will serve as a modern, next-generation umbilical system. "The concept is to replace a T-0 umbilical with an automated umbilical which has a mate, demate and remate capability," said Tom Lippitt, KSC's spaceport engineering and technology lead engineer. "The ability to quickly and reliably mate and demate umbilical connectors under automated control, along with remote connection verification would reduce the time and labor hours required to prepare for launch. The Smart Umbilical Mating System will also be used as a testbed for quick disconnect development and for advance control and leak detection technologies." The system will be used as a development tool for future launch vehicle technology development. According to Lippitt, several technologies being developed relate to umbilicals, such as ice suppression, leak sensing, quick disconnects and others. By using the Smart Umbilical Mating System, the new technologies can be tested in cryogenic conditions. "In addition to ground-based applications, planetary systems and rovers will require umbilical mating for propellant loading and electrical and data connection," said Lippitt. "The technology developed as part of this project may be applied to develop simple, reliable, self-sufficient mating. Some of this work will be required to make certain missions and systems feasible such as the Mars methane fueled rovers." Kennedy Space Center is responsible for managing SLI's Ground Operations Project-NASA's effort to reduce the risk associated with developing a second generation Reusable Launch Vehicle (RLV) by defining, developing and testing technologies needed to safely and cheaply access space. "The project will address the SLI goals of reducing operating costs by reducing the maintenance and manpower needed to do the connections and increase safety by automatically performing hazardous tasks and reducing potential failure modes," said Wiley. Space Launch Initiative is a NASA wide research and development program managed by the Marshall Space Flight Center, Huntsville, Ala. It is designed to improve safety, reliability and cost effectiveness of space travel for second generation reusable launch vehicles. ["KSC Tests Smart Umbilical Mating System for NASA's Space Launch Initiative," **NASA News Release #35-02**, April 23, 2002.]

◆ Following Friday's landing, Atlantis was towed to the OPF to begin deservicing and recycle operations for its next mission, STS-112, in August. On Monday, Endeavour rolled over to the VAB. Next week it will move to the pad for launch of STS-111 in late May. Columbia is in the OPF preparing for a July launch on STS-107. ["Orbiters being prepped for launches in May, July, August," **KSC Countdown**, April 23, 2002.]

April 24: High school seniors from New Mexico took over the Kennedy Space Center Visitor Complex last week to question a number of KSC employees about everything from career paths to balancing personal and professional roles. External Relations and Business Development Director JoAnn Morgan and Education Programs and University Research Division Chief Pam Biegert welcomed the 87 New

Mexico Mathematics, Engineering and Science Achievement (MESA) Program participants. The students also listened to lectures, toured the space center, participated in student educational workshops at the Center for Space Education, and witnessed the landing of the Space Shuttle Atlantis following its STS-110 mission. "I'm just so excited to see what's out here," said Valerie Salim, a student at Rio Grande High School in Albuquerque. "I plan to spend my four days in Florida looking for new career ideas." The visit is part of the year-round, nonprofit New Mexico MESA program. The national initiative promotes educational enrichment for pre-college students from historically underrepresented ethnic groups. Starting in middle school, MESA prepares students for college majors in mathematics, engineering, science and related fields. The MESA program receives financial support from the state of New Mexico, numerous other state and national corporations and foundations, federal agencies, and private donations. "I'd like to do something involving biology and engineering-maybe a physical therapist for astronauts," said Jonathan Vigil from Robertson High School, Las Vegas, Nev. "I'm also enjoying the weather and learning about the employees' extraordinary accomplishments." Living in New Mexico is not the only acceptance criteria. The visiting seniors were a selected group who earned the incentive field trip to KSC based upon grades, completion of four years of high school math and science classes (which exceeds the required graduation minimum), participation in fields trips and community volunteer projects, and a career interest in NASA. (Historically, 98 percent of participants go on to college.) "The number of students in college earning math, science, technology or engineering degrees continues to decline for U.S. students. But the number of jobs in these fields that need to be filled continues to increase," said Pre-College Programs Lead Steve Dutczak. "A major segment of pre-college students are the historically under-represented ethnic groups. It is to this group that programs like MESA offer the way to help fill the future needs of the scientific and technical world." MESA students at KSC represented six regions of New Mexico-from the most northern to the most southern parts of the state, as well as some surrounding areas. Many of the students took part in fundraisers and worked various jobs to help pay for their trip to Florida. "MESA students are our future engineers, scientists, and technicians," said Karroll Purer, KSC education specialist. "Many have faced challenges, such as financial constraints and being first generation college students. MESA students are achievers!" ["New Mexico MESA Students Visit KSC," **NASA News Release #36-02**, April 24, 2002.]

April 25: The NASA Comet Nucleus Tour (CONTOUR) spacecraft arrived at the Kennedy Space Center April 24 and was transported to the Spacecraft Assembly and Encapsulation Facility-2 (SAEF-2) in the KSC Industrial Area today to begin final preparations for launch. CONTOUR will provide the first detailed look into the heart of a comet – the nucleus. The spacecraft will fly as close as 60 miles (100 kilometers) to at least two comets, taking the sharpest pictures yet of the nucleus while analyzing the gas and dust that surround these rocky, icy building blocks of the solar system. For the first time, CONTOUR will help assess the diversity of comets and unravel the mysteries of how they evolve. The Applied Physics Laboratory of Johns Hopkins University, Baltimore, Md., built CONTOUR. They will also be in control of the spacecraft after launch. Beginning on April 29, the CONTOUR integration and test team will undertake a system performance test to verify that all spacecraft systems are functioning to their design capabilities. The week of May 6, using facilities located at KSC's MILA tracking station, the Deep Space Network (DSN) compatibility test will be performed to verify CONTOUR's ability to communicate with the worldwide system of deep space tracking stations operated by the Jet Propulsion Laboratory. On May 13, a five-day mission simulation will begin, once again using ground station facilities at MILA to connect the spacecraft at KSC with the CONTOUR mission operations control center located at the Applied Physics Laboratory. The mission operations team will follow a compressed timeline simulating the flight of CONTOUR, remotely commanding all of the spacecraft's systems and instruments. On May 20, mechanical prelaunch preparations will begin, followed by installation of the spacecraft's solid rocket motor, attachment of the eight solar panels, and performance of a solar array lighting test. The spacecraft will then be placed on a spin-table for spin balance measurements. CONTOUR can then be loaded with its hydrazine fuel. A weight and center of gravity determination will be done and a final spin balance test will be performed. Finally at SAEF-2, the CONTOUR spacecraft will be mated with a solid propellant upper stage that serves as the third stage of the Delta booster. The Boeing Delta II launch vehicle is at Cape Canaveral undergoing pre-erection check out. Buildup of the launch vehicle on Pad A at Space Launch Complex 17 is scheduled to begin on May 28. CONTOUR will be transported to the pad and erected atop the Delta II on June 19. After a spacecraft functional test, there will be the integrated vehicle/spacecraft flight program verification simulated flight. Upon successful completion, the spacecraft will be closed out for launch and the vehicle nose fairing installed around the spacecraft. CONTOUR is scheduled for launch on July 1, 2002

during a 12-second launch window that extends from 2:56:14 - 2:56:26 a.m. EDT. ["CONTOUR Spacecraft Arrives At KSC For Launch Preparations," **NASA News Release #38-02**, April 25, 2002.]

April 25: A South African Internet magnet is scheduled to become the second space tourist early this morning, blasting off on a 10-day, \$20 million trip to the international space station. A three-man crew aboard a Russian Soyuz rocket was supposed to launch a little after 2 a.m. from Kazakhstan. On board are Russian cosmonaut Yuri Gidzenko, Italian pilot Roberto Vittori and tycoon Mark Shuttleworth, who signed a deal with the Russians late last year to make the trip. The rocket is scheduled to dock with the space station Saturday. ["Cyberspace king to visit real thing," **Orlando Sentinel**, April 25, 2002, p A1 & A20.]

April 26: Although staffing problems continue to sting Canaveral National Seashore, the park superintendent says Playalinda Beach is returning to daily openings. Superintendent Robert Newkirk said private guards will supplement the small staff in searching vehicles before they are allowed on the beach access road, parts of which lie within Kennedy Space Center's security zone. ["Playalinda Beach resumes daily hours," **Florida Today**, April 27, 2002, p 3B.]

April 30: Bryan D. O'Connor, a former NASA Space Shuttle program director, astronaut and Marine Corps test pilot, was named Associate Administrator for the Office of Safety and Mission Assurance (OSMA) at NASA Headquarters in Washington. He replaces Fredrick D. Gregory, who has been leading the Office of Space Flight since December. O'Connor, 55, will be responsible for the oversight of all agency safety issues through the development, implementation and oversight of reliability, maintainability and quality assurance policies. He will report to NASA on June 3, 2002. "Bryan's distinguished career as both a naval aviator and NASA astronaut give him the perspective necessary to ensure the continued safety of our programs," said NASA Administrator Sean O'Keefe. "His attention and dedication to safety were signature characteristics during his NASA career, and I look forward to his stewardship of this vital office." O'Connor was selected as an astronaut in May 1980 and is a veteran of two Space Shuttle missions. He was pilot on STS-61B in 1985 and crew commander of STS-40 in 1991. When the Space Shuttle Challenger was lost in 1986, he was given a number of safety and management assignments over the next three years. O'Connor organized the initial wreckage reassembly activities at Cape Canaveral, Fla., and established and managed the operation of the NASA Headquarters Action Center, the link between the agency and the Presidential Blue Ribbon Accident Investigation Panel. In 1986, he was appointed chairman of NASA's new Space Flight Safety Panel. O'Connor also served as Aviation Safety Officer for the astronaut corps. Before joining NASA, O'Connor was a U.S. Marine Corps test pilot and graduated from the U.S. Naval Academy at Annapolis, Md., in 1968. He flew the A-4 Skyhawk and AV-8A Harrier on land and sea assignments in the United States, Europe and the Western Pacific. O'Connor left NASA in August 1991 to become commanding officer of the Marine Aviation Detachment, Naval Air Test Center, Patuxent River, Md. After retiring from the U.S. Marine Corps, he returned to NASA Headquarters as Deputy Associate Administrator for the Office of Space Flight and Space Shuttle program director. Among his other responsibilities, he developed a comprehensive flight safety improvement plan for the Space Shuttle. O'Connor left NASA in February 1996 to become an aerospace consultant. He rejoins NASA after serving as director of engineering at Futron Corp., a Washington-based aerospace safety and risk-management consulting firm. ["NASA Administrator Names New Associate Administrator For Safety," **NASA News Release #02-78**, April 30, 2002.]

During April: NASA Administrator Sean O'Keefe is reworking the agency's overall space commercialization policy that was being put in place last fall when the terrorist attacks sidetracked its release, followed by the retirement of Daniel Goldin as administrator. The policy proposed much broader NASA space program participation with commercial projects, if those projects could help further the aims of NASA. But O'Keefe believes the plan should be simplified. NASA's earlier optimistic planning toward privatizing the shuttle is also on hold. "There is a shuttle business case analysis that is being developed that we anticipate will be completed by early fall," O'Keefe said. "We will then make a judgment on where we go from there." ["Commercial Burden," **Aviation Week & Space Technology**, April 15, 2002, p 15.]

◆ Construction is under way on a Kennedy Space Center laboratory slated to support space station research, the first sign of life in an ambitious project designed to foster world-class research and technology development related to space. The Space Experiment Research and Processing Laboratory (SERPL),

expected to be complete at the end of next year, will serve as the primary gateway for scientific experiment payloads destined for the space station. Tenants will include NASA's experiment processing contractor team, as well as university researchers. The 100,000-square-foot building is being built with state funds. But that facility is seen as a magnet for additional projects to populate a research park that would attract private investment and increase high tech employment. Called the International Space Research Park, the joint state and NASA project would cover 400 acres south of the KSC Visitor Complex, across the road from SERPL. A preliminary study shows the park could employ up to 10,000 employees, over a 20-year build out. ["Kennedy Space Center laboratory slated to support space station research and development," **Brevard Technical Journal**, April 2002, p 9.]

◆ USAF GPS navigation satellite launches at Cape Canaveral are being delayed by USAF concerns about the quality of Boeing work to install new automatic destruct systems on Delta II boosters. A GPS launch that had been planned for May 8 has been delayed by at least a month, and the postponement will have a ripple effect on one or two other GPS missions. The problem has also delayed the Delta II launch of the NASA Aqua spacecraft from Vandenberg AFB from mid-April to at least early May. ["World News Roundup, Americas," **Aviation Week & Space Technology**, April 22, 2002, p 18.]

MAY

May 1: Lockheed Martin this week completed building the nation's final two Titan 4 rockets. The company's Denver factory marked the milestone with reflections on the Titan program, which during the past four decades became synonymous with space exploration and national defense. During the mid-1970s, NASA used the Titan 3 – equipped with a Centaur upper stage – to launch a pair of Viking Mars landing missions, as well as the twin Voyager spacecraft to explore the outer planets. [“Final Titan rockets complete,” **Florida Today**, May 2, 2002, p 1B & 7B.]

May 3: NASA has awarded a \$1.14 billion contract to the Rocketdyne Propulsion & Power Unit of the Boeing Company, Canoga Park, Calif., for maintenance and support of the Space Shuttle Main Engine for the next five years. The contract calls for Rocketdyne to support the Space Shuttle flight manifest. Support includes on-going flight and test engineering, as well as engine refurbishment. In addition, the contract requires the manufacture, assembly, test and delivery of three additional Space Shuttle Main Engines. The contract also provides engineering support to both Main Engine processing at NASA's Kennedy Space Center, Fla., and Main Engine test firing at NASA's John C. Stennis Space Center, Miss., as well as engine design, manufacturing and engineering management at the Rocketdyne facility. A cluster of three Main Engines on each Shuttle provides much of the power needed to launch into low-Earth orbit. They are the world's only large reusable liquid rocket engines. After the Shuttle orbiter lands, the engines are checked and prepared for the next flight. Some components are returned to Rocketdyne for refurbishment. The Space Shuttle Main Engine Project is managed by NASA's Marshall Space Flight Center, Huntsville, Ala. Marshall is a key leader for NASA's development of space transportation and propulsion systems. Rocketdyne has been providing Shuttle Main Engines since 1972, assembling 106 engines. [“NASA Awards \$1.4 Billion Space Shuttle Main Engine Contract To Boeing Rocketdyne,” **NASA News Release #c02-h**, May 3, 2002.]

◆ A new Technology Training Center will give more than twice the room for Brevard Community College aerospace technology students to get more hands-on lab work. Officials will have a grand opening for the training center May 3 at the Center for Space Education at Kennedy Space Center Visitor Complex. Featured speakers include U.S. Rep. Dave Weldon, R-Palm Bay, and BCC President Thomas Gamble. Construction on the 3,000-square foot facility started last October. [“KSC center will double space for tech training,” **Florida Today**, April 27, 2002, p 3B.]

May 4: A Boeing Delta II launched NASA's Aqua Earth-imaging satellite May 4 into a 680-km. (422-mi.) temporary Sun synchronous orbit from Vandenberg Air Force Base, Calif. Shortly before 3 a.m. It will be raised to its working altitude of 705 km. Later this month as instrument checkout and calibration continues. Built by TRW Space and Electronics, Aqua is designed to study water, ice and atmospheric moisture as part of a broader NASA effort to build a global climate model. It is expected to be operational in July. [“Aqua boosted to orbit,” **Aviation Week & Space Technology**, May 13, 2002, p 19. “NASA launches satellite on weather mission,” **Florida Today**, May 5, 2002, p 3A.]

May 6: Installation of the Leonardo Multi-Purpose Logistics Module in Endeavour's payload bay took place. Leonardo holds resupply stowage racks with new equipment, supplies and hardware to be transferred to the Station on mission STS-111. Five resupply stowage platforms and two scientific racks will be attached inside the Destiny Lab. The Microgravity Science Glovebox (MSG), an isolation chamber secured on a storage rack in the MPLM, includes the pore Formation and Mobility Investigation, one of the first materials science experiments on the Station, plus several smaller sealed containers. [“MPLM Leonardo stowed in Endeavour for mission STS-111,” **KSC Countdown**, May 7, 2002.]

◆ The next scheduled ELV launch from Cape Canaveral Air Force Station is Comet Nucleus Tour, or CONTOUR. The spacecraft will provide the first detailed look into the heart of a comet – the nucleus. CONTOUR will fly as close as 60 miles (100 km) to at least two comets, Encke and Schwassmann-Wachmann 3. It will take the sharpest pictures yet of the nucleus while analyzing the gas and dust that surround these rocky, icy building blocks of the solar system. The Applied Physics Laboratory of Johns Hopkins University, Baltimore, Md., built CONTOUR and will also be in control of the spacecraft after

launch, which is scheduled for July 1, 2002, from LC 17A, CCAFS. ["Next ELV payload, CONTOUR, to study two comets," **KSC Countdown**, May 7, 2002.]

May 8: President George W. Bush has announced his intention to nominate Frederick D. Gregory as the next Deputy Administrator for NASA. Gregory, 61, is a veteran astronaut and U.S. Air Force combat pilot, and currently serves as the Associate Administrator for the Office of Space Flight at NASA Headquarters in Washington. "I am delighted with the President's decision and I'm hopeful for an expeditious Senate confirmation," said NASA Administrator Sean O'Keefe. "Fred's legacy of mission safety and his experience as a Space Shuttle commander, aviator and senior agency manager make him an excellent selection." If confirmed as Deputy Administrator, Gregory will serve as the chief operating officer for the agency and report directly to Administrator O'Keefe. He will be responsible for directing and managing many of the programs as well as the day-to-day operations and activities at NASA. Before being named to his current position in December 2001, Gregory served as Associate Administrator for the Office of Safety and Mission Assurance and was charged with the oversight of all safety issues within NASA. He developed, implemented and managed quality assurance policies that dealt with reliability and maintainability. "This agency has the safest and most successful aeronautics and aerospace programs in the world," said Gregory. "I deeply appreciate the opportunity to build on that foundation of success as NASA moves into a new era." As a NASA astronaut, Gregory logged more than 455 hours in space during three Space Shuttle missions. In 1985, he served as pilot on board Challenger during STS-51B. Gregory was mission commander for STS-33 in 1989 and STS-44 in 1991. Gregory was selected as an astronaut in 1978, after a distinguished career with the U.S. Air Force. He logged nearly 7,000 hours in 50 types of aircraft, including 550 combat missions over Vietnam. He retired as a Colonel in December 1993. Gregory has been awarded the Defense Superior Service Medal, two Distinguished Flying Crosses, the Defense Meritorious Service Medal, the Meritorious Service Medal, 16 Air Medals, The Air Force Commendation Medal and three NASA Space Flight medals. His honors also include the NASA Distinguished Service Medal, the NASA Outstanding Leadership Award, the National Society of Black Engineers Distinguished National Scientist Award, the George Washington University Distinguished Alumni Award and an "Ira Eaker Fellow" by the Air Force Association. ["White House Moves To Fill NASA Deputy Administrator Position," **NASA News Release #02-85**, May 8, 2002.]

◆ Shuttle Update: At Pad A the Space Station Remote Manipulator System replacement wrist joint was brought on board Endeavour for the scheduled mission STS-111 on May 30. Preparations for hypergolic loading are in work and scheduled to begin next week. Processing work continues on Columbia in the OPF for the STS-107 microgravity research mission. As leak checks were being completed on Freon Coolant Loop No. 2, technicians noticed that several seals needed to be replaced and additional leak checks completed before servicing begins. Installation of window No. 5 is in work. Processing of Atlantis in the OPF for the August launch to the International Space Station continues on schedule. Removal of the Forward Reaction Control System is planned for tomorrow and checkout of the Orbital Maneuvering System is in work. ["All orbiters on track for launch, mission preparations," **KSC Countdown**, May 9, 2002.]

◆ A TitanII/G-14 launch from Vandenberg AFB June 24 will place a NOAA-M Polar Orbiter spacecraft into orbit. The polar-orbiting satellites monitor the entire Earth, tracking atmospheric variables and providing atmospheric data and cloud images. They track global weather patterns affecting the weather and climate of the United States. Once on orbit NOAA-M will be renamed NOAA-17 and will provide measurements of the Earth's surface and atmosphere that will be input into NOAA's weather forecasting models and used for other environmental studies. ["Weather satellite NOAA-M next in line for launch at Vandenberg AFB," **KSC Countdown**, May 9, 2002.]

May 10: Trailblazers are taking on the challenge of developing technology that will allow for vegetation growth on the surface of Mars. Students and faculty from universities around the country will converge at Kennedy Space Center (KSC) for this year's NASA MarsPort Engineering Design Student Competition 2002 conference organized by the Florida Space Grant Consortium (FSGC). Innovative design ideas will be presented as part of a two-day conference on May 14 - 15 at the Kurt H. Debus Conference Facility at the KSC Visitor Complex. Participants will present a paper on engineering trade studies to design optimal configurations for a MarsPort Deployable Greenhouse (MDG) for operation on the surface of

Mars. The MarsPort competition actually began in the fall of 2001 when invitations were sent out to colleges and universities. Participating student teams were required to write and submit a proposal to the NASA MarsPort 2002 design review committee. From the 20 entries received, six teams were selected to investigate and perform trade studies to derive an optimal configuration for the MDG. This involves a systematic defining of the MDG, and requires analyzing and trading options for the greenhouse structure, light collection, water and nutrient delivery, atmospheric controls, crop selection, harvesting and materials handling, and thermal management. The design keeps in mind the need for a minimal mass and lift-off volume approach. In addition, deployment options from the spacecraft and on the surface are also being analyzed. Representatives of six university teams from Cornell University, University of Colorado-Boulder, University of Florida, University of Central Florida, Saint Louis University and Franklin W. Olin College of Engineering, who are the finalists of the competition, will be here to make their presentations before a panel of judges from KSC, Dynamac Corporation and Florida Institute of Technology. The winning team's innovative ideas will be used by NASA to evaluate and study other engineering trade concepts. The 2002 MarsPort competition conference will also feature presentations by Dr. Sam Durrance, FSGC director and former astronaut, and Dr. Gary Stutte, Plant Scientist, Dynamac Corporation. JoAnn Morgan, KSC's External Relations and Business Development Director will welcome the participants. This year's MarsPort competition is jointly administered and sponsored by the FSGC and the Texas Space Grant Consortium and co-sponsored by KSC and the Florida Space Research Institute. The FSGC was formed in 1989 when NASA implemented the National Space Grant College and Fellowship Program. The FSGC is a voluntary association of 17 universities and colleges along with KSC, Florida Space Authority (FSA), Astronaut Memorial Foundation and Higher Education Consortium for Math and Sciences. The FSGC represents Florida in NASA's Space Grant College and Education Program. It serves more than 230,000 university students in Florida. The MarsPort Engineering Design Competition 2002 conference hours are 9:15 a.m. - 6 p.m. on Tuesday, May 14. The award ceremony will be held on Wednesday, May 15 at 1:45 p.m. where Dr. James L. Jennings, KSC Deputy Director, will present awards to the winning teams. Further information on the NASA MarsPort competition may be obtained by calling the Florida Space Grant Consortium at 321-452-4301. ["Marsport Competition Comes to KSC," **NASA News Release #41-02**, May 10, 2002.]

May 11: Former employees of the company that provides security at Kennedy Space Center and Cape Canaveral Air Force Station claim racial discrimination continues there, and will demonstrate today at the entrance to Canaveral Air Force Station. The anti-racism demonstration is being organized by Cape Canaveral Coalition for Racial Justice, which includes 10 black former security supervisors who allege they were passed over for white workers when a new company took over security at Kennedy Space Center. The contractor, Space Gateway Support, in a court response to a federal lawsuit filed by the men, said no discrimination was intended. The Space Gateway Support Co. took over the security contract from EG&G in 1998. The lawsuit is pending in a federal court in Orlando. ["Protesters gathering today at air station," **Florida Today**, May 11, 2002, p 3B.]

May 14: NASA Administrator Sean O'Keefe today named retired Air Force Major General Michael C. Kostelnik as Deputy Associate Administrator for International Space Station and Space Shuttle, a newly created senior management position within the Office of Human Space Flight. The new position provides leadership and accountability for top-level safety requirements, mission success criteria, overall policy definition, and strategic planning in the direction and administration of the two programs. "I am extremely pleased that General Kostelnik is going to join our team," said Administrator O'Keefe. "The Shuttle and Station programs need to be more closely integrated and will benefit from General Kostelnik's hands-on experience and proven track record in managing leading-edge aerospace systems." Kostelnik's responsibilities will include the corporate level management of program safety, budget, performance and schedule requirements for the International Space Station and the Space Shuttle program. The program managers for these important programs will report directly to Kostelnik, consistent with the recommendations of the International Space Station Management and Cost Evaluation (IMCE) Task Force, known as the Young Report. Kostelnik has more than 25 years of hands-on experience in research, development, testing, and evaluation of leading edge aerospace systems. He brings to NASA broad experience and in-depth expertise in the management of high-risk aerospace development test programs and operations safety. Until his retirement, Kostelnik was the Commander of the Air Force Development and Test Center and Air Armament Center at Eglin Air Force Base in Florida.

Responsible for two of the Air Force's largest installations, he was also the flight manager for high-risk flight operations, which tested weapon systems. From late 1995 through 1997, Kostelnik was Vice Commander and Director, Plans and Programs, of the Air Force Materiel Command, Wright Patterson Air Force Base in Ohio. From mid-1994 through late 1995, Kostelnik was Director, Special Programs, in the Office of the Secretary of Defense at the Pentagon. He managed advanced technology programs, with responsibility for oversight of acquisition, covert operations and intelligence special access programs. "General Kostelnik's experience with next-generations systems and high-risk programs will be invaluable to the Human Space Flight Program," added Administrator O'Keefe. Before serving at the Pentagon, Kostelnik held a variety of positions in the Air Force, including Vice Commander, Warner Robins Air Logistics Center, Warner Robins Air Force Base, Ga., and Commandant of the Air Force Test Pilot School, Edwards Air Force Base, Calif. Kostelnik joined the Air Force as a fighter pilot in 1970, serving as an instructor and flight examiner. He also served as a test pilot in the F-4, F-15, and more than 60 other aircraft. He holds a bachelor's degree in Mechanical Engineering from Texas A&M University, a master's degree in Industrial Management Engineering from the University of Iowa, and has completed extensive advanced program and executive management training at a variety of institutions, including the National Defense University, the Goldratt Institute, and Johns Hopkins. Kostelnik will report to NASA's Kennedy Space Center in Florida June 1 to immediately begin an intensive review of the system integration challenges associated with the International Space Station. He will permanently relocate to NASA Headquarters in Washington by late summer. ["NASA Administrator Names New Deputy Associate Administrator For International Space Station and Space Shuttle," **NASA News Release #02-79**, May 14, 2002.]

◆ At Pad A, technicians have completed the installation of the Space Station Remote Manipulator System replacement wrist joint as work continues for Endeavour's scheduled May 30 mission, STS-111. Over the weekend at Pad A, technicians completed inspections of 13 connector savers in the orbiter T-0 umbilicals after initial checks indicated several savers appeared to be loose. Only one of the 13 savers was not locking properly and was replaced. The Terminal Countdown Demonstration Test for mission STS-111 is scheduled this week. ["Connectors on Endeavour under inspection," **KSC Countdown**, May 14, 2002.]

May 15: The payload carrier Hitchhiker Bridge containing the Fast Reaction Experiments Enabling Science, Technology, Applications and Research (FREESTAR) experiments for mission STS-107 was placed in the payload canister for transfer to the Orbiter Processing Facility. FREESTAR incorporates eight high-priority, secondary, attached shuttle experiments on mission STS-107. The bridge will be installed in Columbia's payload bay. The research mission will also carry the SHI Research Double Module (SHI/RDM), known as SPACEHAB. Experiments on the module range from material sciences to life sciences (many rats). STS-107 is scheduled to launch July 19. ["Experiments to be placed in Columbia's payload bay for July 19 mission," **KSC Countdown**, May 16, 2002.]

May 16: Israel's fist astronaut said Thursday that he feels safe with all of NASA's security precautions and does not consider himself a terrorist target or even an added risk to his space shuttle flight this summer. In one of his first interviews since the latest Middle East crisis, Israeli Air Force Col. Ilan Ramon said NASA is doing everything it can to protect him, his six American crewmates and all the other astronauts. Ramon said training for his 16-day scientific research mission aboard shuttle Columbia has not been disrupted by security measures. NASA increased security to unprecedented levels at Johnson and especially at the launch site in Cape Canaveral, Fl., following the Sept. 11 terrorist attacks. Web posted. (2002). [NASA Security Comforts Israeli Astronaut [Online]. Available WWW: <http://www.space.com/> [2002, May 17].]

