# Chronology of KSC and KSC Related Events for 2004

*Elaine E. Liston*

NASA/TM-2005-211539 February 2005

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## FOREWORD

This 2004 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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NASA Administrator Sean O'Keefe (right) is accompanied on stage in the Press Site Auditorium by Center Director Jim Kennedy for a report to employees on the state of the Agency. The update was broadcast live via NASA Television. O'Keefe focused on the achievements of 2004 and the goals set for 2005. His remarks emphasized the milestones met in NASA's Vision for Space Exploration, including the launch of the comet-chasing Deep Impact mission and the landing of the Huygens probe on Jupiter's moon Titan, both occurring in the past two days, and the progress made in meeting the requirements to return the Space Shuttle to flight.

## JANUARY

**January 1:** The Boeing Co. won a $1 billion contract extension from NASA on Wednesday (December 31, 2003), continuing as the prime contractor for delivering and maintaining equipment and software for the International Space Station. The new contract is the latest move in a two-year effort by the space agency to consolidate 26 space station contracts into seven. The main reason is to cut costs as the focus of the station project shifts from building the pieces to operating the lab in space. How much money taxpayers will save is not yet known. The deal announced Wednesday will last 2 years and nine months, but NASA and the contractor could agree to as many as four more six-month extensions. If that happens, the deal could be worth as much as $1.69 billion. Work on the contract is done at Kennedy Space Center in Brevard County as well as NASA centers in Houston and Huntsville, Ala. In addition to delivering and maintaining equipment and software, the contract includes management and engineering services for most of the space station's subsystems. Web posted. (2004). [Boeing wins $1 billion contract from NASA [Online]. Available WWW: http://www.floridatoday.com/ [2004, January 1].]

**January 2:** NASA's Stardust probe survived a plunge through the tail of a comet 242 million miles from Earth on Friday, capturing particles of the primordial dust that formed our solar system. If all goes well, Stardust will deliver the particles to Earth in a little more than two years. ["Stardust probe catches tail end of old comet," **Orlando Sentinel**, January 3, 2004, p A1 & A10.]

**January 3:** The Mars rover Spirit beamed crystal-clear photos from the planet's Gusev Crater to Earth just after 2:30 a.m. EST, the first images from the surface since the little Pathfinder rover landed seven years ago. It's designed to spend three months journeying from rock to rock in what might be an ancient lakebed. Web posted. (2004). [We're on Mars [Online]. Available WWW: http://www.floridatoday.com/ [2004, January 4].]

**January 4:** The following is a statement from NASA Administrator Sean O'Keefe regarding Saturday's successful landing of the first Mars Excursion Rover (MER), Spirit, on the Martian surface. "Congratulations to the Mars Rover team on achieving a successful landing on the surface of Mars by the Rover Spirit. This amazing feat, coming so soon in the New Year, is a tribute to the dedication to the many men and women throughout NASA and our many partners who worked extremely hard to give our amazing rovers the best chance for success on their mission of exploration on the Red Planet. "In a few weeks, Spirit's twin Opportunity will be landing on the other side of the planet. The rovers will soon begin their mission to search the rocks of Mars for signs that water may have been present for long periods of time--signs that may tell us whether Mars could have been hospitable to life in the past." ["NASA Administrator Marks Successful Spirit On Mars," **NASA News Release #04-001**, January 4, 2004.]

**January 5:** NASA Administrator Sean O'Keefe today named D. Lee Forsgren as the agency's new Assistant Administrator for Legislative Affairs, effective immediately. Forsgren succeeds Charles T. Horner III, who will continue to serve the agency as a

special assistant to the Office of NASA Administrator. [“NASA Names Assistant Administrator For Legislative Affairs,” **NASA News Release #04-006**, January 5, 2004.]

◆ NASA's high-anxiety landing on Mars marked a turning point for an agency still reeling from the loss last year of a $2 billion shuttle and seven astronauts, officials said Sunday. Against long odds, NASA's Mars Spirit rover survived a chancy landing on the surface of the red planet late Saturday. And in the wake of the Feb. 1 Columbia disaster, the stakes could not have been higher. "You could really tell this was a crucial point for the agency," said Chuck Dovale, a senior launch director with the NASA team that launched Spirit in June aboard a Boeing Delta rocket from Cape Canaveral Air Force Station. Added colleague Albert Sierra, NASA's mission integration manager for the Spirit spacecraft at Kennedy Space Center: "The agency could not afford any more failures." Three weeks before the Mars craft arrived at KSC, Columbia disintegrated over eastern Texas. Said Omar Baez, who served as NASA's launch director for both the Spirit and Opportunity missions "This was my New Year's celebration. I partied more (Saturday) night than I did on New Year's Eve." Web posted. (2004). [Success elevates spirits at KSC [Online]. Available WWW: http://www.floridatoday.com/ [2004, January 5].]

◆ It was a day of pride, enthusiasm and hope for space exploration enthusiasts as hundreds of tourists from around the globe streamed into the Kennedy Space Center just hours after the rover's long-awaited landing. The 400-pound rover, the first of two to land on Mars, was launched from Cape Canaveral Air Force Station in June. The Spirit, which is expected to leave the lander in several days, will be used to help determine whether the planet -- now about 105 million miles away from Earth -- has ever supported water or life. [“Mars landing brings hope,” **Florida Today**, January 5, 2004, p 1B & 2B.]

◆ NASA’s reconstituted Aerospace Safety Advisory Panel has its first meeting Jan. 29. Up for discussion are the space shuttle, International Space Station and related programs. The meeting at agency headquarters will be the first since the old ASAP resigned en masse after it was criticized by the Columbia Accident Investigation Board. The current panel will report quarterly, and be able to draw on the technical expertise of the new NASA Engineering and Safety Center at Langley Research Center, VA. [“ASAP Meeting,” **Aviation Week & Space Technology**, January 5, 2004, p 21.]

**January 6:** NASA Administrator Sean O'Keefe today announced plans to name the landing site of the Mars Spirit Rover in honor of the astronauts who died in the tragic accident of the Space Shuttle Columbia in February. The area in the vast flatland of the Gusev Crater where Spirit landed this weekend will be called the Columbia Memorial Station. Since its historic landing, Spirit has been sending extraordinary images of its new surroundings on the red planet over the past few days. Among them, an image of a memorial plaque placed on the spacecraft to Columbia's astronauts and the STS-107 mission. The plaque is mounted on the back of Spirit's high-gain antenna, a disc-shaped tool used for communicating directly with Earth. The plaque is aluminum and approximately six inches in diameter. The memorial plaque was attached March 28,

2003, at the Payload Hazardous Servicing Facility at NASA's Kennedy Space Center, Fla. Chris Voorhees and Peter Illsley, Mars Exploration Rover engineers at NASA's Jet Propulsion Laboratory, Pasadena, Calif., designed the plaque. [“Space Shuttle Columbia Crew Memorialized on Mars,” **NASA News Release #04-009**, January 6, 2004.]

**January 8:** President Bush will announce next week a plan to send astronauts to the moon within 10 years and later on to Mars. The White House and NASA announced late Thursday that the President will announce new goals for the U.S. space program in Washington sometime next week. They would not discuss details, but the head of a grassroots space advocacy group told Florida Today that a senior Bush administration official told him the plan calls for human expeditions to "the moon and beyond." [“Bush shoots for moon, Mars,” **Florida Today**, January 9, 2004, p 1A & 5A.]

**January 11:** President Bush's new vision for NASA will be a double-edged sword for Florida, one that abandons the agency's space shuttles while securing Brevard County's future as the nation's space gateway for two decades. Six days before his last State of the Union address of his first term, and just as his re-election campaign kicks off, Bush on Wednesday (January 14) will unveil a plan to send U.S. astronauts back to the moon and eventually on to Mars. Independent experts expect Bush to direct NASA to start development work for a lunar base that could serve as a proving ground for subsequent missions to Mars, asteroids and other destinations. NASA's shuttles will be retired when construction of the International Space Station is finished around 2010 -- about the time they would have to undergo an expensive recertification program to continue flying. A new spaceship based on a proposed capsule-like design for NASA's planned Orbital Space Plane will be developed to transport crews. Robotic lunar orbiters and rovers will fly scout missions beginning in 2013, paving the way for humans to follow. The U.S. also would launch a crew on a mission to circle Mars, but not land, around 2020. NASA will rely heavily on existing rockets, such as The Boeing Co.'s Delta 4 and the Lockheed Martin Corp.'s Atlas 5, to get components of such expeditions into space. An unmanned, cargo-carrying version of the shuttle -- one which incorporates existing shuttle external tanks, engines and solid rocket boosters -- also is a possibility. And that means the moon missions almost certainly will launch from Kennedy Space Center and Cape Canaveral Air Force Station. "No question, no question. I think Florida is tremendously well-positioned to benefit from this new initiative," said Dale Ketcham, director of space and defense programs for Enterprise Florida, the state's economic development authority. NASA officials are saying little about Bush's plans. The agency doesn't want to get ahead of the President. That's not to say officials won't be paying attention when Bush speaks. "We've been told the president is going to make an announcement. But as to specifics, the President will make that announcement and we won't speculate," said Mike Rein, director of public affairs at Kennedy Space Center. [“Vision solidifies Cape’s significance,” **Florida Today**, January 11, 2004, p 1A & 3A.]

**January 12:** Veteran NASA astronaut Leroy Chiao will replace William S. McArthur, Jr., as the commander of Expedition 9, the next mission aboard the International Space Station. The change in crew assignment is a result of a temporary medical issue related to McArthur's qualification for this long duration flight. Because of medical privacy

considerations, no information about McArthur's condition will be made public. [“Chiao Replaces McArthur As Next Space Station Commander,” **NASA News Release #04-019**, January 12, 2004.]

◆ The late delivery of a crane-like boom could force NASA to scrap plans to return shuttles to flight in September or October, officials said Tuesday. And that increases the chance that NASA's first post-Columbia mission might not launch until November or even 2005. Equipped with cameras and laser sensors, the 58-foot boom will hook onto the shuttle's robot arm, enabling astronauts to inspect shuttle tiles and wing panels. NASA is under orders to find a way to do that type of inspection before launching again. But astronaut Jim Halsell, who is leading NASA's return-to-flight effort, told Florida Today that boom development is "several weeks" behind schedule. That means NASA might not be able to launch during a month long window that opens in mid-September. A mid-November opportunity might be a more realistic possibility. New restrictions will limit upcoming launch opportunities. Near-term missions must be launched in daylight and at times when the shuttle's external tank would be jettisoned on the sunlit side of Earth. Doing so will enable NASA to photograph damage done during the nine-minute flight to orbit. NASA will be limited to launching between mid-September and mid-October, and during a weeklong period in mid-November. There's also a short opportunity next January but none in February or March 2005. Web posted. (2003). [Shuttle missions may wait until 2005 [Online]. Available WWW: http://www.floridatoday.com/ [2003, January 13].]

◆ President Bush's plan to build a space station on the moon and eventually send astronauts to Mars hasn't grabbed the public's imagination, an Associated Press poll suggests. More than half in the poll said it would be better to spend the money on domestic programs rather than on space research. Asked whether they favored the United States expanding the space program the way Bush proposes, people were evenly split, with 48 percent favoring the idea and the same number opposing it, according to the poll conducted for the AP by Ipsos-Public Affairs. Most respondents said they generally support continuing to send humans into space. However, given the choice of spending money on programs like education and health care or on space research, 55 percent said they wanted domestic programs. Those most likely to favor the plan to expand space exploration were men, young adults, people with more education and those with higher incomes. Some have suggested space exploration could be expanded more inexpensively using robots instead of human astronauts to explore the moon or other planets. The AP-Ipsos poll indicated that option was popular, with 57 percent favoring exploring the moon and Mars with robots and 38 percent saying humans. Despite the mixed response about the moon-Mars proposal, general support for space exploration remains strong. Three-fourths in the poll said they thought it was important for the United States to be the leading country in the world in the exploration of space. Still, only 29 percent of those polled said it was "very important." The AP-Ipsos poll of 1,000 adults was taken Friday through Sunday (January 9 through January 11, 2004) and had a margin of sampling error of plus or minus 3 percentage points. [“Poll: U.S. tepid on Bush space plans,” **Florida Today**, January 13, 2004, p 1A & 2A.]

**January 14:** President Bush handed NASA a sweeping new mandate to send people farther into the solar system: returning American astronauts to the moon as early as 2015 and later dispatching human explorers to Mars and other distant locations. Speaking at the space agency's headquarters in Washington on Wednesday, the president instructed NASA to retire the aging space shuttles by 2010 after meeting the United States' obligation to finish building the International Space Station. By 2014, Bush wants NASA to be flying a new Crew Exploration Vehicle that could carry astronauts from Earth to the space station or the moon. The moon shots, which almost certainly would blast off from Brevard County's launch pads, would come as soon as 2015 but no later than 2020. The president offered no dates for a Mars mission, promising only that the future of America's human space flight program would not end at the moon. "We do not know where this journey will end," Bush said. "Yet we know this: Human beings are headed into the cosmos." Bush pledged to get the program started with just $1 billion in new spending on NASA during the next five years, saying the rest of the money will come from shifting $11 billion from other unidentified NASA programs. Bush will ask Congress for the extra money next month. In the works now for nearly a year, the new space plan was prompted by the Feb. 1 loss of Columbia and seven astronauts. The accident cast a spotlight on a once-storied agency which had become bogged down with costly projects like the shuttles and space station, but one lacking the kind of defining vision that pushed the nation to land men on the moon in 1969. The Columbia Accident Investigation Board and Congressional leaders both called for such a vision, and Bush gave his version of it Wednesday with a nod to the fallen astronauts. Bush's plan would push NASA's $15.2 billion budget to just over $16 billion by 2009. That's less than 1 percent of the nation's budget, or a penny of every dollar sent to Washington. The average American taxpayer chips in 15 cents a day to pay for the space program, including the increases driven by the new moon program. "The moon is a logical step toward further progress and achievement," Bush said. "With the experience and knowledge gained on the moon, we will then be able to take the next steps of space exploration: human missions to Mars and to worlds beyond." Bush's plan includes continued emphasis on robotic missions, such as the Spirit rover that was to begin rolling about on Mars overnight. He called on NASA to start sending landers, probes and other robotic craft to the moon by 2008. Robots, while admittedly cheaper and safer, could not do the job humans can exploring the cosmos, the president said. "The human thirst for knowledge ultimately cannot be satisfied by the most vivid pictures or most detailed measurements," he said. "We need to see and examine and touch for ourselves. Only human beings are capable of adapting to the inevitable uncertainties posed by space travel." Bush laid out the goals six days before the final State of the Union address of his first term, not long before revving up his re-election campaign. The space vision is part of a larger set of big ideas Bush's strategists promise to spell out in coming months. [“Plan scraps shuttle fleet, returns humans to moon,” **Florida Today**, January 15, 2004, p 1A & 4A.]

◆ Spacecraft and Expendable Launch Vehicles Status Report: Mission: Gravity Probe B (GP-B), Launch vehicle: Delta II, Launch pad: SLC-2, Vandenberg Air Force Base, Launch date: April 20, 2004 NET, Launch time: 9:57 a.m. PDT. The Gravity Probe B spacecraft is in NASA spacecraft processing facility 1610 on North Vandenberg Air Force Base in California. It is awaiting the return of the reworked Experiment Control

Unit (ECU). The state of battery charge is monitored on a constant basis. The temperature of the dewar's main tank is 1.864 K and has warmed from 1.648 K since the solar arrays were installed over the cryogenic access ports, after the last helium servicing. The temperature is targeted to be no warmer than 1.880 K at launch. However, since the solar arrays have been removed because of the stand-down, there is planned to be another cryogenic serving of liquid helium in mid-February. The ECU was returned to Palo Alto, Calif. in December and is in Lockheed Martin Facilities there. The reworking of the circuit board is complete and it is currently undergoing thermal vacuum testing. This is scheduled to be finished late next week. The circuit board will be returned for installation into the GP-B spacecraft the week of February 10. Meanwhile, the Delta II rocket is at Space Launch Complex 2, enclosed within the gantry-like mobile service tower. It has successfully completed all testing to date and will remain there until the GP-B spacecraft arrives. Gravity Probe B will be launched into a 400-nautical-mile-high polar orbit for a 16-month mission. Government oversight of launch preparations and the countdown management on launch day is the responsibility of NASA's John F. Kennedy Space Center. The launch service is provided to NASA by Boeing Launch Services. KSC News Center (2004). **Spacecraft and Expendable Launch Vehicles Status Report** [Online]. Available E-mail: ksc@newsletters.nasa.gov [2004, January 14].]