May 17: Launch of Space Shuttle Endeavour to the International Space Station (ISS) has been set for May 30 on a flight that will bring to a close the longest stay yet aboard the complex for a resident crew. Endeavour's liftoff on mission STS-111 will occur sometime between 4 and 8 p.m. EDT. A precise time will be announced about 24 hours prior to liftoff. In addition to exchanging station crews, Endeavour's multinational mission will attach a Canadian-built mobile base system to the station that will enable the Canadarm2 robotic arm to move along a railway on the station's truss to build and maintain the outpost. Endeavour's crew -- representing three different countries -- also will replace a faulty joint on the station's robotic arm and unload almost three tons of experiments and supplies from the Italian-built Leonardo

logistics carrier, making its third visit to the station aboard the shuttle. "The team has done a great job preparing this flight and accommodating a major addition to this mission's content that came only last month -- the replacement of a joint on the station's robotic arm," Space Shuttle Program Manager Ron Dittmore said. "The capability to plan, train and prepare equipment for such a complex new task in only a few extra weeks demonstrates the flexibility required for support of the station. Thanks to those efforts, Endeavour is ready to go." The International Space Station's Expedition Four crew, Commander Yury Onufrienko and Flight Engineers Dan Bursch and Carl Walz, on the station since Dec. 7, 2001, will return to Earth aboard Endeavour. The Expedition Five crew, Commander Valery Korzun and Flight Engineers Peggy Whitson and Sergei Treschev, will arrive at the complex aboard Endeavour, beginning a four-month stay. Ken Cockrell will command Endeavour, and Paul Lockhart (Lt. Col. USAF) will serve as pilot. Mission specialists will be Franklin Chang-Diaz (Ph.D.) and French Space Agency astronaut Philippe Perrin (Col., French Air Force). Chang-Diaz and Perrin will conduct three spacewalks to install the new robotics mobile-base system and replace the faulty arm wrist/roll joint. Chang-Diaz will be making a record-tying seventh flight aboard the Space Shuttle. Endeavour is scheduled to land at the Kennedy Space Center, Fla., on June 11. STS-111 marks the 18th flight for Endeavour and the 110th in Space Shuttle history. ["Endeavour To Launch May 30, Continue Station Assembly, Bring Home Veteran Crew," **NASA News Release #02-93**, May 17, 2002.]

◆ Apollo 17 astronaut Eugene Cernan, the last man to set foot on the Moon, said Kennedy Space Center Visitor Complex has been transformed in the past six years, and much of that change can be attributed to Rick Abramson. Abramson, president of the Visitor Complex's parent company, Delaware North Parks Services, on Friday night received the National Space Club Florida Committee's Dr. Kurt H. Debus Award. The annual award is given to someone who has contributed to the local space effort. Cernan spoke at a dinner honoring Abramson. "This isn't Disney World; it's the real world," Cernan said. ["Abramson receives Debus award," **Florida Today**, May 18, 2002, p 3B.]

May 20: Following a best-value competitive procurement, Kennedy Space Center (KSC) this month awarded a two-year contract to two prominent historians and authors, Dr. Kenneth Lipartito and Dr. Orville Butler, to write the history of Kennedy Space Center. The new text will be the first major work to document the Center's history since 1976, when *Moonport: A History of Apollo Launch Facilities and Operations* was published. *Moonport* covered the period from KSC's inception through the Apollo program. Lipartito is chair of the Department of History at Florida International University. A renowned historian, he has authored three books and numerous publications related to organizations and technology. Butler, an independent scholar from Auburn, Wash., co-authored *Manufacturing the Future: A History of Western Electric*, a critically acclaimed and widely read book that serves as a benchmark for works on the history of telecommunications manufacturing. The authors will look at KSC's history from three distinct perspectives. The first will be a local perspective, focusing on the ways KSC has created a favorable culture for its resident workforce and impacted the local economy and community relations. The second will be an organizational perspective, recognizing KSC's unique role in the larger NASA structure, its specific contributions to the U.S. space efforts, and how the Center has evolved as an organizational culture. Third, an institutional perspective will explore KSC's contractor relations and the partnerships with technological and scientific communities that have resulted in scientific and technological advancements around the world. "We are very impressed by this unique approach to the Center's history," said JoAnn Morgan, director of External Relations and Business Development at KSC. "Their work will document and recognize our special heritage and KSC's role in the nation's space program over the past 25 years. In addition, it will depict the achievements of a generation of extraordinary space pioneers." Lipartito and Butler will gather information from a variety of sources, including the KSC archives, other NASA Centers, the National Archives, event and site visits, and individual and group interviews and collections. ["Historians Begin Work to Showcase KSC's Heritage," **NASA News Release #45-02**, May 20, 2002.]

◆ ELV Update: At SAEF-2, the CONTOUR (Comet Nucleus Tour) Mission Simulation was completed last week. This week the spacecraft will be mated to the solid propellant apogee kick motor. CONTOUR will provide the first detailed look into the nucleus of a comet. Flying as close as 60 miles (100 kilometers) to at least two comets, Encke and Schwassmann-Wachmann 3, it will take the sharpest pictures yet of the nucleus while analyzing the gas and dust that surround these rocky, icy building blocks of the solar system.

CONTOUR is scheduled to be launched July 1 on a Delta II rocket from Pad 17-A, CCAFS. ["Contour ELV mission on track for July 1 launch," **KSC Countdown**, May 21, 2002.]

May 23: Shuttle Update: Columbia – the Spacehab/Freestar payload is scheduled to be installed in the payload bay today. Atlantis – processing continues and replacement of window no. 2 is in work. Endeavour – orbiter after closeout and Extravehicular Mobility Unit installation and checkout is in work. ["Two orbiters, one Shuttle getting prepped for launches," **KSC Countdown**, May 23, 2002.]

May 28: NASA's John F. Kennedy Space Center, Fla., has selected Analex Corp., Brook Park, Ohio, for the award of the Expendable Launch Vehicle Integrated Support (ELVIS) contract. This is a new performance-based, fixed-price/cost-plus-award-fee contract to perform various integrated support services for the NASA Expendable Vehicle (ELV) Program Office located at Kennedy. Under the ELVIS contract, Analex will provide a broad range of ELV support services for NASA requirements at Kennedy; Cape Canaveral Air Force Station, Fla.; Vandenberg Air Force Base, Calif.; and other launch site locations. This includes management, operation and maintenance of facilities, systems and equipment, as well as specified technical and administrative capabilities. The contract covers responsibility for furnishing engineering services; performing safety and mission assurance functions; and providing communications, data and telemetry support. In addition, at Vandenberg, Analex will also be responsible for maintenance of NASA's administrative, launch support and spacecraft facilities, mission support planning, and customer support for payload processing activities. The contract has a one-month phase-in period beginning June 1, 2002, to be followed by a three-year, three-month basic period of performance. There are two options of three years each for a potential nine-year, four-month contract term. The contract value for the basic performance period is \$54.9 million. The potential contract value including all priced options over nine years, four months is \$163.7 million. ["NASA Awards ELV Support Contract To Analex Corporation," **NASA News Release #e02-1**, May 28, 2002.]

May 30: Bad weather delayed Thursday's shuttle launch, but NASA said it will try again Friday even though the weather is expected to worsen. Anvil-shaped storms, which formed west of Orlando earlier in the day, drifted toward Kennedy Space Center during the afternoon, getting close enough to scrub the evening flight. In addition, shuttle managers worked through a technical issue during the last hour of the countdown. The left engine used for movement to higher and lower orbits had a regulator showing higher-than-normal readings. Managers stabilized it minutes before launch, but they weren't sure it would hold at that level. It stayed stable, and managers monitored it through the next few minutes of the countdown. Forecasters predict a 30 percent change of favorable launch conditions Friday and Saturday. ["Storm clouds delay shuttle launch," **Florida Today**, May 31, 2002, p 1A.]

May 31: NASA has rescheduled the launch of shuttle Endeavour for Monday because of an abundance of thunderstorms forecast to be in the area this weekend. On Friday morning, NASA delayed the evening's scheduled liftoff for the second day in a row because of encroaching thunderstorms. By afternoon, it was raining at Kennedy Space Center. Monday's available launch time extends from 4 to 8 p.m. NASA will reveal an exact launch time Sunday afternoon. ["Endeavour to try again Monday," **Florida Today**, June 1, 2002, p 1A.]

During May: An ongoing Cape Canaveral Spaceport master planning effort being managed jointly by the NASA Kennedy Space Center, the USAF 45th Space Wing and the Florida Spaceport Authority continues to show healthy launch rates for the Cape into the foreseeable future. A 10-year projection shows an annual world-wide need about 2010 for launch of 125 payloads. Cape operations would be likely to win about 35 of the payloads, equating to about 30 launches a year. "A launch rate of 21-30 is quite significant," Renee Ponik of the planning team told the Cape's 39th Space Congress. The Cape "can keep market share" with those numbers. Long-term studies show that if third-generation launchers were to reduce launch costs to \$100 per pound by mid-century, the global payload rate could grow to 866 per year. The Cape would likely win more than 300 of those, 80% of them horizontally launched. ["Cape Market Projections," **Aviation Week & Space Technology**, May 13, 2002, p 19.]

◆ Shuttle astronauts and instructor pilots flying steep orbiter night approaches in NASA's Gulfstream II Shuttle Training Aircraft (STA) are evaluating new xenon floodlights for the 15,000-ft. shuttle runway at

the Kennedy Space Center. Parts needed to repair the more complex xenon floodlights used for the past 20 years on the approach ends of the runway have become hard to find. The new lights are more cost efficient and easier to repair, but have somewhat different lighting characteristics, which are being evaluated as part of normal shuttle approach training in the STA. Finding space parts is a growing problem as the shuttle system ages. To keep electronic prelaunch test equipment running for example, shuttle solid rocket booster managers must seek 1981-vintage Intel 8086 chips. ["Lights out," Aviation Week & Space Technology, May 27, 2002, p 21.]

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June 1: Bad weather isn't to blame for the latest launch delay for shuttle Endeavour. Because of a persistent technical problem, the shuttle's mission to the International Space Station will not begin until at least Tuesday. Workers had to replace a regulator in one of the shuttle's orbital maneuvering engines Saturday. They expect to be finished tomorrow. During the last hour of Thursday's countdown, managers noticed higher-than-normal pressure readings in the regulator that works with the shuttle's left-side orbital engine. The eventually determined it was under control and proceeded with the countdown, only to have looming clouds interfere with the launch. After running some tests Friday night, technicians again noticed higher-than-normal pressure readings. So they decided to replace the troublesome regulator, which relieves pressure and regulates the flow of nitrogen gas in the engine. Other regulators appear to be fine. The launch time still extends from 4 to 8 p.m. NASA will announce an exact time 24 hours before liftoff as part of NASA's post-Sept. 11 security measures. ["Engine glitch, not weather pushes launch to Tuesday," **Florida Today**, June 2, 2002, p 1A.]

June 2: NASA has again delayed shuttle Endeavour's next opportunity to launch, this time to Wednesday (June 5). NASA managers made the decision during a Sunday meeting to review the progress made in replacing a faulty part inside one of the shuttle's two orbital maneuvering engines. The original repair reschedule called for technicians to replace the part by late Saturday and complete tests of the newly installed part by Sunday. The unusual nature of the repair work and the requirements to test the new component in Endeavour's rear engine compartment forced NASA to slip the next launch attempt to Wednesday. Liftoff of the 12-day mission to the International Space Station is scheduled between 4 and 8 p.m. Wednesday. An exact time will be announced Tuesday afternoon, Kennedy Space Center spokesman Bruce Buckingham said. ["Endeavour won't launch until at least Wednesday," **Florida Today**, June 3, 2002, p 1A.]

June 3: "Commemorating 40 Years of Space Exploration" is this year's theme for the annual Community Leaders Briefing to be held June 6 at the KSC Visitor Complex. KSC Director Roy Dr. Bridges, Jr., will meet with community leaders from Brevard County and the State of Florida. Leaders will hear about NASA's new mission and vision statements, and celebrate KSC's recent accomplishments and upcoming activities. ["KSC Hosts Annual Community Leaders Briefing June 6," **NASA News Release #54-02**, June 3, 2002.]

June 5: Shuttle Endeavour rocketed into the cosmos at 5:22 p.m., dodging thin clouds that characterize many hot Florida afternoons. Weather forecasters had given Endeavour only a 40 percent shot of avoiding thick clouds and winds in the area. They later issued an improved forecast of 80 percent favorable weather. After a roaring start from launch pad 39A, Endeavour slipped into orbit eight minutes later. Endeavour's flight was delayed six days because of bad weather and a bad regulator in the shuttle's left orbital engine. NASA took several days to replace the regulator. ["Station crew awaits shuttle," **Florida Today**, June 6, 2002, p 1A & 4A.]

June 6: The next NASA launch is the National Oceanic and Atmospheric Administration (NOAA) spacecraft from Vandenberg AFB. NOAA-M is another in a series of polar-orbiting Earth environmental observation satellites that provide global data to NOAA's short- and long-range weather forecasting systems. Launch aboard a Titan II rocket from Launch Complex 4W is scheduled for June 24, 2002. ["Next ELV launch June 24 from VAFB," **KSC Countdown**, June 6, 2002.]

June 8: It once was inconceivable. Astronauts hired and trained by a private company like airline pilots. Corporate logos adorning an industry-owned and operated space shuttle fleet. Flight directors at Mission Control working for contractors. Virtual elimination of NASA oversight. That scenario isn't so farfetched anymore. But these days it's government, not industry, that is nudging the shuttle program closer to the private sector. The option is one of several being considered by the National Aeronautics and Space Administration. It's also a major reason why 2002 is shaping up as one of the most pivotal years in the shuttle program's history. The space shuttle's performance never has been better. The fleet is launching more efficiently and flying more trouble-free than ever. In 1998, the ships finally began carrying out the mission for which they originally were designed: construction and support of a space station in orbit. And

so far, the shuttle's work on the international outpost has gone far smoother than anyone dreamed possible. Delays in developing a shuttle replacement have contributed to NASA's predicament. Plans to upgrade the shuttle and refurbish ground facilities were put on the back burner in the late-1990s, when it appeared a successor ship might be in production by 2005 or so. That hope evaporated when NASA canceled the troubled X-33 program last year. A debate continues within NASA about whether to replace or upgrade the fleet. The agency plans to spend \$4.8 billion by 2006 on a Space Launch Initiative designed to develop technologies for a cheaper, safer reusable spaceship. Shuttle managers told Congress in April the fleet may need to keep flying until 2020. That's about eight years longer than previously planned. While NASA debates how long the fleet will be around, agency managers are considering a fundamental change in the way the shuttle program does business. The shuttle's design and huge support staff mean basic operating costs can't be reduced beyond a certain level without threatening safety. Experts say the shuttle is nearing that level. Without more money, further privatization will do little to change that. ["NASA nudges shuttle fleet to private sector," **Orlando Sentinel**, June 9, 2002, p A1 & A22.]

June 10: Tommy Holloway, Manager of the International Space Station Program Office at NASA's Johnson Space Center in Houston, today announced plans to retire, effective July 3. Holloway's deputy, William H. Gerstenmaier, will take over as program manager. Holloway was named space station manager in April 1999 after serving as manager of the Space Shuttle program for nearly four years. He began his career with NASA in 1963, planning activities for Gemini and Apollo Flights at what was then known as the Manned Spacecraft Center. He was a flight director in Mission Control for early Space Shuttle flights and became chief of the office in 1985. In 1989, he was named assistant director for the Space Shuttle Program for the Mission Operations Directorate. He served as Deputy Manager for Program Integration with the Space Shuttle Program and Director of the Phase I Program of Shuttle-Mir dockings before being named Space Shuttle program manager in August 1995. "Tommy's been a fixture with NASA for nearly four decades and his contributions to the agency's human space flight program and the Johnson Space Center are considerable," said Frederick D. Gregory, Associate Administrator for Space Flight at NASA Headquarters in Washington. "His leadership helped set the standards of safety and success for our Space Shuttle and International Space Station programs. I will miss him both personally and professionally." Gerstenmaier first joined the Space Shuttle program in 1980, serving as Propulsion Flight Controller. In 1992, he got his first managerial assignment for the Orbital Maneuvering Vehicle project. Gerstenmaier was selected in 1995 to be the Operations Lead in Moscow for the first phase of the Shuttle-Mir program, serving as lead for the ground control team. In August 1998, he was named Space Shuttle Program Integration Manager and in December 2000 he was selected as Deputy Manager of the International Space Station Program. Since then, he's been responsible for the day-to-day management, development, integration and operations of the orbiting research laboratory. "Bill and Tommy have worked side-by-side for years on a variety of projects, so I expect this to be a smooth and seamless transition," added Gregory. "Bill's extensive program knowledge and experience will be a steadying force as we move forward with the International Space Station construction and research." ["Tommy Holloway, Space Station Program Manager, Retires," **NASA News Release #02-108**, June 10, 2002.]

◆ An American flag recovered from the debris in the days immediately following the terrorist attacks in New York will be returned to the city during a special presentation scheduled for Flag Day, June 14. The American Museum of Natural History will host the event at the Rose Center for Earth and Space. The tattered flag, recovered by the city's police department, was flown into space in December on board the Space Shuttle Endeavour during STS-108 as part of the agency's Flags for Heroes and Families campaign. The large American flag, along with other commemorative badges and patches, were flown with nearly 6,000 smaller American flags that will be presented to the victims' families in New York, Washington and Pennsylvania. Media representatives are invited to the presentation, which begins Friday at 2:30 p.m. EDT. Due to security restrictions, reporters who want to attend must call the American Museum of Natural History at 212/769-5800. The ceremony will be broadcast live on NASA Television. NASA Administrator Sean O'Keefe will return the items flown into orbit to New York Mayor Michael Bloomberg, Governor George Pataki, and representatives from the New York Police Department, the New York fire Department and the Port Authority of New York and New Jersey. The presentation will also feature a commemorative message from the American members of the Expedition Four crew, who were carried into space by Endeavour and are now preparing to come home after a record-setting mission on board the International Space Station. Opening remarks will come from Ellen Futter, President of the American Museum of

Natural History. The American Museum of Natural History is one of the world's preeminent scientific, educational, and cultural institutions. Since its founding in 1869, the Museum has advanced its global mission to discover, interpret, and disseminate information about human cultures, the natural world, and the universe through a wide-reaching program of scientific research, education, and exhibitions. In February 2000, the Museum opened its most ambitious endeavor ever - the monumental 120-foot-high, 335,500 square-foot Frederick Phineas & Sandra Priest Rose Center for Earth and Space. NASA TV is broadcast on the GE2 satellite, Transponder 9C, at 85 degrees West longitude, frequency 3880.0 MHz, audio 6.8 MHz. Items flown to honor the memory of the victims at the Pentagon and in Pennsylvania will be returned as appropriate events can be identified and scheduled. Distribution of the American flags for the survivors and families of the victims will be handled by the city of New York, the Department of Defense, American Airlines and United Airlines. ["NASA Returns World Trade Center Flag To Commemorate Flag Day At New York's American Museum of Natural History," **NASA News Release #N02-42**, June 10, 2002.]

◆ NASA's Kennedy Space Center has chosen International Launch Services (ILS) to launch the latest in its series of missions to Mars. ILS is scheduled to launch the Mars Reconnaissance Orbiter on an Atlas III launch vehicle in August 2005 from Cape Canaveral Air Force Station, Fla. Both the Atlas rocket and the Mars Reconnaissance Orbiter are being built by Lockheed Martin Space Systems Co. of Denver. The Atlas II and III series boast a perfect record of 100 percent mission success in 60 consecutive launches. Web posted. (2002). [Atlas 3 Picks Up Martian Loiter For 2005 Window [Online]. Available WWW: <http://www.spacedaily.com/> [2002, June 11].]

June 12: NASA has extended to September 2008 its six-year, \$1.15 billion contract with Lockheed Martin Space Systems, New Orleans, to provide 35 Super Lightweight External Tanks for the Space Shuttle Program. Under the modified contract, the 35 tanks will be produced at a rate of not less than six per year, versus the eight per year agreed upon in the original contract issued in October 2000. The modification adds \$341 million to the contract. The contract includes the manufacture, assembly, test and delivery of the Super Lightweight Tanks and the operations and maintenance of NASA's Michoud Assembly Facility in New Orleans. The contract also includes activities at NASA's Marshall Space Flight Center, Huntsville, Ala., and Kennedy Space Center, Fla. This is the sixth contract for production of tanks and the first to be comprised totally of Super Lightweight Tanks. This latest version of the tank, which flew for the first time in June 1998, is the same size as the tank it replaces, but is about 7,500 pounds (3,401.9 kilograms) lighter. Since the tank goes almost to orbit, every pound of weight saved is equivalent to a pound of increased payload. The weight reduction allows the Space Shuttle to carry more payload. The Super Lightweight Tank features major changes in materials and design. Its liquid hydrogen tank and the liquid oxygen tank are constructed of a new aluminum lithium, a lighter, stronger material than the metal alloy used to manufacture previous External Tanks. The External Tank, which holds the liquid hydrogen fuel and liquid oxygen for the Shuttle's three main engines, is the largest single component of the Space Shuttle and the only part of the Shuttle that is not reused. Standing 154 feet tall (approximately 50 meters), the gigantic rust-colored tank is taller than a 15-story building and as wide as a silo, with a diameter of about 27.5 feet (approximately 8 meters). During launch, the tank also acts as the structural backbone for the Shuttle orbiter and Solid Rocket Boosters attached to it. The first tank of the sixth production is scheduled for delivery to the Kennedy Space Center this year. Marshall is NASA's key leader for development of space transportation and propulsion systems. ["NASA Extends Shuttle External Tank Contract With Lockheed Martin To September 2008," **NASA News Release #c02-m**, June 12, 2002.]

June 13: Shuttle update: Columbia – processing continues for the July 19 STS-107 mission. The crew was on Center last weekend for CEIT, looking over equipment and payload in the orbiter. Atlantis has had its left-hand Orbital Maneuvering System (OMS) thruster replaced. Preparations were made this week for ammonia servicing. Discovery is still waiting the start of its Orbiter Major Modification (OMM) period that is scheduled to begin at KSC late this summer. ["Columbia crew checks out equipment for STS-107 mission," **KSC Countdown**, June 13, 2002.]

June 14: NASA Administrator Sean O'Keefe today leads a delegation of astronauts in a special presentation of colors at the American Museum of Natural History's Rose Center for Earth and Space in New York. An American flag recovered from the site of the World Trade Center in the days following the September 11 attacks returns home after traveling nearly 5 million miles in space aboard the Space Shuttle

Endeavour during STS-108 in December. The flag, damaged but intact, was pulled from the debris by the New York City Police Department. To honor the victims, families and those who helped in the rescue and recovery efforts of September 11, NASA flew the recovered Stars and Stripes as part of the agency's Flags for Heroes and Families campaign. "The tradition of carrying American flags into space dates back to the very beginning of this historic agency," said Administrator O'Keefe. "From the surface of the Moon to the uncharted regions of our galaxy, NASA has flown the American flag as a patriotic symbol of truth, honor and justice. It is appropriate that we present this flag back to the city of New York on Flag Day." The American Museum of Natural History hosts today's presentation. The Museum is one of the world's premiere scientific educational and cultural institutions. Since its founding in 1869, the Museum has advanced its global mission to discover, interpret and disseminate information about human cultures, the natural world and the universe, through a wide-reaching program of scientific research, education and exhibitions. In February 2000, the Museum of Natural History opened the monumental 120-foot-high, 335,500 square-foot Frederick Phineas & Sandra Priest Rose Center for Earth and Space. "On behalf of the trustees and staff of the American Museum of Natural History, we are deeply moved and very honored to host this meaningful presentation by Administrator O'Keefe to Mayor Bloomberg and Governor Pataki," said Ellen V. Futter, President of the American Museum of Natural History. "The Museum shares a deep commitment to science education with the city, the state and NASA. Today, with the return of these precious items, we rededicate ourselves to our core mission of advancing science literacy and cultural understanding in anticipation of a future filled with courage, resilience and hope." The large American Flag, along with other commemorative badges, patches and other items, were carried into space with nearly 6,000 smaller American flags that will be given to the victims' families in New York, Washington and Pennsylvania. Along with Administrator O'Keefe, NASA astronauts Frank Culbertson, Dominic Gorie, Linda Godwin and Michael Massimino help present the flown items to New York City Mayor Michael Bloomberg, New York Governor George Pataki, and representatives from the New York Police Department, Fire Department and the New York and New Jersey Port Authority. "This precious flag symbolizes the sacrifice and courage of the thousands of New Yorkers and Americans who perished that fateful day," Governor Pataki said. "On behalf of all New Yorkers, I am proud to welcome the flag back to the New York City to honor the innocent men and women who were working in the towers on September 11, and the countless heroes whose spirit and strength has helped carry us through this horrific ordeal." Culbertson served as Expedition Three Commander on the International Space Station and was the only American not on the planet at the time of the terrorist attacks. He captured the first dramatic images from space of the fires at the World Trade Center shortly before the buildings collapsed. Gorie was mission commander of STS-108 and Godwin was a mission specialist on board Endeavour during the December mission. Massimino has close ties to the New York Fire Department and was mission specialist on board the Space Shuttle Columbia during STS-109 in March. "From space, the astronauts get a unique view of our home planet and the destruction was clearly visible from orbit. The events of September 11 deeply affected them, as they did the entire nation," concluded Administrator O'Keefe. "We hope this campaign is seen as a fitting tribute from America's space program as the courageous people of New York move forward." ["NASA Administrator, Astronauts Honor Flag Day With Special Presentation of Old Glory," NASA News Release #02-112, June 14, 2002.]

June 17: The orbiter Endeavour is scheduled to land at Kennedy Space Center (KSC) Monday, June 17, at 1:00 p.m. EDT completing the nearly 12-day STS-111 mission to deliver and install the Mobile Base System (MBS) and transport the Expedition Five crew to the International Space Station. Endeavour launched from KSC on June 5, 2002. Landing at KSC's Shuttle Landing Facility (SLF) is slated to occur on orbit 185 at mission elapsed time 11 days, 19 hours, 38 minutes. The deorbit burn will occur at about 11:56 a.m. EDT. The two KSC landing opportunities on June 17 are at 1:00 p.m. EDT and at 2:36 p.m. EDT. The deorbit burn for the second landing opportunity would take place at 1:33 p.m. EDT. No landing opportunities are planned for the back-up landing location at Edwards Air Force Base (EAFB), Calif., on Monday. If managers must keep Endeavour in orbit an additional day, two landing opportunities are available at KSC on Tuesday, June 18, at 11:56 a.m. EDT and at 1:32 p.m. EDT. Two landing opportunities also exist at EAFB on Tuesday at 3:02 p.m. EDT and at 4:38 p.m. EDT. If landing occurs as scheduled, it will be the 60th landing at KSC in the history of the Shuttle program. Following landing, Endeavour will be towed to the Orbiter Processing Facility for post-mission servicing and preparation for the STS-113 mission in October. About an hour after touchdown, the crews will be taken to crew quarters in the O&C Building, meet with their families and undergo physical examinations. A post-mission press conference

with select members of the STS-111 crew is scheduled to occur at the KSC News Center about six hours after touchdown. A ceremony commemorating the STS-111 and Expedition Four crews' return from space will be held at Ellington Field in Houston, Texas, on June 19. If Endeavour lands at Edwards, an augmented KSC convoy team will be on-site to safe the vehicle, disembark the crew and move the orbiter to the Mate/Demate Device. The turnaround team will be deployed to Edwards by charter aircraft on landing day. ["Endeavour Scheduled To Land At KSC June 17," **NASA News Release #58-02**, June 14, 2002.]

June 18: The crew of space shuttle Endeavour will make another attempt to land today in Florida or California, but weather at both landing sites could again pose a problem. Storms at Kennedy Space Center prompted ground controllers to call off the planned attempts at landing Monday. Today, more storms are expected to develop at KSC, but an earlier landing time of 11:55 a.m. could work in the crew's favor. Chances of rain are expected to increase later. The second attempt would be at 1:31 p.m. Edwards Air Force Base in California also is an option for landing, the first at 3 p.m., but high crosswinds are expected. Before making a decision about landing at Edwards, forecasters will consider whether Wednesday's weather is likely to improve in Florida. Endeavour has enough resources to stay in orbit until Thursday. ["Endeavour to attempt landing 2nd time," **Florida Today**, June 18, 2002, p 1B.]

◆ At SAEF-2, loading of CONTOUR with hydrazine fuel was completed on June 7. The "wet" spin balance test was completed on June 11. A "dry" spin balance without fuel aboard was completed June 1. The spacecraft was mated to the upper stage booster yesterday. CONTOUR is currently scheduled for transportation to the launch pad and mated to the Delta II tomorrow. CONTOUR is scheduled for launch July 1 from Pad 17-A, Cape Canaveral Air Force Station. ["CONTOUR heading to pad for Delta mate," **KSC Countdown**, June 18, 2002.]

◆ The Hypergol Support Building #2 is ready to replace temporary trailers at the Hypergol Maintenance Facility and being officially opened in a ribbon-cutting ceremony June 18. Center Director Roy Bridges, Jr., will welcome guests and speaker William Pickavance Jr., vice president, deputy program manager, Florida Operations, United Space Alliance. ["Ribbon Cutting For New Hypergol Facility," **KSC Countdown**, June 13, 2002.]

June 19: Shuttle Endeavour has a better chance of landing today at Kennedy Space Center or, if necessary, at Edwards Air Force Base in California. The forecast calls for scattered clouds, light winds and drier weather at Cape Canaveral at landing time. Calmer winds also are forecast for Edwards, where high winds prompted landing attempts there to be canceled Tuesday. The first landing attempt will be at 10:53 a.m. at KSC, with the second at 12:27 p.m. Endeavour's landing attempts Monday were canceled because of bad weather. If landing in Florida proves impossible today, there will be landing opportunities at Edwards at 1:58 p.m., 3:33 p.m. and 5:11 p.m. ["Shuttle aims for landing today," **Florida Today**, June 19, 2002, p 1B.]

◆ Shuttle Endeavour touched down flawlessly at Edwards Air Force Base in California on Wednesday, sidestepping stormy weather at Kennedy Space Center. Endeavour's delays in launch and landing could set back the spaceship's next outing, scheduled for Oct. 6. Sending Endeavour back to Kennedy Space Center atop a modified 747 jet, a \$900,000 trip that generally happens six days after landing, will further shorten preparation time for that shuttle's next space station construction mission. After traveling 5.8 million miles on its mission, Endeavour came to a stop on the runway at Edwards at 1:58 p.m. ["On 3rd try, shuttle lands," **Florida Today**, June 20, 2002, p 1B.]

June 21: Technicians are inspecting the liners inside hydrogen fuel lines in shuttle Discovery after finding liner cracks in a pipe leading to one of Atlantis' engines. It's unclear whether the cracks would pose a danger to a shuttle during launch. After finding a small crack in the main propulsion system flow liner, two more cracks were found in the same place. Inspections elsewhere on shuttle Atlantis turned up no more cracks, NASA spokesman James Hartsfield said. The liners act as sleeves inside the hydrogen fuel line in the plumbing for the shuttle's engine. NASA is working to determine whether the problem is limited to that one liner, which was in a bellows, where the fuel line bends. Discovery was moved Thursday (June 20) from the Vehicle Assembly Building to the processing facility, where it will stay until Endeavour's

return to Kennedy Space Center. Endeavour, which landed this week at California's Edwards Air Force Base, is scheduled Monday to leave Edwards aboard a 747, a NASA report said. ["Cracks found in fuel line on Atlantis," **Florida Today**, June 22, 2002, p 1A.]

June 22: NASA will cut the number of contractors working on the International Space Station from 26 to seven beginning in 2004, as the space agency attempts to control costs and switch the focus of the project from design and construction to operation and maintenance. Neither NASA nor the affected contractors are saying how many station-related jobs might be lost in the transition, but NASA managers have told the agency's advisory council that work force reductions are coming in 2004. "We are still too early in this process to speculate on any job impact," NASA spokesman Dwayne Brown said Friday. A NASA procurement official said the impact of the contract consolidation won't be known until contracts are written and bids are in. Merging space station contracts was one of many recommendations made last year by a NASA committee that investigated \$4.8 billion in cost overruns. The panel, headed by former Martin Marietta president Tom Young, reported a laundry list of problems with how the station's finances were handled, including poor contract management. But Brown said NASA already was looking at consolidation before the Young report came out in November. NASA has spelled out its consolidation plan for the existing contractors and asked for comments. Meanwhile, teams of NASA technical and financial experts are assigned to define the requirements for each of the seven new contracts, incorporating some of what they hear from the existing contractors. That work should be done in the fall. ["NASA to slash station contractors," **Florida Today**, June 23, 2002, p 1A & 6A.]

June 24: The launch of NASA's Comet Nucleus Tour (CONTOUR) spacecraft is scheduled for Monday, July 1. The launch window is 2:56:14 - 2:56:20 a.m. EDT. Liftoff will occur aboard a Delta II launch vehicle from Pad A at Space Launch Complex 17, Cape Canaveral Air Force Station. Should launch be delayed, the next opportunity is July 3 from 2:47:41 - 2:47:47 a.m. EDT. CONTOUR is our first detailed look into the heart of a comet -- its nucleus. The spacecraft will fly as close as 62 miles (100 kilometers) from at least two comets, taking the sharpest pictures yet of the nucleus while analyzing the gas and dust that surround these rocky, icy building blocks of the solar system. For the first time, CONTOUR will help us assess the diversity of comets and unravel the mysteries of how they evolve. CONTOUR was built and will be controlled after launch by the Applied Physics Laboratory of Johns Hopkins University. The Delta II launch vehicle and its associated launch support services are from The Boeing Company. NASA's John F. Kennedy Space Center is responsible for the launch countdown management and launch vehicle engineering oversight. ["NASA's CONTOUR Spacecraft Scheduled For Launch July 1," **NASA News Release #61-02**, June 24, 2002.]

◆ NASA managers today temporarily suspended launch preparations for Space Shuttle Columbia until they have a better understanding of several small cracks found in metal liners used to direct the flow inside main propulsion-system propellant lines on other orbiters in the fleet. Columbia's launch on STS-107, previously planned for July 19, will be delayed a few weeks to allow inspections of its flow liners as part of an intensive analysis that is under way. Recent inspections of Space Shuttle Atlantis and Space Shuttle Discovery found cracks, measuring one-tenth to three-tenths of an inch, in one flow liner on each of those vehicles. Some of the cracks were not identifiable using standard visual inspections and were only discovered using more intensive inspection techniques. "These cracks may pose a safety concern and we have teams at work investigating all aspects of the situation," said Space Shuttle Program Manager Ron Dittemore. "This is a very complex issue and it is early in the analysis. Right now there are more questions than answers. Our immediate interests are to inspect the hardware to identify cracks that exist, understand what has caused them and quantify the risk. I am confident the team will fully resolve this issue, but it may take some time. Until we have a better understanding, we will not move forward with the launch of STS-107." The impact of the investigation on other upcoming space shuttle launches has not been determined. ["NASA Managers Delay STS-107 Launch," **NASA News Release #02-117**, June 24, 2002.]

◆ The National Oceanic and Atmospheric Administration (NOAA) spacecraft (NOAA-M) was launched successfully yesterday at 2:23 p.m. EDT aboard a Titan II rocket from Vandenberg Air Force Base, Calif. NOAA-M is another in a series of polar-orbiting Earth environmental observation satellites that provide global data to NOAA's short- and long-range weather forecasting systems. ["Forecasting satellite launched at Vandenberg," **KSC Countdown**, June 25, 2002.]

June 25: United Space Alliance Chief Operating Officer Mike McCulley will host a commissioning ceremony to hand over a new, state-of-the-art convoy command vehicle to KSC Center Director Roy Bridges on Thursday, June 27 at 1 p.m. at the Landing Operations Facility. The new 40-foot vehicle is replacing a 15-year old model, and will be used following Shuttle landings as the prime vehicle to control critical communications between the orbiter, the crew and the Launch Control Center, to monitor the health of the Shuttle Orbiter systems and to direct convoy operations at the Shuttle Landing Facility. Many upgrades and high-tech features were incorporated into the design and development of this vehicle making it more reliable and efficient for the convoy crew. Seating capacity was increased from four to twelve, video recorders and television monitors were added to provide the convoy team with the maximum amount of visual information. ["NASA to Receive Hand Over of New Convoy Command Vehicle From United Space Alliance During Commissioning Ceremony," **NASA News Release #63-03**, June 26, 2002.]

June 26: The Boeing Co. is considering staff reductions that could be announced "pretty soon" at Kennedy Space Center, as one of the company's major NASA contracts winds down, a Boeing spokesman said Wednesday. About half of Boeing's 2,400 employees on the Space Coast work under the Payload Ground Operations Contract, which originally was set to expire June 30. The 15 ½-year contract is being extended while NASA selects a company to take over a replacement contract, called Checkout Assembly and Payload Processing Services. The work involves preparing and loading equipment shipped into space on shuttles and unmanned rockets. Much of the equipment is used for the International Space Station. The work also includes unloading and processing payloads returning from space. ["Boeing may cut jobs at KSC," **Florida Today**, June 27, 2002, p 1C.]

June 27: NASA managers this week temporarily suspended launch preparations for Space Shuttle Columbia until they have a better understanding of several small cracks found in metal liners used to direct the flow inside main propulsion-system propellant lines on other orbiters in the fleet. Columbia's launch on STS-107, previously planned for July 19, will be delayed a few weeks to allow inspections of its flow liners as part of an intensive analysis that is under way. Recent inspections of Space Shuttle Atlantis and Space Shuttle Discovery found cracks one-tenth to three-tenths of an inch in one flow liner on both vehicles. Some of the cracks were not identifiable using standard visual inspections and were only discovered using more intensive inspection techniques. According to Space Shuttle Program Manager Ron Dittmore the cracks might pose a safety concern and teams are at work investigating the situation. "Until we have a better understanding, we will not move forward with the launch of STS-107," he said. The impact of the investigation on other upcoming Space Shuttle launches has not been determined. ["Orbiters investigated for safety issues – July launch delayed," **KSC Countdown**, June 27, 2002.]

◆ United Space Alliance Chief Operating Officer Mike McCulley hosted a commissioning ceremony to hand over a new, state-of-the-art convoy command vehicle to KSC Center Director Roy Bridges on Thursday, June 27, at the Landing Operations Facility. The new 40-foot vehicle is replacing a 15-year old model, and will be used following Shuttle landings as the prime vehicle to control critical communications between the orbiter, the crew and the Launch Control Center, to monitor the health of the Shuttle Orbiter systems and to direct convoy operations at the Shuttle Landing Facility. Many upgrades and high-tech features were incorporated into the design and development of this vehicle making it more reliable and efficient for the convoy crew. Seating capacity was increased from four to twelve, video recorders and television monitors were added to provide the convoy team with the maximum amount of visual information. ["NASA to receive hand over of new convoy command vehicle from United Space Alliance during commissioning ceremony," **NASA News Release #63-03**, June 26, 2002.]

June 28: The launch of NASA's Comet Nucleus Tour (CONTOUR) spacecraft aboard a Boeing Delta II rocket has been postponed to no earlier than Wednesday, July 3. During installation of the launch vehicle fairing around the spacecraft on Thursday, possible particulate contamination was observed on the top solar array panel. As a precautionary measure, this particulate is being analyzed to determine its composition and what further action, if any, is necessary. Should launch occur on July 3, the launch time would be 2:47:41 a.m. EDT. The prelaunch press conference would be held on Monday, July 1, at 1 p.m. EDT. The CONTOUR launch period extends until July 25 without affecting the mission. ["CONTOUR Launch Postponed," **NASA News Release #66-03**, June 28, 2002.]

◆ NASA's Kennedy Space Center, Fla., has extended the period of performance of the Payload Ground Operations Contract (PGOC) held for the last 15 years by The Boeing Company at Kennedy Space Center. The contract expires June 30, 2002. This cost-plus-award-fee extension through September 30, 2002, is valued at \$25.3 million and brings the total contract value to almost \$2 billion. The extension provides for ground support, test, integration and de-integration of space shuttle and expendable launch vehicle payloads, including flight elements of the International Space Station; operation and maintenance of associated facilities and ground systems; and support of the government's top priorities of safety, mission success, and payload-developer/customer satisfaction. This action ensures uninterrupted program support through the PGOC and bridges the gap in performance between June 30, 2002, and the award of the follow-on contract to PGOC -- the Checkout, Assembly and Payload Processing Services (CAPPS) contract. The original PGOC contract was initiated in January 1987 with McDonnell Douglas Space and Defense Systems. ["NASA Extends Boeing Payload Ground Operations Contract," **NASA News Release #c02-p**, June 28, 2002.]

◆ NASA and space-industry officials touted a plan Friday they said would bring a slice of California's Silicon Valley to Kennedy Space Center. The plan involves the current construction of a \$47 million laboratory and future development of a 320-acre office and high-tech research-and-development park. The lab and the park eventually would create about 8,000 jobs, officials said. The proposed International Space Research Park will be a place where students and others work alongside some of "the world's best scientists," said Jim Ball, the project's manager for NASA. NASA previously has announced the project. Officials held Friday's presentation at the Space Center's Visitor Complex to update those interested in the project and to seek their input for carrying out the plan. ["NASA touts research park, **Florida Today**, June 29, 2002, p 1B & 2B.]

◆ NASA hopes to finish inspections of space shuttle Columbia's main engines and hydrogen fuel lines by the end of next week, but flight director Kelly Beck said Friday more tests and analysis will be needed before deciding when the shuttle can fly. Technicians are removing Columbia's main engines after minuscule, but potentially dangerous, cracks were found in the liners inside the hydrogen fuel lines of two other orbiters, Atlantis and Discovery. Doing that requires delaying the scheduled July 19 launch by at least several weeks. Similar inspections and safety analyses are being conducted on all four of the nation's shuttles, and NASA has said none will fly until it completes its safety reviews. ["Technicians remove Columbia's engines," **Florida Today**, June 29, 2002, p 1B & 5B.]

◆ NASA and the Air Force should study the feasibility of combining their Florida space launch operations into a unified national spaceport that would serve civilian, commercial and military customers, a federal commission has recommended. The nation's civilian space agency maintains its own launch facilities at Kennedy Space Center for the shuttle. Down the beach, the Air Force is in charge of expendable rocket launches from Cape Canaveral Air Force Station. Combining some aspects of the two could save money by eliminating duplication and could generate more income by presenting a streamlined service to commercial launch users, concluded members of the Commission on the Future of the U.S. Aerospace Industry. The 12-member panel issued the recommendation as part of an ongoing study of all aspects of U.S. aerospace endeavors. Congress authorized the commission in a defense bill last year. ["Report suggests merging space launch operations," **Florida Today**, June 29, 2002, p 1A.]

June 29: NASA's John F. Kennedy Space has chosen Boeing Space Operations Co., Titusville, Fla., for the Checkout, Assembly and Payload Processing Services (CAPPS) contract. CAPPS is the follow-on contract to the Payload Ground Operations Contract that has been performed by the Boeing Company since 1987. CAPPS has a four-year basic period of performance with the potential total contract period of 10 years if NASA exercises all options for extensions. The value of the contract for the initial four-year period is \$332 million. There are two three-year priced options for a potential ten-year contract value of \$810 million. The contract provides for management and technical support of payload processing for the Space Shuttle, International Space Station, expendable launch vehicles and other payload programs. ["NASA awards Payload Processing Contract to Boeing Space Operations Company," **NASA News Release #c02-z**, June 29, 2002.]

◆ Shuttle Endeavour and its ride, a modified Boeing 747 jet, quietly sneaked into Kennedy Space Center just before 11 a.m. Saturday. The return of Endeavour was marked with little of the usual fanfare. Sometimes, the shuttle/jet combo flies over major metropolitan areas and Brevard County's beaches. No one on the beach reported seeing the shuttle fly over Saturday. As part of NASA's post-Sept. 11 policy, the public is not notified ahead of time about launch times or the return of the shuttles from Edwards Air Force Base, Calif., where Endeavour landed June 19. ["Endeavour lands at KSC," Florida Today, June 30, 2002, p 1B.]

JULY

July 1: Four decades from swamp to space: That's the story of Kennedy Space Center. NASA started acquiring land for the center in 1962, next door to Cape Canaveral. Then came the experts, the rocket scientists, the builders and the dreamers, into a realm of cosmic vision, patriotic fervor, long hours and bloodthirsty mosquitoes. Kennedy Space Center is marking its 40th anniversary today, the date in 1962 when its predecessor, the Launch Operations Directorate, was declared an independent center by NASA. The center, which became KSC after President John F. Kennedy's assassination in 1963, was the civilian counterpart to the military launch installations at Cape Canaveral. Together, they comprised the United States' launch point for human space flight. ["KSC marks 40-year trip from swamp to space," **Florida Today**, July 1, 2002, p 1A & 4A.]

◆ It was never a sure thing that man would launch to the moon from north Merritt Island just because NASA sent up rockets from adjacent Cape Canaveral. The remote launch site had competition from other places. For a time, officials considered launching the Saturn 5 from Cumberland Island, Ga.; Cape Canaveral; offshore from the Cape; Mayaguana Island, Bahamas; Brownsville, Texas; White Sands Missile Range, N.M.; Christmas island in the mid-Pacific; and South Point, Hawaii. The Air Force, Army, and Navy all tested ballistic missiles and rockets on launch pads spread out along Cape Canaveral beginning in 1950. The successful, and historic, missions of the Explorer 1 satellite, a few monkeys, Alan Shepard, and other Mercury and Gemini astronauts all started at the Cape. Because of the space race with the Soviet Union, the United States was soon looking for a place to launch its gigantic rocket, the towering Saturn. Dr. Kurt Debus, a German launch operations manager who worked closely with Wernher von Braun, co-wrote a NASA and Air Force report recommending adjacent Merritt Island as the launch site for the Saturn rockets in 1955. He would later become the NASA center's first director. In 1962, NASA bought 83,900 acres of land on north Merritt Island and negotiated with Florida for another 55,800 acres within the Mosquito Lagoon. In all, the space agency spent \$71,872,000. On July 1, 1962, NASA declared the Launch Operations Directorate on Merritt Island would become an independent center. Before that, the workers operated under a division of Marshall Space Flight Center in Huntsville, Ala., where all the rocket builders were headquartered. "It just got to be too much to build this place and launch vehicles and be under Marshall," Kennedy Space Center archivist said. On the same day, NASA made the Pacific Missile Range in Point Mugu, Calif., its own Launch Operations Office, according to a press release from 1962. The Atlantic counterpart was christened the John F. Kennedy Space Center in 1963 in tribute to the fallen president who challenged America to get to the moon. From there, workers began building the infrastructure needed to send men to the moon, including the gigantic Vehicle Assembly Building, which housed the Saturn rockets. ["Errant rocket led launches to Cape," **Florida Today**, July 1, 2002, p 4A.]

◆ A mysterious dustlike coating on the Contour spacecraft is delaying its launch on a cometary mission until at least Wednesday morning, and inspectors are trying to figure out how insects got near the spacecraft. The Boeing-built Delta 2 rocket and Contour were to lift off Monday, but the launch has been reset for 2:47 a.m. Wednesday. Workers last week noticed a fine dusty layer on the top of the spacecraft and needed time to clean it and investigate. They have not identified the substance or its origin. ["Dust coating delays launch of Contour spacecraft," **Florida Today**, July 2, 2002, p 1A.]

July 3: NASA's Comet Nucleus Tour (CONTOUR) spacecraft - set to provide the closest look yet at the "heart" of a comet - successfully launched today at 2:47 a.m. EDT aboard a Boeing Delta II rocket from Cape Canaveral Air Force Station, Fla. Designed and built by The Johns Hopkins University Applied Physics Laboratory (APL) in Laurel, Md., the 2,138-pound (970-kilogram) spacecraft was placed into an elliptical Earth orbit 63 minutes after launch. About 19 minutes later the mission operations team at APL acquired a signal from the spacecraft through the Deep Space Network antenna station in Goldstone, Calif., and by 5:45 a.m. EDT Mission Director Dr. Robert W. Farquhar of the Applied Physics Lab confirmed the craft was operating normally and ready to carry out its early orbit maneuvers. CONTOUR will orbit Earth until Aug. 15, when it is scheduled to fire its main engine and enter a comet-chasing orbit around the sun. The mission's flexible four-year plan includes encounters with comets Encke (Nov. 12, 2003) and Schwassmann-Wachmann 3 (June 19, 2006), though it can add an encounter with a "new" and scientifically valuable comet from the outer solar system, should one be discovered in time for CONTOUR to fly past it. CONTOUR's four scientific instruments will take detailed pictures and measure the chemical makeup of

each comet's nucleus - a chunk of ice and rock - while analyzing the surrounding gas and dust. The \$159 million CONTOUR is the sixth mission in NASA's Discovery Program of lower cost, scientifically focused exploration projects. ["CONTOUR Spacecraft Launches From Cape Canaveral," **NASA News Release #68-02**, July 3, 2002.]

◆ NASA technicians detected a crack in the main propulsion system on the space shuttle Columbia this week, similar to those found on two of its sister ships. The discovery of fine fissures near the liquid hydrogen and oxygen lines on the shuttles Atlantis and Discovery prompted shuttle managers last week to ground the entire fleet indefinitely. Three shuttle flights were planned for the remainder of the year, including a 16-day science mission on Columbia, which was to begin in mid-July. At Kennedy Space Center, shuttle workers removed Columbia's engine and will continue searching for additional cracks this week. [Web posted. (2002). [Crack found in third space shuttle [Online]. Available WWW: <http://www.cnn.com/> [2002, July 3].]

July 4: NASA should do a better job of reviewing the quality of work done by its contractors, the agency's inspector general wrote in a new report. The inspector general said it found weaknesses in how NASA handles federally mandated review called Quality Assurance Surveillance Plans. The inspector general's office said improved training and more diligent attendance to important changes to contractor duties over time are necessary to make such reviews useful. The report said NASA agreed with the findings and is taking action on the report's recommendations. The inspector general limited its investigation to contracts at three NASA centers – the Ames Research Center, Goddard Space Flight Center and Langley Research Center. Contracts at Kennedy Space Center were not part of the inspector's review. ["Report criticizes NASA's reviews," **Florida Today**, July 5, 2002, p 1B.]

July 8: After completing its inspection of space shuttle Columbia, NASA has found three cracks in a liner in a liquid-hydrogen pipe in one of its engines. The discovery means three of NASA's four shuttles have cracks in engine flow liners, and the fourth, Endeavour, awaits inspection. Preparations were under way Monday for removal of Endeavour's main engines prior to inspection, which is expected to be completed by week's end. After inspections are complete, according to a status report, NASA will make decisions on what action to take. Columbia's July research mission has been delayed already, and upcoming space station construction missions, including one originally scheduled for Aug. 22 are in doubt. Delays likely will mean a longer stay on space station Alpha for its three-person crew, which went up in June and planned to stay until October. ["Inspections shows cracks in 3 of 4 NASA shuttles," **Florida Today**, July 9, 2002, p 1B.]

July 10: Inspectors found a crack Wednesday morning in one of the hydrogen flow liners in Endeavour, killing hopes that it could carry essential tasks of the four-shuttle fleet while NASA deals with similar cracks found in the other three. "There was only one found in Endeavour," Kennedy Space Center spokesman Bill Johnson said, "and they're still inspecting." The crack was found in a liner in a foot-wide pipe that carries hydrogen fuel to one of Endeavour's three main engines. Inspection of Endeavour is running ahead of schedule and should be finished today. An announcement about NASA's options for dealing with the grounded shuttle fleet is expected as soon as Friday. Columbia's July science flight already has been delayed. An August flight to the space station by Atlantis, as well as future flights, are in jeopardy until the problem is resolved. In addition to the four shuttles, similar cracks also were found in a replica of the propulsion system which was used, mostly in the late 1970s, to prove the shuttles' main engines would work. NASA has not determined what caused the cracks and whether they pose a hazard to the shuttles or crews. Engineers and other experts have been working since last month, when the first of the cracks was spotted, to gather and analyze data about the metal lining. ["Flaw plagues entire shuttle fleet," **Florida Today**, July 11, 2002, p 1A.]

July 11: NASA Administrator Sean O'Keefe today said the White House has officially presented the U.S. Senate with the nomination of Frederick D. Gregory, astronaut and Associate Administrator for Space Flight, as the next NASA Deputy Administrator. Gregory is a veteran Space Shuttle Commander and former U.S. Air Force combat pilot, and currently leads NASA's human space flight endeavors. If confirmed as Deputy Administrator, Gregory will serve as the chief operating officer for the agency and report directly to Administrator O'Keefe. He will be responsible for directing and managing many of the

programs, as well as day-to-day operations and activities, at NASA. But first, the Senate Commerce Committee must consider the nomination and make its recommendation to the full Senate. "I am pleased to hear that Chairman Hollings has received the President's nomination and grateful that his committee is prepared to give consideration expeditiously," said Administrator O'Keefe. "I look forward to Fred assuming his new role at this critical point in NASA's history, and I thank Senator Hollings and his colleagues for their mindful stewardship of the interests of this agency." Senator Hollings, a seven-term Democrat from South Carolina, serves as Chairman of the Commerce, Science, and Transportation Committee, and is the fifth most senior member of the Senate. Before being named to his current position in December 2001, Gregory served as Associate Administrator for the Office of Safety and Mission Assurance and was charged with the oversight of all safety issues within NASA. He developed, implemented and managed quality assurance policies that dealt with reliability and maintainability. As a NASA astronaut, Gregory logged more than 455 hours in space during three shuttle missions. In 1985, he served as pilot on board Challenger during STS-51B. Gregory was mission commander for STS-33 in 1989 and STS-44 in 1991. Gregory was selected as an astronaut in 1978, after a distinguished career with the U.S. Air Force. He logged nearly 7,000 hours in 50 types of aircraft, including 550 combat missions over Vietnam. He retired as a Colonel in December 1993. Gregory has been awarded the Defense Superior Service Medal, two Distinguished Flying Crosses, the Defense Meritorious Service Medal, the Meritorious Service Medal, 16 Air Medals, The Air Force Commendation Medal and three NASA Space Flight medals. His honors also include the NASA Distinguished Service Medal, the NASA Outstanding Leadership Award, the National Society of Black Engineers Distinguished National Scientist Award, the George Washington University Distinguished Alumni Award and an "Ira Eaker Fellow" by the Air Force Association. ["White House Formally Nominates Frederick Gregory As NASA Deputy Administrator,," **NASA News Release #02-124**, July 11, 2002.]

◆ The audit report "NASA Oversight of United Space Alliance's Safety Procedures at the John F. Kennedy Space Center" (IG-02-018) has been posted to the NASA Office of Inspector General Web site at: <http://www.hq.nasa.gov/office/oig/hq/ig-02-018r.pdf> United Space Alliance (USA), a joint venture of The Boeing Company and Lockheed-Martin, is one of five prime contractors supporting the Space Shuttle Program (SSP). USA is responsible for the contracted tasks associated with the processing and flight preparation of the Space Shuttle fleet. USA's work affects the safety of NASA's astronauts; the Space Shuttle orbiters; and space flight personnel, hardware, and equipment. The Space Shuttle Program Office located at the Lyndon B. Johnson Space Center is responsible for managing the Space Flight Operations Contract (SFOC) and the SSP. SSP operations occur primarily at Johnson, the John F. Kennedy Space Center, and the George C. Marshall Space Flight Center. We reviewed USA's implementation of the SFOC safety requirements for the SSP related to ground operations and integrated logistics at Kennedy, as well as NASA's oversight of USA's safety procedures. *Results of Audit:* The safety responsibilities between USA and NASA were clear in that NASA established all SSP safety requirements, USA implemented those requirements through the SFOC, and NASA was fully responsible for the safe launch of the Shuttle. However, Kennedy's procedures for ensuring that USA properly implemented those safety requirements were not the same procedures defined in the SFOC. The SFOC states that NASA is to provide direct safety oversight of all USA operations. Nevertheless, Kennedy did not provide direct safety oversight of USA's ground operations but rather obtained insight into USA's safety operations through surveillance and audits. Further, Kennedy did not perform any level of safety oversight for integrated logistics, a high-risk area for injuries and mishaps. Implementing a level of oversight contradicting that required by the SFOC could lead to lapses in safety oversight, which increases the risk of harming personnel and damaging Space Shuttle hardware. Although USA had developed a detailed safety management system to ensure compliance with NASA requirements for the safety of NASA's astronauts; the Space Shuttle orbiters; and space flight personnel, hardware, and equipment, we identified two areas where USA can further improve safety. USA inappropriately used ground support equipment (GSE) at Kennedy prior to completing required analyses to ensure that all hazards associated with the GSE were properly controlled. Additionally, there was no evidence that USA performed some critical, required safety procedures for a specific operation at Kennedy involving payload removal from an orbiter vehicle. By using GSE prior to completion of the analyses and by not performing all required safety procedures for payload removal, USA may have increased the risk of harm to personnel and Shuttle hardware. NASA has planned six Space Shuttle flights to assemble the International Space Station from June 2002 through April 2003. Therefore, prompt management attention to all four areas is particularly important to the safety and success of the

SSP. *Recommendations:* We recommended that NASA ensure that SFOC safety requirements and Kennedy safety procedures are consistent. We also recommended that NASA review USA processes for implementing SSP requirements related to the approval and use of GSE in critical applications and ensure that USA's safety procedures for future payload installation and removal operations are properly implemented and documented. Finally, we recommended that NASA require the Kennedy Shuttle Processing Directorate and Shuttle Safety Office to improve procedures for ensuring that USA implements all safety requirements associated with safety analyses and payload removals. *Management's Response:* NASA concurred with five of the seven recommendations and has taken or planned corrective actions that we consider responsive. Although NASA nonconcurred with two recommendations, it has planned corrective actions that we consider responsive. ["NASA Oversight Of United Space Alliance's Safety Procedures at Kennedy Space Center," **NASAOIG News Release #2002-078**, July 11, 2002.]

◆ NASA will not launch a space shuttle until mid-September at the earliest because of tiny cracks found inside the fuel lines of all four orbiters. Shuttle program manager Ron Dittemore said Friday that the shuttles probably have been flying with the cracks for some time – perhaps as far back as the first flight of Columbia in 1981. But he said he would not clear the fleet for launch until either the problem is fixed or engineers can be sure the cracks will not grow during flight and send metal particles into the engines. The minuscule cracks – the largest is three-tenths of an inch in length – are in the metal sleeves designed to smooth the flow of super-cooled hydrogen from the main fuel tank into the engines of the shuttles. The sleeves are inside curves in those pipes, as an extra safeguard against any kind of clogging in the lines. The National Aeronautics and Space Administration first discovered the problem last month during an inspection of shuttle Atlantis. Subsequent examinations of Discovery, Columbia and Endeavour uncovered more cracks. ["Tiny cracks in fuel lines will keep shuttle fleet grounded for months," **Orlando Sentinel**, July 13, 2002, p A14.]