**January 15:** In a move designed to align the agency with the new exploration agenda outlined yesterday by President George W. Bush, NASA Deputy Administrator Frederick D. Gregory announced a comprehensive restructuring of the offices within NASA Headquarters in Washington. Retired U.S. Navy Rear Admiral Craig E. Steidle is the new Associate Administrator, Office of Exploration Systems. The Office of Exploration Systems is established to set priorities and direct the identification, development, and validation of exploration systems and related technologies. Dr. J. Victor Lebacqz is the new Associate Administrator, Office of Aeronautics, which was previously known as the Office of Aerospace Technology. The new Office of Aeronautics was created to reflect NASA's commitment to aviation research and aeronautics technologies for the nation's civil and defense interests. The changes are consistent with NASA's ongoing responses to the management and cultural issues addressed by the Columbia Accident Investigation Board. The Office of the NASA Administrator will be streamlined to allow for more independent leadership in areas vital to the execution of NASA's vision and mission. Among the changes, four new independent offices will be created. The new offices include: The Office of Chief Engineer is established to ensure agency development efforts and mission operations are planned and conducted using sound engineering. The Office of Health and Medical Systems is established to ensure the well-being of the NASA workforce and to provide independent oversight authority for healthcare, related research and information. The Office of the Chief Information Officer is established to manage the agency's Information Technology (IT) investments, lead the development of an IT strategic plan, and create a roadmap to guide the agency's IT programs and policies. The Office of Institutional and Corporate Management is established to lead the oversight of NASA's management systems, institutional, and corporate activities. [“NASA Announces New Headquarters Management Alignment,” **NASA News Release #04-024**, January 15, 2004.]

◆ NASA launched the beginning of a radical internal retooling Thursday, one aimed at reorganizing the agency to meet President Bush's mandate to return astronauts to the moon. Unveiled a day after Bush announced plans to send humans beyond Earth orbit, the restructuring is expected to prompt unprecedented change at NASA. Some $11 billion will be shifted within NASA's budget in the next five years to free up money to execute the agency's new charter. Programs not relevant to the Bush plan could be canceled or curtailed. NASA field centers could be shut down. Exact details remain to be determined, but the bare outlines began to emerge as NASA established a new office to oversee future exploration initiatives. "The immediate task we've got to get about the business of doing is thinking seriously about how we organize ourselves to do this," agency chief Sean O'Keefe told employees during an address broadcast on NASA TV. Those tasks include the development by 2008 of both robotic lunar scouts and a new spaceship to ferry astronauts to the International Space Station and the moon. The latter would begin test flights around 2008 but might not fly with astronauts until 2014. In a move designed to meet those goals, NASA is establishing five new offices at the agency's headquarters in Washington. Overseeing those efforts will be a presidential commission headed by former Air Force Secretary Pete Aldridge. The commission will advise NASA on its moon mission strategies and report back to Bush in about four months. It also will tackle issues such as potential international participation in the project and work force recruitment and retention. One-quarter of NASA's 19,000 civil servants will be eligible for retirement in the next three years. To pay for the program, NASA will ask Congress for an extra $1 billion during the next five years. Much of that money will be directed to the robotic probes and initial development of the new ship. Preliminary estimates show NASA then would require budget increases of three percent a year -- or raises equal to the historical rate of inflation -- to send astronauts to the moon sometime between 2015 and 2020. Whether the U.S. House and Senate buy into the plan remains to be seen. Bush and Vice President Dick Cheney consulted with key congressional leaders as the moon proposal was being hatched. Said KSC deputy director Woodrow Whitlow: "Right now, we're committed to the safe return to flight of the shuttle and using that vehicle to complete the construction of the International Space Station." [“NASA begins moon efforts,” **Florida Today**, January 16, 2004, p 1A & 6A.]

**January 16:** NASA will not risk astronauts or shuttles on another mission to upgrade Hubble Space Telescope, widely considered the most successful science spacecraft ever. Administrator Sean O'Keefe canceled a 2006 flight to service Hubble, a result of last year's Columbia accident and President Bush's plan to retire the shuttles by 2010. O'Keefe informed the Hubble team in a private meeting Friday at Goddard Space Flight Center in Maryland, challenging them to find clever ways to keep Hubble working as long as possible without a visit from an astronaut repair crew. Hubble engineers believe the telescope could break down as early as 2007, three years before its planned retirement in 2010. Around that time, NASA plans to purposely plunge the school-bus sized telescope into the Pacific Ocean to protect people on Earth from falling debris. [“NASA cancels Hubble tune-up,” **Florida Today**, January 17, 2004, p 1A & 2A.]

◆ The director of Kennedy Space Center and two Republican congressmen sought to reassure fearful workers Friday they will play a key role in President Bush's plan to send astronauts back to the moon. With NASA's shuttle fleet targeted for retirement after construction of the International Space Station is completed in 2010, many KSC workers are afraid they might become victims of future job cuts. A proposed new spaceship might not fly with astronauts until 2014, potentially creating a four-year gap in human space flights from Florida. Workers fear such a hiatus might trigger the type of severe job cuts experienced between the end of the Apollo program in 1975 and the first shuttle launch in 1981. Moreover, there is no firm guarantee the new Crew Exploration Vehicle -- which will ferry astronauts to the station and the moon -- will launch from KSC or Cape Canaveral Air Force Station. "I want you to know I fully understand the immediate concerns many of you have with families to raise and with careers to plan," KSC Director James Kennedy told members of the center's work force, which numbers about 14,000. But "no matter what shape or form the new Crew Exploration Vehicle may take, the KSC work force will be required to work those programs," he added. Unveiled Wednesday, the Bush plan calls for NASA to send astronauts to the moon between 2015 and 2020. The idea is to use the lunar surface as a proving ground for subsequent missions to Mars, asteroids or elsewhere in the solar system. A day later, the agency opened a new office to develop and implement moon mission strategies. A presidential commission will oversee that effort and report back to Bush in about four months. Among things to be hashed out in that time frame: The type of rockets that will be used to launch the new spaceship and the site from which it will be launched. Kennedy said the KSC work force must stay focused on the crucial first stage of the Bush plan, which was sparked by the Feb. 1 Columbia accident. "We have to make sure we pay attention to job one. And job one is safely returning the space shuttle program to flight," he said. [“Workers afraid of NASA job cuts,” **Florida Today**, January 17, 2004, p 1B & 7B.]

**January 19:** Spacehab Inc., a maker of living modules for the U.S. space shuttle, filed an $87.7 million formal claim against NASA on Tuesday for equipment destroyed during the Columbia disaster, citing the findings of the investigation board. Houston-based Spacelab said it was in “discussions” with NASA with the goal of settling the claim as soon as possible. NASA spokesman Doc Mirelson said he had not seen Spacehab’s claim and had no immediate comment. Web posted. (2004). [Spacehab files $87 million claim with NASA for shuttle [Online]. Available WWW: http://www.reuters.com/ [2004, January 20].]

**January 20:** A task force assessing NASA’s recovery from the Columbia accident said in an interim report released Tuesday that “it is still much too soon to predict” when the space shuttle will fly again. The NASA appointed Stafford-Covey Return To Flight Task Group said the agency is making “solid progress” on many fronts but that much more needs to be done to address problems including deficiencies in the way shuttle flights are directed from Johnson Space Center and in NASA’s overall culture of safety. Led by a pair of ex-astronauts, the 28 members of the task group are monitoring NASA’s efforts to meet 15 return-to-flight recommendations by the Columbia Accident Investigation Board. The recommendations range from upgrading the array of Kennedy Space Center cameras that track shuttles during launch to restructuring shuttle management. “While the tone of

the interim report is justifiably positive, progress should not be mistaken for accomplishment," the 78-page document states. Neither NASA nor task-force officials would provide detailed comment about the report. ["NASA's work slowly progresses, report says," **Orlando Sentinel**, January 21, 2004, p A9.]

◆ Among the five space shuttle veterans named Tuesday to the Astronaut Hall of Fame are Kathryn Sullivan, the first American woman to walk in space, and Norman Thagard, the first American to live on Russia's Mir space station. Also named was Richard Covey, who flew on the Hubble telescope repair mission and the first flight after the Challenger disaster. He is now helping lead the commission overseeing the shuttles' return to flight in the wake of last year's Columbia accident. Francis "Dick" Scobee, who died in the 1986 Challenger accident, will be inducted as well, along with Fred Gregory, the first African-American to command a shuttle and now NASA's second-in-command. The Hall of Fame will induct the astronauts in a May 1 ceremony at the Kennedy Space Center Visitor Complex. ["Sullivan, Scobee among 5 named to astronaut hall," **Florida Today**, January 21, 2004, p 1B.]

**January 21:** NASA's plan to use the International Space Station as a safe haven for stranded shuttle crews will get close scrutiny from a panel overseeing agency efforts to rebound from the Columbia disaster. The reason: NASA might employ the idea if it cannot find a way to fix the type of damage that doomed Columbia's crew. "We have decided to add it as one of the formal issues we will address," former NASA astronaut Richard Covey told reporters Wednesday. Covey is co-chairing an independent group monitoring NASA progress on implementing 15 "return-to-flight" recommendations issued by the Columbia Accident Investigation Board. Among those: A recommendation that calls for NASA to put in place a means for astronauts to inspect and repair shuttle thermal tiles and wing panels in orbit. Serious damage to a wing panel triggered the Columbia disaster. Engineers are making strides with a technique to fix fragile tiles. But repairing composite carbon wing panels has proven to be a greater challenge. Covey said shuttle managers might lean on the safe haven plan as "a mitigating factor" when in comes to judging whether NASA adequately addresses the accident board recommendation. "We want to be in a position to provide our assessment relative to that," he said. NASA last year initiated a post-Columbia study aimed at seeing whether astronauts on a crippled shuttle could survive on the station with a resident crew until a rescue mission could be launched. The agency determined there typically would be enough food and supplies on the outpost to sustain seven shuttle astronauts and a two-person station crew for 86 days. ["Panel will scrutinize NASA plan for station," **Florida Today**, January 22, 2004, p 7A.]

◆ NASA's new budget plans call for spending $6.6 billion during the next five years on the spacecraft that is supposed to take Americans back to the moon and beyond, agency chief Sean O'Keefe said Wednesday. Speaking to reporters for the first time since President Bush outlined a new agenda for the space program last week, O'Keefe said that more details will be released when the agency's $16.2 billion request for the 2005 budget year is released Feb. 1. But he cautioned that not all of the questions swirling around the proposal will be answered. The $16.2 billion request for 2005

represents a 5.6 percent increase over the 2004 request, which was not quite $15.5 billion. NASA's budget, under the plan, would increase just less than 5 percent in both 2006 and 2007, then by about 1.5 percent in 2008, O'Keefe said. ["NASA chief sheds light on moon mission's cost," **Orlando Sentinel**, January 22, 2004, p A16.]

**January 22:** The permanent repository of Space Shuttle Columbia debris at NASA's Kennedy Space Center (KSC), Fla. is stored on the 16th floor of KSC's Vehicle Assembly Building (VAB). In the future, the debris will be used for research purposes so NASA and the scientific community can continue to learn from Columbia. ["Space Shuttle Columbia Debris Repository To Be Opened To Media," **NASA News Release #N04-012**, January 22, 2004.]

◆ NASA cut United Space Alliance's bonus by $45 million because of the shuttle contractor's role in the Feb. 1 Columbia disaster that killed seven astronauts. Houston-based USA still will get $36 million of the $81 million maximum bonus available from NASA for the six-month period during which the shuttle accident happened. But it is the lowest fee NASA has awarded on the main shuttle contract since its inception in 1996, when The Boeing Co. and Lockheed Martin Corp. combined forces to create the United Space Alliance. "We're satisfied with it," said Kari Fluegel, a company spokeswoman at Kennedy Space Center. "Safety is and always has been the top priority and contract fees, particularly in this case, they're not a priority. We're satisfied and we're looking forward to moving on to return to flight." The reduced bonus will not affect United Space Alliance workers in Brevard County. No jobs will be cut because of it, nor will individual workers' bonuses or pay be impacted directly by the lower bonus, company officials said. The $45 million reduction is a substantial amount of money, but it's a tiny fraction of the $2.8 billion that United Space Alliance is slated to earn between 2002 and 2004 on its contract to maintain, prepare and launch the shuttles. The company has about 6,600 local workers. USA is eligible for a bonus award every six months. NASA officials determined that Columbia accident investigators' findings showed blame was shared by agency managers and several contractors, not just USA. "The agency found that USA acted as an integral member of the shuttle program team that was responsible for the safety of Columbia and its crew both before and during the flight, and levied the fee reduction as a consequence," NASA Deputy Associate Administrator Michael Kostelnik said in a prepared statement. NASA waited to determine the bonus until it could review the accident investigators' report and fairly assess USA's level of responsibility for the accident. ["NASA cuts bonuses for shuttle contractor," **Florida Today**, January 23, 2004, p 1A & 7A.]

**January 23:** Starting this year, Administrator Sean O'Keefe has designated the last Thursday in January to be NASA Remembrance Day. This is a day for all of us in the NASA family to take time to remember those who have died in the pursuit of exploration and the legacy of lessons learned they have given us to carry on the NASA Vision as a safer, stronger, and smarter Agency. This year, NASA Remembrance Day will be held on January 29. E-mail distribution. (2004). [Kennedy, James W. Re: "NASA Remembrance Day" [Electronic]. **CD Comm #2004-02**, [January 23, 2004.].]

**January 25:** NASA's Opportunity rover survived a high-anxiety dive through the Martian atmosphere today, landing safely on a flat equatorial basin halfway around the planet from its identical twin Spirit. Traveling at 12,000 mph — or fast enough to cross the continental United States in four minutes — the Opportunity spacecraft began a screaming plunge through the atmosphere just before midnight. Six minutes later, the rover — nestled in protective airbags — hit the surface and then bounced repeatedly before rolling to a stop in a region that once might have been awash with water, a key ingredient in the recipe for life. And within about four hours, the spacecraft beamed back panoramic pictures of undulating slopes, windswept dunes and slab-like rocks on a surface unlike any previously seen landscapes on the red planet. Coming exactly three weeks after the Jan. 3 Spirit landing, the arrival of Opportunity marked the first time in more than two decades that NASA has had two spacecraft operating simultaneously on the surface of Mars. ["2nd rover on Mars' surface," **Florida Today**, January 25, 2004, p 1A.]

**January 27:** NASA's shuttle, or some variation of its components, could play a role in President Bush's plan to send astronauts back to the moon. The president this month directed NASA to retire the three remaining shuttles by 2010 and begin flying the replacement Crew Exploration Vehicle by 2014. The imminent end of the shuttle program has worried some of the 14,000 Brevard County workers at Kennedy Space Center. On Tuesday, for the first time since the president's announcement, a NASA official indicated the shuttle system may have a future as a sort of super-rocket. William Readdy, the agency's associate administrator for human spaceflight, said the shuttle main engines, solid-fueled booster rockets and external fuel tank combine to offer a proven way to lift heavy equipment to orbit. That's going to be a key requirement of any engineers' plan to get humans to the moon, Mars or other destinations beyond Earth orbit. In its current configuration, he said the shuttle's rocket system lifts an orbiter and cargo weighing about 100 tons. The nation's other existing rockets lift about one-third as much. In recent months, NASA has been studying the possibility of automating the three orbiters Atlantis, Endeavour and Discovery as cargo-haulers. Another option is to build a lighter container, which would allow for heavier payloads. Upgrades to the system could further increase its power. A shuttle-derived rocket could give NASA the ability to launch large components, for moon missions or other projects, already assembled rather than in pieces, Readdy said. It also would mean continued work for at least part of the shuttle workforce. The pads and other facilities needed to launch any shuttle-style vehicle already are in place at KSC. Web posted. (2004). [NASA: Shuttle may be reborn as rocket [Online]. Available WWW: http://www.floridatoday.com/ [2004, January 27].]

**January 28:** A landmark bill giving NASA greater flexibility to restructure and revitalize its work force cleared its final major hurdle today after being passed by the U.S. House. The NASA Work Force Flexibility Act of 2003 (S. 610, H.R. 1085) will be presented for the President's consideration. The U.S. Senate passed it in November. Sponsored by U.S. Senator George Voinovich (R-Ohio) and U.S. Rep. Sherwood Boehlert (R-N.Y.), the NASA Work Force Flexibility Act of 2003 builds on existing law. Among other reforms, it provides the agency additional tools to address the

challenges of the 21st century. It provides NASA the ability to improve recruitment and retention, and to compete with the private sector. [“NASA Work Force Flexibility Act Ready For President’s Consideration,” **NASA News Release #N04-044**, January 28, 2004.]

◆ The state of Florida unveiled a new specialty license plate Wednesday to honor the seven astronauts who died on during the space shuttle Columbia accident. The red, white and blue plate, which features a generic space shuttle blasting into orbit, takes the place of the popular Challenger commemorative plate. The new “space plate” includes the names of both the Columbia and Challenger. Proceeds from the plate will go toward space and technology education programs and space-related business development Programs. They also will maintain the Space Mirror Memorial at Kennedy Space Center. [“Tag to keep shuttles reaching toward sky,” **Orlando Sentinel**, January 29, 2004, p B1.]