July 12: The audit report "Space Shuttle Safety Upgrades" (IG-02-020) has been posted to the NASA Office of Inspector General Web site at: <http://www.hq.nasa.gov/office/oig/hq/ig-02-020.pdf> The Space Shuttle is the only U.S. vehicle that can launch humans and payloads into space and safely return them from orbit. Since the Space Shuttle Challenger mishap, NASA has improved the safety of the Space Shuttle; the estimated risk of catastrophic failure during launch decreased from 1 in 78 missions in 1986 to 1 in 556 missions today. The continued safe operation of the Space Shuttle is a top priority and is essential in NASA's ability to support the assembly and operations of the International Space Station. NASA has made investments in Space Shuttle safety improvements over the last several years. At the same time, NASA has reduced the Space Shuttle budget by about a third through efficiencies and contract consolidation. Having achieved these budget reductions, continued improvements in Space Shuttle safety will require additional investments. During the audit, the Office of Management and Budget (OMB) issued "Fiscal Year 2003 Budget of the U.S. Government," assessing the Space Shuttle Safety Upgrades Program as ineffective. The basis of OMB's assessment was NASA's large cost overruns and schedule delays in improving the safety of the Space Shuttle. *Results of Audit:* NASA appropriately managed safety upgrades approved for implementation to ensure that they met established safety objectives, were selected using quantitative and qualitative factors, and were adequately funded for fiscal year (FY) 2002. In addition, we found that NASA ensured that the integration of the safety upgrades did not adversely affect the Space Shuttle flight schedule. Although the safety upgrades approved for implementation were adequately funded for FY 2002, the Congress and Aerospace Safety Advisory Panel expressed concerns about the adequacy of future funding. *Management's Response:* NASA management stated that the report substantiated that significant efforts are under way by the Agency and the Space Shuttle Program Office to fully recognize and integrate all aspects of human space flight within the confines of safety, mission, and budget. Many decisions are dependent on the results of ongoing studies including those related to extending the life of the Space Shuttle through 2020. ["Space Shuttle Safety Upgrades," **NASAOIG News Release #2002-079**, July 12, 2002.]

July 16: The next scheduled ELV launches will be from Cape Canaveral Air Force Station (CCAFS). The Galaxy Evolution Explorer (GALEX) spacecraft, at the Orbital Space Systems Group facility in Dulles, Va., is expected to be shipped to KSC for final processing in mid-August. Meanwhile, at Vandenberg Air Force Base in California, its Pegasus XL launch vehicle has completed processing and is ready for ferry to KSC approximately two weeks after the arrival of the GALEX spacecraft. Launch is no earlier than

October. The TDRS-J (Tracking and Data Relay Satellite) spacecraft is anticipated to arrive at KSC from the Boeing Satellite Systems plant in El Segundo, Calif., Sept. 26. The launch, on a Atlas II launch vehicle, is scheduled to occur on Oct. 29. The Solar Radiation and Climate Experiment (SORCE) spacecraft is at the Orbital Space Systems Group spacecraft facility in Dulles, Va., undergoing environmental testing. SORCE is scheduled to arrive at KSC to begin final processing on Oct. 25 for a Dec. 1 launch. The Orbital Sciences Pegasus XXL launch vehicle is undergoing buildup and testing at Vandenberg Air Force Base. Two flight simulation tests are scheduled while the vehicle is in California, Test No. 1 on Oct. 1 and Test No. 2 on Oct. 9. The Pegasus is scheduled for ferry to Cape Canaveral, using the Orbital Sciences L-1011 aircraft, on Oct. 28. Three flight simulation tests are also planned at KSC prior to launch and are scheduled to occur on Nov. 1, Nov. 8 and Nov. 18. ["ELV processing continues for fall launches," **KSC Countdown**, July 16, 2002.]

◆ While the government and environmentalists debate transporting nuclear waste to Nevada, toxic, explosive materials have been trucked into Kennedy Space Center and Cape Canaveral Air Force Station for decades. The powerful chemicals are used to fuel the space shuttle and various rockets, NASA and local officials say. Since 1965, NASA has moved about 250 million pounds of volatile liquid hydrogen alone over U.S. highways leading into the two space launch centers. The ride from New Orleans typically takes about 16 hours and takes 50 individual hydrogen tanker trips per shuttle launch. KSC is doing a lot of hydrogen research. In the long term, it is looking to build its own hydrogen production plant either on-site or nearby to save money and make for a safer journey. The Space Launch Initiative, NASA's plan for a successor to the shuttle, has ambitious launch rates. NASA's contract with Air Products does not expire until 2010, so the agency still has time to develop an on-site production plan. ["Volatile fuels traverse state," **Florida Today**, July 17, 2002, p 1A & 5A.]

July 17: The U.S. Centennial of Flight Commission recently named the Smithsonian Institution's National Air and Space Museum (NASM) and the National Aeronautics and Space Administration (NASA) as partners in the celebration of the 100th anniversary of the Wright brothers' first powered flight. The two organizations will join forces with the Commission and eight other partner organizations to create awareness and plan celebratory activities for 2003. ["U.S. Centennial Of Flight Commission Welcomes NASM and NASA As Partners In Celebrating 100 Years Of Powered Flight," **NASA News Release #02-127**, July 17, 2002.]

July 18: NASA Administrator Sean O'Keefe will abandon a comprehensive review started under the Clinton administration that was intended to be a blueprint for the space agency's future work force, missions and facility needs. Instead, O'Keefe said he would pursue broad reforms that follow President Bush's management agenda to reshape NASA into a citizen-centered, results-oriented, market-based agency. The decision, announced at a congressional hearing on NASA work force issues, took some lawmakers by surprise. They had been waiting for the Strategic Resources Review for months, hoping it would provide insight into the troubled space agency's personnel and infrastructure requirements. O'Keefe said the review wasn't accomplishing much and decided to "terminate that effort and move on." NASA's dwindling and aging work force has congressional overseers concerned. Since 1993, NASA's civil service work force has declined 26 percent from approximately 25,000 to its current level 18,450 full-time employees. NASA scientists and engineers age 60 or older outnumber the under-30 work force 3-to-1. About a quarter of the NASA science and engineering work force is eligible to retire within five years, while the pool of qualified college graduates to replace them is shrinking. To deal with the personnel crisis, NASA recently asked Congress to approve a set of legislative proposals that would let the agency offer bonus pay, buyouts, scholarships-for-service and give the agency more flexibility to hire highly qualified mid-level career specialists from the private sector to fill critical needs. One proposal would give the agency great authority to change personnel policies on pay, sick leave, overtime and firing procedures. O'Keefe said he had no immediate plans to use the broad new authorities but that NASA managers might need them in the future. ["O'Keefe scraps review of NASA," **Florida Today**, July 19, 2002, p 1A. & 3A.]

◆ Shuttle Update: Columbia – Following inspections of Main Propulsion System (MPS) flow liners that identified three cracks on engine No. 2 liquid hydrogen flow liner, mission managers delayed Columbia's launch date until a full engineering analysis is complete. Endeavour – Eddy current testing of liquid oxygen and hydrogen flow liners are complete. Technicians identified two cracks, the first on engine one

and the second on engine two liquid hydrogen flow liners. The cracks are similar to the ones discovered on the other three orbiters. In parallel to the flow liner inspections, Shuttle Endeavour processing continues for its next mission to the International Space Station. Removal of the Multi-Purpose Logistics Module from the payload bay was completed last week. Atlantis – Processing continues for launch to the International Space Station. Controllers tests are complete on Auxiliary Power Units No. 2 and 3. Left-hand Orbital Maneuvering System (OMS) engine heat shield installation is complete. Inspections of Atlantis identified three cracks on engine No. 1 liquid hydrogen flow liner. All launch dates are under review. [“Orbiter processing still under way; launch dates under review.” **KSC Countdown**, July 18, 2002.]

July 19: The second Women of Color Government and Defense Technology Awards Conference and Professional Development Seminar will offer professional development and recognize women leaders working for the government, including six Kennedy Space Center (KSC) employees. The multicultural event recognizes the achievements and professional development of women in the fields of math, engineering, science and information technology. Career Communications Group, Inc. and U.S. Black Engineer & Information Technology magazine will host the conference at the Washington, D.C. Convention Center on July 18-19, 2002. Several employees were nominated by NASA-KSC as certificate recipients. The KSC women being honored as "Technology All Stars" are: Hortense Burt (Flight Assurance Manager); Dr. Gena Baker (Senior Process Engineer); Michelle Amos (Electronics Design Engineer); Dr. Dawn Elliott (Flight Systems Engineer); and Barbara Brown (KSC's Ames Research Center Liaison & Intelligent Systems Deputy Manager). Also being recognized is this year's "Rising Star," Stacie Smith (Computer Engineer). "The recognition of these six women as leaders in technology is evidence that KSC's diverse workforce continues to be successful," said KSC Deputy Director James Jennings. "I'm happy to see that their contributions to the space program are appreciated by non-NASA organizations." [“KSC Employees Honored As “Technology All Stars,” **NASA News Release #70-02**, July 19, 2002.]

◆ A company helping to build a crown jewel of the state's space-related economic development effort was ordered off the construction site last month for not having Florida workers' compensation insurance. Alabama-based Millennium Metal Works was working on the Space Experiment Research and Processing Laboratory at Kennedy Space Center without the proper workers' coverage, officials said. In addition, the Florida Space Authority, the state arm overseeing the lab's construction, said the Immigration and Naturalization Service escorted undocumented workers from the construction site this month. On June 26, the Division of Workers' Compensation issued a stop-work order to Millennium after receiving an anonymous tip that the company's paperwork was not in order, said Sharon McWhite, acting supervisor of the Orlando office. Officials from the division said it appeared the company was paying Alabama rates for the mandatory insurance. The case is under investigation, and state regulators said there was no indication the company had gotten Florida insurance since the stop-work order. Alabama insurance rates are about one-third the rates for Florida steelworkers. That edge may have allowed the out-of-state company to underbid its competitors. The state is spending \$30 million for the 100,000-square-foot laboratory as part of a partnership with NASA. After its opening in the fall 2003, the lab will be a place for researchers to prepare their experiments for shuttle or space station missions. It also will serve as an anchor for what officials hope will be a large industrial park. After a stop-work order is issued, there is a 30-day investigative period. The case then is handed over to a criminal office. [“KSC lab subcontractor taken off job for lacking workers' insurance,” **Florida Today**, July 20, 2002, p 1A & 2A.]

◆ NASA had no hard answers Friday to the hard questions of when the space shuttles will fly and which mission will go first, but it's starting to look as if a space station mission could bump a science mission. “I don't think it's very likely” that Columbia's science flight will launch first, shuttle program manager Ron Dittmore said. “But I can't rule that out.” The earliest a shuttle will launch is Sept. 26, he said, with another flight no earlier than Nov. 2. Columbia could fly in September if repairs are easier to complete on Columbia than on Atlantis, which is tasked with the next space station mission. By Wednesday, Dittmore's team will have narrowed repair options down to one likely method. By July 31, he said, they'll decide whether they need to do repairs or simply fly without fixing the cracks. The liners keep explosive liquid hydrogen flowing smoothly through the fuel lines into the main engines. Replacing the fuel liners won't be necessary, Dittmore said. Three repair options are under consideration: welding; drilling small holes on the ends of the cracks to stop their spread; or a “super slot.” More than one repair method may be

necessary given the different nature of the cracks and different flow-liner materials in different shuttles. ["Sept. 26 is earliest shuttle will launch," **Florida Today**, July 20, 2002, p 1B.]

July 22: The FBI and NASA Office of Inspector General today announced the arrest of three student employees of the NASA Johnson Space Center, Houston, in connection with the theft of lunar and meteorite samples. The employees -- Thad Roberts, Tiffany Fowler and Shae Saur - were summer employees and have been dismissed from their respective student employment programs based on their involvement in the case. Johnson Space Center notified the FBI and NASA Inspector General of the possible theft on July 15. Further inquiries about the investigation should be directed to the NASA Office of Inspector General (Paul Shawcross at 202/358-2558) or the Federal Bureau of Investigation (Sara Oates at 813/272-8236). ["NASA Cooperating In Investigation of Theft," **NASA News Release #02-133**, July 22, 2002.]

July 23: After a year of steep cuts, a Senate subcommittee wants to add \$200 million to NASA's proposed budget and said they want more but are constrained by the dismal fiscal climate. The move by the Senate subcommittee that oversees the National Aeronautics and Space Administration budget would bump the agency's funding to \$15.2 billion. The full Appropriations Committee will consider the plan Thursday, but the House version won't emerge until the fall. "We believe that we could fund NASA at least \$1 billion more," said Sen. Barbara Mikulski, the Maryland Democrat who chairs the subcommittee. The Senate plan would devote \$105 million in the 2003 budget to an unmanned mission to Pluto -- a project that a panel of scientists recently said should be one of NASA's top priorities. The money, combined with \$15 million already in NASA's budget for outer-planetary exploration, is enough to keep the mission alive through 2003. The Senate committee also is asking NASA to set priorities for upgrades to the space shuttle and facilities at Kennedy Space Center that support the shuttle. ["NASA could get a bonus in its budget," **Orlando Sentinel**, July 24, 2002, p A3.]

July 24: Roy S. Estess, center director for NASA's John C. Stennis Space Center in Mississippi, today announced plans to retire after 42 years in government service, 37 with NASA. Administrator Sean O'Keefe named William (Bill) W. Parsons Jr., the current Center Operations and Support Director at Stennis, as Estess' successor, effective August 25th. ["Roy Estess Retires, NASA Administrator Names Bill Parsons As New Stennis Center Director," **NASA News Release #02-137**, July 24, 2002]

July 25: Crew members from STS-113 and STS-116 have been at KSC in the past week for Crew Equipment Interface Test (CEIT). Mission Specialists John Herrington and Michael Lopez-Alegria, on STS-113, looked over the P1 truss, the first portside integrated truss structure to be installed on the International Space Station. Commander Terrence Wilcutt, Pilot William Oefelein and Mission Specialist Robert Curbeam, STS-116, checked out the P5 truss, which will be attached to the Station on their mission, currently scheduled for June 2003. ["Shuttle crews visit Center for payload familiarization," **KSC Countdown**, July 25, 2002.]

July 26: Donald Pettit, Ph.D., a member of the Expedition Six backup crew, will replace Donald Thomas, Ph.D., on the future mission to the International Space Station. ["Backup Crew Member Assigned To Expedition Six," **NASA News Release #02-139**, July 26, 2002.]

◆ A budget bill moving through the U.S. Senate directs NASA to study testing and launching its next generation space vehicles, perhaps even the replacement for the space shuttle, from an island off the Virginia coast instead of Kennedy Space Center, U.S. Rep. Dave Weldon said Friday. In the fine print of a bill containing NASA's 2003 budget, passed Thursday by the Senate Appropriations Committee, is language which "recognizes Wallops Flight Facility as a launch and recovery site for next generation launch vehicles and small commercial and scientific payloads" and requires NASA to report to it by January on how it "will utilize Wallops as a testing and launch facility." "I think you would agree with me that this is unacceptable," Weldon, R-Palm Bay, wrote in a letter Friday to Florida Sens. Bob Graham and Bill Nelson. "Kennedy Space Center has been and will continue to be the nation's leading civil space launch site." Weldon is particularly concerned about the terminology "next generation launch vehicle" -- words often associated with NASA's effort to build a ship to replace the shuttle. Leading that effort is Marshall Space Flight Center in Alabama, the center ordered to study Wallops' launch potential. The

Wallops language was not NASA's or President Bush's budget request. It was added by a subcommittee chaired by Sen. Barbara A. Mikulski, D-Md. Her state is home to Goddard Space Flight Center, the NASA facility that oversees the activities at Wallops Island. NASA officials, at headquarters and its involved centers, declined comment. ["Launch wording worries Weldon," **Florida Today**, July 27, 2002, p 1A & 5A.]

◆ Tiny cracks in the space shuttles' fuel-pipe liners most likely will be repaired by welding, shuttle program manager Ron Dittmore said Friday. Although NASA hasn't ruled out flying with the cracks, which have probably been in the hydrogen lines' metal flow liners for years, a repair is the most likely option, he said. A final decision will be announced next week, and a repair could be finished in time for a late September or early October launch. A team of experts in safety, processing, testing and materials met this week to discuss the options and settled on the welding technique, Dittmore said. He wants to see further reports before making a final decision on what action to take. ["NASA may weld cracks on shuttle," **Florida Today**, July 27, 2002, p 5A.]

July 30: Following inspections of Columbia's Main Propulsion System (MPS) flow liners that identified three cracks on engine No. 2 liquid hydrogen flow liner, mission managers delayed the launch date until a full engineering analysis could be completed. Nominal processing has been finished in preparation for Columbia's research mission. Processing continues for Atlantis' launch to the International Space Station. Orbital Maneuvering System (OMS)/Reaction Control System (RCS) electrical verification is in work and OMS/RCS flight controls checkout is complete. Atlantis' payload bay doors were closed last week in preparation for rollover once the flow liner issue is resolved. Processing also continues for Endeavour's launch to the Space Station. The Multi-Purpose Logistics Module was removed from the payload bay, as deservicing continues from Endeavour's previous mission. Fuel cell verification is complete. OMS pod checkout and replacement of windows No. 6 and 8 are in work. ["Three orbiters being checked out, fitted for upcoming launches," **KSC Countdown**, July 30, 2002.]

◆ Engineers at Kennedy Space Center are looking at new ways to hush the sound produced by launches of the shuttle's successor. Using a model one-tenth the size of the launch pad, they are looking at ways to divert the sound or absorb it somehow. They're even talking about blasting another massive sound wave toward the pad at launch, which they hope would almost cancel out the sound wave coming from the rocket engines. Right off the launch pad, the space shuttle produces about 150 decibels. The goal is to use more passive ways to control the sound than the current deluge of water, said Raoul Caimi, Kennedy Space Center's former lead engineer of a project that simulates the noise of liftoff. "Water's a crude thing," said Malcolm Crocker, an Auburn University professor who studied the sound from the giant Saturn rockets in the 1960s. He said that water did not reduce the sound by much. Another problem with using water is that when the solid rocket boosters ignite, they produce acid. ["Engineers seek sound-mufflers," **Florida Today**, July 31, 2002, p 1B & 2B.]

During July: The Kennedy Space Center will be getting a new control tower for the space shuttle landing facility next year, and many features will have been determined by NASA Ames' Future Flight Central tower simulator, which creates a 360-deg. out-the-window view. Using a model of the Kennedy Space Center terrain, the location, orientation and height of the proposed tower were adjusted for better visibility than the current tower under a range of visibility and weather conditions simulated by the Future Flight Central tower. The interior layout is also being evaluated for good human factors at the Ames facility. ["Shuttle Tower," **Aviation Week & Space Technology**, July 15, 2002, p 17.]

AUGUST

August 1: The U.S. Senate late Thursday confirmed Frederick D. Gregory as NASA Deputy Administrator. Gregory, a veteran Space Shuttle commander who previously served as the Associate Administrator for Space Flight, is set to become the agency's first African-American deputy. The Senate will now send the confirmation back to the White House for the President's signature. Gregory must be sworn into office before he assumes his new position. ["U.S. Senate Confirms Frederick D. Gregory, NASA's First African-American Deputy Administrator," **NASA News Release #02-146**, August 1, 2002.]

◆ The first of 11 tiny hairline cracks that grounded the entire shuttle fleet was spotted by David Strait, who works for United Space Alliance, one of NASA's contractors. Within the space agency there's talk of an award for the systems inspector, who caught the biggest potential hazard at the launch site since an engineer spied a 4-inch pin wedged against Discovery's fuel tank during a countdown in 2000. Engineers feared the cracks could grow, chip and possibly lead to a launch explosion. Strait was inspecting the fuel lines inside the tail of Atlantis on June 12, routine work before the three main engines can be installed. Barely 10 minutes into the job, he saw it, a crack three-tenths of an inch long in one of the liners of the hydrogen-fuel pipe that feeds main engine No. 1. He called over the two technicians working with him. Then main propulsion system engineers were summoned. Shuttle program manager Ron Dittmore has already declared that workers will no longer rely solely on visual inspections. ["NASA may honor man who found fuel cracks," **Florida Today**, August 2, 2002, p 3A.]

August 2: NASA's shuttle fleet could resume flying again by the end of September after repairs are made to the tiny fuel-line cracks that caused the agency to suspend all launches this summer. The cracks – 11 total among the fleet – are in the lining of pipes that funnel hydrogen into the ships' main engines during launch. NASA officials considered leaving them alone but decided in the end that the cracks need to be fixed with welding and polishing. The plan is to begin work next week on shuttle Atlantis, which would be first in line to fly on a mission to the international space station. ["Shuttles may fly again soon," **Orlando Sentinel**, August 3, 2002, p A1 & A12.]

◆ Near ornery alligators and NASA's launch zone, three men probe the Banana River for the sounds mating fish make. Mike Lane, Steve Van Meter and Grant Gilmore submerge robots that can stay for weeks in waters where no human should wade for long. "We will be able to predict where some of the fish are migrating," said Gilmore, a fisheries ecologist with Dynamac Corp., NASA's environmental consultant. If they can do that, their robots and sensors will help sustain the \$188 million that fresh and saltwater fishing pumps into Brevard County's economy each year. But the implications go beyond fishing. The three say their robots will help nab illegal shrimp trawlers, prevent pollution in the Indian River Lagoon and help boaters avoid collisions with manatees. "We think there are so many spin-offs from this technology. It's just beginning. It's brand new," Van Meter said. Fish biologists agree. ["NASA robots seek answers under water," **Florida Today**, August 3, 2002, p 1A & 3A.]

◆ NASA's Johnson Space Center in Houston, has exercised an existing option under the Space Flight Operations Contract in support of the Space Shuttle Program. This two-year option extends the contract period of performance through September 30, 2004. The contract also includes assembling the solid rocket boosters, planning missions, preparing the flight crew equipment and software and providing training for the International Space Station and support for flight operations. ["NASA extends contract with USA another 2 years," **Florida Today**, August 6, 2002, p 1B. "NASA Exercises Space Flight Operations Contract Option," **NASA News Release #c02-w**, August 2, 2002.]

August 5: Repairs began on space shuttle Atlantis on Monday, and workers should be able to begin reinstalling its main engines by the end of the week with an eye toward a launch in late September. The first task Monday as to polish rough slots in the hydrogen fuel lines' flow liners, whose tiny cracks have drawn so much attention. Atlantis could launch on a construction mission to the International Space Station as soon as Sept. 28. Next would be Endeavour to the station on Nov. 2 and Columbia on a science mission as soon as Nov. 29. ["Repairs under way on shuttle Atlantis," **Florida Today**, August 6, 2002, p 1B.]

◆ The chairwoman of the Senate subcommittee that handles NASA's budget has told Florida legislators she is not trying to move any work from Kennedy Space Center to Wallops Flight Facility in Virginia. U.S. Sen. Barbara Mikulski, D-Md., wrote Florida's two senators to say wording in a budget report that suggested making Wallops a launch and recovery site for next-generation launch vehicles was not intended to shift any launch responsibilities away from KSC. "You have my word on this," Mikulski scrawled at the bottom of a typed letter to U.S. Senators Bill Nelson, D-Tallahassee, and Bob Graham, D-Miami Lakes. Nelson and Graham said they will try to change the wording in future versions of the report to make sure its intent is clear and on the record. U.S. Rep. Dave Weldon, R-Palm Bay, asked in a letter last month that the Florida senators intervene, expressing concern the bill ordered NASA to study using the Wallops site for the testing, launch and recovery of "next-generation launch vehicles and small commercial and scientific payloads." ["Senator: No plans to shift launch work from KSC," **Florida Today**, August 6, 2002, p 1A & 7A.]

August 6: NASA Administrator Sean O'Keefe today selected William F. Readdy as the agency's next Associate Administrator for Space Flight at NASA Headquarters in Washington. Readdy, a veteran Space Shuttle commander and Navy test pilot, replaces Frederick D. Gregory, who was confirmed by the U.S. Senate Aug. 1 as NASA's Deputy Administrator. ["Administrator Sean O'Keefe Selects Astronaut William F. Readdy As Space Flight Associate Administrator," **NASA News Release #02-152**, August 6, 2002.]

◆ NASA managers made a decision to weld the cracks in the Main Propulsion System (MPS) liquid hydrogen flow liners. The welding repairs are scheduled to begin this week. The technique calls for welds of three very small cracks on Atlantis and two on Endeavour. Additionally, the microscopic rough edges of the liner holes will be smoothed by polishing to reduce the chance of more cracks developing in the future. The welding repair was chosen after several groups of engineers determined the most likely cause of these cracks is high-cycle fatigue – a phenomenon attributed to combined environments such as vibration, thermal and acoustics. Atlantis processing continues for launch of STS-112 to the International Space Station, no earlier than Sept. 28. After repairs are completed on Atlantis' flow lines, welders will begin similar repairs on Endeavour. Ammonia servicing and replacement of window No. 2 are in work. Launch of STS-113 to the Space Station is scheduled no earlier than No. 2. Nominal processing has been completed in preparation for Columbia's research mission, now scheduled for no earlier than Nov. 29. Due to the difference in material and number of slots on Columbia's flow liners, more engineering investigation is needed before a final repair option is selected. ["Atlantis first for weld repairs on flow liners," **KSC Countdown**, August 6, 2002.]

August 8: Upcoming launch schedules have been revised. The TDRS-J is now first in line, but not until November. NASA and Lockheed Martin have agreed on a three-week postponement of the launch to accommodate final Atlas/Centaur (AC-144) launch vehicle assembly work. Launch date for the GALEX (Galaxy Evolution Explorer) spacecraft aboard a Pegasus XL rocket is now under review. Planned hardware and software changes to the spacecraft's logic unit were implemented and testing and data analysis is underway. SORCE (Solar Radiation and Climate Experiment), another Pegasus launch, is scheduled for Dec. 1. ["Changes in ELV schedule puts TDRS-J first to launch, in November," **KSC Countdown**, August 8, 2002.]

◆ A delay in the Russian mission expected to take pop start Lance Bass to the International Space Station could push back shuttle missions scheduled for this fall. A Soyuz spacecraft scheduled to leave for the station Oct. 22 will instead go Oct. 28. It's likely to be docked until Nov. 7, putting off the proposed Nov. 2 mission of shuttle Endeavour at least until after that. No reason was given for the Soyuz delay. ["Singer's mission may delay shuttle," **Florida Today**, August 9, 2002, p 1A.]

August 9: Welding work on tiny cracks in shuttle Atlantis began Friday afternoon. The welders are using a gas tungsten arc welding process to make the repairs because it leaves few spatters or debris. Inspections will make sure that no particles larger than 400 microns, or 0.016 inches, are left in the fuel lines, which carry explosive liquid hydrogen to the main engines. ["Atlantis gets welding work," **Florida Today**, August 10, 2002, p 3B.]

August 13: During inspections on Crawler Transporter No. 2, technicians removed two of the 16 JEL (jacking, equalization and leveling) cylinders to gain access to the bearings for routine maintenance and found three of the four bearings had cracks. Of the three bearings, two had extensive damage. Further eddy current inspections indicate that cracks are present in 15 of the bearings. There are 16 cylinders and 32 bearings per crawler. After locating the cracks on Crawler No. 2, technicians used eddy current to inspect Crawler No. 1 and found that 13 bearings also had cracks. Although no cause is known at this time, engineers are currently evaluating the situation to determine the most appropriate solution. ["Cracks found on crawler bearings during routine maintenance – situation being evaluated," **KSC Countdown**, August 13, 2002.]

August 16: After 25 years, NASA's twin Voyager spacecraft continue traveling beyond all the planets. The eventual goal is to become the first spacecraft to taste interstellar space. Voyager 1, which launched on Sept. 5, 1977, flew past Jupiter and Saturn, then angled northward out of the plane of the planets' orbits. After Voyager 2 launched on Aug. 20, 1977, and completed its tour of Jupiter and Saturn, NASA extended the spacecraft's adventure with flybys of Uranus in 1986 and Neptune in 1989. ["25 Years Later, Voyager Mission Keeps Pushing the Space Envelope," **NASA News Release #02-156**, August 16, 2002.]

◆ NASA said Friday that it has ordered enough space parts to repair both of the arthritic crawler-transporters that lug space shuttles to their launch pads. The extensive bearing damage that surfaced recently in the massive 37-year-old crawler-transporters threatens to extend a summer long suspension of shuttle flights caused by tiny fuel-line cracks. Missions could resume with the launch of Atlantis between Sept. 28 and Oct. 5 if mechanics can repair at least one of the crawler-transporters without the extensive use of new parts. ["Repair bills take off while shuttle fleet stays grounded," **Orlando Sentinel**, August 17, 2002, p A7.]

◆ Kennedy Space Center workers Friday began putting the three main engines back into Atlantis, following days of delicate welding and polishing to fix minuscule cracks in metal liners inside its hydrogen fuel pipes. Workers also got the OK to start welding identical cracks in Endeavour, which is set to launch as soon as Nov. 2. NASA and its contractors are assessing the welding and polishing work done on Atlantis. So far, the repair plan seems to have worked. Similar analysis is planned after the repairs to Endeavour. Atlantis' repaired pipes will be looked over after a mission to spot changes, said program manager Ron Dittmore. ["NASA may need more time for fixes," **Florida Today**, August 17, 2002, p 3A.]

August 20: NASA managers today said published media reports suggesting the agency plans to read the minds of potential terrorists go too far and ignore the facts and science behind the research. The articles were based on a NASA presentation, which served as talking points for a meeting with Northwest Airlines in December 2001. "NASA does not have the capability to read minds, nor are we suggesting that would be done," said Robert Pearce, Director, NASA's Strategy and Analysis Division in the Office of Aerospace Technology in Washington. ["NASA Rejects Claims It Plans Mind Reading Capability," **NASA News Release #02-160**, August 20, 2002.]

August 21: The government leaders of the Space Coast will officially unveil their first-of-its-kind 50-year vision of the future of America's premiere Spaceport during ceremonies held Aug. 28. NASA, The 45th Space Wing and Florida Space Authority will officially endorse the Cape Canaveral Spaceport Master Plan during a signing ceremony held at Port Canaveral's Terminal 10. Mr. Roy Bridges, Director, Kennedy Space Center, Brig. Gen. Greg Pavlovich, Commander, 45th Space Wing and Edmond Gormel, Executive Director, Florida Space Authority, will represent their respective agencies. Also represented at the official ceremony will be four agencies committed to be cooperative partners in the master plan. They are the Canaveral Port Authority, National Park Service, the Naval Ordnance Test Unit and the U.S. Fish and Wildlife Service. Many national, state and local government and business officials have also been invited to the event. During the ceremony, details of the 50-year plan will be revealed. The master plan provides a collective vision for Spaceport development for the next half century and represents a continued committed partnership among the Cape's major government agencies. The ultimate goal of this endeavor is to maintain the spaceport's status as the premiere gateway to space for the next half century and beyond.

[“NASA, 45th SW, FSA unveil Spaceport’s 50-year vision of the future,” **NASA News Release #75-02**, August 21, 2002.]

◆ The first Lockheed Martin Atlas V Evolved Expendable Launch Vehicle (EELV) lifted off from new Launch Complex 41 facilities August 21 carrying an ILS/Eutelsat commercial spacecraft. The 191-ft EELV marked the first new unmanned heavy booster design launched from radically new pad facilities at the Cape since the Saturn V of the late 1960s. [“Atlas V soars, market slumps,” **Aviation Week & Space Technology**, August 26, 2002, p 22-23.]

◆ Federal investigators questioned and released a 19-year-old pilot who flew into restricted NASA airspace Thursday. The pilot was identified as Daniel Loscher-Blanco of Venezuela, a flight student at Embry-Riddle Aeronautical University in Daytona. He was released about 4 p.m. after questioning. [“Pilot violates airspace,” **Florida Today**, August 23, 2002, p 1B.]

August 22: Space shuttle mission managers have decided to repair one of the giant crawlers that takes shuttles to the launch pads while leaving the other intact. This will prevent them from having both crawlers out of commission at the same time. Instead of cobbling together the good bearings from both crawlers to make one shipshape, workers will install new bearings in crawler No. 2 to replace cracked ones. They expect to get eight bearings from the manufacturer by Labor Day weekend. Those will be combined with nine spares at Kennedy Space Center and the undamaged bearings in crawler No. 2. More new bearings will arrive later for repairs to the other crawler. The 37-year-old crawlers have run for years with no problem. The cracks were discovered during a scheduled refurbishment of the 5.5-million-pound machines. Damage to the bearings may be attributed to a failure of the lubricant that keeps them running smoothly. A different lubricant, heat-tolerant Caterpillar Desert Gold Grease, will be used in the future, and NASA and contractor United Space Alliance are working to make sure the bearings aren’t rotating when they shouldn’t be, NASA spokesman Bruce Buckingham said. Once crawler No. 2 is repaired, it will be taken for a test run, and workers will inspect the new bearings. [“Repair work under way on shuttle crawler,” **Florida Today**, August 23, 2002, p 1A.]

◆ Kennedy Space Center’s Education Programs and University Research Division recently awarded several grants to support future spaceport technology work. Two years ago KSC’s education office, led by Pam Biegert, KSC’s Education Programs and University Research Division chief, sought additional funding for new university partnerships. The funding request was approved, and KSC issued grant announcements relating to student intern activity and technical activity. The technical activity supports two areas: cryogenics and life sciences. In the cryogenics area, University of Central Florida and Southern University (Baton Rouge, LA) will work independently to investigate cryogenic switch technology. In the life sciences area, Ohio State University will be teaming up with Dr. John Sager, autonomous harvester for plants in space, and others to look at technology for harvesting food on longer duration Space Shuttle missions. [“KSC Awards Grants Supporting Future Spaceport Technology,” **NASA News Release #76-02**, August 22, 2002.]

August 23: After pushing shuttle Atlantis’ launch date to Oct. 2, NASA shuttle managers Friday said Endeavour’s launch will slip to sometime in early November, and the Columbia science mission won’t go until January. Endeavour was set to fly as soon as Nov. 2 to the International Space Station with a new station crew. But since the Soyuz flight to the station, recently bumped to Oct. 28, means the Endeavour mission must wait to avoid having too many people on the station at once. Because Soyuz will undock around Nov. 7, Endeavour can’t arrive at the station until at least then. The Soyuz could take pop-music star Lance Bass into space, if the deal goes through. The new target launch date for Columbia is Jan. 16, pushed back from Nov. 29. Columbia was already bumped by the two station missions. Dates for all other missions in 2003 are under review. [“Two missions pushed back,” **Florida Today**, August 24, 2002, p 3A.]

◆ Lance Bass is expected to fly to Houston this weekend for space training with his fellow crew members, but whether his trip to the International Space Station is paid for remains in question. Russia’s space agency told The Associated Press that the ‘N Sync singer and his sponsors have a few more days to make a payment on the estimated \$20 million price for the Oct. 28 trip in a Soyuz ship. If he doesn’t pay,

his training in Russia will halt, and a cargo container will be sent in his place. NASA, meanwhile, says it isn't charging Bass for International Space Station training in the United States. "He's coming with the taxi crew. There's no cost. That's part of training," NASA spokesman Kyle Herring said from Johnson Space Center in Houston. ["Singer's training continues at NASA," **Florida Today**, August 24, 2002, p 3A.]

August 25: Roy S. Estess, director of NASA's Stennis Space Center in Mississippi, announced his retirement effective August 25. Estess joined NASA as a Saturn V second-stage test engineer in 1966, and was appointed center director in 1989. ["Apollo vet retires," **Aviation Week & Space Technology**, August 5, 2002, p 17.]

August 26: Amid the world's most sophisticated rockets, something not so sophisticated squeals and rummages in the thick brush nearby. Wild hogs violently tear up the grounds at Kennedy Space Center, leaving barren dirt swaths along the road. They maraud sea turtle nests at the space center's beaches. Worst of all, they wander into roads, endangering NASA workers as they come and go. Arik Rosenfeld, a Ph.D. candidate from Israel, spent the summer tagging and releasing KSC's hogs to estimate their numbers and their potential effects at the space center. His population study could lead to better strategies for controlling the beasts, federal wildlife officials say. Hogs were among Florida's first invasive species, brought to the state and Merritt Island by European settlers more than 400 years ago. Getting a reliable estimate on their population has been difficult, because the hogs hide in the thick brush at the space center. Rosenfeld thinks there are at least 1,200 in NASA's security area alone, but possibly as many as 7,000. "The actual population probably falls somewhere in the middle," said Ralph Lloyd, deputy manager for Merritt Island National Wildlife Refuge, which manages wildlife at the Cape. Refuge officials say they may take up Rosenfeld's recommendations for better access roads and more trapping, but are awaiting his final results before they make any changes. "We probably are never going to eliminate them," said Dorn Whitmore, a ranger at Merritt Island National Wildlife Refuge. "But if we can continue to put pressure on them with our trapping program, we can keep them in control." ["KSC tries to rein in hogs," **Florida Today**, August 27, 2002, p 1A & 2A.]

August 27: Shuttle program managers have decided to repair Crawler Transporter No. 2 (CT-2) to enable Atlantis' rollout for mission STS-112. Technicians have removed and replaced 14 of 32 bearings and reinstalled seven cylinders. Four additional cylinders are being refurbished; two were removed yesterday. The remaining bearings are scheduled to be manufactured and delivered by Labor Day weekend, in time to support the scheduled rollout for an Oct. 2 launch. Launches of subsequent missions have been rescheduled. STS-113 is targeted for early November; STS-107 is targeted for Jan. 16, 2003. ["Crawler no. 2 under repair for Atlantis rollout, launch Oct. 2." **KSC Countdown**, August 27, 2002.]

◆ Lockheed Martin won't be getting a renewal on its \$1.9 billion Consolidated Space Operations Contract (CSOC) with NASA when it expires at the end of 2003. Instead, the U.S. space agency will open its telemetry, data processing and communications work for planetary exploration and human space flight to a new round of bidding. Hoped-for savings for NASA under the hotly contested 1998 contract fell far short, a problem compounded when the dot.com implosion deprived Lockheed Martin of a commercial market it had targeted for the same services. NASA plans to break the competition into several work packages that ultimately will be managed separately by the five field centers that were consolidated under CSOC. Administrator Sean O'Keefe, whose "One NASA" policy normally aims at greater centralization, gave Lockheed Martin CEO Vance D. Coffman the bad news Aug. 27. ["One NASA," **Aviation Week & Space Technology**, September 2, 2002, p 23.]

◆ The Boeing Co. and Brevard County officials are hoping to receive some good news this week – that Boeing has been tapped to keep a lucrative NASA contract at Kennedy Space Center. The outcome could have major implications for Boeing's local work force. About 1,200 of Boeing's 2,400 employees in Brevard County work under NASA's Payload Ground Operations Contract. The 15 ½-year, \$1.9 billion contract was set to expire June 30. NASA announced in June that Boeing's current contract would be extended until Sept. 30. The new contract will go into effect Oct. 1. Called Checkout Assembly and Payload Processing Services, or CAPPs, the contract is one of KSC's largest. It would be a four-year deal

with options to extend it by six more years. ["Boeing awaits news on NASA work," **Florida Today**, August 27, 2002, p 1C.]

August 28: In 50 years, Kennedy Space Center and Cape Canaveral Air Force Station may have landing strips for rocket planes going to the International Space Station, rockets launching every 36 hours, hotels near the Visitor Complex and even space tourists flying out of Brevard County. On Wednesday, space officials unveiled their land-use plan for Florida's spaceport, which encompasses the space center and the Air Force Station, for the next 50 years. By 2075, the plan says it is possible for 251 spacecraft to launch from the spaceport annually. Currently, only about 21 launchers lift off every year. "It looks like I'm smoking something or doing something to come up with launch rates like that," Kennedy Space Center Director Roy Bridges said. Bridges said this was just a plan. The launch market, government's demand and available technology would drive what actually happens. Overall, the leaders said the plan was important to stay competitive in a global launch market. No other launch site has a long-term plan like this, Bridges said. In the near future, Kennedy Space Center could service and launch the replacement shuttle fleet now on NASA's drawing board. Agency officials hope for a first flight from the Space Launch Initiative about 2012. ["Space leaders unveil plan," **Florida Today**, August 29, 2002, p 1A & 5A.]

August 29: NASA's John F. Kennedy Space Center has chosen Boeing Space Operations Co., Titusville, Fla., for the Checkout, Assembly and Payload Processing Services (CAPPS) contract. CAPPS is the follow-on contract to the Payload Ground Operations Contract that has been performed by the Boeing Company since 1987. CAPPS has a four-year basic period of performance with the potential total contract period of 10 years if NASA exercises all options for extensions. The value of the contract for the initial four-year period is \$332 million. There are two three-year priced options for a potential ten-year contract value of \$810 million. The contract provides for management and technical support of payload processing for the Space Shuttle, International Space Station, expendable launch vehicles and other payload programs. ["NASA awards Payload Processing Contract to Boeing Space Operations Company," **NASA News Release #c02-z**, August 29, 2002.]

◆ Administrator Sean O'Keefe today announced James L. Jennings, Deputy Director of the NASA Kennedy Space Center (KSC) in Florida, has been selected as the Deputy Associate Administrator for Institutions and Asset Management at NASA Headquarters in Washington, effective Sept. 9. Jennings, who has been with the agency for 35 years, has been KSC's Deputy Director since August 2000. He will be responsible for providing operational and management support for Headquarters and will direct a full range of activities relating to personnel and institutional management, reporting directly to NASA Deputy Administrator Frederick Gregory. ["KSC's James L. Jennings Selected As Headquarters' Deputy Associate Administrator For Institutions and Asset Management," **NASA News Release #02-165**, August 29, 2002.]

August 30: A day after NASA announced Boeing Space Operations Co. won a follow-up contract for space shuttle and rocket payload processing, Boeing said about 10 percent of the 1,200 workers on the previous contract were laid off as a result. Between 110 and 120 of Boeing's workers at Kennedy Space Center got the bad news Thursday. Another 300 Boeing workers had to reapply for jobs with other companies working as sub-contractors and partners with Boeing under the new contract. Most of them already have been offered jobs, said Jim Chilton, Boeing's director of mission management. Also, between 110 and 120 Boeing employees have found other jobs with Boeing, he said. Those jobs are not part of the new contract. That leaves 850 workers under the new contract. Called Checkout, Assembly and Payload Processing Service – or CAPPS – the deal is one of the Space Center's largest. It pays Boeing \$332 million within an initial four-year period. ["Boeing lays off 110 to 120 workers," **Florida Today**, August 31, 2002, p 1A.]

During August: A NASA project to replace the 25-year-old Launch Processing System (LPS) computer setup for space shuttles is exceeding budget by 70%; is nearly 40 months behind schedule; and threatens a cancellation of the upgrade. A NASA Headquarters cost/management assessment team visited Kennedy Space Center in early August to review Checkout Launch and Control System (CLCS) efforts and make recommendations to NASA Administrator Sean O'Keefe. A modification or cancellation is possible. United Space Alliance and Lockheed Martin are part of the multi-company team for the project that was

due to be fully operational by September 2001. An Office of Management and Budget assessment, however, indicates the new system cannot be operational until at least late FY 2005. The program has grown from \$233 million to about \$400 million. The cost overruns and delays could also affect the standing of Kennedy Center Director Roy Bridges who has taken the lead management role in the project. The inherent involvement in the development of the system's user – United Space Alliance – has been another hallmark of the program. "Customer involvement at every phase is crucial to our success," Bridges said at the project's inception in 1997. "The CLCS is a 'must-do-and-deliver' project for us. We cannot support our mission without it." He said. One entire shuttle firing room in the Launch Control Center has been devoted to CLCS development, leaving two other firing rooms to manage shuttle processing and launches. The CLCS philosophy is to create a computer system that has more universal application than the LPS system, where computers and software are devoted to more individual systems and operations. ["Cost overruns, delays plague new shuttle launch system," **Aviation Week & Space Technology**, September 2, 2002, p 42.]

◆ NASA exercised a two-year option on the Space Flight Operations Contract with United Space Alliance that will run through September 30, 2004, for an estimated total cost and fee of \$2.844 billion. The option will cover "at least" 11 shuttle flights, according to the Johnson Space Center. ["USA Option," **Aviation Week & Space Technology**, September 2, 2002, p 17.]

◆ For the third year in a row, Kennedy Space Center has come in on top in innovation award money among NASA centers. KSC applicants garnered \$190,850 in Space Act Award money for its most recent year, a dramatic leap from \$12,000 awarded 10 years earlier. The amount was the highest among the 10 competing NASA centers. ["Kennedy Space Center ranks highest in innovation award money," **Brevard Technical Journal**, August 2002, p 19.]

◆ As a new shuttle launch schedule is being formed, NASA has been forced to bump an astronaut from the next long-duration station crew. Astronaut Don Thomas, a veteran of four space shuttle flights, trained for more than a year to spend several months on board the ISS as a member of the Expedition 6 crew expected to arrive on Endeavour in November. But flight surgeons have determined Thomas has a medical condition that will disqualify him, at least temporarily, from long-duration missions. Thomas will be replaced on the flight by astronaut Donald Pettit, who has been training as a backup Expedition 6 crewmember. Pettit, a chemical engineer, was selected as an astronaut in 1996; this will be his first space flight. ["Astronaut Bumped," **Aviation Week & Space Technology**, August 5, 2002, p 17.]

SEPTEMBER

September 3: Shuttle managers will repair the robotic arm's base inside shuttle Atlantis because they are concerned it could wiggle too much during launch. The issue probably won't delay getting Atlantis ready for its next flight to the International Space Station on Oct. 2, Kennedy Space Center spokesman Bruce Buckingham said Tuesday. The robotic arm rests on a pedestal called the Manipulator Positioning Mechanism. "Apparently, they're concerned there might be too much wiggle room between the MPM" and the robotic arm, Buckingham said. Managers decided on Tuesday to wait until Atlantis gets to the launch pad later this month before fixing it. They will install a block to keep the pedestal from pivoting more than it's supposed to. Meanwhile, the crawler that takes the shuttle to the pad is being fixed. Technicians plan to retest the monstrous vehicle later this week. The crawler had cracks in some of its bearings in the cylinders that keep the mobile pad level as it climbs up to the launch site. ["Shuttle arm may wiggle too much," Florida Today, September 4, 2002, p 1B.]

◆ The property on which the U.S. Space Camp Florida and the U.S. Astronaut Hall of Fame operate soon could be sold to the highest bidder, officials said. SouthTrust Bank in Birmingham, Ala., will compete its foreclosure with a public auction for the property at 11 a.m. Sept. 18 at the Brevard County Courthouse in Viera. If no one buys the property at auction, it will fall under ownership of the bank, said Mary Merritt, director of the attractions, which are located in the same building off State Road 405, near Kennedy Space Center Visitor Complex. Both attractions are operated by the U.S. Space Camp Foundation in Huntsville, Ala. ["Space Camp site set for auction," Florida Today, September 3, 2002, p 1B.]

September 9: In a letter received at National Aeronautics and Space Administration headquarters Monday, a Russian official said the financially desperate agency couldn't wait any longer for the cash needed to put the 'N Sync singer, Lance Bass, on the Oct. 28 Soyuz flight to the International Space Station. Less than two weeks ago, the 23-year-old Bass was at NASA's Johnson Space Center in Houston, training with his crewmates. But the strings attached to the flight – an estimated \$20 million price tag – appear to have scuttled the plan to make Bass the first entertainer in space. ["Russians close launch window for 'N Sync singer," Orlando Sentinel, September 10, 2002.]

September 10: Some \$340 million proposed for NASA's budget during the next six years should go a long way toward fixing timeworn facilities at Kennedy Space Center, director Roy Bridges said Tuesday. Although previous estimates to refurbish the Vehicle Assembly Building and other shuttle-related facilities went to \$600 million, Bridges said planned budgets should be enough to keep the program safe and shuttles flying as late as 2020. In 2002 and 2003, \$50 million per year is allocated for major refurbishments of facilities, he said. That's a significant increase over the \$20 million a year spend in the late '90s, he added. Bridges cited various projects designed to refurbish facilities, from electrical upgrades to \$5.7 million for "safe haven," which opened another high bay in the Vehicle Assembly Building so three other stacks could be stored there during a hurricane. In addition, a new five-story office building will eliminate battered office trailers that took the place of offices that were ousted from the VAB, and a state-of-the-art experiment processing facility will replace a converted airplane hangar that scientists have used for decades. "We have a pretty good track record, I think, of looking each year at where the safety and health risks are in the program and moving money in order to take care of those problems," Bridges said. The Aerospace Safety Advisory Panel, which advises Congress and NASA, has criticized Kennedy Space Center for not keeping up with maintenance requests. Often managers must defer maintenance money from a facility that needs work to one that's in crisis. "From a safety standpoint, I would say they're doing a great job," panel member and former launch director Bob Sieck said. ["Director: \$340 million will fix KSC facilities," Florida Today, September 10, 2002.]

◆ NASA's Associate Administrator for Space Flight, William F. Readdy, today named James W. Kennedy as Deputy Center Director at NASA's Kennedy Space Center (KSC), Fla., and David A. King as Deputy Center Director at NASA's Marshall Space Flight Center, Huntsville, Ala., effective November 3. Kennedy currently serves as Deputy Center Director at Marshall, while King is Director of Shuttle Processing at KSC. The announcement represents an exchange of senior managers between two of

NASA's human space flight centers. The appointments reflect Administrator Sean O'Keefe's 'One NASA' approach to program management, which focuses on enhanced coordination, collaboration and communication among all agency facilities to reach common goals. "These key personnel moves epitomize the concept of One NASA," said Administrator O'Keefe. "They also further the good partnership between Marshall and the Kennedy Space Center and promote executive mobility within the agency." ["NASA senior official appointments emphasize 'One NASA' management approach," **NASA News Release #02-172**, September 10, 2002.]

◆ NASA today selected TRW, Redondo Beach, Calif., to build the next-generation successor to the Hubble Space Telescope in honor of the man who led NASA in the early days of the fledgling aerospace agency. The space-based observatory will be known as the James Webb Space Telescope, named after James E. Webb, NASA's second administrator. While Webb is best known for leading Apollo and a series of lunar exploration programs that landed the first humans on the Moon, he also initiated a vigorous space science program, responsible for more than 75 launches during his tenure, including America's first interplanetary explorers. The James Webb Space Telescope is scheduled for launch in 2010 aboard an expendable launch vehicle. ["NASA announces contract for next-generation space telescope named after space pioneer," **NASA News Release #02-171**, September 10, 2002.]

◆ After its shuttle fleet was grounded all summer by cracks, NASA moved a step closer to liftoff, delivering a newly mended Atlantis to the launch pad Tuesday atop a repaired spaceship hauler. The four-mile journey from the hangar to the pad took almost all morning, and the huge platform and its new bearings held up well. The National Aeronautics and Space Administration hopes to launch Atlantis as early as Oct. 2. Atlantis will carry a major new part for the International Space Station, and a pair of astronauts will conduct three spacewalks to hook everything up. Atlantis originally had been scheduled for an August liftoff. ["Atlantis has smooth ride on repaired NASA hauler," **Orlando Sentinel**, September 11, 2002.]

September 11: A NASA-wide memorial was held to commemorate the 9-11 attacks. The program included how NASA helped. ["One NASA—September 11 Memorial," **KSC Countdown**, September 10, 2002.]

◆ The payload for Mission STS-112, the S1 truss, was moved to the pad last week. It will eventually be transferred to Atlantis' payload bay. The first starboard truss segment, the S1 will be attached to the central truss segment, the S0 truss, on the International Space Station during mission STS-112. Atlantis is scheduled to launch no earlier than Oct. 2. ["S1 truss moves to pad for mission STS-112," **KSC Countdown**, September 10, 2002.]

◆ A Kennedy Space Center team helped rescue a diver in distress Wednesday, Sept 11, using a recompression chamber on board Freedom Star, one of the Shuttle Rocket Booster (SRB) retrieval ships, manned by United Space Alliance (USA) workers. The diver, Jack Wilcox, 50, is in good condition and recovering in Florida Hospital Orlando after being airlifted from the Army dock at Port Canaveral. It is believed he suffered decompression sickness after ascending too quickly in an out-of-air emergency. "I don't know what would have happened if they hadn't happened to be out there," Wilcox said from his hospital bed on Thursday. "Andy Fish (a USA SRB retrieval diver and diver medical technician) stayed with me inside the chamber the whole time working with me and reassuring me. The KSC folks were really great throughout the whole experience." Wilcox and several friends were lobster diving at about 100 feet down on Pelican Flats about 20 miles off of Cape Canaveral, when Wilcox ran out of air. He approached his dive buddy and shared air to about 60 feet. Having difficulty getting enough air, Wilcox made a free ascent to the surface. Wilcox experienced chest pain and difficulty breathing as the boat, Knot Content, headed into port. The group radioed the U.S. Coast Guard for help. The Freedom Star team, who are a part of USA's SRB Element Marine Operations, heard the call for help and asked the Coast Guard if they could assist. The ship was out on a crane certification exercise and coincidentally had a diver medical technician and other divers training on the crane. The ship's divers were trained for the hyperbaric chamber on board. "We only did what anyone would do," said Capt. Dave Fraine, "It's the law of the sea. You help when you can. We're just grateful to God we were able to help." Jack Mullen, the USA retrieval supervisor aboard Freedom Star, said the diver DMT and team were able to help because of all the training they do to be able

to assist one of their own in case of a dive accident during a retrieval mission. The hyperbaric chamber on board is used to help a diver suffering decompression sickness, too many nitrogen bubbles in the blood, which can cause injury or death if untreated. "We are glad our training and capabilities could be of assistance to a member of the public. It was just by luck that we were in the middle of a training operation and were close enough with the right resources to be able to help," Mullen said. Capt. Fraine, Mullen and their Freedom Star team scrambled to meet the Knot Content after the Coast Guard gave them the go ahead. "The KSC folks were all lined up on board to grab me," Wilcox said. "Within a few seconds they had me in the chamber and Andy began to work with me taking my vital signs and doing what he could do to help me." The team was met by KSC Occupational Health doctor Skip Beeler, USA diver medical technicians to help with the chamber, and KSC firefighters and paramedics at the Army dock. The doctor entered the chamber and continued the process of helping to stabilize Wilcox. After several hours in the chamber, Wilcox, who lives in Orlando, was airlifted to Florida Hospital Orlando. "I didn't know if I was going to make it. It's a huge relief to be in the hospital recovering thanks to the KSC guys," Wilcox said. ["KSC Team Rescues Distressed Diver," **NASA News Release #82-02**, September 12, 2002.]

September 12: Space shuttle workers have installed a block to help prevent the mechanism that holds Atlantis' arm from moving during flight, but they are evaluating a tiny gap to see whether further work is needed. Atlantis' payload, the S1 truss for the starboard side of the International Space Station, is scheduled to be installed in the shuttle's cargo bay today, a NASA spokesman said. Atlantis, which rolled out to the pad earlier this week, is set to launch no earlier than Oct. 2. Meanwhile, shuttle mission managers Thursday approved Nov. 10 as a new launch date for Endeavour. It was scheduled to fly in early November, so the new data doesn't represent a significant delay. ["Engineers evaluate fixes to shuttle Atlantis," **Florida Today**, September 13, 2002, p 1B.]

◆ A massive computer upgrade and more than 500 jobs at Kennedy Space Center's Launch Control Center could be in jeopardy. Kennedy Space Center Director Roy Bridges said this week an independent NASA assessment team from headquarters in Washington, D.C., came to review the Checkout and Launch Control System in August. The system was supposed to bring the computers in launch control up to current standards instead of 1970s computer technology, which has so far cost \$272 million. Through the end of fiscal year 2003, NASA has projected to spend \$399 million on the project. When it was conceived in 1997, the original estimate was \$206 million, and it was supposed to be fully operational by December 2000. Now, the program will be able to launch its first shuttle in July 2005. NASA Headquarters may make a decision on what to do with the program in mid-September. It is uncertain whether this will mean a loss of jobs for government and contract workers, Kennedy Space Center spokesman Bill Johnson said. ["Delays endanger KSC computer upgrade, jobs," **Florida Today**, September 13, 2002, p 1B & 2B.]

◆ An amateur astronomer hunting for asteroids may have discovered a piece of the rocket that launched the Apollo 12 astronauts to the moon in 1969, a NASA scientist said Thursday. The object was first spied on Sept. 3 by Arizona astronomer Bill Yeung. Follow-up observations and calculations of its path suggest it is orbiting the Earth once every 48 days at a distance twice that of the moon. Although initially believed to be an asteroid, astronomers now suspect it is a rocket fragment, possibly the third stage of the massive Saturn V launched Nov. 14, 1969, with astronauts Charles "Pete" Conrad Jr., Richard Gordon and Alan Bean aboard. ["Asteroid hunter may have found Apollo-era rocket," **Florida Today**, September 13, 2002, p 9A.]

◆ Completion of the international space station hit a snag Thursday when Japan's cash-strapped space program announced it would delay launch of the bus-sized research module it is building for the project. The research capsule, the only part of the space station developed and run by an Asian country, was scheduled for launch sometime in 2004. Liftoff is now planned for April 2005 at the earliest, the space agency said. ["Japanese budget cuts force delay at international space station," **Florida Today**, September 13, 2002, p 7A.]

◆ William F. Readdy, NASA associate administrator for Space Flight, announced the appointment of James W. Kennedy as deputy center director, Kennedy Space Center (KSC), Fla., and David A. King, deputy center director, Marshall Space Flight Center, Ala., Sept. 10, 2002. The appointments will be effective Nov. 3, 2002. Roy D. Bridges, Jr., director, KSC, announced the appointment of JoAnn H.

Morgan as acting, deputy center director, KSC, Sept. 11, 2002. Morgan will serve as acting, deputy center director through Nov. 3, 2002. Kennedy currently serves as deputy center director, Marshall Space Flight Center. He began his NASA career as a cooperative education student at KSC. He transferred from KSC to Marshall in 1969. Throughout his career, he has held a variety of management positions which include deputy director and acting director for the former science and engineering directorate and director of engineering at Marshall. King currently serves as director, Shuttle Processing at KSC. He began his career as a main propulsion system engineer in 1983. He has served in a variety of positions such as flow director for the Space Shuttle Discovery, acting deputy director, Installation Operations directorate, deputy director, Shuttle Processing and as Shuttle Launch Director. He has been in his current position since 1999. Morgan serves as director, External Relations & Business Development at KSC. She began her federal career in 1958 as a cooperative education student with the Army Ballistic Missile Agency. She has served in a variety of managerial positions including division chief and deputy director, Expendable Launch Vehicles, director, Payload Projects and Ground Operations; director, Safety and Mission Assurance and associate director, Advanced Development and Shuttle Upgrades. She has served in her current position since May 2000. ["NASA Announces New Management Appointments," **NASA News Release #81-02**, September 12, 2002.]

◆ When space shuttle Atlantis thunders to orbit next month a video camera mounted to the external fuel tank will provide an unprecedented live view as the ship and six astronauts go from zero to 17,500 mph in just over eight minutes. Liftoff is scheduled for October 2 between 2 and 6 p.m. EDT. Atlantis will deliver a 15-ton truss structure to the International Space Station during its 11-day mission. Web posted. (2002). [Sneak peek at 'shuttlecam' [Online]. Available WWW: <http://www.spaceflightnow.com/> [2002 September 12].]