◆ President Bush's plan to send humans back to the moon made its debut Wednesday before Congress, prompting skeptical lawmakers to respond with a curtain of fuss about costs. "The American public is justifiably apprehensive about starting another major space initiative for fear that they will learn later that it will require far more sacrifice, or taxpayer dollars, than originally discussed or estimated," said Sen. John McCain, R-Ariz. NASA Administrator Sean O'Keefe presented a Senate panel few details about the plan. He promised more specifics next week when the White House sends its annual budget request to Congress. At the first congressional hearing on the plan since Bush announced it Jan. 14, lawmakers were left with little to do but ask polite questions and speculate about pitfalls. O'Keefe assured senators that Bush, Vice President Dick Cheney and others in the administration strongly support the new space exploration program. Lawmakers on the Senate Commerce, Science and Transportation Committee asked O'Keefe to explain what will happen to thousands of government and civilian workers dedicated to the shuttle program once the reusable space planes are retired in 2010, as called for in the Bush initiative. "We'll have to work out those challenges at that time," O'Keefe said. [“Panel wary of space plan,” **Florida Today**, January 29, 2004, p 1A & 2A.]

◆ NASA picked a name for the program to create a new space vehicle to take humans to the moon: Constellation, a common noun astronomers and astrologers use to describe patterns of stars. [“Project named,” **Florida Today**, January 29, 2004, p 1A.]

◆ NASA announced plans to name the landing site of the Mars Opportunity rover in honor of the Space Shuttle Challenger’s final crew. The area in the vast flatland called Meridiani Planum, where Opportunity landed this weekend, will be called the Challenger Memorial Station. Opportunity successfully landed on Mars Jan. 25. Web posted. (2004). [Shtutle Challenger crew memorialized on Mars [Online]. Available WWW: http://www.spcaeflightnow.com/ [2004, January 28].]

**January 29:** On Thursday, NASA employees throughout the country paused to remember the 17 astronauts who died in three separate tragedies over the years. The

Apollo 1 spacecraft fire on the launch pad killed three on Jan. 27, 1967. The Challenger launch explosion killed seven on Jan. 28, 1986. The Columbia disintegration happened Feb. 1, 2003. [“Columbia astronauts memorialized at JSC,” **Florida Today**, January 31, 2004, p 14A.]

◆ A grouchy momma owl is getting plenty of respect at a shuttle launch pad, where work stopped to give her babies time to hatch. The great horned owl is nesting on Pad 39A, and during a relatively quiet time, with the shuttles grounded, NASA halted painting and other refurbishment while she nurtures her three eggs. On one side of the mobile launch platform, ropes block off a stairway leading down to a landing surrounded by fuel valves. There, the owl has nestled into what is essentially a painter's dropcloth. Sometimes, she flies off to hunt, leaving the three eggs exposed. Usually, however, she's there to defend them. "If somebody goes down there and looks at her, she'll have that look," said operations Chief Steve Leonhard, who works for chief shuttle contractor United Space Alliance. "She looks up, like, 'I dare you to come down here. I'll teach you a lesson!' "Great horned owls are federally protected but not endangered. Because she chose Kennedy Space Center as a nesting place, this owl also chose the Merritt Island National Wildlife Refuge, where NASA and the Fish and Wildlife Service work together to try to accommodate animals. "We respond on the order of hundreds of times a year to wildlife issues," said Ralph Lloyd, deputy manager of the refuge. The reports range from a buzzard in the Vehicle Assembly Building to an alligator under a car to a rattlesnake in a bathroom. "We take a lot of pride in watching for all the different wildlife out here," said Steve Bulloch, facility integration manager for NASA. The owl is in the middle of her nesting period, which takes about 30 days. Afterward, "we've considered removing the hatchlings," Lloyd said. It now appears another great horned owl is nesting at Pad 39B, where shuttle Atlantis is scheduled to launch next fall. However, that owl is on a high beam, more than 200 feet up, Leonhard said, so she shouldn't interfere with work there. Web posted. (2004). [Owl halts launch pad work [Online]. Available WWW: http://www.floridatoday.com/ [2004, January 29].]

◆ NASA lacks a comprehensive quality-control program at Kennedy Space Center and the capability to track problems that could destroy shuttles, an internal review panel reported Thursday. In findings that mirrored those of Columbia accident investigators, the panel also said KSC workers are afraid they'll be punished if they report problems. "The work force seems worried about telling the truth," said the panel, which examined KSC quality control as part of NASA's post-Columbia return to flight effort. "The perception that reported errors would be used to discipline the technicians who had made or missed seeing the errors is an indicator of a management or communication issue." The panel was made up of safety experts from other NASA centers, the Department of Defense and the Federal Aviation Administration. The panel also found NASA quality control specialists viewed the cutbacks in inspections as a job threat. Consequently, "there are morale and trust issues" with the quality control work force, the panel said. The group urged NASA to reassess its quality control program while putting in place a means to track problems and conduct trend analysis. A method for adding government inspections to pre-launch work lists also was recommended, and the panel said NASA should continue ongoing efforts to rectify worker trust and morale issues. KSC

spokesman Mike Rein said center officials already are working to implement panel recommendations. "We're going to use the report to help us improve our quality assurance and safely return the shuttle to flight," he said. Web posted. (2004). [Panel finds NASA lacks capability to track down shuttle problems [Online]. Available WWW: http://www.floridatoday.com/ [2004, January 29].]

◆ The head of the board that investigated the Columbia space shuttle disaster has agreed to examine NASA's decision to cancel any missions to extend the life of the Hubble Space Telescope, agency officials said on Thursday. The chairman of the Columbia Accident Investigation Board, Adm. Harold W. Gehman Jr., is to review the safety of having shuttle astronauts refurbish the orbiting observatory. The administrator of NASA, Sean O'Keefe, asked Admiral Gehman to step in after Senator Barbara A. Mikulski, Democrat of Maryland, took issue with Mr. O'Keefe's decision to cancel a servicing mission to the telescope. In a letter Monday to Ms. Mikulski, Mr. O'Keefe said he would stand by his decision because a Hubble mission posed extra risks to astronauts. But after a discussion with the senator, Mr. O'Keefe agreed to ask Admiral Gehman for an opinion. Web posted. (2004). [Shuttle Investigator Will Review Hubble Decision [Online]. Available WWW: http://www.nytimes.com/ [2004, January 30].]

**January 30:** Spacecraft and Expendable Launch Vehicles Status Report: Mission: Gravity Probe B (GP-B), Launch vehicle: Delta II, Launch pad: SLC-2, Vandenberg Air Force Base, Launch date: April 17, 2004 NET, Launch time: 9:45 a.m. PDT. The Gravity Probe B spacecraft is in NASA's Payload Processing Facility 1610 on North Vandenberg Air Force Base in California. It is awaiting the return of the reworked Experiment Control Unit (ECU). The ECU is currently in Lockheed Martin spacecraft facilities at Palo Alto, Calif. The reworking of the circuit board, installation into the ECU and functional testing is complete. Final thermal vacuum chamber testing is under way. The ECU containing the associated circuit board will be returned for installation into the GP-B spacecraft by Feb. 10. The battery charge continues to be monitored and there has been no significant change in the level of charge. The temperature of the dewar's main tank remains at 1.8765 K. The temperature is targeted to be no warmer than 1.880 K at launch. There is planned to be another cryogenic serving of cryogenic liquid helium in mid-February before the solar arrays are re-installed on the spacecraft. Meanwhile, the Delta II rocket is at Space Launch Complex 2, enclosed within the gantry-like mobile service tower. It has successfully completed all testing to date and will remain there until the GP-B spacecraft arrives. As a result of the earthquake in central California earlier this month, inspections of the pad and the Delta rocket have been under way. No after-effects have been observed to the launch pad or the gantry. Precautionary testing of the solid rocket motors has been re-scheduled for Feb. 9. KSC News Center (2004). **Spacecraft and Expendable Launch Vehicles Status Report** [Online]. Available E-mail: ksc@newsletters.nasa.gov [2004, January 30].]

◆ President George W. Bush on Friday named a nine-member commission to study how best to implement his plans for renewed manned missions to space, including stops on the moon and Mars. The body, dubbed the President's Commission on Implementation of United States Space Exploration policy, will "provide recommendations" on a host of

issues tied to Bush's blueprint, the White House said in a statement. The president called two weeks ago for development of a new spacecraft capable of traveling to the moon as early as 2015, then possibly on to Mars. The commission will study questions like the availability of lunar natural resources that could be used for sustainable human and robotic missions; how to choose future destinations for human exploration; and how to encourage young Americans to study math, science and engineering, the statement said. The panel must submit its first report 120 days after its first meeting, which has yet to be scheduled. Web posted. (2004). [Bush taps space exploration panel [Online]. Available WWW: http://www.spacedaily.com/ [2004, January 31].]

◆ NASA's Mars rover Opportunity spied hints Friday of a mineral that typically forms in water -- a finding that could mean the dry and dusty red planet was once wetter and more hospitable to life. That is the very question Opportunity and its twin, Spirit, were sent to answer. The preliminary discovery came hours before Opportunity was to roll its six wheels onto the Martian surface for the first time. Engineers planned to command the rover to roll the 10 feet off its lander and onto Mars at 3:30 a.m. today. Confirmation was expected three hours later. ["Opportunity set to roll off lander," **Florida Today**, January 31, 2004, p 8A.]

◆ Orange County entered a six-way national competition Friday that could bring a new NASA business-services center to an office park near the University of Central Florida. The National Aeronautics and Space Administration plans to pick a location for its new finance, procurement and personnel division by March 1. Communities in five other states are vying for the center, which would open late next year and bring more than 500 jobs to the winning locale. The NASA jobs would pay an average of nearly $50,000, and they would draw more highly skilled workers into the market. Like the Central Florida location, which is near Kennedy Space Center, the sites in the other states are all near existing NASA facilities. NASA plans to consolidate its scattered back-office operations at the new location, which will be called the NASA Shared Services Center. ["Orange makes bid for NASA operation," **Orlando Sentinel**, January 31, 2004, p A1 & A14.]

**January 31:** For researchers who venture to NASA's giant Vehicle Assembly Building in coming years to study the destructive forces that occur when a spacecraft such as shuttle Columbia breaks apart in Earth's atmosphere at hypersonic speed, there is a flight-data recorder to consider. Of the 83,800 pieces of Columbia debris in a newly opened repository in the VAB at Kennedy Space Center, the briefcase-size recorder is among the least damaged. To engineers who investigated the disintegration of Columbia high over Texas a year ago Sunday (February 1), the recorder, with its two reels of 1-inch magnetic tape each the size of a small pizza, was by far the most helpful item recovered. Its nearly two hours of in-flight data provided a precise record of what happened inside Columbia's left wing as it broke up. About 7,000 square feet of former engineering office space on the 16th floor of the VAB, a box of a building so vast that interior views seem like painted movie backdrops, now holds the more than 80,000 pounds of debris recovered in east Texas and Louisiana. One or two new pieces still come in each week. "It's not a museum," said Scott Thurston, a NASA shuttle manager and team leader for Columbia's preservation. "We kind of think of it as more of a library. It's a place of learning."

[“Columbia repository is ‘place of learning’,” **Orlando Sentinel**, January 31, 2004, p B1 & B2.]

**During January:** NASA’s space shuttle main engine passed its 1 millionth sec. of operation during a 8.5-min. static firing at Stennis Space Center, Miss. The engine was undergoing an acceptance test prior to its scheduled flight on the STS-121 mission, the second after shuttles resume flying. Overall the big Rocketdyne engine has racked up more than 826,000 sec. firing in the test stand, and almost 174,000 sec. in flight during 113 missions. [“World News Roundup,” **Aviation Week & Space Technology**, January 26, 2004, p 19.]

In the Orbiter Processing Facility, seen here is the vertical stabilizer on the orbiter Discovery. On the edge of the stabilizer are the four Rudder Speed Brake Actuators recently installed. Below is the engine number 1 interface. Discovery has been assigned to the first Return to Flight mission, STS-114, a logistics flight to the International Space Station.

## FEBRUARY

**February 1:** A ceremony was held at the KSC Visitor Complex to commemorate the one-year anniversary of the shuttle Columbia accident, as well as the loss of other astronauts in science's exploration of space. KSC Director Jim Kennedy recalled the triumph of human spirit during the past year, from the investigation through the effort to preserve the debris for future study. He recalled in particular inspirational remarks by Columbia's first pilot, Bob Crippen, who spoke fondly of the ship during the memorial at KSC's runway the week of the accident. Kennedy addressed the crowd directly. "Thank you for this past year of devotion, commitment, loyalty to the NASA family," he said. "We do not do this job alone. We do it with the collective wisdom of this nation and indeed this world, and what you mean to us cannot be put into words." Kennedy and Deputy Center Director Woodrow Whitlow Jr. placed a floral wreath at the base of the wall. On February 1, 2003, the Columbia and its crew were lost over the western United States during re-entry into Earth's atmosphere. The 28th and final flight of Columbia (STS-107) was a 16-day mission dedicated to research in physical, life and space sciences. The Columbia crew successfully conducted approximately 80 separate experiments during their mission. ["Columbia services offers time to heal," **Florida Today**, February 2, 2004, p 1A & 3A.]

**February 2:** NASA Administrator Sean O'Keefe on Monday dedicated a memorial to the crew of space shuttle Columbia at Arlington National Cemetery, eulogizing the astronauts as "pilots, engineers and scientists all motivated by a fire within." More than 400 Columbia family members, former astronauts and NASA staff attended the dedication, which took place a year and a day after the ship disintegrated on its return to earth, claiming the lives of all seven astronauts. The memorial features a bronze replica of a mission patch designed by crew members. The names of the Columbia astronauts – Rick Husband, William McCool, Michael Anderson, David Brown, Kalpana Chawla, Laurel Clark and Ilan Ramon – are etched into the bronze, which is set on Vermont marble. O'Keefe said the crew's legacy would live on in President Bush's call to renew missions to the moon and begin human exploration on Mars. ["NASA dedicates crew memorial for Columbia," **Florida Today**, February 3, 2004, p 4A.]

◆ NASA Administrator Sean O'Keefe today announced the Martian hills, located east of the Spirit Mars Exploration Rover's landing site, would be dedicated to the Space Shuttle Columbia STS-107 crew. "These seven hills on Mars are named for those seven brave souls, the final crew of the Space Shuttle Columbia. The Columbia crew faced the challenge of space and made the supreme sacrifice in the name of exploration," Administrator O'Keefe said. The Shuttle Columbia was commanded by Rick Husband and piloted by William McCool. The mission specialists were Michael Anderson, Kalpana Chawla, David Brown, Laurel Clark; and the payload specialist was Israeli astronaut Ilan Ramon. NASA will submit the names of the Mars features to the International Astronomical Union (IAU) for official designation. The IAU serves as the internationally recognized authority for assigning designations to celestial bodies and their surface features. ["NASA Dedicates Mars Landmarks to Columbia Crew," **NASA News Release #04-048,** February 2, 2004.]

◆ The new U.S. public budget unveiled Monday gives a big boost to spending on efforts to get the U.S. shuttle back in space and to start moves to get manned missions to the moon and Mars. Funding for the National Aeronautics and Space Administration (NASA) in fiscal 2005 will rise by 5.6 percent to 16.2 billion dollars. The 866 million dollar increase for the year starting October 1 comes after a decade of stagnation for the space program. Most other government departments saw funding fall. NASA's boost almost rivals defense spending -- the other priority of President George W. Bush -- which was scheduled to rise by seven percent. Bush's budget presented to Congress would help fund the return to space of the US space shuttle program, which was grounded after the explosion of the Columbia shuttle on February 1, 2003. Spending on space flight programs was to rise to 6.674 billion dollars compared to 5.875 dollars in 2004, a 13.6 percent increase. The budget for human space exploration was to reach 8.5 billion dollars, an increase of 13.3 percent over the current 7.5 billion dollars. Bush last month announced the retirement of the shuttle program in 2010, as he unveiled a far more ambitious program, to include new manned flights to the moon from about 2015. This would be a launch pad for manned missions to Mars further down the road. NASA is to resume a full program of shuttle launches later this year. The administration wants construction of the orbiting International Space Station finished by 2010 when the United States will withdraw from the project. Web posted. (2004). [NASA gets new funds for space shuttles and moon mission [Online]. Available WWW: http://www.spacedaily.com/ [2004, February 2].]

◆ NASA's three remaining space shuttles have been grounded since the Columbia disaster, and they cannot return to flight until a slew of safety improvements are made. The space agency hopes that can be done in time for a September launch of Atlantis on a mission to test new inspection and repair techniques and to deliver equipment to the International Space Station. But managers concede the flight could slip into next year because of the difficulty of making the necessary fixes. Columbia accident investigators issued 29 recommendations last summer, 15 of which must be met before the next shuttle mission. None of the recommendations has been carried out yet, but a task force says solid progress has been made in improving launch photography, redesigning a bolt catcher and adopting an industry-standard definition of shuttle debris. The biggest technical challenges are creating a repair kit to patch holes in the leading edges of the wings, and an extension boom for inspecting the underside of a shuttle in orbit. The plan calls for using the space station as a platform to carry out much of the work. All told, the safety improvements will cost NASA at least $280 million, probably much more. NASA has decided that all of the remaining shuttle flights will be devoted to completing the space station. Between 28 and 35 shuttle missions will be needed to finish the job by 2010. At that point, the shuttles will be retired. The shuttles are to be replaced by a crew exploration vehicle that would start out ferrying crews and supplies to the space station and then evolve into a spacecraft for exploring the moon and Mars. Between the shuttles' retirement in 2010 and the first manned flight of the new vehicle by 2014, the United States will have no way to send humans into space. Russia and the other countries taking part in the space station will be responsible for delivering crews. Web posted. (2004).