September 16: After investing \$273 million, NASA is canceling a cutting edge launch-control computer system for the space shuttle that is over budget, behind schedule and too expensive to operate. The move will affect about 570 civil servants and contract employees and almost certainly will result in some layoffs. It had been predicted that the still-unfinished computer upgrade – dubbed CLCS for Checkout and Launch Control System – would be 50 percent cheaper than the 25-year-old system currently used at Kennedy Space Center. Last month, however, an assessment team from the National Aeronautics and Space Administration's headquarters in Washington concluded that the project could be \$15 million more expensive each year. The spiraling costs and uncertain time frame led NASA on Monday to finally pull the plug. ["After \$273 million, NASA scraps project," **Orlando Sentinel**, September 17, 2002, p A1 & A7.]

September 17: At the conclusion of the Flight Readiness Review held today at Kennedy Space Center, NASA mission managers set Oct. 2 for the launch of the Space Shuttle Atlantis to the International Space Station (ISS). Mission STS-112 will continue the expansion of the vast orbiting outpost including additions to the first space railroad. Atlantis will launch between 2 and 6 p.m. EDT. The precise launch time will be announced about 24 hours before liftoff. Atlantis is carrying the first starboard integrated truss segment, S-One (S1), to the ISS as well as what will be the first pickup truck in space. The 45-foot truss structure adds to the length of the space railroad and provides the necessary cooling and power systems for future international expansion of the space laboratory. Attached to the truss, the Crew and Equipment Translation Aid (CETA) Cart A is the first of two human-powered carts that will ride along the railway, providing mobile work platforms for future spacewalking astronauts. "Engineering and ground processing teams have done outstanding work in the past few months to ensure the readiness of Atlantis for a safe flight," NASA Space Shuttle Program Manager Ron Dittmore said. "Because of the dedication and hard work of these teams, we have resolved the technical issues and are ready to resume the task of assembling the International Space Station. Atlantis is in great shape and ready to fly." Jeff Ashby (Capt., USN) will command Atlantis, and Pam Melroy (Col., USAF) will serve as pilot. Mission specialists will be David Wolf (M.D.), Sandra Magnus (Ph.D.), Piers Sellers (Ph.D.) and Russian Space Agency Cosmonaut Fyodor Yurchikhin (Ph.D.). This will be Magnus', Sellers' and Yurchikhin's first shuttle mission, Ashby's third and Melroy's second. This will be Wolf's third mission, his most recent being a 119-day stay aboard the Russian Space Station Mir in 1997 and 1998. Wolf and Sellers will conduct three spacewalks during STS-112 to install and outfit the new truss structure and spacewalk work platform. Atlantis is scheduled to land at Kennedy Space Center, Fla., Oct. 13. STS-112 marks the 26th flight for Atlantis and the 111th in Shuttle

history. ["NASA's Shuttle Orbiter Atlantis Ready For Next History Mission," **NASA News Release #86-02**, September 17, 2002.]

◆ The future of the Merritt Island National Wildlife Refuge is being determined now through a mandated process for a 15-year Comprehensive Conservation Plan (CCP). Established in 1963, the 140,000-acre refuge supports more than 500 species, including several that are considered threatened or endangered. Increasing public use, habitat loss, invading exotic plant species and pollution are issues that are required to be addressed in the plan, prompted by the National Wildlife System Improvement Act of 1997. An open house to get ideas from the public for other issues to be considered in the CCP planning process will be held on Saturday at the Visitors Center, located five miles east of U.S. 1 on State Road 402. ["Planning under way for wildlife refuge," **Space Coast Press Tribune**, September 18, 2002, p 9A.]

September 18: A new telecommunications satellite for Latin America and Europe is on its way to replace two aging satellites in orbit. The Hispasat 1D satellite rode a Lockheed Martin-built Atlas 2AS rocket on time at 6:04 p.m. Wednesday from launch pad 36A at Cape Canaveral Air Force Station. Twenty-eight minutes later, the spacecraft was safely in orbit. ["Satellite rides Atlas rocket to space," **Florida Today**, September 19, 2002, p 1B.]

◆ NASA Administrator Sean O'Keefe said Wednesday he was outraged that several hundred space workers were told in a Kennedy Space Center parking lot their jobs soon would be eliminated. O'Keefe was at KSC on Tuesday for the flight readiness review in preparation for the scheduled Oct. 2 launch of shuttle Atlantis. His visit coincided with managers informing 570 agency and contractor employees their project to upgrade launch control computers was canceled. O'Keefe said he agreed with the decision to end the project but objected to the way in which employees were informed. O'Keefe said the decision to cut the program was justified and consistent with his desire that government agencies such as NASA stop the historic practice of throwing more money at projects that aren't meeting their objectives. ["NASA chief upset with handling of dismissals," **Florida Today**, September 19, 2002, p 1A & 2A.]

September 19: Mission managers set Oct. 2 for the launch of the Space Shuttle Atlantis to the International Space Station (ISS). Mission STS-112 will continue the expansion of the vast orbiting outpost including additions to the first space railroad. Atlantis will launch between 2 and 6 p.m. EDT. The payload for the mission includes the S1 truss and, attached to the truss, the Crew and Equipment Translation Aid (CETA) Cart A. It is the first of two human-powered carts that will ride along the railway, providing mobile work platforms for future spacewalking astronauts. This week the STS-112 crew was at KSC for Terminal Countdown Demonstration Test activities, including practice driving the M-113 armored personnel carrier as part of emergency egress training. ["Managers confirm Oct. 2 launch date for Atlantis," **KSC Countdown**, September 19, 2002.]

September 20: A long-lost piece of an Apollo rocket has returned to Earth orbit after decades of racing around the Sun, the first time our planet has captured an object from solar orbit, astronomers said Friday. Earth's new satellite is most likely the third stage of a massive Saturn V rocket that lifted Apollo 12 astronauts to the moon in November 1969, according to astronomers at NASA's Jet Propulsion Laboratory in Pasadena, California. Web posted. (2002). [Apollo 12 rocket returns to Earth orbit [Online]. Available WWW: <http://www.cnn.com/> [2002, September 21].]

◆ Apollo 11 astronaut Edwin "Buzz" Aldrin escaped criminal prosecution on Friday for punching a conspiracy theorist who wanted him to swear on a Bible that he really did walk on the moon in 1969. Los Angeles County prosecutors declined to file a misdemeanor battery charge against the 72-year-old ex-astronaut, who said he was defending himself and his stepdaughter when he clocked 37-year-old Bart Winfield Sibrel outside a Beverly Hills hotel on Sept. 9. Sibrel – who made TV documentaries and films debunking the Apollo 11 moon landing on July 20, 1969 – videotaped the incident for a new film. The district attorney's office decided not to file charges because Sibrel sustained no visible injury and did not seek medical attention, and because Aldrin had no previous criminal record, he said. Aldrin was the second the man to take a walk on the Moon, following Neil Armstrong on the lunar surface. Web posted. (2002). [Ex-Astronaut Aldrin Not to Face Charges in Punching [Online]. Available WWW: <http://www.yahoo.news.com/> [2002, September 21].]

◆ Kennedy Space Center Director Roy Bridges met Friday with NASA and contractor employees whose program was canceled this week. NASA on Tuesday announced the termination of the Checkout Launch and Control System, citing delays and being over-budget. The \$400 million program was supposed to upgrade the space center's launch computers. The next day, NASA Administrator Sean O'Keefe criticized Bridges for the way the dismissals were handled. On Friday, NASA drove about 600 people in 20 buses to a conference facility at the KSC Visitor Complex. When Bridges walked into the room, the crowd gave him a standing ovation. Bridges, along with KSC director of shuttle processing Dave King, Checkout Launch and Control System project manager Bruce Hevey, and KSC spaceport engineering and technology directorate director Jim Heald represented NASA management. The 90-minute meeting was positive overall, said KSC spokesman Bruce Buckingham, who attended the meeting. Employees have 60 days left with the program. ["KSC director addresses canceled program workers," **Florida Today**, September 21, 2002, p 1A.]

◆ Kennedy Space Center likely won't issue a hurricane alert until at least Monday, but the base already has plans in place should Isidore's winds threaten the Cape and shuttle Atlantis, which is on the launch pad. Emergency managers at KSC said Friday they would look at the hurricane's track Monday morning and decide whether to issue an alert, which would lead to preparedness activities around the center. Any kind of hurricane winds would force the return of Atlantis to the Vehicle Assembly Building. The threat of a strike by tropical weather forced the rollback of shuttles four times in the past. The most recent was Atlantis in September 1996, when Hurricane Fran threatened Brevard County. ["Space Center sets up plan," **Florida Today**, September 21, 2002, p 3A.]

September 21: On the deserted beach at Kennedy Space Center sits an unremarkable two-story house. The second floor is painted gray, the bottom white concrete blocks. A wooden deck leads from upstairs to the pristine white sand below. The isolated house – known colloquially as the Beach House – is the last place America's astronauts get to say good-bye to their families before embarking upon dangerous million-mile voyages. For years before a launch, astronauts spend their days sitting in simulators, water tanks and classrooms, going over every detail of a mission. On the beach, just days before liftoff, the explorers can stop training and have a few final hours of quiet. The house itself was built in 1962 as part of the Neptune Beach Subdivision. NASA bought the land a year later for \$31,500. Then, it was called the Astronaut Training and Rehabilitation Building. Now, its proper moniker is the Kennedy Space Center Conference Center. NASA has since remodeled the building to modernize it and made it more functional. ["NASA's beach retreat puts astronauts at ease," **Florida Today**, September 22, 2002, p 1A & 3A.]

September 23: As NASA contemplates handing over more space shuttle operations to private companies, a task force assigned to study the subject recommends an independent safety organization no matter how the agency handles privatization of its manned spaceflight programs. The task force, which is studying "competitive outsourcing" of shuttle operations among other issues, briefed administrator Sean O'Keefe on its findings in private Monday. NASA officials and the company conducting research for the task force would not release the report or comment on its contents, calling it a preliminary draft. *Aviation Week & Space Technology*, citing a leaked copy of the report and interviews with unidentified members of the task force, reported Monday the group found NASA needs to reform contract management and safety in its manned programs. The magazine also reported the task force will propose a checks-and-balances system under which NASA, the prime shuttle contractor and a safety organization separate from NASA would all have to sign off before a flight. ["Task force suggests safety panel," **Florida Today**, September 24, 2002, p 3B.]

September 26: The contractor that runs the Kennedy Space Center Visitor Complex for NASA made a last-minute deal Thursday to save the U.S. Astronaut Hall of Fame, keeping the country's most comprehensive collection of astronaut artifacts in Brevard County. One day after the Hall of Fame and Space Camp Florida were auctioned to settle a multi-million dollar foreclosure lawsuit, Delaware North Park Services signed a deal with the bank to lease the property and facilities on State Road 405 for three to five years. The agreement means the Hall of Fame will stay open, but Space Camp probably will not. The museum will be an extension of the visitor complex. The deal also protects the future of the Astronaut

Scholarship Foundation. ["Deal keeps space hall in Brevard," **Florida Today**, September 27, 2002, p 1A & 3A.]

September 27: The U.S. Astronaut Hall of Fame will close its doors at 5 p.m. Sunday and reopen in no more than a month under the direction of Delaware North Parks Services of spaceport, officials said Friday. About 60 of the Hall of Fame's workers, employed by the nonprofit U.S. Space Camp Foundation in Alabama, will have a chance to be interviewed to be rehired. Rick Abramson, president and chief operating officer of Delaware North, said his company plans to spend \$500,000 to \$1 million to renovate the Hall of Fame. ["Space hall to close Sunday for a month," **Florida Today**, September 28, 2002, p 1A.]

◆ On 22 screens across the nation, including the Kennedy Space Center Visitor Complex, the 1995 Ron Howard film "Apollo 13" opens today on IMAX screens, becoming the first 35mm live-action movie to be adapted to the format. IMAX screens are three times larger than the average 35mm screen and 4,500 times larger than the average television screen. ["Apollo 13' comes to the BIG screen," **Florida Today, TGIF**, September 27, 2002, p 3.]

September 30: Michael E. Wetmore has been appointed director of the Shuttle Processing organization at Kennedy Space Center, effective Nov. 3, 2002. In this position, Wetmore will be responsible for the management and oversight of Space Shuttle processing and launch operations at KSC. He has been the deputy director of Shuttle Processing since 1999. ["Michael E. Wetmore Named Director, Shuttle Processing at KSC," **NASA News Release #93-02**, September 30, 2002.]

September 31: Just when it seemed Kennedy Space Center dodged Hurricane Lili, the storm appears to be headed for Houston's mission control center, potentially delaying Wednesday's launch of shuttle Atlantis. Shuttle managers are expected to decide Wednesday morning whether they need to send Houston-based workers home from KSC to take care of their homes and families or whether the storm could prompt an evacuation of Johnson Space Center. Only limited mission control facilities exist elsewhere. For instance, controllers could help land a shuttle from KSC, but they couldn't conduct complicated docking procedures or spacewalks. There are slight weather concerns for launch day at Kennedy Space Center, including coastal showers. There's a 60 percent chance of acceptable conditions at launch time. ["Lili may delay shuttle launch," **Florida Today**, October 1, 2002, p 1A. & 2A.]

◆ Thanks to a ship that usually retrieves solid-rocket boosters from the ocean, Jack Wilcox ended a troubled dive with two things: a lobster and his life. He and his wife, Patty, of Maitland thanked the crew of Freedom Star in person on Monday as the sun beat down on the bright white, twin NASA ships at Cape Canaveral Air Force Station. The United Space Alliance crew heads out today on its mission to retrieve Atlantis' boosters after the shuttle's scheduled Wednesday launch. On Sept. 11, Wilcox was diving for lobster and ran out of air more than 100 feet down. He breathed some of his buddy's air on the way up but had to finish his ascent rapidly without air, causing him to get decompression sickness, a potentially fatal condition. The ship's crew, which was smaller than usual because of a training exercise that day, head the distress call from Wilcox's boat and put him in a recompression chamber aboard the Freedom Star. Andy Fish, a medical technician and diver, went in with him. Wilcox was airlifted to an Orlando hospital for treatment and is feeling fine. ["Lobster diver says thanks to life-saving NASA crew," **Florida Today**, October 1, 2002, p 1B.]

During September: Being has delayed the first launch of the Delta IV Evolved Expendable Launch Vehicle at Cape Canaveral by 3-4 weeks to late October or early November to correct a launch software problem found during a countdown rehearsal with the vehicle fueled. The first flight was to have been Oct. 9. ["World News Roundup, Americas," **Aviation Week & Space Technology**, September 9, 2002, p 26.]

OCTOBER

October 4: NASA has awarded work valued at \$25 million involving telecommunications support services to Lockheed Martin Space Operations, Houston, as an addition to the broader Consolidated Space Operations Contract (CSOC) currently held by Lockheed. The work provides additional support requirements for the NASA Integrated Service Network, including tasks such as procurement, installation, operation and maintenance of telecommunications services. Those services include video teleconferencing systems, voice teleconferencing systems and facsimile installations. The work is planned through Dec. 31, 2003, and will be performed primarily at NASA's Marshall Space Flight Center, Huntsville, Ala. The additional work brings the total value of the CSOC to \$2.1 billion. ["NASA Awards \$25 Million Contract Addition to Lockheed Martin," **NASA News Release #c02-cc**, October 4, 2002.]

October 7: There have been months of delays. Cracks and repairs. A hurricane. If mission managers can iron out a couple of technical issues in time, shuttle Atlantis should lift off today on a journey to add to the backbone of the International Space Station. Two issues worried mission managers Sunday. Of most concern was the heater on the orbiter that's running too hot. It keeps water, a byproduct of the power-producing fuel cells on board, from freezing so the liquid can be vented into space. Though venting of the water is considered a third-string option for getting rid of it, it is an important function. Too much water could reduce the fuel cells' ability to produce electricity, possibly hindering Atlantis' chances of a safe landing. The heater, which normally operated at 170 degrees Fahrenheit, is setting itself at a safety point between 230 and 250 degrees. If its controller should fail completely, the temperature could soar to 700 degrees. A repair would mean a delay of several days, launch director Mike Leinbach said. ["Atlantis aims for liftoff today," **Florida Today**, October 7, 2002, p 1A & 4A.]

◆ Atlantis blasted off on the first shuttle flight in four months Monday, with a side-mounted video camera showing the coastline and the brilliant blue ocean receding fast in the distance as the spaceship climbed toward orbit. Atlantis' 3:45:51 p.m. liftoff was right on time in a bright blue sky, on its way to install a new truss on the International Space Station. Fighter jets patrolled the wide no-fly zone around the pad to guard against a terrorist attack. The Air Force chased after six stray planes in the final few hours before liftoff. ["Shuttlecam shows view as Atlantis blasts off," **Orlando Sentinel**, October 8, 2002, p A3. "Repaired shuttle on way to station," **Florida Today**, October 8, 2002, p 1A & 4A.]

October 8: Adam Kissiah, who patented a cochlear implant when he was a NASA engineer in 1977, got his first payment for the invention that has changed the lives of people including radio host Rush Limbaugh and former Miss America Heather Whitestone. The \$21,000 award was the largest of those distributed Tuesday to more than 100 pioneers at the luncheon at Kennedy Space Center Visitor Complex. The Space Act Awards were established by 1958's Space Act. ["NASA honors inventor for hearing implant," **Florida Today**, October 9, 2002, p 3A.]

◆ The head of NASA and a host of top Pentagon officials said Tuesday that beginning with next year's budget, the link between the country's civil space agency and its military counterpart will be much closer. Speaking at a town-hall meeting sponsored by an industry group, Sean O'Keefe, NASA Administrator, and Undersecretary of the Air Force Peter Teets said a number of changes are coming. They see NASA and the Defense Department working together in areas such as space-based radar and communications satellites – and, probably, the effort to build a replacement for the aging space shuttle. ["Military influence to grow at NASA," **Orlando Sentinel**, October 9, 2002, p A5.]

October 10: The TDRS-J spacecraft is undergoing testing at a Calif. factory and is planned to arrive at KSC on Oct. 17. The mission is scheduled to launch Nov. 20. SORCE is at Va.'s Orbital Space Systems Group spacecraft facility and scheduled to begin final processing on Oct. 26 for its Dec. 1 launch. The ICESAT and CHIPSAT spacecraft completed vibration testing. CHIPSAT concluded thermal vacuum tests. The ICESAT and CHIPSAT mission is scheduled to launch NET Dec. 15. ["ELV spacecrafts undergo processing," **KSC Countdown**, October 10, 2002.]

October 12: Kennedy Space Center held a 40th anniversary picnic at the Visitors Complex on Saturday. Gene Cernan, the last man to walk on the moon, was one of four astronauts representing the four decades of the space program. ["KSC turns the big 4-0," **Florida Today**, October 13, 2002, p 1B & 5B.]

◆ A pink dawn at Kennedy Space Center silhouetted shuttle Endeavour as it rode a giant crawler slowly to Pad 39A on Saturday morning in preparation for its November mission. The shuttle, which began its journey before dawn, reached its destination about 7:30 a.m. Endeavour will take the P1 truss to the space station. Launch is scheduled for November 10. The Boeing-built truss was delivered to the launch pad last week. ["Endeavour settles in," **Florida Today**, October 13, 2002, p 1B.]

October 14: For the first time in more than 10 years, a new rocket engine bellowed fire and smoke from Cape Canaveral Air Force Station. The RS-68 engine, installed in Boeing's new Delta 4 rocket, test fired at 5:35 p.m. EDT for about five seconds. The firing was the culmination of a proactice countdown in advance of the rocket's first flight in mid-November. Several large bolts kept the rocket secured to the refurbished Launch Pad 37 during the firing. Web posted. (2002). [Boeing Test Fires New Delta 4 Rocket Engine at Pad 37 [Online]. Available WWW: <http://www.space.com/> [2002, October 15].]

October 15: NASA is investigating a problem with the explosive nuts that release the space shuttle upon launch after a backup system failed during Atlantis' liftoff last week. At T-minus zero in the countdown, eight pyrotechnics nuts on hold-down posts, one on the external tank vent line and one on a lanyard explode, releasing bolts so the shuttle can lift off. Immediately afterward, the solid rocket boosters fire. Each nut has two pyrotechnics in it, NASA spokesman James Hartsfield said. Only one set of pyrotechnics fired, the 10 nuts exploded, and Atlantis lifted off safely. Until Atlantis lands at Kennedy Space Center on Friday, however, investigators won't be able to determine exactly what went wrong. The shuttle's on-board computer sent the command to fire the nuts that release the bolts. ["NASA investigates launch failure," **Florida Today**, October 16, 2002, p 1A.]

October 17: Shuttle Atlantis is due to land at Kennedy Space Center Friday morning. Weather prospects are excellent for the scheduled 11:44 a.m. landing, with the burn that takes Atlantis out of orbit set for 10:36 a.m. A second landing opportunity is at 1:21 p.m. NASA is not activating California's Edwards Air Force Base as a backup site. Once Atlantis returns, NASA will continue its investigation into a glitch in the explosive nuts that release the shuttle on launch. A backup set of pyrotechnics failed to explode when Atlantis lifted off. ["Atlantis to return to space center," **Florida Today**, October 18, 2002, p 4A.]

◆ NASA should turn over most, if not all, shuttle operations to some kind of private enterprise, a task force has advised administrator Sean O'Keefe. The cost to operate, repair and maintain the fleet and its ground equipment has become too great a burden for NASA, the panel said in a report given to O'Keefe in September but not made public until this week. The report, prepared by a panel of advisers chosen from inside and outside NASA, offers O'Keefe pros and cons about varying degrees of private operation of the \$3.8 billion a year shuttle program. Some options floated would restructure shuttle contracts to involve more companies and shift a larger share of the work to the private sector. Two other options would almost completely privatize the program, including transferring ownership of the four orbiters to a private company or companies. One last idea is to create a semi-private space authority to run the program with a mixture of government and contractor workers. ["Shuttles burden NASA," **Florida Today**, October 18, 2002, p 1A & 4A.]

◆ Engineers at Kennedy Space Center have peered into the heart of a 100-pound meteorite without cutting it open, using the same technology as a medical CT scan. But the space center's Computed Tomography Scanner is hundreds of times more sensitive than medical scans. Behind the 7,000-pound, steel-encased lead door inside the Non-destructive Testing Laboratory, engineers use a tiny piece of radioactive cobalt-60 to shoot gamma rays or X-rays through a meteorite chunk, which stands like a two-foot-tall pillar and slides along a track in between the radiation source and the sensors. The \$1 million scanning machine has been at the space center since 1985. In its time there, it has been a safety measure for the shuttle program. It scanned dents on an Orbital Maneuvering System engine that helps the shuttle shift from one orbit to another. They have scanned wear and tear on the shuttle's landing gear and on the insulating tiles on the orbiter's outside. It can spot things on the inside that otherwise would not be

possible without taking the entire device apart. ["NASA uses CT scan to probe meteorite," **Florida Today**, October 17, 2002, p 1A.]

October 18: Space shuttle Atlantis and its crew of six returned from the international space station Friday, ending a 4.5 million-mile voyage that accomplished major construction work. Atlantis landed on its first attempt and main gear touchdown occurred at 11:43:40 a.m. The nose gear touched down eight seconds later, with wheel stop ending the nearly 11-day mission at 11:44:35 a.m. The cross wind speeds at landing weren't yet available. ["Atlantis returns to KSC," **Florida Today**, October 19, 2002, p 1A & 3A.]

October 21: About 60 elementary students were on hand for the Oct. 21 dedication ceremony for the Sendler Education Outpost in the Merritt Island National Wildlife Refuge. It will be the children – about 6,000 a year – who will most benefit from the pavilion style structure located at Dummit Cove near Haulover Canal, said Forrest McCartney, former director of Kennedy Space Center and immediate past president of the Merritt Island Wildlife Association (MIWA). The outpost is named in honor of the family of space pioneer Karl Sendler, who was a manager under KSC's first director, Kurt Debus. The \$40,000 project was funded by MIWA, with assistance from the Merritt Island National Wildlife Refuge, NASA and Kennedy Space Center. Web posted. (2002). [Refuge outpost honors space pioneer [Online]. Available WWW: <http://www.floridatoday.com/> [2002, October 30].]

October 22: Sean O'Keefe took time off Monday and went to Huntsville, Ala., to endorse the Republican candidate for governor at the space museum near Marshall Space Flight Center. Next Monday, he will be at the Cocoa Beach Hilton with Tom Feeney, the GOP nominee in the 24th Congressional District that includes Kennedy Space Center. NASA is not paying for the trips and O'Keefe is not doing official business, agency spokesman Glenn Mahone said. ["NASA head stumps for GOP candidates," **Florida Today**, October 23, 2002, p 1A & 2A.]

◆ An expected delay in the launch of a Russian Soyuz rocket to the International Space Station hasn't yet affected shuttle Endeavour's launch date. The Russian space agency has not announced a delay formally, but Russia is now working toward a likely launch at 10:11 p.m. EST Tuesday, NASA spokesman James Hartsfield said from Houston. The new date represents a two-day delay in the wake of the explosion of an unmanned, slightly different Soyuz rocket last week. Endeavour is to launch Nov. 10, which would put the shuttle crew on the station after the three-man Soyuz taxi crew leaves. Having both crews aboard would over burden the station, so a further delay in Soyuz could affect Endeavour. Endeavour is taking along a new space station crew on its mission to install another girder on the station. The port truss is nearly the mirror image of the truss installed by Atlantis' crew. ["Soyuz may not affect shuttle," **Florida Today**, October 23, 2002, p 2A.]

◆ NASA has put off the next step in the development of a replacement for the space shuttle, saying there are too many unanswered questions to proceed. Next month, the agency was supposed to narrow the design pool for the next-generation reusable launch vehicle. The \$4.8 billion program, known as the Space Launch Initiative, is supposed to come up with two designs by 2006. But the National Aeronautics and Space Administration has decided to slow the selection process. NASA spokesman Michael Brukus said the decision to postpone the selection process was made because the initial deadline was coming up. There are a number of studies of the unresolved issues that the agency is awaiting, he said. The delay was not unexpected. A recent General Accounting Office report recommended postponing the selection, and NASA Administrator Sean O'Keefe, while vague about his intentions, has said in recent weeks that the SLI program is being thoroughly reviewed. ["NASA taps brakes on shuttle replacement," **Orlando Sentinel**, October 23, 2002, p A3.]

◆ NASA is proposing entering into an agreement with the State of Florida, through the Florida Space Authority, to develop an International Space Research Park (ISRP) on the Kennedy Space Center. An Environmental Impact Statement (EIS) addressing the impacts of the proposed development on two alternative sites on the Kennedy Space Center is being prepared. ["International Space Research Park," **KSC Countdown**, October 22, 2002.]

October 24: Shuttle Update: Columbia processing continues in preparation for the research mission scheduled for no earlier than Jan. 16. Polishing, welding and cleaning on the flow-liners are complete. Shuttle main engine installation began Monday (October 21). Shuttle Atlantis post-flight inspections are in work to prepare the orbiter for its next mission to the International Space Station. Engineers continue to evaluate a problem that prevented the detonation of one of two sets of small explosives that release bolts that hold the Shuttle's solid rocket boosters to the launch platform and release ground connections to the external tank. This system did not operate as designed at liftoff of STS-112. A second redundant system fired normally and all pyrotechnic bolts were safely released. Engineers are checking systems on Atlantis, including the onboard Master Events Controller, wiring and connections related to the pyrotechnics as part of the investigation. Checks of related equipment on the Mobile Launcher Platform also are ongoing. ["Two orbiters in post-launch, prelaunch processing," **KSC Countdown**, October 24, 2002.]

◆ NASA could again launch astronauts on expendable rockets, something it has not done since the days of Apollo, Administrator Sean O'Keefe wrote in a letter to a Texas congressman. The agency may speed development of a spacecraft to deliver crew members to and from the International Space Station. If so, O'Keefe wrote, it might mean launching the new vehicle on rockets related to the models used to boost Americans to space and then the moon in the 1960 and '70s. The Space Launch Initiative, a \$5 billion program charged with finding a reusable launch vehicle to replace the shuttle, finished a study in June on a multipurpose vehicle that could carry astronauts to and from the station instead of a single-purpose escape craft, O'Keefe said. The administrator told U.S. Rep. Ralph Hall, D-Texas, the one reason NASA stopped work on its X-38 crew-return vehicle was the singular purpose of the craft. O'Keefe said such a crew-return vehicle might cost \$3 billion, but it would make more financial sense to construct a multi-purpose ship that could ferry crew members to and from the space station. ["NASA considers rockets to transport station crews," **Florida Today**, October 24, 2002, p 1A & 4A.]

October 25: A military navigation satellite will not go into space on time next week because workers damaged its Delta 2 rocket while assembling it, the Air Force said. The accident happened Friday at Launch Complex 17 at Cape Canaveral Air Force Station, when a workers operating a crane inadvertently hoisted the satellite and the third stage of the rocket after those two segments were connected to the lower stages of the Delta 2. ["Assembly mishap delays upcoming Delta 2 launch," **Florida Today**, October 30, 2002, p 1A.]

October 26: The Solar Radiation and Climate Experiment (SORCE) was shipped to Kennedy Space Center, Fla., on October 25 to begin launch preparations. The spacecraft left Orbital Sciences Corporation in Dulles, Va., on the 25th and arrived at Kennedy Space Center on October 26 for final tests and integration with the Pegasus XL rocket for launch this winter. Web posted. (2002). [SORCE Shipped to Kennedy [Online]. Available WWW: <http://www.spacedaily.com/> [2002, November 1].]

October 28: NASA Administrator Sean O'Keefe canceled plans to attend a Space Coast event with Republican Congressional candidate Tom Feeney after airplane problems in Washington on Monday. The administrator took some personal time off from his normal duties to fly down to Florida to appear with Feeney, who is running for a District 24 seat in the U.S. House of Representatives. The joint event was billed as a town hall meeting where space industry officials could ask O'Keefe and Feeney questions about NASA. O'Keefe probably will not make it back to the Space Coast before elections next Tuesday. ["Plane trouble cancels NASA town meeting," **Florida Today**, October 29, 2002, p 3B.]

◆ The International Space Station partners are looking beyond their individual financial difficulties to solidify construction plans through 2008 and ensure the Russians can supply Soyuz escape capsules until NASA builds a replacement. NASA's station program manager, Bill Gerstenmaier, said Monday the international partners agreed to a modified launch schedule for Japanese, European and Canadian components earlier this month. At the same meeting in Houston, the partners discussed the Russians' ability to build more Soyuz spacecraft beyond 2006. The United States plans to finish construction of its currently planned portion of the station, through the installation of Node 2, by 2004. All of the currently planned parts would be in orbit by 2008 under the new plan, Gerstenmaier said. ["Space station partners OK modified launch schedule," **Florida Today**, October 29, 2002, p 1B & 5B.]

◆ NASA and contractor engineers are working “around the clock” to find out why one of two circuits used to detonate the massive bolts holding the shuttle Atlantis to the launch pad failed to fire earlier this month. While the healthy circuit operated normally and all eight of the “hold down” bolts anchoring the shuttle vehicle to the pad detonated as required, a failure in such a “crit-1” system is of some concern. As such, the issue must be resolved before the shuttle Endeavour can be cleared for launch Nov. 10 or 11 on the next space station assembly flight. NASA managers plan to meet Thursday for a traditional flight readiness review to assess Endeavour’s ground processing and to set an official launch date. Liftoff from pad 39A at the Kennedy Space Center currently is targeted for between midnight and 4 a.m. EST Nov. 10. Web posted. (2002). [Engineers study glitch in shuttle firing circuit [Online]. Available WWW: <http://www.spaceflightnow.com/> [2002, October 28].]

October 29: The TDRS-J satellite is scheduled to be launched Nov. 20 aboard a Lockheed-Martin Atlas IIA vehicle. The Atlas stage with its Rocketdyne MA-5A two-chamber booster engine and sustainer engine was erected on Pad 36-A on Oct. 9. The initial power application to the vehicle occurred on Monday, Oct. 14. This is the 24th and final Lockheed Martin Atlas IIA model launch vehicle (no solid rocket boosters) and has a 100 percent success rate. [“ELV update,” **KSC Countdown**, October 29, 2002.]

◆ The “moon trees,” grown from seeds that orbited the moon in Apollo 14 astronaut Stuart Roosa’s personal gear, now have offspring growing throughout the country. The story of the moon trees has gained more and more attention since NASA scientist Dave Williams, inspired by an Indiana schoolteacher who wanted to know more about her local moon tree, began tracking the trees. He has a Web site where he lists known trees, many of which were planted as part of 1976 bicentennial celebrations, including one at Kennedy Space Center’s Visitor Complex. [“Moon trees’ legacy spreads across U.S.,” **Florida Today**, October 29, 2002, p 1B & 2B.]

October 30: NASA will send humans beyond the International Station in this generation, NASA Deputy Administrator Fred Gregory said at the 7th Cape Canaveral Spaceport Symposium held at the Radisson at the Port in Cape Canaveral. “We’re going to move out of the stodgy old NASA, and we’re going to move into the future,” Gregory said. “And we’re going to do it when all of us are still alive.” Gregory talked of going to the moon, an asteroid or Mars and using the space station as a stepping stone. When humans go this time, Gregory said, they would conduct science research while they are there. He said he didn’t want Kennedy Space Center to turn into a “ghost town of gantries” like it was when he was a shuttle astronaut training in the 1970s. The way to keep that from happening is to plan. Kennedy Space Center Director Roy Bridges presented him with a painting of some planets that he hoped would remind him to “get us out of low-Earth orbit.” [“Deputy chief shares goals for future NASA,” **Florida Today**, October 30, 2002, p 3B.]

◆ NASA is talking with the two contractors who developed next-generation rockets about carrying the next-generation space shuttle. The space agency may announce whether it will launch astronauts aboard a rocket-launched ship instead of a shuttle when its next budget is made public in early 2003, some space officials suggested Tuesday at the Cape Canaveral Spaceport Symposium. The study is part of NASA’s Space Launch Initiative, which recently has refocused on its initial goals, SLI deputy program manager Dan Dumbacher said. The rocket concept is just one option under study, Kennedy Space Center Director Roy Bridges said. [“NASA eyes rockets for space travel,” **Florida Today**, October 30, 2002, p 1B & 2B.]

October 31: Ten days are left until the next Shuttle launch of Endeavour on mission STS-113, Nov. 10. In Shuttle history to date, 133 spacewalks have been made by U.S. astronauts, 46 of them for ISS assembly and maintenance. Total EVA time on the Space Shuttle is 471 hours, 45 minutes. EVA time on the International Space Station totals 285 hours, 25 minutes. Mission STS-113 will add three spacewalks about 6.5 hours each to the list as Mission Specialists Michael Lopez-Alegria and John Herrington attach the first port-side truss, P1, to the Station. [“ISS assembly flights add to Shuttle history of EVA hours, number,” **KSC Countdown**, October 31, 2002.]

◆ Shuttle Endeavour will launch a day later than planned to give the crew of the International Space Station more time to catch up on sleep, after the Soyuz crew leaves just a few days earlier. Endeavour will launch early Nov. 11, between midnight and 4 a.m. A problem with the explosive nuts that release the

shuttle during launch, which occurred when Atlantis lifted off early last month, won't prevent Endeavour from flying, shuttle program manager Ron Dittmore said Thursday. He was at Kennedy Space Center for a flight readiness review. Intensive testing on Endeavour's mobile launch platform shows it's ready to go, he said, even though the investigation into the problem on Atlantis' platform is continuing. It's likely the problem is particular to the mobile launch platform Atlantis used, he said. Tests show the problem likely was not within shuttle Atlantis, who computer sends the signal to explode the nuts. ["Endeavour delay helps crew shift sleep cycle," **Florida Today**, November 1, 2002, p 1A.]

◆ The union that covers space workers in Brevard has filed a complaint alleging that NASA Administrator Sean O'Keefe and a contractor have been illegally campaigning for Republican congressional candidate Tom Feeney. The complaint, dated Oct. 31 and addressed to the Federal Elections Commission, claims: ■ Yang Enterprises Inc., a services subcontractor at Cape Canaveral Air Force Station and the Kennedy Space Center, held a mandatory meeting during work hours to encourage workers to protest in front of the office of Feeney's Democratic opponent, Harry Jacobs. ■ Supervisors and managers of Space Gateway Support passed out Feeney campaign literature and yard signs on federal property during work time. ■ O'Keefe is actively campaigning for Feeney. The federal Hatch Act prohibits most political activity on government property and its federal employees to use their authority to attempt to influence elections. Chris Hunt, president of the Transport Workers Union 525, which filed the complaint, said the Air Force and NASA have prevented him from handing out AFL-CIO voter education guides at KSC and the Cape, even though a court ruled them non-political. O'Keefe canceled an appearance at a Feeney event Monday because of travel problems. Even if he had made it, NASA spokesman Glenn Mahone said, no government resources would have been used. SGS officials said it has never endorsed anyone. Yang spokesman Sylvester Lukis said the charges are without merit. ["Union files complaint against O'Keefe," **Florida Today**, November 1, 2002, p 1B.]

During October: NASA may have to re-qualify the insulation it uses to protect the solid rocket motor cases on its space shuttle fleet from the burning solid fuel inside. ATK Thiokol Propulsion has been buying asbestos insulation from Canada's Jeffrey Asbestos Mine for at least 27 years, and the mine is closing. U.S. space agency officials traveled to Quebec last week to seek a way to continue procuring the Jeffrey material. If they can't find one, a new asbestos source probably would have to be qualified. Delays in the launch schedule are unlikely, NASA says, because stocks of qualified insulation and motors are on hand. ["Asbestos Warning," **Aviation Week & Space Technology**, October 28, 2002, p 21.]

NOVEMBER

November 1: NASA may someday outfit shuttles with a power converter to allow the orbiters to draw electricity from the International Space Station so the ships could dock at the orbiting lab for as long as a month. The shuttle fleet already has some capability for longer stays in space. An add-on in the cargo bay generates extra electricity needed to power the orbiter for 16 to 18-day trips instead of the standard 10- to 12-day missions. Three such flights are scheduled now, and two of the missions are destined for the station, in 2004 and again in 2008. The third, aboard Columbia, is a 16-day science mission that is supposed to launch Jan. 16, but will not make a stop at the station. The goal is to find ways to do more science on the station. Longer shuttle visits would help by providing more room, more time and more people for experiments. The already scheduled longer-duration flights are set for April 2005 and January 2008. Columbia and Endeavour are the only shuttles to have flown such missions, but Atlantis is wired to handle the EDO pallet too. ["NASA studies longer missions," **Florida Today**, November 2, 2002, p 1B & 2B.]

◆ The Liberty Star's usual mission is to fetch spent fuel tanks that drop from the space shuttle. But lately, the ship has been busier probing for answers to better coral conservation. Scientists hope sound shorts from the ship will help save a rare reef found only off East Central Florida. The sound waves that bounce back will tell them where the *Oculina varicosa* coral grows. Once they know that, they'll be able to tell whether the reef needs more protection. "We're trying to map the whole region," said John Reed, a researcher at Harbor Branch Oceanographic Institution in Fort Pierce. Reed recently returned from a weeklong expedition to scan the reef with multibeam sonar. Aboard the Liberty Star, he and other scientists scanned about two-thirds of the federal protected reef, from Fort Pierce to Melbourne. It's all part of a federal project to study the Oculina Bank, a jagged reef about 25 miles offshore that stretches from Fort Pierce to Cape Canaveral. The trip, which started Oct. 16, was an unusual excursion for a NASA boat into marine research. The space agency manages the Liberty Star. The vessel is operated out of Port Canaveral by United Space Alliance. ["NASA ship may help save reef," **Florida Today**, November 2, 2002, p 1A & 3A.]

◆ A nonprofit research group is hoping to set up a research laboratory near the Kennedy Space Center for study and research in the specialized field known as plasma. A group of area scientists and researchers called the Space Engineering Institute Inc. said its intentions are to build a 15,000-square-foot plasma research laboratory called the Spacecoast Plasma and High-Energy Electrostastics Research & Engineering Laboratory, or SphereLab, near KSC. The group hopes to have the first phase of SphereLab – about 5,000 square feet – completed by next June. Institute members are setting up a steering committee for the project and identifying suitable sites. ["Research group wants lab near KSC," **Florida Today**, November 2, 2002, p 1C.]

November 4: About 200 government and business representatives, scientists and engineers interested in NASA Kennedy Space Center's new environmental clean-up technologies will tour the Launch Complex-34 remediation site at the Cape Canaveral Spaceport Nov. 7. Representatives of the U.S. Environmental Protection Agency will also be attending. The two technologies are being demonstrated as part of the EPA's Superfund Innovative Technology Evaluation (SITE) Program. Areas of LC-34 were polluted during the early history of the space program with solvents used to clean Apollo rocket parts. The solvents are classified as dense non-aqueous phase liquids (DNAPLs). Left untreated in the ground, DNAPLs can contaminate fresh water sources. The touring group of national and international participants will view remediation demonstration zones at the L-34 site. They will hear presentations on two of the remediation technologies being used. One of the technologies is now available for licensing. "What makes these new technologies so attractive is that they are relatively affordable and easy to implement," said Dr. Jackie Quinn, the NASA environmental engineer who heads the project. "These spin-offs could help clean up polluted areas across the nation and the world." The technologies are Emulsified Zero-Valent Iron (EZVI) and bioaugmentation using KB1, a naturally occurring microbial species. Quinn is a co-inventor of EZVI with three University of Central Florida professors and a graduate student. KB1 was developed by GeoSyntec and the University of Toronto. Simply put, the EZVI technology uses iron particles in an environmentally friendly oil and water base to neutralize DNAPLs. Through KB1 bioaugmentation, microorganisms are added to a DNAPL-contaminated site to create the right mix of microorganisms that

will render contaminating chemicals harmless. Thousands of sites across the world face problems with DNAPL contamination. The EPA has reported that DNAPLs are present at 60 to 70 percent of all sites on the Superfund National Priorities List. DNAPL contamination sites may include those created by dye and paint manufacturers, dry cleaners, chemical manufacturers, metal cleaning and degreasing facilities, leather-tanning facilities, pharmaceutical manufacturers, adhesive and aerosol manufacturers and government facilities. ["Environmental Clean-Up Site Tour and Technology Demonstration," **NASA News Release #107-02**, November 4, 2002.]

◆ Ramon Lugo III has been appointed deputy director of the Expendable Launch Vehicles (ELV) & Payload Carriers Program at Kennedy Space Center (KSC), effective November 10, 2002. ["Ramon Lugo III Named Deputy Director, Expendable Launch Vehicles & Payload Carriers Program at Kennedy Space Center," **NASA News Release #108-02**, November 4, 2002.]

November 5: Preparations for the countdown and launch of Space Shuttle Endeavour from launch pad 39A continue on schedule. Aft closeouts were completed last week and aft doors installed. At the Flight Readiness Review Oct. 31, mission managers selected Nov. 11 as the launch date for STS-113, the launch window still between midnight and 4 a.m. Columbia continues with preparation for its research mission scheduled for no earlier than Jan. 16. Wheels and tires are installed and payload bay doors are closed for flight. Integrated hydraulic tests are scheduled for Wednesday. The orbiter is undergoing preparations to be mated with the solid rocket boosters and the external tank. On Atlantis, post-flight inspections from STS-112 continue in preparation for STS-114, scheduled to launch in March. Flowliner inspections are in work and the Forward Reaction Control System will be removed on Wednesday. The Orbiter Major Modification (OMM) period for Discovery continues. ["STS-113 launch date scheduled for Nov. 11," **KSC Countdown**, November 5, 2002.]

November 6: Moon rocks weren't enough. Neither was testimony from astronauts or even photographic evidence. So NASA has commissioned a mini-book to show that yes, indeed, Americans did land on the Moon. Most humans on Earth accept that U.S. astronauts first got to the moon aboard the Apollo 11 mission on July 20, 1969. But those who don't believe have created a sort of cottage industry of doubt, and that is what NASA wants to combat. "I'd been concerned for some time that there was this story that's circulating about how we never landed on the Moon and we would get, periodically, calls from people about how to respond to that, especially from teachers," said Roger Launius, NASA's former chief historian. Launius had long wanted to put together an educational aid for teachers and others who wanted to counter the doubters, and in September, NASA agreed to pay aeronautics engineer James Oberg \$15,000 to write a monograph gathering up materials answering the skeptics, point by point. The National Aeronautics and Space Administration has dealt with the controversy for decades, without much fanfare, but Launius said the questioning intensified in 2001 after the Fox television network aired "Conspiracy Theory: Did We Land on the Moon?" Web posted. (2002). [NASA throws book at moon hoaxers [Online]. Available WWW: <http://www.cnn.com/> [2002, November 6].]

November 7: Media representatives are invited to attend a special ceremony honoring astronaut John Herrington and the crew of STS-113. Herrington is the first tribal registered Native American astronaut. The ceremony is scheduled to begin on Sunday, Nov. 10 at 9:00 p.m. EST at the Kennedy Space Center's Visitor Complex—Rocket Garden, Kennedy Space Center, Fla. STS-113 will be the 16th Shuttle flight to visit the International Space Station. The Space Shuttle Endeavour will continue the outward expansion of the orbital outpost by delivering the P1 (Port-One) Truss. Also, Endeavour will deliver the Expedition Six crew to the Station and return the Expedition Five crew to Earth. The Space Shuttle launch is scheduled between midnight and 3 a.m. Monday, Nov. 11. ["Special Native American Send Off For NASA's Next Shuttle Mission," **NASA News Release #N02-71**, November 7, 2002.]

◆ Launch Complex 34 at the Kennedy Space Center was polluted during the early history of the space program with solvents used to clean Apollo rocket parts. NASA has been testing new techniques at the site and hopes to soon patent a new method for cleaning up chemical solvents they say could cut cleaning costs in half. For the past four years, the space center has been trying new techniques for cleaning up solvents near the launch pad where Apollo rockets blasted to the moon. Jackie Quinn, an environmental engineer for the space agency has developed a method with three University of Central Florida professors and a

graduate student. In August, they pumped 700 gallons of the cleaning mixture underground. The iron-oil-water mixture breaks down the solvents into nontoxic substances. At roughly \$15 to \$30 per pound of solvent removed, it's potentially half the cost of current methods, she said. Quinn expects the new method to be available for general use in the next six months. ["NASA shows off pollution-busters," **Florida Today**, November 8, 2002, p 3B.]

◆ In a distinguished federal service career that spanned a half-century, George W.S. Abbey today announced his retirement from NASA, effective January 3, 2003. Abbey leaves the agency after a highly decorated aerospace career, which included the Medal of Freedom, the nation's highest civilian award, for his role on the Apollo 13 Mission Operations Team. In February 2001, Abbey became the Senior Assistant for International Issues reporting to the NASA administrator. Subsequent, he was appointed as a Senior Visiting Fellow at the James Baker Institute for Public Policy at Rice University. He is also working with the University of Texas El Paso to enhance the University's engineering and science programs and encourage young students to pursue careers in science and engineering. "George helped to shape some of NASA's most difficult programs and missions as a true innovator and pioneer," said Administrator Sean O'Keefe. "Throughout his eminent career, George distinguished both himself and the agency. He leaves behind a legacy of excellence and dedication that the hardworking people of NASA will follow for years to come." Abbey joined NASA in 1964, as an Air Force Captain assigned to the Apollo Program. In December 1967 he left the Air Force and was named technical assistant to the JSC Center Director. In January 1976, he was named Director of Flight Operations, where he was responsible for operational planning and for the overall direction and management of flight crew and flight control activities for all human space flight missions. In 1983, he became Director of Flight Crew Operations Directorate, where he continued to be responsible for all Space Shuttle flight crews and center aircraft operations. Abbey was appointed Deputy Associate Administrator for Space Flight at NASA Headquarters in Washington in March 1988. In July 1990, he was selected as Deputy for Operations and senior NASA representative to the Synthesis Group, chaired by former Apollo astronaut Lt. Gen. Thomas P. Stafford, USAF (ret.), and charged with defining strategies for returning to the Moon and landing on Mars. In July 1991, Abbey was appointed Senior Director for Civil Space Policy for the National Space Council in the Executive Office of the President, and in 1992 he was named as Special Assistant to the NASA Administrator. Abbey was named Deputy Director of JSC in 1994 and was selected as the JSC Center Director in 1996. Born in Seattle on August 21, 1932, Abbey received his bachelor's degree in general science from the U.S. Naval Academy, Annapolis, Md., in 1954, and a master's degree in electrical engineering from the U.S. Air Force Institute of Technology, Wright Patterson Air Force Base, Ohio, in 1959. A pilot in the U.S. Air Force, Abbey had more than 4,000 hours in various types of aircraft before being detailed to NASA. This year, 2002, he was selected as a Distinguished Alumnus of the U.S. Air Force Institute of Technology. Abbey's numerous honors and awards include the NASA Exceptional Service Medal, the NASA Outstanding Leadership Medal, three NASA Distinguished Service Medals and the 1970 Medal of Freedom, which was presented by President Richard M. Nixon, for his distinguished civilian service in peacetime. He was the recipient of the Rotary National Award for Space Achievement in 1997. "George is a demanding leader who rarely accepts compromise," added Administrator O'Keefe. "His ability to motivate and inspire his staff to work harder and smarter helped NASA write much of its human space flight history. His devotion to the success of America's space program is unquestionable and I wish him the best." ["George W. S. Abbey Announces Retirement," **NASA News Release #02-215**, November 5, 2002.]

November 8: NASA has decided to build a new space plane to carry astronauts to and from the International Space Station, government officials said Friday. The proposed orbital space plane, which could be launched from Cape Canaveral aboard an emerging breed of rockets, is part of a sweeping overhaul of the space agency by NASA Administrator Sean O'Keefe. NASA said it will ask Congress, as early as Tuesday, to amend its current and future budgets to implement a newly finished Integrated Space Transportation Plan. In addition to the new vehicle, O'Keefe's plan calls for spending more money to upgrade the current shuttles so they can keep flying through at least 2015. Space agency officials declined to release details of their proposal Friday, preferring instead to signal their plans in a brief press release. O'Keefe is expected to reveal more, including specific budget figures, next week. ["NASA shuffles budget," **Florida Today**, November 9, 2002, p 1A & 3A.]

November 9: Following a review of Space Shuttle processing activities at Launch Pad 39A, mission managers today confirmed the launch of Space Shuttle Endeavour for Monday, Nov. 11, at the preferred launch time of 12:58:40 a.m. EST. The planned launch window on Monday extends from 12:53:39 - 1:03:39 a.m. EST with the preferred launch time reflecting a flight day three rendezvous and docking with the International Space Station. The launch window will be updated to coincide with the latest orbital position of the Space Station and will be announced at the T-9 minute hold. STS-113 is a scheduled 11-day mission with a planned KSC landing at about 8:17 p.m. EST on Nov. 21. This mission marks the sixteenth Shuttle flight to the International Space Station and the fifth Shuttle mission this year. Mission STS-113 is the 19th flight of the orbiter Endeavour and the 112th flight overall in NASA's Space Shuttle program. On mission STS-113, astronauts will deliver the Expedition Six crew and the Port 1 (P1) Integrated Truss Structure to the International Space Station. During the seven days Endeavour will be docked to the Station, three spacewalks will be performed dedicated to connecting the P1 truss to the port side of the S0 truss, already in place on the Station. The STS-113 crew includes Commander James Wetherbee, Pilot Paul Lockhart, and Mission Specialists Michael Lopez-Alegria and John Herrington, and Expedition Six crew members Commander Kenneth Bowersox, Donald Pettit, and Nikolai Budarin, a cosmonaut with the Russian Space Agency. ["Nov. 11 Shuttle Mission STS-113 Launch Time Announced," **NASA News Release #112-02**, November 9, 2002.]

November 10: The launch of shuttle Endeavour was delayed Sunday night because of a leak in a line that supplies oxygen to the astronauts. It will lift off no earlier than Nov. 18. It wasn't clear whether a second line that runs to the flight deck would supply enough oxygen to the astronauts, NASA spokesman George Diller said, and there was concern the leak could be worsened by the vibrations of launch. The seven astronauts were at the pad, but only two were in the orbiter at the time of the scrub. They removed part of their suits, got in their van and headed back to their temporary quarters at Kennedy Space Center. Shuttle program manager Ron Dittmore said the oxygen system that posed the problem checked out fine before the shuttle was moved to the launch pad but began to show signs of a possible leak just after technicians began pumping fuel into the shuttle's external tank Sunday. When Endeavour lifts off, it is slated to head to the International Space Station with a new port-side girder and a new station crew. ["Shuttle launch put off," **Florida Today**, November 11, 2002, p 1A & 3A.]

◆ As astronauts were on the pad preparing to board Endeavour late Sunday, Native Americans were holding a pre-launch ceremony in honor of astronaut John Herrington, the first member of a federally recognized tribe to go into space. Native American youth, elders and a Chickasaw dance troupe came from across the United States to participate in the ceremony in the shadows of rockets from early space flight in the rocket garden at the Kennedy Space Center Visitor Complex. Native Americans said their horizons have been broadened with Herrington's accomplishments. The space flight is a first for Herrington, who is a Chickasaw. ["Ceremony honors Herrington, rest of crew," **Florida Today**, November 11, 2002, p 3A.]

November 12: Lisa Malone, The Kennedy Space Center's associate director for external relations and business development, and USAF Lt. Col. Mike Rein, chief of public affairs for the 45th Space Wing at Cape Canaveral, have won the 2002 Harry Kolcum Memorial News and Communications Award for public affairs. The awards were presented by the National Space Club's Florida Committee. Kolcum was a former managing editor of *Aviation Week & Space Technology* who was also senior editor at the Cape from 1980-93. ["World News Roundup," **Aviation Week & Space Technology**, November 18, 2002, p 25.]

◆ The oxygen-leak problem aboard shuttle Endeavour was compounded Tuesday when workers looking for its source damaged the blanket that insulates the shuttle's robotic arm. The worry is that the arm itself could be damaged, NASA spokesman Bruce Buckingham said Tuesday night. That possibility is being investigated. "It's not a major process to reinstall the blanket, since we've already got access to it right there," he said. ["Repairs lead to new damage," **Florida Today**, November 13, 2002, p 1A.]

November 13: Nearly 170 workers in NASA's defunct launch-control system program are getting word this week of the layoffs they knew were coming. The project to upgrade Kennedy Space Center's 170s-era launch computers was canceled in September after running five years behind schedule and by as much as \$300 million over budget. The laid-off workers now face a difficult job market for engineers and tech workers. Lockheed Martin spokesman Ron Meder said about 117 of the company's 140 workers on the

project would begin receiving two-week layoff notices today. Lockheed has tried to find new jobs for them but has succeeded in finding work for just 23 employees. United Space Alliance said 50 of its workers in the program will receive layoff notices today. NASA Administrator Sean O'Keefe announced the termination of the checkout launch and control system project Sept. 17. ["NASA initiates expected layoffs," **Florida Today**, November 13, 2002, p 1A & 3A.]

◆ Workers at Kennedy Space Center pressurized Endeavour's oxygen system to test their repair of a leaky hose fitting Wednesday afternoon, while investigation of a scratch on the shuttle's robot arm continued. Workers had to use a platform to access the area near the top of the cargo bay, where the leak was located, and the platform tore the blanket covering the arm and scraped the arm Tuesday, NASA spokesman Bruce Buckingham said. Engineers are using X-rays and ultrasound to make sure none of the internal components of the arm were damaged. The external damage is a bit like a ding on a car – a 2-inch-long scratch with a dent about two-tenths of an inch deep. The evaluation could be finished tomorrow, and a patch, if necessary, could be in the works by Friday. ["Shuttle arm evaluation continues; leak fixed," **Florida Today**, November 14, 2002, p 1A & 2A.]

November 14: "Apollo 13" star and two-time Oscar winner Tom Hanks, Apollo 13 commander Jim Lovell and "Apollo 13" director Ron Howard attended a press conference at the Kennedy Space Center Visitor Complex. The three attended a benefit dinner and showing of the IMAX version of the film at the Visitor Complex. The Kennedy Space Center screening and dinner were part of a fund-raiser for the Astronaut Scholarship Fund, which provides college money for engineering and science students. Hanks has another space movie in the works, but he's not the star. He's helping pull together a large-format IMAX documentary using archival Apollo mission footage that will make people feel as if they're on the moon. "Magnificent Desolation" should take a few years to put together, he said. ["Celebrities share 'Apollo 13' stories," **Florida Today**, November 15, 2002, p 1A.]

November 15: NASA officials Friday said they were forced to delay the launch of Space Shuttle Endeavour to the International Space Station until next Friday to make way for a Boeing rocket blastoff. The inaugural launch of Boeing's unmanned Delta IV rocket was postponed from Saturday until no earlier than Tuesday because of a 90 percent chance of bad weather Saturday. The Delta IV and the Endeavour are sharing the same range facility, so the rocket's postponement also delayed the space shuttle. Web posted. (2002). [Shuttle to wait for Boeing to launch rocket [Online]. Available WWW: <http://www.cnn.com/> [2002, November 15].]

November 18: The NASA Advisory Committee's Advanced Space Transportation Subcommittee met with NASA officials at NASA headquarters to receive an update on the Space Launch Initiative, the \$4.8 billion program that was originally meant to develop a replacement for the shuttle. But the program is being reshaped to meet the agency's new goal of building a crew-only spacecraft that will carry astronauts to and from the International Space Station. The advisory panel's briefing was one of the first public venues at which space agency officials presented their new plan to an audience of experts. Advisory panel members reminded NASA officials that they thought they were headed toward a decision in 2006 that would commit the agency to a new kind of reusable launch vehicle that would replace the shuttle, lower the cost of access to space and increase safety for the astronauts who ride in the powerful machines. Within the past week, much of that direction was shelved in favor of the agency's new directive: to pursue an orbital space plane that could be ready to serve as a space station crew-return vehicle by 2010. Initially, the plane would be launched on rockets from Cape Canaveral. NASA plans to spend \$2.4 billion in the next five years to further develop the orbital space plane concept. The agency still needs congressional approval. ["Space plane plan frustrates advisory panel," **Florida Today**, November 19, 2002, p 4B.]

◆ For the past decade, Virgil "Gus" Grissom's Mercury 7 spacesuit has hung in a glass case at the Astronaut Hall of Fame. Now his 75-year-old widow says she plans to get it back. But National Aeronautics and Space Administration officials said Monday that the suit, which Grissom wore on his suborbital flight in 1961, belongs to the space agency. Gus Grissom, they said, checked it out in the 1960s for show and tell at one of his son's classes and never returned it. In a Nov. 8 letter from NASA to Delaware North Parks Services, which recently took over the Astronaut Hall of Fame, the space agency wrote that the "spacesuit, boots, gloves and helmet worn by Virgil I. 'Gus' Grissom as the sole property of

the U.S. Government and that Delaware North should not release these items to any parties without written direction from NASA.” NASA spokesman Robert Mirelson said the agency hasn’t decided where the spacesuit will be displayed. The Grissoms decided to retrieve the property after the private, not-for-profit museum was taken over earlier this year by Delaware North, which also has a contract with NASA to run the visitor center tourist attraction at Kennedy Space Center. NASA officials said they intend to return all of Gus Grissom’s other artifacts to the family today. [“Astronaut’s widow fights NASA,” **Orlando Sentinel**, November 19, 2002, p A1 & A4.]