[Shuttle retirement set, but next flight isn't clear [Online]. Available WWW: http://www.cnn.com/ [2004, February 2].]

**February 4:** Spacecraft and Expendable Launch Vehicle Status Report: Mission: Gravity Probe B (GP-B), Launch vehicle: Delta II, Launch pad: SLC-2, Vandenberg Air Force Base, Launch date: April 17, 2004, Launch time: 10:09:12 a.m. PDT. The Gravity Probe B spacecraft is in NASA's Payload Processing Facility 1610 on North Vandenberg Air Force Base in California. It is awaiting the return of the reworked Experiment Control Unit (ECU). The ECU is currently in Lockheed Martin spacecraft facilities at Palo Alto, Calif. The reworking of the circuit board, installation into the ECU, functional testing and thermal vacuum chamber testing are all complete. The work has gone better than expected and the ECU will be returned to Vandenberg Air Force Base tomorrow Thursday, Feb. 5. Meanwhile this week, GP-B spacecraft test team members have been returning to Vandenberg in preparation for the arrival of the ECU. In other planned spacecraft processing, battery reconditioning is scheduled for Feb. 6-8. The ECU will be reinstalled Feb. 9. Cryogenic servicing of liquid helium is scheduled for Feb. 16. Operations to reinstall the solar arrays are planned for Mar. 7–19. The spacecraft is currently scheduled to be transported to Space Launch Complex 2 on Apr. 1 and mated to the Delta II rocket. Meanwhile, the Delta II rocket is at Space Launch Complex 2 enclosed within the gantry-like mobile service tower. It has successfully completed all testing to date and will remain there until the GP-B spacecraft arrives. KSC News Center (2004). **Spacecraft and Expendable Launch Vehicles Status Report** [Online]. Available E-mail: ksc@newsletters.nasa.gov [2004, February 4].]

◆ Working with the Federal Bureau of Investigation, the Image Analysis facility here is studying the Sarasota kidnapping video of Carlie Brucia to provide any new information possible to law enforcement officers. KSC is joining NASA's Marshall Space Flight Center in Alabama in reviewing the tape. "Earlier today, working through our KSC security office, we were contacted by the FBI who asked us to review the tape," said Armando Oliu, Final Inspection Team lead for the shuttle program overseeing the image lab. "We immediately began to review the video upon its arrival and will continue to review it until we feel there is nothing new to learn." The lab is using an advanced SGI® TP9500 data management system to review the tape. This is the new $3.2 million system KSC installed in preparation for Return to Flight of the Space Shuttle fleet. The system allows NASA engineers to perform preliminary video analysis within hours of a shuttle launch and provide more detailed film analysis the day after launch. NASA, United Space Alliance (USA) and Silicon Graphics, Inc. teamed to create one of the world's highest performing visual film analysis systems. With the new system, NASA's Ice/Debris Team can analyze full-frame, real-time, standard-definition and high-definition video at 1280x720 pixels and can analyze 16 mm and 35 mm film data at 4096x3112 pixels. The system was designed to process 150,000 frames of film and 300,000 frames of video within two weeks of a launch. ["NASA KSC Image Analysis Facility Studying Sarasota Kidnapping Video," **KSC News Release #03-04,** February 4, 2004.]

Amid widespread uncertainty about job security, a high-ranking NASA official on Wednesday predicted Kennedy Space Center would remain the nation's gateway to space or decades to come. "The future is fuzzy on a lot of scores. But I think the future is very bright when it comes to space exploration," said William Readdy, a former astronaut who is NASA's associate administrator for spaceflight. "In terms of the launch facilities at the Kennedy Space Center, they'll be launching exploration vehicles decades into the future. And so I just don't think I would have that kind of angst, that kind of concern." Readdy's comments came two days after President Bush submitted to Congress a proposed $16.2 billion budget for NASA in 2005. The boost would launch Bush's new plan to send astronauts back to the moon between 2015 and 2020 to prepare for subsequent missions to Mars. The plan also calls for NASA to finish construction of the International Space Station and retire the agency's shuttle fleet in 2010. A new crew exploration vehicle then would launch human expeditions about 2014. Plans to retire the shuttles, combined with a potential four-year hiatus in manned launches at KSC, have raised the specter of potential job cuts here. Readdy, however, said NASA will consider using existing shuttle engines, external tanks and rocket boosters to form an ultra heavy-lift launch vehicle to support future moon missions. "There's a likelihood that could wind up being a shuttle-derived vehicle that would use the infrastructure that's already in place, the work force that's already in place," he said. NASA officials are working on a blueprint for the moon missions. A presidential commission is overseeing that effort and will report back to Bush in about four months. Web posted. (2004). [KSC not worried about future [Online]. Available WWW: http://www.floridatoday.com/ [2004, February 4].]

**February 5:** A satellite lifted into orbit Thursday night will feed the increasing demand for high-definition television. International Launch Services, a cooperative effort of Lockheed Martin and Proton rocket builder Krunichev, launched the Atlas 2AS at 6:46 p.m. from Cape Canaveral Air Force Station. The Lockheed rocket put SES-Americom's AMC-10 satellite into orbit after a short delay caused by a troublesome helium valve. [“Cable-TV satellite soars into orbit,” **Florida Today**, February 6, 2004, p 1B.]

◆ NASA's estimate for the cost of returning shuttles to flight topped $400 million on Thursday, a 44 percent jump that is expected to increase again by the time the agency launches its first post-Columbia mission. In the latest version of the agency's Return To Flight Implementation Plan, NASA said it expects to spend $404 million by the end of this year on new safety measures and initiatives recommended by the Columbia Accident Investigation Board. A previous version of the plan, released in November, pegged the cost at $280 million. NASA officials said the earlier estimate was preliminary, and that the new figure better reflects the agency's understanding of costs. The latest estimate shows that NASA spent $94 million on Return-To-Flight work in fiscal 2003, which ended Sept. 30. That's $24 million more than the agency estimated in November. The agency expects to spend $264 million in fiscal 2004 -- up from a previous estimate of $175 million. A $45 million estimate for opening and operating a new NASA Engineering and Safety Center at Langley Research Center in Hampton, Va., remained the same. The largest Return-To-Flight cost: $99 million to put in place the means to inspect and repair shuttle tiles and wing panels in orbit. The previous forecast: $57 million. Investigators ordered that work after blaming the Columbia accident on a piece

of foam insulation that broke free from the shuttle's external tank shortly after launch. [“Shuttle fixes top $400M, **Florida Today**, February 6, 2004, p 1A & 5A.]

**February 6:** NASA and its International Partners have assigned new crews to fly to the International Space Station this year. As Expedition 9, NASA astronaut Edward Michael "Mike" Fincke and Russian cosmonaut Gennady Padalka will be the next crew to live aboard the complex. NASA astronaut Leroy Chiao and Russian cosmonaut Salizhan S. Sharipov will serve as Expedition 10. Fincke and Padalka are set for launch April 18 on a six-month mission. Padalka will serve as Expedition 9 commander and Soyuz commander, and Fincke will be the NASA Space Station science officer and flight engineer. They have been training together as a Space Station crew since March 2002. Chiao and Sharipov will serve as backup for Expedition 9 and as the prime crew for Expedition 10. They're scheduled to launch to the Space Station in October. Chiao will serve as the expedition commander and NASA science officer, and Sharipov will serve as Soyuz commander and flight engineer. Astronaut William S. McArthur Jr. and cosmonaut Valery I. Tokarev will serve as the Expedition 10 backup crew. European Space Agency Astronaut Andre Kuipers will also launch aboard the Soyuz with Fincke and Padalka in April. Kuipers will spend about a week aboard the Station conducting scientific experiments under a commercial agreement between the European Space Agency and Russia. Kuipers will return to Earth with Expedition 8 crewmembers Mike Foale and Alexander Kaleri. [“New Crews Named For 2004 Space Station Missions,” **NASA News Release #04-056,** February 6, 2004.]

◆ NASA delayed plans to dispose of the hazardous remnants of a historic Apollo launch tower this week to see whether a preservation group can come up with enough money to turn the gantry into a national monument. Known as Launch Umbilical Tower 1, the gantry was the starting point for eight Apollo and Skylab flights, including the flight that took astronauts Neil Armstrong and Buzz Aldrin to the moon in July 1969. The 380-foot tower was dismantled in 1983, and segments of it since have been rusting in a five-acre "bone yard" behind the NASA Headquarters Building at Kennedy Space Center, creating an environmental hazard. Several previous "Save The Tower" campaigns have failed, and now heavy metals and toxic substances within orange gantry paint are leeching into the soil at the open-air storage site as well as the water table beneath it. To comply with federal and state regulations, NASA this week launched a $2 million effort to decontaminate and dispose of the pieces. "A lot of people have tried over the years to save the tower, but unfortunately no one has come up with the financial wherewithal to do it," said Burton Summerfield, chief of the safety, health and environmental division at KSC. "For us right now, this is an environmental issue rather than a historic preservation issue." NASA nevertheless put the disposal project on hold to investigate a last-minute proposal from The Space Restoration Society, a nascent non-profit organization still seeking its tax-exempt status from the Internal Revenue Service. Made up of space history buffs, the group likens the Launch Umbilical Tower -- also known by the NASA acronym LUT -- to the piers from which Christopher Columbus set sail from in Palos de la Frontera, Spain with the Nina, Pinta and Santa Maria. The group hopes to raise $40 million -- its estimate for restoring the gantry and then erecting it somewhere on Kennedy Space Center grounds. The most likely site is the KSC Visitors Complex, according to

preliminary society plans. To garner support, the society has launched a web site -- www.savethelut.org -- as well as a petition drive that has generated more than 1,666 signatures since Tuesday. The 1,096th signatory: a Neil Armstrong. It was unclear, however, whether the Apollo astronaut submitted that petition. NASA officials say the agency appreciates the group's intentions. But they also question the structural integrity of tower segments, which have been exposed to the elements now for more than two decades. All tower parts, meanwhile, might not be available. The tower's hammerhead crane and the top three levels of the gantry already have been refurbished and are on display at the Apollo-Saturn 5 Center at KSC. The "white room" where astronauts boarded their Apollo spacecraft is on loan to the Kansas Cosmodrome and Space Center in Hutchinson, Kansas. But the biggest issue is whether the society can raise the kind of cash that would be required not only to restore and raise the tower but also maintain it after any resurrection. "I think that's the question in everybody's mind right now. A lot depends on how viable their offer is. If they come to the table with a substantial amount of money, then I'm sure they will get careful consideration," Summerfield said. "The downside for us is that we're out trying to get this issue addressed from an environmental standpoint. And the longer we wait on that side, the more difficult it makes our job. So there are definitely competing pressures in order to try to get this addressed quickly." [“NASA delays tower destruction,” **Florida Today**, February 7, 2004, p 1B & 4B.]

**February 7:** NASA grounded its Shuttle Training Aircraft fleet recently after critical parts of an engine splashed into the Banana River as an astronaut and two crewmates were flying one of the jets over Kennedy Space Center. The early December incident raises new questions about the safety of the aging Gulfstream 2 aircraft, which were modified by NASA to deploy their thrust reversers in flight to help mimic the shuttle's brick-like descent. One of the airplane's two reversers, plus other associated hardware, fell off during the flight. Shuttle commanders and pilots routinely use the craft to practice dangerous landings, which call for an approach seven times steeper than conventional jets, but agency officials downplayed the mishap. The mishap took place at 7:45 p.m. Dec. 2 (2003) as an unidentified astronaut, an instructor pilot and a simulation engineer prepared for a final approach to KSC's three-mile landing strip. The twin-engine plane was flying at 13,000 feet when an instrument-panel light alerted the crew to a problem with one of the thrust-reversers, which are used to put the craft into a sharp dive toward the runway. Onboard computers automatically shut down the simulated shuttle landing, allowing the aircraft to land normally. It wasn't until a post-landing inspection that the crew noticed the plane was missing the thrust-reverser, adapter duct, tailpipe and cowling. The 585-pound package, which is five feet long and four feet in diameter, was discovered Wednesday by NASA contractor divers. Its location: the floor of the Banana River some 300 feet north of a heavily traveled causeway that connects the KSC Industrial Area with nearby Cape Canaveral Air Force Station. No ground casualties were reported. But the incident prompted NASA to ground its shuttle training aircraft fleet. [“Shuttle-training craft grounded,” **Florida Today**, February 7, 2004, p 1A & 9A.]

**February 9:** NASA/KSC is a sponsor of the 2004 National Association of Minority Engineering Program Administrators, Inc. (NAMEPA) National Conference on February 11-14 in Orlando, Fla. This year’s theme is, “Beyond the Margin: Innovative Strategies

for Diversity, Collaboration and Results." Since 1979, NAMEPA has served to raise the value of educators, corporations, government agencies and non-profit organizations. The group is dedicated to offering a complete overview of the total effort and challenges essential in developing a minority engineer. On February 12, the luncheon keynote speaker is KSC Deputy Director, Dr. Woodrow Whitlow. He is discussing the conference theme as it relates to leadership. He is also speaking about the similar goals of NAMEPA and NASA, to increase the quantity and quality of our nation's engineering workforce. On February 13, Astronaut Leland Melvin is addressing the student participants. ["2004 NAMEPA National Conference in Orlando, Fla.," **KSC News Release #04-04,** February 9, 2004.]

◆ Refuting a rising chorus from critics around the world, NASA officials said Monday the agency would stand firm on its controversial decision to cancel a shuttle mission to service the Hubble Space Telescope. Circling Earth in a different orbit, the International Space Station could not provide a telescope-repair crew with a safe haven if a shuttle encounters serious trouble on a Hubble servicing flight, officials said. Post-Columbia safety standards, the officials insisted, would force NASA to have a second shuttle ready to launch on a rescue mission, putting two spaceships and two crews at risk. And that would create even greater schedule pressure than those cited by accident investigators as a contributing cause of the February 2003 Columbia disaster, they said. "We're just looking at a situation where we don't think it's prudent," said NASA chief scientist John Grunsfeld, a former astronaut who flew on two Hubble servicing flights. "It puts us exactly in the trap of buying in ahead of time to extreme schedule pressure in order to enable a mission to Hubble." The mid-January decision to cancel NASA's last planned Hubble servicing flight came two days after President Bush announced plans to send astronauts back to the moon by 2020. In the weeks since, the institute that operates the observatory has been bombarded with e-mails bemoaning the verdict. "Save The Hubble" web sites have sprung to life along with a petition drive that has garnered 16,000 signatures. ["No shuttle to Hubble," **Florida Today**, February 10, 2004, p 1A & 6A.]

**February 12:** Spacecraft and Expendable Launch Vehicle Status Report: Mission: Gravity Probe B (GP-B), Launch vehicle: Delta II, Launch pad: SLC-2, Vandenberg Air Force Base, Launch date: April 17, 2004, Launch time: 10:09:12 a.m. PDT. The Gravity Probe B spacecraft is in NASA's Payload Processing Facility 1610 on North Vandenberg Air Force Base in California. After final thermal vacuum chamber testing at Lockheed Martin in Sunnyvale, Calif., the Experiment Control Unit (ECU) was shipped to Vandenberg and arrived there Feb. 4. The ECU was reinstalled into the Gravity Probe B spacecraft over the weekend. Testing of the spacecraft with the ECU installed is now underway. In other planned spacecraft processing, servicing of the Gas Management Assembly (GMA) is underway today. The GMA provides the helium gas required to spin up the gyroscopes. It also performs magnetic flux reduction, or "flux flushing," to minimize noise or reduce the trapped magnetic field within each gyro's housing. Filling the dewar with liquid helium in preparation for cryogenic servicing of the spacecraft is planned for Feb. 13. The actual servicing of the spacecraft is scheduled to begin Feb. 16. Operations to reinstall the solar arrays are planned to begin in mid-March. The spacecraft is currently scheduled to be transported to Space Launch Complex 2 on Apr. 1

and mated to the Delta II rocket. Meanwhile, the Boeing Delta II rocket is at Space Launch Complex 2, enclosed within the gantry-like mobile service tower. It has successfully completed all testing to date and will remain there until the GP-B spacecraft arrives. There are no Delta II launch vehicle issues or concerns at this time. KSC News Center (2004). **Spacecraft and Expendable Launch Vehicles Status Report** [Online]. Available E-mail: ksc@newsletters.nasa.gov [2004, February 12].]

**February 17:** Although NASA has recruited a former DOD official who has participated in Base Realignment and Closure (BRAC) efforts to perform an inventory of its facilities, the agency has no "specific intention" of closing any field centers, according to Administrator Sean O'Keefe. The official was "brought in a month ago, following a comprehensive effort we conducted last year to look at real property assessments, inventorying what we have," O'Keefe says. "The approach that we asked for ... is how do we use those facilities in the most cost-effective way. There is no specific intention to look at a realignment or closure activity. His expertise was primarily in the realignment phase - working with individual communities to ensure transition from one mission to the other." Aviation Week BIS (2004). **Aerospace Daily** [Online]. Available E-mail: intelligence@aviationnow.com [2004, February 17].]