November 19: Space Shuttle program managers have rescheduled the launch of Endeavour on the STS-113 mission to no earlier than Nov. 22. The new launch date avoids conflict with other launches planned from CCAFS, and allows shuttle engineers additional time to complete an ongoing evaluation of two open technical issues: replacement of another flexible hose and further analysis of the robotic arm’s condition after ultrasound inspections last week revealed some delamination of its carbon composite structure. [“New STS-113 launch date hangs on technical issues,” **KSC Countdown**, November 19, 2002.]

November 20: Relatives of the late astronaut Gus Grissom today plan to retrieve artifacts of his experience as one of the United States’ original seven space explorers on loan to the U.S. Astronaut Hall of Fame. But one item they will not get is Grissom’s spacesuit, which NASA says belongs to the government. NASA is considering displaying the suit at the Smithsonian Institution in Washington. The Hall of Fame was recently taken over by Delaware North Park Services, the same company that runs the Kennedy Space Visitor Complex for NASA. The company was being cautious in making sure all of its loan agreements were up to date. That’s when the Grissoms told the company they wanted the mementos back. That included the spacesuit which Betty Grissom donated to the Astronaut Hall of Fame believing that it belonged to her husband. The Grissom pressure suit is the one he wore on his suborbital flight aboard the Liberty Bell 7 space capsule on July 21, 1961. It was the second and final suborbital flight in the Mercury Project. [“Grissom’s kin, NASA fight over spacesuit,” **Florida Today**, November 20, 2002, p 1A & 2A.]

◆ For the second time in a week, Boeing decided to delay the debut launch of its Delta 4 rocket. The mission team rescheduled the liftoff for no earlier than 5:39 tonight. Liftoff did occur at 5:39 p.m. from a refurbished Pad 37B at Cape Canaveral Air Force Station. [“Boeing plans to launch Delta 4 rocket tonight,” **Florida Today**, November 20, 2002, p 2A. Web posted. (2002). [Delta 4 rocket’s debut successful [Online]. Available WWW: <http://www.floridatoday.com/> [2002, November 20].]

◆ Shuttle managers Wednesday gave Endeavour a green light for a Friday evening launch, saying test showed its damaged robot arm could withstand the stresses of liftoff and its job in space. “The arm has been cleared for flight, and the (oxygen) line issue has been resolved,” shuttle program manager Ron Dittmore said Wednesday night, referring to oxygen and nitrogen lines that were replaced after a leak delayed Endeavour’s planned Nov. 11 launch. Endeavour’s astronauts arrived at Kennedy Space Center on Wednesday, ready for Friday’s launch, which is scheduled to take place between 7 and 11 p.m. There’s an 80 percent chance of acceptable weather for liftoff. Also at KSC on Wednesday, shuttle Columbia rolled from a processing facility to the Vehicle Assembly Building to prepare for its January science mission. [“Endeavour crew arrives for another launch try Friday,” **Florida Today**, November 21, 2002, p 1A.]

November 21: Gus Grissom’s 75-year-old widow and eldest son retrieved the fallen astronaut’s personal effects Wednesday (November 20) from the Astronaut Hall of Fame. But the artifact his widow and son wanted most – Grissom’s Mercury 7 spacesuit – was still sealed in a glass case at the Titusville museum when the pair headed home to Houston. Although the Grissoms had the suit for nearly 30 years before lending it to the museum a decade ago, the National Aeronautics and Space Administration says it always has belonged to the government. “The suit will remain at the Hall of Fame until the ownership issue is resolved,” said the Grissoms’ Melbourne attorney, Jim Fallace. Fallace said NASA has been aware since 1965 that the family had the spacesuit. “It never was an issue until September of this year when Betty Grissom refused to sign a new loan agreement” with the museum, he said. During a meeting with NASA’s chief counsel Bruce Anderson and a Delaware North representative, the personal items were returned, ownership of the suit was discussed and the family’s lingering questions over the fire were heard, Scott Grissom said. Web posted. (2002). [Grissom’s relatives retrieve property, but spacesuit stays [Online]. Available WWW: <http://www.orlandosentinel.com/> [2002, November 21].]

November 22: Beautiful weather at Kennedy Space Center didn't help Endeavour on Friday night, when the shuttle launch was delayed because of rain at emergency landing sites in Spain. It was the second time a shuttle launch was postponed because of poor weather at abort-landing sites across the Atlantic Ocean. The last such delay was in November 1985. The next launch attempt is set for 7:49 tomorrow with a five-minute window. A third attempt, if needed, is expected Monday. ["Rain in Spain delays launch," **Florida Today**, November 23, 2002, p 1A.]

November 23: Shuttle Endeavour launched Saturday into a starry sky as it lifted off from Kennedy Space Center carrying a new crew and girder to the International Space Station. It leapt into space from launch pad 39A after overcoming minor technical issues and worries about gloomy weather overseas, which delayed Friday's attempt. Launch occurred at 7:49 p.m. Mission managers were looking at an instrument reading that indicated a fuel valve in one engine remained open after launch when it shouldn't have. The reading prompted them to use just one engine for fine-tuning of the shuttle's orbit about 40 minutes after launch. The issue, which is still under investigation, won't have an impact on the mission, shuttle launch integration manager Jim Halsell said. The 11-day mission is expected to end with Endeavour's return to KSC at 3:49 p.m. Dec. 4. ["Shuttle streaks to space station," **Florida Today**, November 24, 2002, p 1A & 3A.]

◆ The federal government must commit to revitalizing the United States' space launch infrastructure, most notably the civilian and military spaceport facilities here in Brevard County, according to a panel of experts studying the state of the country's aerospace industry. The Commission on the Future of the Aerospace Industry issued a report this week offering the Bush Administration recommendations on nurturing the industry. Like several other reports issued in recent months, the commission said the facilities at Cape Canaveral Air Force Station and Kennedy Space Center are in dire need of tender loving care. "NASA and DoD must maintain and modernize their space launch and support infrastructure to bring them up to industry standards," the report said. Like many other reports issued inside and outside NASA, the report says electrical systems are antiquated, ducts are collapsing and the gigantic Vehicle Assembly Building needs millions of dollars in repairs after decades of battling heavy wind and the Florida coast's generally corrosive weather. ["KSC needs TLC, experts say," **Florida Today**, November 24, 2002, p 3B.]

November 25: The TDRS-J spacecraft went to the pad yesterday for mating to the Lockheed Martin Atlas IIA launch vehicle. Launch from pad 36-A is scheduled for Dec. 4 between 9:42 and 10:22 p.m. EST. TDRS-J will help replenish the current constellation of geosynchronous TDRS satellites. The TDRS System is the primary source of space-to-ground voice, data and telemetry for the Shuttle. ["TDRS-J on the pad at CCAFS for launch Dec. 4," **KSC Countdown**, November 26, 2002.]

November 26: Two NASA contracts for test vehicles, awarded to The Boeing Co. and Lockheed Martin, will develop technology for an orbital space plane. Boeing will further develop its X-37 test vehicle. Lockheed Martin will develop an escape system for launch pad emergencies. ["NASA awards X-37 contracts," **Florida Today**, November 27, 2002, p 1A & 8A.]

During November: Space Hardware Optimization Technology Inc., a Greenville, Ind.-based company that develops and builds research hardware for the space shuttle and International Space Station, is selling space for experiments on a May 2003 flight of the shuttle Endeavour. The company's Advanced Separations processing Facility, which last flew in 1998, uses experiment "cassettes" about the size of a lunch box that costs about \$100,000 to fly. In the past, the hardware has been used for cell culture and for work on drug encapsulation, protein crystal growth and biochemical purification and extraction. ["Space Available," **Aviation Week & Space Technology**, November 25, 2002, p 17.]

DECEMBER

December 2: NASA's Tracking Data and Relay Satellite is set to fly on an Atlas 2A rocket from Cape Canaveral Air Force Station between 9:42 and 10:22 p.m. Wednesday, when there is a 70 percent chance of acceptable launch weather. It will join eight other satellites currently in orbit around the planet. This satellite will be the last of its generation. NASA is looking at designs for the next group of TDRS satellites. The first was launched 19 years ago, and many of them are reaching the end of the lives. ["Bug-eyed satellite awaits launch," **Florida Today**, December 3, 2002, p 2A.]

December 4: Although clouds prohibited shuttle Endeavour from landing on Wednesday, weather was good enough to allow the launch of a new satellite. "The weather rules for the Atlas rocket are much less strict," said NASA spokesman Rob Navias. The Atlas 2A rocket, built by Lockheed Martin, plowed through a low deck of night clouds, lighting them from above. Now, a new Tracking and Data Relay Satellite is on its way to join an aging armada of NASA communications satellites. The TDRS-J spacecraft rode into space at 9:42 p.m. from Pad 36A at Cape Canaveral Air Force Station. Web posted. (2002). [NASA launches Atlas 2A carrying communication satellite [Online]. Available WWW: <http://www.floridatoday.com/> [2002, December 4].]

December 5: Endeavour's landing on Dec. 4 was postponed due to low clouds in the KSC vicinity that would violate weather constraints at the time of landing. Forecasters predict an increase chance of showers and clouds during today's landing attempts, with Friday's weather showing improvement. Endeavour has two potential opportunities to land today, with the first of two landing opportunities available at 2:54 p.m. EST (deorbit burn occurring at 1:49 p.m.). The second landing opportunity would be 4:30 p.m. EST. Two opportunities are also available at KSC on Friday. Columbia awaits its roll out to Pad 39A in preparation for its launch scheduled for Jan. 16 for the Spacehab microgravity research mission. The orbiter was mated to its twin Solid Rocket Boosters and External Tank on Nov. 20. Atlantis continues to be processed for its March launch to the International Space Station. Auxiliary Power Unit leak and functional tests, and Master Events Controller verification are in work. Other work scheduled is the gaseous nitrogen servicing on the Environmental Control and Life Support System. ["Endeavour and crew still waiting for landing opportunity," **KSC Countdown**, December 5, 2002.]

December 7: NASA has chosen The Boeing Co.'s Delta 2 rocket to launch up to 19 scientific satellites between 2006 and 2009. The contract calls for 12 firm launches and options for seven more launches of medium class payloads. NASA would pay the Huntington Beach, Calif.-based Boeing Launch Services \$1.2 billion if 19 launches are picked up. Twelve of the launches will be from the Cape Canaveral Air Force Station and seven are planned from Vandenberg Air Force Base in California. Seven launches are scheduled in 2006, six in 2007, two in 2008, and four in 2009. ["Boeing lands Delta 2 contract," **Florida Today**, December 8, 2002, p 1B.]

◆ After a record three-day weather delay, the shuttle Endeavour landed at Kennedy Space Center on Saturday, bringing American Peggy Whitson and two Russian cosmonauts back to Earth after six months aboard the international space station. Under hazy skies, Endeavour's seven astronauts touched down at 2:37 p.m., with shuttle commander Jim Wetherbee and pilot Paul Lockhart at the controls. ["Shuttle touches down after record delay," **Orlando Sentinel**, December 8, 2002, p A3.]

◆ The Delta 2 rocket that was damaged in a crane accident in October is repaired and scheduled to fly January 29. The Air Force and rocket manufacturer The Boeing Co. met Dec. 4 and closed their review of the accident. On Oct. 25 at launch pad 17 at Cape Canaveral Air Force Station, a crane operator accidentally lifted the military satellite and the third stage of the rocket after they were attached to the lower portion of the rocket. The Air Force reported no damage to the Global Positioning Systems satellite. No one was injured. ["Repaired rocket cleared for launch," **Florida Today**, December 8, 2002, p 1B.]

December 9: Despite rain showers in parts of central Florida, workers slowly lugged shuttle Columbia out to its launch pad. It first peeked out the Vehicle Assembly Building at 7:35 a.m. Drops of rain started sprinkling over Kennedy Space Center about 8:50 a.m., when the shuttle was about a quarter-mile into its

3.4-mile journey to Pad 39A. NASA officials said the shuttle was not damaged during the ride. However, it cannot fly through the rain because at such high speeds, the rain can damage. The tiles that protect the shuttle from heat during re-entry are waterproofed specifically for rain while it is moving to and sitting on its launch pad, Kennedy Space Center spokesman George Diller said. The protective gantry was rotated around the shuttle once it got to the pad to keep it safe from the weather. Columbia, the eldest orbiter, is being prepared for its Jan. 16 science mission. . Web posted. (2002). [Columbia rolls out in the rain [Online]. Available WWW: <http://www.floridatoday.com/> [2002, December 10].]

December 11: The task force that last year delivered a blistering assessment of NASA's international space station program now has much greater confidence in the project, the panel's chairman said Wednesday. The National Aeronautics and Space Administration has made changes to the program's budget, management structure and team, and taken steps to determine which on-board experiments hold the most scientific promise. The combination impressed the task force, said Thomas Young, a former president of Martin Marietta who led the group. "The right things have been done to make it a credible program," Young told the NASA Advisory Council. ["Space station soothes its toughest critics," **Orlando Sentinel**, December 12, 2002, p A16.]

◆ **ISS Update:** On Wednesday, the Starboard 6 (S6) truss segment, the 11th and final piece of the Space Station's football-field-long backbone and one of few station components fabricated in Houston, was flown to KSC aboard NASA's Super Guppy aircraft. The truss will be processed at KSC for launch aboard the Space Shuttle on assembly flight 15A in early 2004. The mission will also include the fourth and final set of U.S. solar arrays delivered to the Station. ["Final segment of ISS backbone arrives at KSC," **KSC Countdown**, December 12, 2002.]

ELV Update: The launch of the ICESat (Ice Cloud and land Elevation Satellite) and CHIPSat (Cosmic Hot Interstellar Plasma Spectrometer) polar-orbiting satellites for NASA aboard a Boeing Delta II rocket is scheduled to occur on Thursday, Dec. 19. Liftoff will be from Space Launch Complex 2 (SLC-2) at Vandenberg Air Force Base, Calif. The 45-minute launch window extends from 7:45 p.m. – 8:30 p.m. EST. ICESat will be launched into an orbit of 375 statute miles while CHIPSat will be launched into a polar orbit of 350 miles. ["Next NASA ELV Launch to improve life on Earth, look for life beyond," **KSC Countdown**, December 12, 2002.]

December 12: Workers overhauling shuttle Discovery found a cracked ball joint inside a liquid oxygen pipe late Tuesday (December 10) night, prompting NASA to look at Atlantis and Endeavour to see whether the problem exists throughout the fleet. Shuttle program managers at Johnson Space Center in Houston so far have decided not to inspect the plumbing in Columbia, which was rolled out to the pad Monday for a Jan. 16 launch. NASA does not expect to find such a crack in Columbia, which two years ago underwent the same kind of overhaul that Discovery is being subjected to this year. However, if the same ball joint is found damaged in the checks of Atlantis or Endeavour, shuttle managers could change their minds. Inspection of Columbia would be difficult, if not impossible, while it sits vertically on its mobile launch platform. A decision to roll the shuttle back from the launch pad to inspect or repair parts inside Columbia's fuel pipes would delay the 16-day scientific mission. Web posted. (2002). [Workers find crack in shuttle Discovery, prompting possible inspection of entire fleet [Online]. Available WWW: <http://www.floridatoday.com/> [2002, December 12].]

◆ A dot.com tycoon has picked Cape Canaveral as a launch site for a new breed of rockets that could lift half-ton satellites for about half the current market price, state government officials said Thursday. Space Exploration Technologies Corp., or SpaceX, plans to launch its proposed Falcon rocket from a state-owned pad at Space Launch Complex 46, Gov. Jeb Bush and Florida Space Authority officials said. The Falcon, which could launch for the first time as early as 2004, is a two-stage, kerosene-fueled vehicle that would carry about 1,000 pounds to low-Earth orbit. ["Company to launch small rockets for less cost," **Florida Today**, December 13, 2002, p 1A.]

◆ NASA assigned former Idaho teacher Barbara Morgan to a shuttle flight. She is scheduled to fly on Nov. 13, 2003 on STS-118, an 11-day mission aboard Columbia that will deliver and install the second-to-last truss segment to the International Space Station. As part of her duties, Morgan will choreograph three

complicated spacewalks from inside the shuttle. During re-entry, she will sit on the flight deck and help the pilot and commander with landing. ["Teacher set for space," **Florida Today**, December 13, 2002, p 1A & 4A.]

December 13: The last two men to walk on the moon took one of the first walks Friday through the reopened Astronaut Hall of Fame. Peering at the relics of space history, Apollo 17 astronauts Gene Cernan and Harrison "Jack" Schmitt toured the Hall before its reopening this weekend. They saw the spacesuits, capsules and hardware of the Apollo era. "Every time you look at them, you see things that you forgot about," Schmitt said. "Even if you're in the middle of the program as an astronaut, you may not know all that's going on." It also was 30 years ago that they left the moon in their lunar module "Challenger." At the time of their tour Friday, they would have been asleep in the lunar module, getting ready for their third and final walk. The Hall of Fame has been closed for two months. The hall and U.S. Space Camp Florida were foreclosed on by SouthTrust Bank of Alabama for millions of dollars in unpaid debts. The bank bought the property at a foreclosure auction earlier this year and then leased it back to Delaware North, which has been working to refurbish exhibits and then reopen the museum as a complimentary tourist attraction to the Kennedy Space Center Visitor Complex. . Web posted. (2002). [Apollo 17 crew tours remodeled space hall [Online]. Available WWW: <http://www.floridatoday.com/> [2002, December 13].]

December 16: Technicians have found no more cracks like the one detected in a part in shuttle Discovery last week, but inspections are continuing. The crack was in a plum-size metal ball that is part of a support inside a liquid oxygen line. No cracks were found inside Atlantis, NASA spokesman James Hartsfield said, and further inspections of Discovery are on hold while Endeavour's inspections are completed. Discovery is undergoing a major overhaul at Kennedy Space Center. The crack was discovered during standard inspections. Web posted. (2002). [NASA finds no more shuttle cracks [Online]. Available WWW: <http://www.floridatoday.com/> [2002, December 17].]

December 17: For the third consecutive day weather delayed the launch of a Titan 2 booster from Vandenberg Air Force Base in California while a technical problem has pushed back a Delta 2 launch from the same site until next month. The Titan 2 was scheduled to lift off early Tuesday to place Coriolis, a military research spacecraft, into orbit, but poor weather forced controllers to scrub the launch for the third day in a row. Tuesday was to be the last chance to launch the Titan 2 until at least next week because a Delta 2 was scheduled to lift off from Vandenberg late Thursday afternoon. Web posted. (2002). [Titan, Delta launches delayed [Online]. Available WWW: <http://www.spacetoday.net/> [2002, December 17].]

◆ Shuttle Update: Discovery-- An engineering evaluation continues following the discovery of a surface crack found during standard Orbiter Maintenance and Modification (OMM) inspections. The crack, located on a 2.25-inch-diameter metal ball, is associated with the Ball Strut Tie Rod Assembly (BSTRA) inside Discovery's 17-inch liquid oxygen line. Further inspections of Discovery's 17-inch and 12-inch lines have found no cracks, although the inspections have not been completed. Columbia -- Prelaunch preparations continue at Pad 39A for Shuttle Columbia's Jan. 16 launch on the Spacehab microgravity research mission. Preparations are complete for loading hypergolic reactants on the Shuttle, with loading scheduled to begin yesterday. The Helium Signature Test is complete. The crew will arrive to participate for the Terminal Countdown Demonstration Test scheduled for later this week. No inspections are planned on Columbia related to the BSTRA ball crack evaluation. Atlantis -- Atlantis continues to be processed for its March launch to the International Space Station. Preparations for the Payload Premate Test are in work. As part of the analysis under way of the crack found in the BSTRA ball on Discovery, technicians completed an inspection of Atlantis' lines and found no cracks. Technicians installed Atlantis' three Space Shuttle Main Engines on Saturday. Endeavour -- Deservicing and processing continues for the STS-115 mission to the International Space Station scheduled in May 2003. Heat shield removal is complete and technicians have begun removing Endeavour's three Space Shuttle Main Engines. Inspections are under way of the BSTRAs on Endeavour to gather data to be used in the analysis of a crack found in an assembly on Discovery. The inspections of Endeavour have found no cracks so far. ["Orbiters being inspected for cracks like those found in Discovery," **KSC Countdown**, December 17, 2002.]

◆ Shuttle Columbia came out of its last overhaul as less of a ship, at least where weight is concerned. That weight loss has made it more of a ship, too, in that it will be able to haul more cargo on its first

mission to the International Space Station. The overhaul, completed in late 2001, cost \$145 million. NASA's oldest orbiter is scheduled to fly to the station for the first time in November 2003, carrying a new girder and shuttle crew that will include former Idaho teacher Barbara Morgan. Meanwhile, Columbia's next jaunt is scheduled for Jan. 16, when it will fly a research mission. The crew, including Israel's first astronaut, arrived Tuesday at Kennedy Space Center for its countdown test this week. The plan to put Columbia on space station missions for the first time was a natural decision given its renovations, altered goals and the station's needs. ["Mission requires weight loss," **Florida Today**, December 18, 2002, p 1A & 3A.]

December 18: An inspection of liquid oxygen lines in the space shuttle Atlantis found no evidence of cracks like the ones found earlier this month in Discovery. An inspection of Atlantis found that bearings used to support a liquid oxygen line were intact and did not have any cracks like the one found on a bearing in Discovery. The crack in Discovery prompted the check of Atlantis because of concerns that the problem could be a fleet-wide issue like one earlier this year that grounded the shuttle fleet over the summer. Because Atlantis had no problems, there are no plans to inspect Columbia, currently on the launch pad for a mid-January launch. Web posted. (2002). [No cracks found in shuttle Atlantis [Online]. Available WWW: <http://www.spacetoday.net/> [2002, December 18].]

December 19: ELV Update: The launch of NASA's ICESat and CHIPSat spacecraft aboard a Boeing Delta II expendable launch vehicle from Vandenberg Air Force Base, Calif., has been postponed. During a review of test data, a problem within an ordnance box was found. The difficulty is associated with the signal this unit provides for launch vehicle devices to unlatch and separate the payload fairing. The removal and replacement of this unit and the associated retest will take approximately two weeks. Launch is currently targeted for no earlier than Jan. 8, 2003, if the work can be completed as planned. ["Satellite launch at Vandenberg encounters signal problem -- launch delayed," **KSC Countdown**, December 19, 2002.]

◆ The Astronaut Hall of Fame, Kennedy Space Center Visitor Complex's newest attraction chronicling the personal side of the NASA story, has opened its doors to the public. A formal grand opening celebration and unveiling of new educational programs at the Hall of Fame will take place in Spring 2003. The Visitor Complex acquired the Astronaut Hall of Fame in late September on behalf of NASA and made it an official part of the Visitor Complex experience. Since that time, the facility, located on State Road 405 in Titusville, has undergone more than \$700,000 in improvements, from new paint to upgraded computer systems. ["Visitor Complex adds Astronaut Hall of Fame to space attractions," **KSC Countdown**, December 19, 2002.]

December 20: A company that provides security at Kennedy Space Center did not discriminate against minority employees seeking promotions, a federal jury decided Friday. After about 10 hours of deliberation in federal district court, a 10-person jury found in favor of Space Gateway Support Co. and against 10 black employees seeking nearly \$11 million in punitive damages for race discrimination. SGS won a 10-year, \$2.2 billion contract with NASA and the Air Force in 1998, beating out EG&G Florida and Johnson Controls. Before SGS took over, the plaintiffs argued, there were 14 black security supervisors, but that number soon dwindled to zero. At the time the contract was announced, NASA and the Air Force said they hoped to reduce operating costs by \$900 million, a goal that was anticipated to result in substantial layoffs. ["Judge: Security firm at KSC did not racially discriminate," **Florida Today**, December 21, 2002, p 3B.]

◆ As 2002 draws to a close, NASA's Kennedy Space Center (KSC) is in an ongoing celebration of its 40th year as America's premier gateway to the stars. Designated the Launch Operations Center on July 1, 1962, the year saw the accomplishment of ten successful launches in addition to the unveiling of a new Master Plan for the Cape Canaveral Spaceport and displaying leadership in the areas of environmental stewardship, research and technology project development, educational initiatives, and safety and health performance. Between March and November 2002, KSC launched five Space Shuttle missions: the Hubble Space Telescope Servicing Mission and four assembly flights to the International Space Station (ISS). During the past 12 months, more than 56,000 pounds in components have been added to the Space Station, including the S0, S1 and P1 trusses. The Station's backbone of trusses, launched from KSC, now stretches almost 133 feet. As a result, the previous internal volume, compared to an efficiency apartment, has

increased to that of a three-bedroom house. The year also included launch and assembly of the Mobile Transporter, the first "space railroad," and two Crew and Equipment Translation Aid (CETA) carts. The physical growth of the Station has brought its purpose of scientific research and experiment to the forefront. Experiments on the Station attained more than 90,000 hours of operating time. Of these, 65 U.S. investigations were conducted, as well as many international studies. The KSC team also managed five successful Expendable Launch Vehicle (ELV) launches in 2002: the High Energy Solar Spectroscopic Imager (HESSI), Feb. 5; Tracking and Data Relay Satellite-I (TDRS-I), March 8, and Tracking and Data Relay Satellite-J (TDRS-J), Dec. 4; Aqua EOS (Earth Observing System), May 4; and the National Oceanic and Atmospheric Administration-M (NOAA-M) satellite, June 24. Two of these launches were from pads at Vandenberg Air Force Base, Calif., and three from Cape Canaveral Air Force Station (CCAFS), adjacent to KSC in Florida. ["Kennedy Space Center reflects on 2002, prepares for 2003," **NASA News Release #131-02**, December 20, 2002.]

December 21: NASA overhauled its \$5 billion program to replace the shuttle when it realized there was no way it could afford to build a fleet of new ships according to Bush administration budget documents obtained by *Florida Today*. Four different independent estimates commissioned by NASA found the cost of developing and building a fleet of fully functional reusable vehicles to replace the shuttles would be \$30 billion to \$35 billion, according to a memo the administration sent Congress to justify shuffling billions of dollars in NASA's 2003 budget. The memo provides the most detailed explanation yet about why NASA refocused Space Launch Initiative on building a fleet of cheaper vehicles that meet the more immediate need to get astronauts to and from the International Space Station. When SLI was born, NASA believed the government and private companies would share the cost of developing the reusable launch vehicle (RLV) and spacecraft because of potential commercial applications. The price tag: about \$10 billion. "These key assumptions have proven too optimistic," the agency said in its presentation to congressional budget writers. ["Launch initiative scrapped over cost," **Florida Today**, December 22, 2002, p 4A.]

December 24: The twin rovers that will launch from Cape Canaveral next summer and ramble across Mars in early 2004 are yet to be named. Right now, they're known by the monikers "Mars Exploration Rovers" – or MER-A and MER-B. NASA is collaborating with the Planetary Society and LEGO Co. to get school children involved in a contest to name the two robotic explorers. Kids can submit entries until Jan. 31, 2003. NASA plans to announce the winners before the first launch, set for May 30. ["NASA sponsors contest for kids to name Mars rovers by Jan. 31," **Florida Today**, December 25, 2002, p 1A & 2A.]

December 28: All 10 NASA centers will be connected to a central accounting system in 2003, resolving a long-criticized weakness that government auditors have said contributed to the space agency's \$5 billion cost overrun on the International Space Station. Administrator Sean O'Keefe, in his first full year on the job, made a centralized financial computer system a top priority after the General Accounting Office repeatedly ripped NASA for not have a system that let managers share up-to-date financial and project status information. The Core Financial System already has been installed at Glenn Research Center in Ohio and Marshall Space Flight Center in Alabama. The remaining eight centers will begin using the system, a couple at a time, in the first half of 2003. All centers are supposed to be on the system by July, O'Keefe said. The new system will provide live information on equipment, travel and project spending -- among other things -- so that people at Headquarters making decisions can know what is happening fiscally at Johnson Space Center in Houston or Kennedy Space Center in Brevard. ["NASA plan fixes accounting woes," **Florida Today**, December 29, 2002, p 1B & 2B.]

APPENDIX A

Space Shuttle Missions

Mission	Launch Vehicle	Launch/Landing Date	Launch / Landing Site
STS-109	Columbia	March 1 – 12, 2002	39A / KSC
STS-110	Atlantis	April 8 – 19, 2002	39B / KSC
STS-111	Endeavour	June 5 – 19, 2002	39A / EAFB
STS-112	Atlantis	October 7 – 18, 2002	39B / KSC
STS-113	Endeavour	November 23 – December 7, 2002	39A / KSC

Expendable Missions

Payload	Launch Vehicle	Launch Date	Launch Site
HESSI	Pegasus XL	February 5, 2002	CCAFS
TDRS-I	Atlas II	March 8, 2002	36A / CCAFS
AQUA-EOS PM	Delta	May 4, 2002	SLC-2W / VAFB
NOAA-M	Titan II	June 24, 2002	SLC-4E / VAFB
CONTOUR	Delta	July 3, 2002	17A / CCAFS
TDRS-J	Atlas IIA	December 4, 2002	36A / CCAFS

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