**February 18:** Spacecraft and Expendable Launch Vehicle Status Report: Mission: Gravity Probe B (GP-B), Launch vehicle: Delta II, Launch pad: SLC-2, Vandenberg Air Force Base, Launch date: April 17, 2004, Launch time: 1:09:12 p.m. EDT (10:09:12 a.m. PDT). The Gravity Probe B spacecraft is in NASA's Payload Processing Facility 1610 on North Vandenberg Air Force Base in California. Preparations are on schedule for the launch which is targeted to occur on Saturday, Apr. 17. The Experiment Control Unit (ECU) arrived at Vandenberg Feb. 4 from Lockheed Martin in Sunnyvale and was reinstalled into Gravity Probe B. Powered-on testing of the spacecraft with the ECU installed is underway. Indications are that Gravity Probe B and the ECU are performing as desired. In other planned spacecraft processing, servicing of the Gas Management Assembly (GMA) is also underway. The GMA provides the helium gas required to spin up the gyroscopes. It also performs magnetic flux reduction, or "flux flushing," to minimize noise or reduce the trapped magnetic field within each gyro's housing. The dewar with cryogenic liquid helium is connected to the ground support equipment, in preparation for servicing that will return the helium to a superfluid state. The filling of the spacecraft with helium begins today. Operations to re-install the solar arrays will begin in mid-March. The spacecraft is currently scheduled to be transported to Space Launch Complex 2 on Apr. 1 and mated to the Delta II rocket. Meanwhile, the Boeing Delta II rocket is at Space Launch Complex 2, enclosed within the gantry-like mobile service tower. It has successfully completed all testing to date and will remain there until the GP-B spacecraft arrives. There are no Delta II launch vehicle issues or concerns at this time. KSC News Center (2004). **Spacecraft and Expendable Launch Vehicles Status Report** [Online]. Available E-mail: ksc@newsletters.nasa.gov [2004, February 18].]

**February 19:** Members of NASA's Space Flight Leadership Council, which

is charged with the oversight of the agency's Return to Flight efforts, today moved the target window for the next flight of the Space Shuttle to March 2005. The decision was made at NASA's Johnson Space Center in Houston after an extensive review of activities surrounding plans to return the orbiter fleet to safe flight. The council also decided that the Space Shuttle Discovery will carry Commander Eileen Collins and a six-person crew into orbit for the Return to Flight mission, which is designated as STS-114. ["NASA Updates Space Shuttle Return to Flight Plans," **NASA News Release #04-065,** February 19, 2004.]

**February 25:** Spacecraft and Expendable Launch Vehicle Status Report: Mission: Gravity Probe B (GP-B), Launch vehicle: Delta II, Launch pad: SLC-2, Vandenberg Air Force Base, Launch date: April 17, 2004, Launch time: 1:09:12 p.m. EDT (10:09:12 a.m. PDT). The Gravity Probe B spacecraft is in NASA's Payload Processing Facility 1610 on North Vandenberg Air Force Base in California. Preparations are on schedule for the launch, which is scheduled to occur on Saturday, April 17. Powered-on testing of the spacecraft with the reworked ECU installed continues without problems. Reconditioning of the spacecraft's cryogenic helium dewar back to a temperature of 1.65 Kelvin has been underway. This is essentially a topping off process that also cools the helium in the tank to a superfluid state near absolute zero. The topping continued until 95% of the helium in the dewar was in a superfluid condition. The dewar has now been closed out, so the launch nominally needs to occur within about 90 days. A final top-off is planned to occur at the launch pad to assure the helium will last the planned 16-month duration of the mission. In other planned spacecraft processing, the Gas Management Assembly (GMA) is undergoing "rate of rise" testing that checks for leakage rates. The GMA provides the helium gas required to spin up the gyroscopes. It also performs magnetic flux reduction, or "flux flushing," to minimize noise or reduce the trapped magnetic field within each gyro's housing. Operations to reinstall the solar arrays will begin on March 8. The spacecraft is currently scheduled to be transported to Space Launch Complex 2 on April 1 and mated to the Delta II rocket. Meanwhile, the Boeing Delta II rocket is at Space Launch Complex 2, enclosed within the gantry-like mobile service tower. It has successfully completed its testing to date and will remain there until the GP-B spacecraft arrives. The solid rocket booster inspections performed as a precaution after the recent earthquake in central California have been completed with no anomalies observed. There are no Delta II launch vehicle issues or concerns at this time. KSC News Center (2004). **Spacecraft and Expendable Launch Vehicles Status Report** [Online]. Available E-mail: ksc@newsletters.nasa.gov [2004, February 25].]

◆ NASA Administrator Sean O'Keefe today expressed his appreciation to the President for signing into law a new act giving NASA greater flexibility to restructure and revitalize its work force. President George W. Bush yesterday signed the NASA Flexibility Act of 2004. "I am very excited about this human capital legislation," said Administrator O'Keefe. "With fewer students entering math and science studies, there's greater competition to attract those graduates who do make science and technology a career. This law now gives us additional tools to address the 21st century challenges we face in recruiting and retaining the exceptional talent required to carry out NASA's mission of exploration and discovery." NASA created a Human Capital Legislation

Implementation Team in August to begin work on the many tasks that must be accomplished before using the new authorities provided in the act. The team also is leading the change-management initiatives underway to ensure effective communication with the entire NASA work force regarding the human capital legislation. Sponsored by U.S. Senator George Voinovich (R-Ohio) and U.S. Rep. Sherwood Boehlert (R-N.Y.), the bill builds on existing law. Among other reforms, it provides the agency the ability to improve recruitment and retention, and to compete with the private sector. The legislation also establishes a Science and Technology Scholarship for Service Program, which provides financial assistance to students in exchange for a commitment to work for NASA. The General Accounting Office has continued to rank "strengthening human capital" as one of NASA's top management challenges. The agency's over-60 science and engineering work force outnumbers its under-30 employees by nearly 3-to-1. The potential departure of these individuals represents a dramatic loss of knowledge, experience and leadership. [“President Signs NASA Work Force Flexibility Act Into Law,” **NASA News Release #04-071,** February 25, 2004.]

**February 27:** NASA's Deputy Administrator, Fred Gregory, named Jeffrey E. Sutton as the agency's Assistant Administrator, Office of Institutional and Corporate Management. The new office (Code O) will provide technical expertise, policy oversight and overall leadership for NASA's institutional, corporate, infrastructure and management systems activities. Code O will manage the NASA Directives Management System; internal management control and audit follow-up systems, including internal assessments and the ISO 9001-based management systems. [“NASA Creates Office Of Institutional & Corporate Management,” **NASA News Release #04-074,** February 27, 2004.]

◆ Space Shuttle Processing Status Report, Vol. 1 No. 1: **Discovery** (OV-103); NASA’s Space Flight Leadership Council meeting Feb. 19 and selected Space Shuttle Discovery as the lead vehicle for Return to Flight and moved the launch planning window to March 6 through April 18, 2005. Processing continues for flight and implementation of Columbia Accident Investigation Board recommendations and Return to Flight modifications. During processing, technicians found minor corrosion on the Rudder Speed Brake, as well as gears installed in reverse direction on one of the four actuators. The four actuators were removed from the vehicle, and will be X-rayed and undergo an engineering evaluation to determine further action. **Atlantis** (OV-104); Technicians in the Space Shuttle processing facility at Kennedy Space Center continue to prepare Atlantis for future missions. All of Atlantis’ Reinforced Carbon-Carbon (RCC) panels were removed, shipped to the vendor for inspection and thermography, and returned to KSC for installation on the vehicle. All 22 left side wing leading edge panels have been re-installed. Workers now will begin to installing the C-shaped T-seals that fit between each RCC panel. Build-up of the right-hand RCC panels and associated fittings begins next week. **Endeavour** (OV-105); Space Shuttle Endeavour is in its Orbiter Major Modification period, which began in December 2003. Technicians are installing cabling in the forward area of the vehicle in preparation for installation later this year of its new Multifunction Electronic Display System or “glass cockpit.” RCC panels continue to be removed from the vehicle and returned to the vendor for inspection. Of the 44 panels on Endeavour, eight left-hand panels and nine right-hand panels were removed.

Owner-press-release. (2004). **Space Shuttle Processing Status Report** [Online]. Available E-mail: owner-press-release@spinoza.public.hq.nasa.gov [2004, February 27].]

**During February:** NASA has postponed plans to set up an International Space Station Research Institute (ISSRI) while it sorts out just what role space station science will have under President Bush's new space exploration policy. The agency had long intended to set up a non-governmental organization (NGO) to manage research on the orbiting laboratory, based on priorities established after consultation with the microgravity science community. The Office of Biological and Physical Research had released a draft Statement of Work for the NGO, with a draft request for proposals due out this winter. But Bush's new policy calls for station research to be focused on keeping astronauts healthy during the deep space missions the policy envisions. With that in mind, NASA will wait at least a year before deciding whether to continue the ISSRI procurement with modifications or dropping it altogether. ["Wait and See," **Aviation Week & Space Technology**, February 2, 2004, p 17.]

This aerial photo shows the storage area containing Launch Umbilical Towers that were used during the early years of the Space Program. In the lower left corner of the storage field is a Caterpillar excavator with a 48-inch shear demolishing LUT-1, used to launch Apollo 8, Apollo 11, Skylab manned missions and the Apollo-Soyuz Test Project. The shear is one used in the deconstruction of the Twin Towers in New York City after 9/11.

## MARCH

**March 1:** NASA's plan to implement President George W. Bush's moon-Mars-beyond space vision will use small incremental steps called space policy building blocks, according to documents just released by the agency. The strategy is meant to keep costs low and make sure no one policy direction will threaten the evolution of the overall project. The first of the building blocks, called Lunar Testbeds and Missions, will include a major new series of space robotic probes to the moon, along with an accelerated program of unmanned Mars exploration. Both elements were covered in funding requests in the fiscal year 2005 budget for the National Aeronautics and Space Administration, which is now under review in Congress. NASA already has announced the first part of the Bush plan: a new series of reconnaissance satellites to be launched into lunar orbit. Scheduled for blast-off in 2008, the satellites will map the lunar surface in greater detail than ever before, identifying and classifying features such as large rocks and boulders, rills, hills and canyons. The idea would be to create maps that visiting astronauts -- and their robotic companions -- can use to navigate their landers and roving vehicles. Web posted. (2004). [NASA Planning Steps To Moon, Mars [Online]. Available WWW: http://www.spacedaily.com/ [2004, March 1].]

**March 2:** The Martian plain being examined by the robotic rover Opportunity was once "drenched" with enough water to support life, scientists said Tuesday. Edward Weiler, NASA's associate administrator for space science, said the primary mission of the agency's Mars exploration program is to answer the question of whether life existed on the Red Planet. "Today's results are a giant leap toward achieving that long-term goal," Weller said at a news conference at NASA Headquarters in Washington. ["Mars rover discovers evidence of water," **Orlando Sentinel**, March 3, 2004, p A1 & A12.]

◆ NASA has begun studies to determine if it will need a new class of powerful super rockets to boost the new moon and Mars spaceships President Bush has proposed as part of a new U.S. space policy. The studies, experts told United Press International, will help shape a decision by the end of the year on the size and capabilities of the space launching vehicles that will be needed to lift payloads under Bush's plan. The decision is similar to choices that faced the National Aeronautics and Space Administration in 1962 when new rockets were proposed to lift the Apollo spacecraft and its components. The United States at the time was limited to existing families of ballistic missiles, such as Thor, Atlas and Titan, which were undergoing modifications to allow the launch of space probes instead of atomic warheads. The choice for the Apollo rocket was shaped by the decision on how to send astronauts to the moon -- the same type of decision NASA faces with Bush's space policy. Three methods were under consideration in 1962. The first would have used the huge Nova booster to send an astronaut-carrying space capsule directly from Cape Canaveral on Florida's coast to a landing on the moon's surface. A second method, called Lunar Orbit Rendezvous, would have used a single Saturn V super booster to send a lander and capsule combination first into Earth orbit and then to orbit around the moon before dispatching the lander to the surface. A third idea was called Earth Orbit Rendezvous. Under that plan, smaller Saturn I rockets would have launched various elements of Apollo into Earth orbit, where they would have been assembled forming a

larger Moonship. Early signs indicate some version of Earth Orbit Rendezvous might be selected for Bush's Project Constellation program. Existing U.S. space boosters large enough to lift the Constellation manned capsules are the Boeing Delta IV heavy and the Lockheed Martin Atlas V heavy. Both rockets, in their largest versions, can lift about 50,000 pounds into a low Earth orbit. Web posted. (2004). [NASA Studies New Booster [Online]. Available WWW: http://www.spacedaily.com/ [2004, March 2].]

◆ Lockheed Martin may be forced to pay up to $400 million for damage to a US government weather satellite dropped at a company factory last year, the Secretary of Commerce said Tuesday. Donald Evans, speaking before a subcommittee of the Senate Appropriations Committee, said that the Commerce Department is investigating the mishap at Lockheed Martin's Sunnyvale satellite facility in September, when the NOAA N-Prime satellite slipped off a platform and fell approximately one meter to the floor. An internal company investigation determined that several bolts designed to hold the satellite to the platform it was resting on had been removed without proper documentation. Evans told senators that the department was considering all options, including legal action to recover the costs of the damaged satellite from Lockheed Martin, the prime contractor for NOAA N-Prime. Web posted. (2004). [Lockheed may pay for dropped satellite [Online]. Available WWW: http://www.spacedaily.com/ [2004, March 3].]

**March 3:** The IMAX Corporation today, in association with Academy Award-winning actor Tom Hanks, and aerospace technology leader Lockheed Martin Corporation, announced a new IMAX 3-D space film, which will take moviegoers to the moon and allow them to walk side-by-side with the brave astronauts of the Apollo program. IMAX will produce "Magnificent Desolation" along with Hanks' and Gary Goetzman's production company Playtone. Lockheed Martin will sponsor it. "NASA is proud to collaborate with Playtone, as well as continue our successful relationships with IMAX and Lockheed Martin," said Glenn Mahone, Assistant Administrator for Public Affairs at NASA Headquarters in Washington. "Tom Hanks' enthusiasm for exploration is clearly evident in his previous productions that chronicle NASA's remarkable history, and we believe 'Magnificent Desolation' is a wonderful opportunity to capture the interest and curiosity of the next generation of explorers." IMAX space films have been seen by over 85 million people and played in over 15 languages worldwide. The most recent collaboration between Lockheed Martin, NASA and IMAX was the extremely successful release of "Space Station," an IMAX 3-D film released in April 2002, which has grossed nearly $70 million at the box office and continues to play in theaters worldwide. [“NASA Supports New IMAX 3-D Film Project With Tom Hanks and Lockheed Martin,” **NASA News Release #04-076,** March 3, 2004.]

◆ Two veteran astronauts have been named to key space flight posts at NASA's Johnson Space Center (JSC) in Houston. Robert Cabana (Colonel, USMC, Ret.), who has flown on four Space Shuttle flights, has been named JSC Deputy Director. Kenneth Bowersox (Captain, USN), who recently commanded the sixth expedition to the International Space Station, will replace Cabana as Director of Flight Crew Operations. [NASA Fills Key Space Flight Positions,” **NASA News Release #04-080,** March 3, 2004.]

◆ Spacecraft and Expendable Launch Vehicles Status Report: Mission: Gravity Probe B (GP-B), Launch vehicle: Delta II, Launch pad: SLC-2, Vandenberg Air Force Base, Launch date: April 17, 2004, Launch time: 1:09:12 p.m. EDT (10:09:12 a.m. PDT). The Gravity Probe B spacecraft is in NASA's Payload Processing Facility 1610 on North Vandenberg Air Force Base in California and preparations are on schedule for a launch on Saturday, April 17. Powered-on testing of the spacecraft with the reworked Experiment Control Unit (ECU) reinstalled is complete and a detailed data analysis is now underway. The ECU appears to be performing fully as intended. Functional testing of the remainder of the spacecraft continues and is on schedule. No problems have been revealed. In other planned spacecraft processing, the Gas Management Assembly (GMA) "rate of rise" testing has been completed satisfactorily. This testing checked leakage rates and amounts. The GMA provides the helium gas required to spin up the gyroscopes. It also performs magnetic flux reduction, or "flux flushing," to minimize noise or reduce the trapped magnetic field within each gyro's housing. Reconditioning of the spacecraft's cryogenic helium dewar back to a temperature of 1.65 Kelvin has been completed and the dewar was sealed. This was essentially a topping-off process that also cooled the helium in the tank to a superfluid state near absolute zero. The topping continued until 95 percent of the helium in the dewar was in a superfluid condition. Since the dewar has now been closed out, the launch nominally would need to occur within about 90 days. A final top-off is set to occur at the launch pad to assure the helium will last the planned 16-month duration of the mission. Operations to reinstall the solar arrays will begin on March 8. The spacecraft is currently scheduled to be transported to Space Launch Complex 2 on April 1 and mated to the Delta II rocket. Meanwhile, the Boeing Delta II rocket is at Space Launch Complex 2, enclosed within the gantry-like mobile service tower. It has successfully completed its testing to date and will remain there until the GP-B spacecraft arrives. The solid rocket booster inspections performed as a precaution after the recent earthquake in central California have been completed with no anomalies observed. There are no Delta II launch vehicle issues or concerns at this time. KSC News Center (2004). **Spacecraft and Expendable Launch Vehicles Status Report** [Online]. Available E-Mail: ksc@newsletters.nasa.gov [2004, March 3].]

**March 4:** Space Shuttle Processing Status Report, Vol. 1 No. 2: **Discovery** (OV-1030; Return to Flight preparations continue on orbiter Discovery in the processing facility at KSC. Following the decision by NASA management to remove and X-ray the Rudder Speed Brake actuator gears, the four actuators were removed from the vehicle and sent to the NASA Shuttle Logistics Depot in Cape Canaveral, Fla., for X-ray beginning Monday. The X-ray will determine if the gears were installed correctly. The Body Flap actuators are installed, with a fit check set for today. The Body Flap re-installation is scheduled for Friday. Build-up of Reinforced Carbon-Carbon (RCC) panels and associated fittings is ongoing. The first RCC panels are scheduled to be hung starting early next week. **Atlantis** (OV-104); Processing of Atlantis continues at KSC in preparation for its future mission. Installation of the C-shaped T-seals that fit between each RCC panel is beginning on the left-hand wing leading edge. Right-hand RCC spar fittings are being installed, with the first panels being placed on the vehicle starting next week. Remote Manipulator System hi-potential voltage tests are ongoing. Installation of window No. 2 is scheduled for next week. **Endeavour** (OV-105); Space Shuttle Endeavour is in its

Orbiter Major Modification period, which began in December 2003. Thermal Protection System blankets are being removed to support removal and inspection of the Rudder Speed Brake actuators. RCC panels continue to be removed from the vehicle and returned to the vendor for inspection. Owner-press-release. (2004). **Space Shuttle Processing Status Report** [Online]. Available E-mail: owner-press-release@spinoza.public.hq.nasa.gov [2004, March 4].]

**March 5:** NASA this year plans to kick off nationwide technology-development contests that will award cash prizes to the winners. The idea is to stimulate innovation and competition in areas that represent technological hurdles to future space exploration. Details remain sketchy, but the first challenges likely will revolve around revolutionary advances in spacecraft and robotic technologies. Contests aimed at cutting the cost of space missions are likely. The contests will be open to U.S. industry, academia, non-profit organizations, students and individuals who are not federal employees. Initial prize purses will be up to $250,000. Larger prizes will be available in future years. NASA's proposed budget for 2005 includes $20 million for the "Centennial Challenges" program. NASA program manager Brant Sponberg on Tuesday likened the contests to the $25,000 prize offered in 1919 by French émigré Raymond Orteig for the first non-stop airplane flight between New York and Paris. An unknown 25-year-old air-mail pilot named Charles Lindbergh won it in 1927. [“Big money in NASA technology contests,” **Florida Today**, March 5, 2004, p 6A.]

**March 10:** NASA Deputy Administrator Fred Gregory today announced the appointment of Albert "Al" Condes as Deputy Assistant Administrator, and Joseph R. "Joe" Wood as Deputy Assistant Administrator (Exploration), Office of External Relations. Condes is responsible for NASA's international activities and coordination, particularly those related to Human Space Flight and Earth Science, in the U.S government interagency process. Wood is responsible for development of NASA's international exploration activities, particularly those related to exploration beyond low earth orbit. He also will coordinate NASA exploration policy formulation within the U.S. government interagency process. [“NASA Names Deputy Assistant Administrators For External Relations,” **NASA News Release #04-087,** March 10, 2004.]

◆ NASA’s MESSENGER spacecraft, the first Mercury orbiter, has arrived in Florida after being shipped from NASA’s Goddard Space Flight Center in Greenbelt, Md. MESSENGER — short for MErcury Surface, Space ENvironment, GEochemistry, and Ranging — will be launched on a six-year mission aboard a Boeing Delta II rocket on May 11. Secured in an air-conditioned transportation van, MESSENGER arrived at the Astrotech Space Operations processing facilities near Kennedy Space Center, where it was offloaded and taken into a high bay clean room. After the spacecraft is removed from its shipping container by employees of the Johns Hopkins University Applied Physics Laboratory, builders of the spacecraft, their first activity will be to perform an initial state-of-health check. Then processing for launch can begin including checkout of the power systems, communications systems and control systems. The thermal blankets will also be attached for flight. Meanwhile, at Space Launch Complex 17, the build-up and checkout of the Boeing Delta II Heavy expendable launch vehicle will be underway.

The activity on Pad 17-B is currently scheduled to begin on March 31 with the erection of the first stage. The nine extra-large, strap-on solid boosters will follow, erected in sets of three during the week of April 1-7. Next, the second stage will be hoisted atop the first stage on April 13. After the Delta II is fully erected on the pad, vehicle electrical checks will begin. A countdown test with the first stage loaded with liquid oxygen will occur on April 21. A Simulated Flight Test, a plus count, will occur the following day. This activates the electrical and mechanical flight systems on the vehicle as they will occur from liftoff through spacecraft separation. Finally, on April 27, the compact 1.2-ton MESSENGER spacecraft will arrive at the pad and be lifted atop the Delta II. After a critical integrated test, the Flight Program Verification on April 30, the fairing will be placed around the spacecraft on May 4. The final pre-launch preparations and countdown activities begin three days before launch. Liftoff is targeted for the opening of a 12-second launch window at 2:26 a.m. EDT on Tuesday, May 11. MESSENGER will fly past Venus three times and Mercury twice before starting its year-long orbital study of Mercury in July 2009. The Venus flybys, in November 2004, August 2005 and October 2006, will use the planet's gravity to guide MESSENGER toward Mercury's orbit. Mercury flybys in October 2007 and July 2008 will fine-tune the MESSENGER path and allow the spacecraft to gather data critical to planning the mission once it is in orbit. ["MESSENGER Spacecraft Arrives In Florida To Begin Final Preparations For May Launch," **KSC News Release #07-04,** March 10, 2004.]

◆ Spacecraft and Expendable Launch Vehicles Status Report: Mission: Gravity Probe B (GP-B), Launch vehicle: Delta II, Launch pad: SLC-2, Vandenberg Air Force Base, Launch date: April 17, 2004, Launch time: 1:09:12 p.m. EDT (10:09:12 a.m. PDT). The Gravity Probe B spacecraft is in NASA's Payload Processing Facility 1610 on North Vandenberg Air Force Base in California and preparations are on schedule for a launch on Saturday, April 17. The first of four solar arrays has been installed and testing has been completed. The second solar array will be installed tomorrow, March 11. Solar array installation activities are targeted for completion on March 18. Powered-on testing of the spacecraft with the reworked Experiment Control Unit (ECU) reinstalled is complete. A detailed data analysis is confirming that the ECU is performing as desired. Installation of small ordnance inside the Forward Equipment Enclosure (FEE) has been completed. The FEE surrounds the electronics of the Science Mission Dewar, which has valves that are opened on-orbit by these pyrotechnics to equalize pressure. The spacecraft is currently scheduled to be transported to Space Launch Complex 2 on April 1 and mated to the Boeing Delta II rocket. At the pad, the rocket is enclosed within the gantry-like mobile service tower and was powered up yesterday for the resumption of pre-launch testing. KSC News Center (2004). **Spacecraft and Expendable Launch Vehicles Status Report** [Online]. Available E-Mail: ksc@newsletters.nasa.gov [2004, March 10].]

◆ The launch of an Atlas 3 rocket early Friday was delayed 24 hours because of an unspecified issue with the Asian telecommunications satellite it is to carry into orbit. The MBSAT spacecraft is scheduled to launch between 12:40 a.m. and 2:10 a.m. Saturday. ["Launch delayed," **Florida Today**, March 11, 2004, p 16A.]

**March 11:** NASA will stick to its decision to cancel a shuttle mission to the Hubble Space Telescope, NASA Administrator Sean O'Keefe said. Earlier Thursday, he told a Senate panel he would go along with a congressional request to have the national Academy of Sciences and the General Accounting Office look into ways to keep the telescope running beyond its 2005 retirement date. ["No mission to Hubble," **Florida Today**, March 12, 2004, p 12A.]

**March 12:** Dr. Jacqueline Quinn, a NASA environmental engineer in the Spaceport Engineering and Technology Directorate at Kennedy Space Center, recently received the Society of Women Engineers (SWE) Technical Achievement Award. The Space Coast section of SWE honored Quinn with the award for her "scientific and engineering research of innovative solutions for the remediation of groundwater, soil and sediment contamination at the Spaceport." Quinn and three University of Central Florida professors developed the Emulsified Zero-Valent Iron (EZVI), which uses iron particles in an environmentally friendly oil and water base to neutralize toxic chemicals. Ultimately, Quinn would like to see this technology used to fight groundwater contamination. "I was very surprised to receive the award," Quinn said. "There are so many talented women engineers doing incredible science research and development in the Space Coast area. I am honored to be one of SWE's recognized achievers for 2003." Quinn started working on the EZVI technology in 2000 with a grant from the Small Business Technology Transfer Program at KSC. A patent for the technology has been issued with two more patents pending. ["NASA Environmental Engineer Receives Society of Women Engineers Technical Achievement Award," **KSC News Release #08-04,** March 12, 2004.]

◆ Space Shuttle Processing Status Report, Vol. 1 No. 3: **Discovery** (OV-103); At Kennedy Space Center, Discovery continues to be processed for the Return to Flight mission. The four Rudder Speed Brake actuators were X-rayed on Monday and Tuesday to determine if the gears were installed correctly. One of the four actuators, actuator No. 2, showed that a gear was reversed. It will be sent back to the vendor for refurbishment, and returned to KSC for re-installation on the vehicle. Vehicle power-up testing continues with the Main Propulsion System leak tests and fuel cell system checkout. The Body Flap actuator fit check was successfully completed. Build-up of Reinforced Carbon-Carbon (RCC) panels and associated fittings is ongoing. Six RCC spar fittings have been installed on the left-hand leading edge. **Atlantis** (OV-104); Preparations continue in the processing facility for Atlantis' future mission to the International Space Station. Seven T-seals, the C-shaped seals that fit between each RCC panel, have been installed on the left-hand wing leading edge. Build-up of the right-hand RCC panels and associated fittings is ongoing. The nose cap was delivered to the Thermal Protection System Facility (TPSF) on Tuesday. Technicians in the TPSF are beginning to build the thermal blankets that will be installed in the nose cap. Installation of window No. 2 is scheduled for today. **Endeavour** (OV-105); Space Shuttle Endeavour is in its Orbiter Major Modification period, which began in December 2003. Thermal Protection System blankets have been removed from the Rudder Speed Brake panels in preparation for the removal and inspection of the actuators. RCC panels continue to be removed from the vehicle and returned to the vendor for inspection. Owner-press-release. (2004). **Space**

**Shuttle Processing Status Report** [Online]. Available E-mail: owner-press-release@spinoza.public.hq.nasa.gov [2004, March 12].]

◆ Former astronaut Neil Armstrong says Americans should support President Bush's plan for renewed missions to the moon and beyond. Armstrong said the plan is economically sustainable and that the country must accept the risks associated with space exploration in order to reap technological rewards. "Our president has introduced a new initiative with renewed emphasis on the exploration of our solar system and expansion of human frontiers," Armstrong told a crowd of nearly 600 people Thursday. "This proposal has substantial merit and promise." He was in Houston to receive the Rotary National Award for Space Achievement. Armstrong, 73, commanded NASA's Apollo 11 mission in 1969, becoming the first person to walk on the moon. In 1971, he left the space program to pursue a teaching career in aeronautical engineering in his native Ohio. Web posted. (2004). [Former astronaut Neil Armstrong endorses Bush space exploration plan [Online]. Available WWW: http://www.orlandosentinel.com/ [2004, March 12].]

**March 13:** An Atlas 3 rocket launched a communications satellite designed to provide 70 audio and video channels to handheld devices in Japan and South Korea. This was the second launch of the year for an Atlas 3, built by Lockheed Martin leaving one more launch, scheduled for early 2005, before the model is retired to make way for the new Atlas 5 rocket, company officials said. The liftoff was at 12:40 a.m. (ET) Saturday from launch complex 36B at the Cape Canaveral Air Force Station. Web posted. (2004). [Atlas rocket roars into orbit [Online]. Available WWW: http://www.cnn.com/ [2004, March 13].]

**March 15:** Space Shuttle Processing Status Report #S04-02: **Discovery** (OV-103); Discovery is being processed for the Return to Flight mission. Four Rudder Speed Brake actuators were X-rayed last Monday and Tuesday to determine whether the gears were installed correctly. One of the four actuators, actuator No. 2, showed a gear was reversed. It will be sent back to the vendor for refurbishment and returned to KSC for re-installation on the vehicle. Vehicle power-up testing continues with the Main Propulsion System leak tests and fuel cell system checkout. The Body Flap actuator fit check was successfully completed. Build-up of Reinforced Carbon-Carbon (RCC) panels and associated fittings is ongoing. Six RCC spar fittings have been installed on the left-hand leading edge. **Atlantis** (OV-104); Preparations continue in the processing facility for a future mission to the International Space Station. Seven T-seals, the C-shaped seals that fit between each RCC panel, have been installed on the left-hand wing leading edge. Build-up of the right-hand RCC panels and associated fittings continues. The nose cap was delivered to the Thermal Protection System Facility (TPSF) last Tuesday. Technicians in the TPSF are beginning to build the thermal blankets that will be installed in the nose cap. **Endeavour** (OV-105); Endeavour is in its Orbiter Major Modification period, which began in December 2003. Thermal Protection System blankets have been removed from the Rudder Speed Brake panels in preparation for the removal and inspection of the actuators. RCC panels continue to be removed from the vehicle and returned to the vendor for inspection. Owner-press-release. (2004). **Space Shuttle**

**Processing Status Report** [Online]. Available E-mail: owner-press-release@spinoza.public.hq.nasa.gov [2004, March 15].]

◆ Statement by NASA Administrator about Senate budget resolution: "I am extremely pleased by the Senate's adoption last week of a budget resolution for Fiscal Year 2005 that assumes the President's budget request for NASA. The Senate's action is a critical first step. The President's budget request for NASA will allow us to safely return our Space Shuttle fleet to flight status and to meet our commitments for the International Space Station. The budget also allows us to begin thoughtful and responsible implementation of NASA's Vision for Space Exploration to return to the moon and continue our exploration of Mars," NASA Administrator Sean O'Keefe said today. [“Statement By NASA Administrator About Senate Budget Resolution,” **KSC News Release #04-092,** March 12, 2004.]

◆ William H. Pickering, the Jet Propulsion Laboratory director who pulled together the nation's first successful satellite launch in only three months and who later led the exploration of the solar system that culminated with the landing this year of two successful rovers on Mars, died of pneumonia Monday at his home in La Cañada Flintridge. Known affectionately as "Mr. JPL" and "Rocket Man," the New Zealand native who helped open the door to the stars was 93. "Dr. Pickering was one of the titans of our nation's space program," said the current JPL director, Charles Elachi. "It was his leadership that took America into space and opened up the moon and planets to the world." "More than any other individual, Bill Pickering was responsible for America's success in exploring the planets," said former Caltech President Thomas E. Everhart. "Under his leadership and vision, the field of planetary science grew into a distinct and cohesive new discipline." Web posted. (2004). [Longtime JPL Director Put U.S. In Space Race [Online]. Available WWW: http://www.orlandosentinel.com/ [2004, March 17].]

**March 16:** Surrounded by NASA memorabilia, Kennedy Space Center director Jim Kennedy recalled lying on a towel during a kindergarten rest period and hearing his teacher say, "Let's go outside and watch the launch." That blast into the past was sparked during a Tuesday visit by about 30 senior KSC staff members to the U.S. Space Walk of Fame Museum, which houses hundreds of items related to space exploration. It's also where winners of a children's space art contest will be announced on Saturday. The KSC group was headed to an all-day management retreat after the museum stop. "We've been inspired by this," said Kennedy, 54, who lived in Cocoa Beach as a child and first visited the museum when it was moved to Searstown Mall from Miracle City Mall last year. "It's the perfect way to start the day since we're on our way to a retreat. One of our mission's tenets is that we feel compelled to build the future on the rich history of the Space Center." Retired NASA employee and Walk of Fame president Charlie Mars was thrilled to hear such enthusiasm. Mars said NASA can help the museum in many ways, such as pointing organizers to grants. "We want them to help spread the word about who we are to the rest of NASA folks and contractors at the Cape, and for them to come see what we're all about," he said. Web posted. (2004). [KSC management takes walk through Space Walk of Fame [Online]. Available WWW: http://www.floridatoday.com/ [2004, March 17].]

**March 17:** Spacecraft and Expendable Launch Vehicles Status Report: Mission: Gravity Probe B (GP-B), Launch vehicle: Delta II, Launch pad: SLC-2, Vandenberg Air Force Base, Launch date: April 17, 2004, Launch time: 1:09:12 p.m. EDT (10:09:12 a.m. PDT). The Gravity Probe B spacecraft is in NASA's Payload Processing Facility 1610 on North Vandenberg Air Force Base in California and preparations are on schedule for a launch on April 17. Three of four solar arrays have been installed and tested. The remaining array will be installed tomorrow. After each solar array is installed, a "walk-out test," which is an unfolding, is performed to ensure that the array deploys properly. The spacecraft is then rotated for installation of the next solar array. Powered-on testing of the spacecraft with the reworked Experiment Control Unit (ECU) reinstalled is complete. A detailed data analysis has confirmed that the ECU is performing as desired. Installation of small ordnance inside the Forward Equipment Enclosure (FEE) has been completed. The FEE surrounds the electronics of the Science Mission Dewar, which has valves that are opened on-orbit by these pyrotechnics to equalize pressure. The spacecraft is currently scheduled to be transported to Space Launch Complex 2 on April 1 and mated to the Boeing Delta II rocket. At the pad, the rocket is enclosed within the gantry-like mobile service tower and is powered up. A countdown test with the first stage loaded with liquid oxygen will occur tomorrow, March 18. A Simulated Flight test, which is a plus count, will occur March 24. This activates the electrical and mechanical flight systems on the vehicle as they will occur from liftoff through spacecraft separation. The Launch Site Readiness Review, an assessment of the Delta II launch vehicle's readiness for spacecraft arrival, is scheduled for March 30. Mission: MESSENGER, Launch vehicle: Delta II, Launch pad: 17-B, Launch date: May 11, 2004, Launch time: 2:26:14 a.m. – 2:26:26 a.m. EDT. The MESSENGER spacecraft arrived at the Astrotech Space Operations processing facility near Kennedy Space Center on March 10. It was offloaded and taken into a high bay clean room. The soft covers were then removed, and the spacecraft was hoisted onto a test stand and powered-up the same day. Post-arrival state-of-health checks were successfully completed. Processing for launch began this week, including checkout of the power systems, communications systems and control systems. Workers are also beginning to attach the thermal blankets to the spacecraft for flight. Build-up of the Boeing Delta II launch vehicle at Pad 17-B on Cape Canaveral Air Force Station is scheduled to begin on March 31. MESSENGER has been built for NASA by the Johns Hopkins University Applied Physics Laboratory in Baltimore, Maryland. The spacecraft will fly past Venus three times and Mercury twice before starting its year-long orbital study of Mercury in July 2009. The Venus flybys, in November 2004, August 2005 and October 2006, will use the planet's gravity to guide MESSENGER toward Mercury's orbit. Mercury flybys in October 2007 and July 2008 will fine-tune the MESSENGER path and allow the spacecraft to gather data critical to planning the mission once it is in orbit. KSC News Center (2004). **Spacecraft and Expendable Launch Vehicles Status Report** [Online]. Available E-Mail: ksc@newsletters.nasa.gov [2004, March 17].]

**March 18:** Space Shuttle Processing Status Report S04-03: **Discovery** (OV-103); Discovery processing milestones continue to be achieved in preparation for the first Return to Flight mission, designated STS-114. The No. 2 Rudder Speed Brake actuator was sent back to the vendor for refurbishment and to have the gears placed into the

proper orientation. It will be returned to KSC in about six weeks for reinstallation on the vehicle. Following a successful fit check; the Body Flap was installed on March 12. The first Reinforced Carbon-Carbon (RCC) panel was installed on the left-hand leading edge of the wing on Monday. On Sunday, Discovery began a two-week power-down period to perform orbiter electrical wiring inspections and hi-potential voltage testing. **Atlantis** (OV-104); In the processing facility, technicians continue to prepare Atlantis for a mission to the International Space Station. Preparations continue to remove the Rudder Speed Brake actuators. Thirteen T-seals, the C-shaped seals that fit between each RCC panel, have been installed on the left-hand wing leading edge. Build-up of the right-hand RCC panels and associated fittings is ongoing. **Endeavour** (OV-105); Endeavour is in its Orbiter Major Modification (OMM) period, which began in December 2003. Structural and wire inspections associated with OMM continue in the midbody and aft. Nineteen left-hand and all 22 right-hand RCC panels have been removed from the vehicle and returned to the vendor for inspection. Of the 44 RCC panels on Endeavour, technicians have completed the thermography and engineering analysis of 20 panels. Owner-press-release. (2004). **Space Shuttle Processing Status Report** [Online]. Available E-mail: owner-press-release@spinoza.public.hq.nasa.gov [2004, March 17].]

**March 20:** A $45 million military navigation satellite is circling the planet today after a last-minute launch Saturday aboard a Boeing Delta 2 rocket. With the 2.2-ton satellite nestled in its protective nosecone, the 12-story rocket leapt off its launch pad 17B at Cape Canaveral Air Force Station at 12:53 p.m. -- right at the end of a 14-minute launch window. Countdown to a planned 12:41 p.m. liftoff was halted 43 seconds before launch when engineers detected higher-than-allowable pressure within the rocket's gaseous nitrogen purse system. The original launch time -- 12:39 p.m. -- was shifted two minutes to avoid launching the Delta on a collision course with other objects in orbit. Web posted. (2004). [Military satellite safely in orbit [Online]. Available WWW: http://www.floridatoday.com/ [2004, March 21].]

◆ For the Delta launch team at Cape Canaveral, there is little time to spare following Saturday's successful mission as workers refurbish pad 17B for its next mission. NASA's MESSENGER space probe to orbit the planet Mercury is slated for liftoff May 11 from the seaside complex aboard a Boeing Delta 2-Heavy rocket. Assembly of the rocket's stages begins at the pad on March 31. But before the first stage can be delivered to the pad, routine post-launch cleaning has to be performed after Saturday's fiery flight that carried a Global Positioning System satellite into orbit. "We have about a week-and-a-half to basically scrub the pad down, take care of any damage that occurs from either fire or blast," said Lt. Col. Brad Broemmel, Air Force launch director and commander of the 1st Space Launch Squadron at the Cape. Web posted. (2004). [Pad to be refurbished for time-critical launch. [Online]. Available WWW: http://www.spaceflightnow.com/ [2004, March 20].]

**March 22:** NASA's M2K4 Web site launched an interactive program giving any citizen of cyberspace the chance to drive NASA's Mars Rovers, Spirit and Opportunity, across the red planet. "This experience gives visitors to NASA's Web site the chance to explore Gusev Crater and Meridiani Planum, without having to make the 300-million-mile trek,"

said Dennis Armstrong, NASA's Kennedy Space Center Public Web Information Manager. "We're hoping users will count on this feature as a great source to find out about Mars Exploration Rover discoveries. A lot of people already have. During the first 10 days of program operation, we received more than 210,000 page views," Armstrong said. The interactive experience is frequently updated with the latest pictures and data from the Mars Rover missions. Drivers of the digital Martian duo can examine the same points of interest investigated by the real rovers. M2K4 is a multimedia experience that gives Web users the chance to explore the Mars Exploration Rover missions up close. Interactive features include animations of the mission, Martian trivia, and the chance to virtually drive across the surface of Mars. ["NASA Announces New Mars Interactive Web Feature," **NASA News Release #04-097,** March 22, 2004.]

◆ NASA has been flying shuttles for more than 20 years without inspecting a critical landing system whose failure could destroy a spaceship and kill its crew, an agency manager acknowledged Monday. NASA recently found that gears within shuttle's rudder speed brake actuators were installed incorrectly on Discovery, the ship assigned to fly its first post-Columbia mission. An internal investigation now is under way, NASA shuttle program manager William Parsons said. The intent: To determine how such critical hardware could go without inspections since the devices were manufactured in the late 1970s. Housed inside the shuttle's vertical tail fin, four actuators are used to open and close shuttle rudder speed brake flaps during atmospheric re-entry, guiding and slowing an orbiter as it approaches a landing strip. Failure of any of the devices would be unforgiving. "Loss of the rudder speed brake would be loss of vehicle (and) loss of crew," Parsons said. "If it jammed open or jammed closed, it would be catastrophic." NASA's entire inventory of the devices will be inspected before shuttles return to flight. Parsons said the work probably would be done in time to meet a March 2005 launch date. Web posted. (2004). [Critical shuttle system was installed incorrectly [Online]. Available WWW: http://www.floridatoday.com/ [2004, March 23].]

◆ A NASA plan to fix potentially catastrophic problems with shuttle rudder speed brakes could force the agency to borrow parts from one orbiter to ready another for flight -- a practice severely criticized by Challenger accident investigators. NASA has enough rudder speed brake parts on hand to outfit Discovery for its first post-Columbia shuttle mission, a flight scheduled to launch in March 2005. But the agency also intends to have Atlantis ready to fly a rescue mission should Discovery suffer damage that would prevent it from making a safe return to Earth. And NASA shuttle program manager William Parsons said Monday the agency might have to borrow parts from Endeavour to have Atlantis ready for a spring 2005 launch. The commission that investigated the 1986 Challenger accident called that practice -- known as cannibalization -- "a potential threat to flight safety. This practice is costly and disruptive, and it introduces opportunities for component damage," the commission said in its final report. It recommended that NASA beef up its spare parts program and "stop the practice of removing parts from one orbiter to supply another." The current situation cropped up after NASA discovered corrosion in a shuttle body flap, a device that shields the ship's main engines and helps guide orbiters during atmospheric reentry. Actuators that move the flap are similar to those used to operate the shuttle's rudder speed brake, which help slow an orbiter as it approaches a

landing site. The similarities prompted NASA to remove four rudder speed brake actuators from Discovery and ship them back to their manufacturer for inspections. Minor corrosion was uncovered, and a key gear also was installed improperly on one of the devices. A second improperly installed gear then was found on a spare unit. Actuators from Atlantis and Endeavour still must be inspected. Parsons said NASA has two spare actuators that can be used on Atlantis and 94 percent of the parts needed to build two additional units for the ship. The remaining parts, however, will either have to be manufactured from scratch - a lengthy process -- or borrowed from Endeavour, he said. Web posted. (2004). [NASA may take brake parts from other shuttles [Online]. Available WWW: http://www.floridatoday.com/ [2004, March 23].]

**March 23:** NASA's Opportunity rover has demonstrated some rocks on Mars probably formed as deposits at the bottom of a body of gently flowing saltwater. "We think Opportunity is parked on what was once the shoreline of a salty sea on Mars," said Dr. Steve Squyres of Cornell University, Ithaca, N.Y., principal investigator for the science payload on Opportunity and its twin Mars Exploration Rover, Spirit. Clues gathered so far do not tell how long or how long ago liquid water covered the area. NASA's Associate Administrator for Space Science Dr. Ed Weiler said, "This dramatic confirmation of standing water in Mars' history builds on a progression of discoveries about that most Earthlike of alien planets. This result gives us impetus to expand our ambitious program of exploring Mars to learn whether microbes have ever lived there and, ultimately, whether we can." In telltale patterns, called crossbedding and festooning, some layers within a rock lie at angles to the main layers. Festooned layers have smile-shaped curves produced by shifting of the loose sediments' rippled shapes under a current of water. [“Standing Body of Water Left Its Mark In Mars Rocks,” **NASA News Release #04-100,** March 23, 2004.]

**March 24:** NASA has set Saturday, March 27, for the flight of its experimental X-43A research vehicle. The unpiloted 12-foot-long vehicle, part aircraft and part spacecraft, will be dropped from the wing of a B-52 aircraft, boosted to nearly 100,000 feet by a booster rocket and released over the Pacific Ocean to briefly fly under its own power at seven times the speed of sound, almost 5,000 mph. This will mark the first time a non-rocket, air-breathing scramjet engine has powered a vehicle in flight at hypersonic speeds, defined as speeds above Mach 5 or five times the speed of sound. [“NASA’s X-43A Vehicle Ready For Flight,” **NASA News Release #04-000,** March 24, 2004.]

◆ Spacecraft and Expendable Launch Vehicles Status Report: Mission: Gravity Probe B (GP-B), Launch vehicle: Delta II, Launch pad: SLC-2, Vandenberg Air Force Base, Launch date: April 17, 2004, Launch time: 1:09:12 p.m. EDT (10:09:12 a.m. PDT). The Gravity Probe B spacecraft is in NASA’s Payload Processing Facility 1610 on North Vandenberg Air Force Base in California, and preparations are on schedule for a launch on April 17. All four solar arrays have been installed and were tested successfully. Powered-on testing of the spacecraft with the reworked Experiment Control Unit (ECU) reinstalled also has been successfully completed. Installation of small ordnance inside the Forward Equipment Enclosure (FEE) has been completed. The FEE surrounds the electronics of the Science Mission Dewar, which has valves that are opened on-orbit by

these pyrotechnics to equalize pressure. The spacecraft will be mated to the payload attach fitting (PAF) on March 25. Closeouts to Gravity Probe B in preparation for going to the launch pad will then be performed on March 29. The following day, it will be installed into the transportation canister. The spacecraft will be transported to Space Launch Complex 2 on April 1 and mated to the Boeing Delta II rocket. At the pad, the rocket is enclosed within the gantry-like mobile service tower and is powered up. A Simulated Flight test, which is a plus count, is underway today. This activates the electrical and mechanical flight systems on the vehicle as they will occur from liftoff through spacecraft separation. A countdown test with the first stage loaded with liquid oxygen was successfully completed on March 18. The Launch Site Readiness Review, an assessment of the Delta II launch vehicle's readiness for spacecraft arrival, is scheduled for March 30. Mission: MESSENGER, Launch vehicle: Delta II, Launch pad: 17-B, Launch date: July 30, 2004 NET, Launch time: 2:17:44 a.m. – 2:17:56 a.m. EDT. A decision has been made to reschedule the launch of NASA's MESSENGER spacecraft – the first designed to orbit the planet Mercury—to no earlier than July 30. The launch opportunity extends until Aug. 13, 2004. Several factors led to NASA's decision to move the launch from its original May 11 date, including a desire to include more testing of MESSENGER's fault-protection system software. This allows the spacecraft to check its own health and, when necessary, switch between alternative backup systems. This will also create some additional time for the test team to complete final assembly and checkout affording a more comfortable spacecraft processing schedule. The spacecraft will continue its processing activities at the Astrotech Space Operations facilities near Kennedy Space Center. The stacking of the Boeing Delta II launch vehicle at Pad 17-B is being rescheduled for mid-June. KSC News Center (2004). **Spacecraft and Expendable Launch Vehicles Status Report** [Online]. Available E-Mail: ksc@newsletters.nasa.gov [2004, March 24].]

◆ Space Shuttle Processing Status Report S04-04: **Discovery** (OV-103); Discovery continues its two-week power down period for orbiter electrical wiring inspections. It's scheduled to be powered up Tuesday, March 30. While the Rudder Speed Brake panels are removed from the vehicle, workers will perform fastener replacement in preparation for reinstallation on the vehicle. Reinforced Carbon-Carbon (RCC) panel installation is continuing with three left-hand panels hung. Build-up of the left-hand panels and associated fittings is ongoing. Following a successful fit check, technicians continue to assemble the Thermal Protection System blankets that will be installed inside Discovery's nose cap. **Atlantis** (OV-104); Technicians continue to process Atlantis for its future mission to the International Space Station. Flex hose X-rays and inspections are complete. Engineers are evaluating results. Fifteen T-seals, the C-shaped seals that fit between each RCC panel, have been installed on the left-hand wing leading edge. Right-hand RCC panel measurements are complete, with panel assembly in progress. On March 25 the nose cap was returned to the Orbiter Processing Facility. The nose cap had been located in the Thermal Protection System Facility, so technicians could build up the thermal protection blankets that are installed inside the nose cap. **Endeavour** (OV-105); Space Shuttle Endeavour is in its Orbiter Major Modification period, which began in December 2003. All of Endeavour's RCC panels have been removed from the right-hand and left-hand leading edge of the wings. Preparations are being made to ship the panels

back to the vendor. Once the panels are removed, they undergo thermography and other non-destructive evaluation techniques to verify they have no internal flaws. Owner-press-release. (2004). **Space Shuttle Processing Status Report** [Online]. Available E-mail: owner-press-release@spinoza.public.hq.nasa.gov [2004, March 24].]

◆ NASA will begin demolishing remnants of a historic Apollo launch tower today after a failed private bid to raise money to erect it as a national monument. Under pressure to comply with federal environmental regulations, NASA has given the go-ahead to a contractor to proceed with a $2 million effort to dispose of segments of Launch Umbilical Tower-1, or LUT-1. The 380-foot gantry served as the starting point for eight Apollo and Skylab flights, including the mission that took Neil Armstrong and Buzz Aldrin to the moon in July 1969. The tower was dismantled in 1983, and segments have been rusting in a five-acre "bone yard" at Kennedy Space Center, creating an environmental hazard. Heavy metals and toxic substances within orange gantry paint are leeching into the soil at the open-air site as well as the water table beneath it. The six-month demolition effort is aimed at bringing NASA into compliance with federal regulations. "We have evidence that indicates that the structure is causing environmental contamination, and we've got a responsibility to deal with that," said Burt Summerfield, chief of the safety, health and environmental division at KSC. "We need to move on with the problems we have at hand." A decontamination effort started in early February but the demolition of gantry segments was put on hold after the Space Restoration Society launched a "Save the LUT" campaign. The preservation group presented a proposal to NASA but was unable to raise the estimated $40 million needed to re-erect the gantry. Several previous efforts to save the tower also failed. Web posted. (2004). [NASA dusts historic launch tower [Online]. Available WWW: http://www.floridatoday.com/ [2004, March 24].]

◆ Florida must fight to keep its space industry and work hard to increase its take, lawmakers and state officials heard Tuesday during Space Day at the Capitol. They got specific assurances for particular programs. Rep. Bob Allen, R-Merritt Island, said he traveled around the Capitol with the Space Day steering committee as they met with Gov. Jeb Bush. Out of that meeting, Allen said, there was support expressed by the governor for a $1.3 million line item in this year's budget for the Florida Commercial Space Financing Corp. and $500,000 in additional money to continue work on a hangar for NASA's next space vehicle after the shuttle is retired at the end of the decade. Those would be increases for the $2.9 million total now appropriated for Space Authority and related operations in the House budget. In the budget now, there is $300,000 set for the Florida Commercial Space Financing Corp. Allen said the governor and House Speaker Johnnie Byrd both expressed support for the larger allocations. It's part of the effort to be flexible at the state level and as the space industry proceeds to realize President Bush's initiative to return to the moon and send a manned flight to Mars. About 75 representatives from industry, NASA, the U.S. Air Force and the state's Space Authority made the rounds. Tax abatements for business, infrastructure help and education support were on the wish list. The delegation focused on how partnerships can help get that done, citing the Space Life Sciences Lab at Kennedy Space Center as a prime example. The day itself was a partnership, as coordinated teams with representatives of the state, NASA and

the Air Force visited legislators and other officials. Web posted. (2004). [Florida 'cannot rest' on space laurels [Online]. Available WWW: http://www.floridatoday.com/ [2004, March 24].]

**March 26:** Russia has proposed extending the current International Space Station missions from six months to one year. The change would allow the country to set aside seats on one launch a year for two paying customers. The proposal was sent to NASA a few days ago. The space station has been limited to two full-time residents since last year's suspension of the U.S. space shuttle program in the wake of the Columbia disaster, which left Russia's three member Soyuz rocket as the only vehicle to take astronauts to and from the station. ["Russians suggest 1-year space duty," **Orlando Sentinel**, March 27, 2004, p A16.]

**March 27:** Three years after its first test flight ended in an explosion, NASA on Saturday successfully launched an experimental jet designed to reach speeds approaching 5,000 mph. The unpiloted X-43A made a 10-second powered flight, then went through some twists and turns during a six-minute glide before plunging into the Pacific Ocean about 400 miles off the California coast. NASA built the X-43A under a $250 million program to develop and test an exotic type of engine called a supersonic-combustion ramjet or scramjet. ["NASA deems jet test a success," **Florida Today**, March 28, 2004, p1A.]

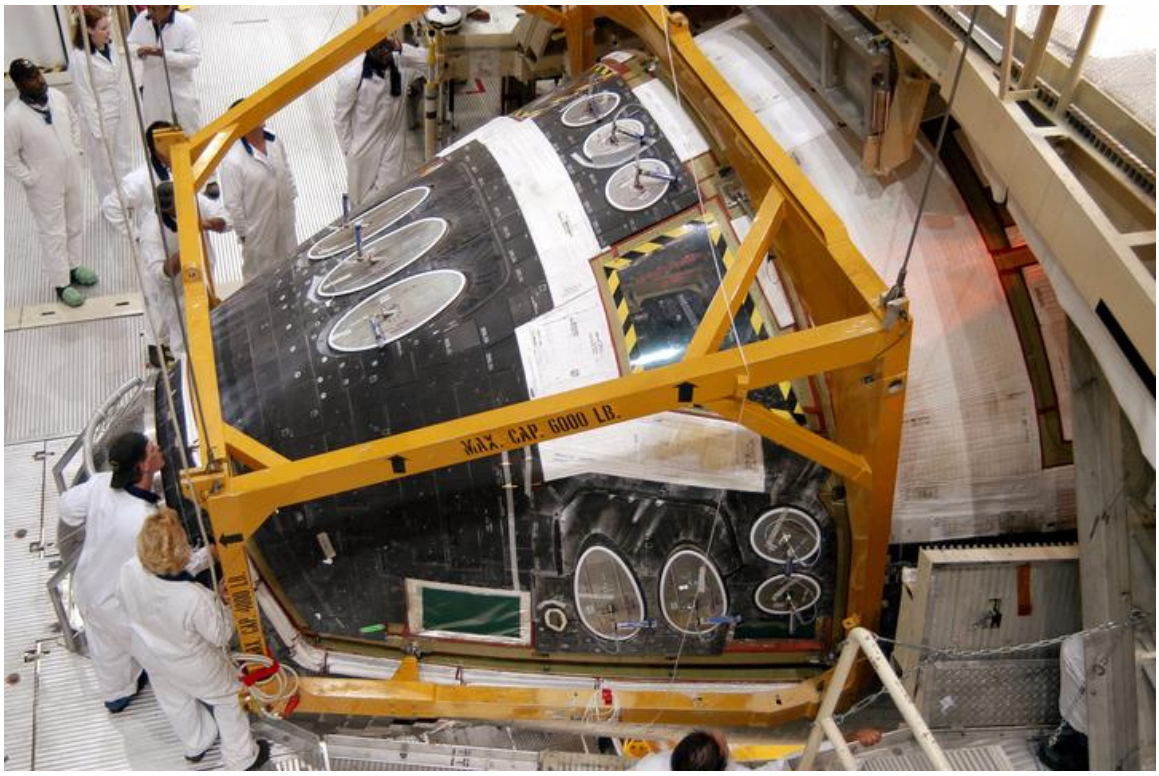
**March 30:** NASA Administrator Sean O'Keefe will join Florida Gov. Jeb Bush and U.S. Mint Director Henrietta Holsman Fore to launch Florida's official state quarter. The ceremony is April 7 at the Kennedy Space Center (KSC) Visitor Complex. The Florida quarter design is entitled, "Gateway to Discovery." The quarter depicts Florida's past with a Spanish Galleon and the state's future with a Space Shuttle. The design was selected via a public, three-week Internet voting process. ["NASA Helps Launch Florida Quarter," **NASA News Release #04-107,** March 30, 2004.]

**March 31:** Spacecraft and Expendable Launch Vehicles Status Report: Mission: Gravity Probe B (GP-B), Launch vehicle: Delta II, Launch pad: SLC-2, Vandenberg Air Force Base, Launch date: April 17, 2004, Launch time: 1:09:12 p.m. EDT (10:09:12 a.m. PDT). The Gravity Probe B spacecraft is in NASA's Payload Processing Facility 1610 on North Vandenberg Air Force Base in California, and preparations are on schedule for a launch on April 17. The spacecraft was mated to the payload attach fitting (PAF) on March 25. Closeouts to Gravity Probe B in preparation for going to the launch pad have been completed. Today the spacecraft is being installed into the transportation canister in preparation for being moved to Space Launch Complex 2 on Thursday, April 1 and mated to the Boeing Delta II rocket. At the pad, the rocket is enclosed within the gantry-like mobile service tower and is powered up. A Simulated Flight test, which is a plus count, has been completed successfully. This test activated the electrical and mechanical flight systems on the vehicle as they will occur from liftoff through spacecraft separation. A countdown test with the first stage loaded with liquid oxygen was successfully completed on March 18. The next major test is the Flight Program Verification to be conducted on April 5. This is an integrated test of the Delta II vehicle

and the Gravity Probe B spacecraft. Installation of the fairing around the spacecraft is scheduled for April 8. Mission: MESSENGER, Launch vehicle: Delta II, Launch pad: 17-B, Launch date: July 30, 2004 NET, Launch time: 2:17:44 a.m. – 2:17:56 a.m. EDT. MESSENGER is at the Astrotech Space Operations facilities near Kennedy Space Center where it is undergoing prelaunch testing. Testing of the spacecraft's radio system uplink and downlinks through the KSC/JPL interface with the Deep Space Network is underway. This testing will last about ten days. Autonomy testing is also underway. This verifies MESSENGER's ability to operate on its own when not in direct contact with Earth. Installation of thermal blankets continues. On April 13, the spacecraft will be moved from its current location in the hazardous processing facility where it has been since arrival to an adjacent non-hazardous payload processing facility. The remainder of its final assembly and testing will be completed there. The spacecraft will return to the hazardous processing facility when ready for fueling, spin balance testing and mating to the upper stage. KSC News Center (2004). **Spacecraft and Expendable Launch Vehicles Status Report** [Online]. Available E-Mail: ksc@newsletters.nasa.gov [2004, March 31].]

**During March:** NASA's top budget officer doesn't see much choice for the U.S. human space program as it steers away from the space shuttle and International Space Station to President Bush's long-range exploration agenda. According to comptroller Steve Isakowitz, Bush's plan was designed to make the exploration program sustainable over the long term by avoiding a big bill due years after Bush has left office. Isakowitz tells the NASA Advisory Council the philosophy holds even if Bush isn't reelected in the fall. "What is the alternative here?" he said. "A new president comes in and says, 'I don't like this because the previous president liked this.' I'm not sure what else you would do dramatically differently…I don't think we can go back any more. The problem we face now is we're down to a three-orbiter fleet. We're really one accident away, and we're done, and without a longer-term vision, that's it." ["No Alternative?" **Aviation Week & Space Technology**, March 15, 2004, p 21.]

The Florida Safety Council recently presented Boeing with the Safety Achievement Award for 2003, based on the work of Payload Services employees at Kennedy Space Center. The safety award honors selected Florida businesses based on size, occupational injury rates and overall effectiveness of their safety programs. Boeing Payload Services employees were the overall winners in the category of 1,000 to 2,000 employees "based on a lost time frequency rate of 0.00 and a lost time severity rate of 0.00." ["Boeing wins Florida Safety Council Award," **Brevard Technical Journal**, March 2004, p 4.]




Workers in the Orbiter Processing Facility watch closely as Discovery's Forward Reaction Control System (FRCS) is lowered into position in the orbiter's forward fuselage nose area. The FRCS provides the thrust for attitude (rotational) maneuvers (pitch, yaw and roll) and for small velocity changes along the orbiter axis (translation maneuvers). Discovery is designated as the Return to Flight vehicle for mission STS-114, no earlier than March 2005.

## APRIL

**April 1:** The Cabin Pressure Monitor developed by Jan Zysko received NASA's Commercial and Government Invention of the Year Awards for 2003. The Monitor, developed by Zysko, a NASA engineer, is patented by the agency. The device is a hand-held, portable, accurate, valuable, important, and life-saving instrument with many applications. The monitor was selected in both categories for its application and adaptability to both commercial and government uses. Zysko and a team from NASA's Kennedy Space Center (KSC), Fla., developed the technology from concept to prototype to commercialization in less than 12 months for less than $100,000. NASA developed the Personal Cabin Pressure Altitude Monitor and Warning System (CPM) to respond to various requirements and to significantly improve public aviation safety. The CPM senses the local pressure environment while operating independently of other aircraft or spacecraft systems. Hypoxia can quickly render a crew helpless. The device provides a timely warning to crewmembers, while they are still mentally and physically able to take corrective action. The monitor provides audio, vibratory, and visual alarms of the impending danger of lack of oxygen (hypoxia), when cabin pressure falls below preprogrammed levels. A lighted digital screen displays a warning text message and also annotates the pressurization condition causing the alarm. The NASA Biomedical Engineering Laboratory purchased several CPMs to add to the inventory of emergency medical equipment used to support air medical evacuation. In its initial NASA application, the device protected workers in the Kennedy Space Center (KSC) Mars Simulation Chamber from an accidental pump down to a high altitude condition. [“NASA Selects Top Invention,” **NASA News Release #04-108,** April 1, 2004.]

**April 2:** Space Shuttle Processing Status Report S04-05: **Discovery** (OV-103); On Wednesday of this week, Discovery was powered up following a two-week power down to perform electrical wiring inspections. The left-hand Orbiter Maneuvering System pod will be moved from the Hypergolic Maintenance Facility to the Orbiter Processing Facility as early as today and is scheduled for installation on the vehicle next week. Installation of left-hand Reinforced Carbon-Carbon (RCC) panels and build-up of the left-hand panels and associated fittings is ongoing. Thermal Protection System blankets continue to be assembled and will be installed inside of Discovery's nose cap. The nose cap is scheduled for installation next week. **Atlantis** (OV-104); Atlantis is powered up in support of mission processing in preparation of its future flight to the International Space Station. Technicians continue steps toward removal of the rudder speed brake actuators. RCC work continues with left-hand T-seal installation and right-hand RCC build up. The left in-board elevon actuator is installed. Remote Manipulator System high-potential voltage tests were successfully completed. **Endeavour** (OV-105); Space Shuttle Endeavour is in its Orbiter Major Modification period, which began in December 2003. Electrical modifications continue to prepare the crew module for future installation of the Multi-functional Electronic Display System (MEDS), or "glass cockpit." All RCC panel thermography and shipping preparations are in work. Preparations to remove the rudder speed brake actuators continue. Structural and wire inspections continue in the mid-body and aft. Owner-press-release. (2004). **Space**

**Shuttle Processing Status Report** [Online]. Available E-mail: owner-press-release@spinoza.public.hq.nasa.gov [2004, April 2].]

**April 5:** NASA's Aura spacecraft, the latest in the Earth Observing System (EOS) series, arrived at Vandenberg Air Force Base, Calif., to begin launch preparations. Packed in a special shipping container, Aura was transported from Northrop Grumman's Space Park manufacturing facility in Redondo Beach, Calif. The spacecraft will undergo final tests and integration with a Delta II rocket for launch in June. Aura's four state-of-the-art instruments will study the atmosphere's chemistry and dynamics. The spacecraft will provide data to help scientists better understand the Earth's ozone, air quality and climate change. "The entire Aura team is very excited to see all our efforts come to fruition and is looking forward to a successful launch," said Rick Pickering, Aura Project Manager at NASA's Goddard Space Flight Center in Greenbelt, Md. Aura fulfills part of NASA's commitment to study the Earth as a global system and represents a key agency contribution to the U.S. Global Change Research Program. This mission will continue the global data collection underway by NASA's other EOS satellites, Terra, which monitors land, and Aqua, which observes Earth's water cycle. The Aura spacecraft is part of NASA's Earth Science Enterprise, a long-term research effort to determine how human-induced and natural changes affect global environment. [“NASA’s Aura Satellite Delivered To Launch Site,” **NASA News Release #04-111**, April 5, 2004.]

**April 6:** NASA announced a modification in the Public-Private Competition to operate the NASA Shared Services Center (NSSC). The modification was announced after agency review of possible sites for the Center. NASA's Deputy Administrator Fred Gregory said, "The exceptional quality and creativity of the site proposals caused us to reevaluate the selection process. NASA's goal is to ensure the Public-Private Competition is conducted in a fair and equitable manner in order to achieve maximum advantage to the taxpayer." NASA's original assumption was one site would be materially superior to all others, and all of the NSSC service competitors would use the selected location. However, during the evaluation process, it became evident all of the nominations exceeded the technical standards set forth in the site nomination criterion and guidelines. After conclusion of the site evaluation, there was no clearly superior proposal that would be of greater benefit to NASA than the others. NASA concluded the public-private competitors would be in a better position to specifically assess and capitalize on site selection if allowed to choose from all six locations. As part of the public-private process, NASA will allow competitors to incorporate one of the six eligible sites into their proposals. The six sites are in the vicinity of NASA's Kennedy Space Center, Fla.; Glenn Research Center, Cleveland; Johnson Space Center, Houston; Langley Research Center, Hampton, Va.; Marshall Space Flight Center, Ala.; and Stennis Space Center, Miss. [“NASA Modifies Shared Services Center Competition,” **NASA News Release #04-116**, April 6, 2004.]

**April 7:** Ever since the third grade, Stephanie Stilson knew she would one-day work for NASA. Little did Stilson imagine she would be responsible for a Space Shuttle. "My father took me to visit the Kennedy Space Center (KSC) in Florida when I was nine," Stilson said. "I told him then that when I grew up, I was going to work for NASA. My

father loves to tell that story," she added. Stilson is the Space Shuttle Discovery vehicle manager at KSC, NASA's primary space launch facility. She oversees all activities associated with planning, scheduling and preparing the Discovery orbiter for space. Before every launch, she is the one to answer the all-important question, "Is it ready to fly?" Discovery is scheduled to be the orbiter that returns NASA's Space Shuttle fleet to safe flight following the Shuttle Columbia accident. Discovery will carry the STS-114 crew to the International Space Station. The launch planning window for the mission opens in March 2005. It may seem a daunting responsibility, but Stilson takes pride in knowing the major role she plays in space exploration. Stilson works with NASA engineers, technicians and contractors as KSC's representative for Shuttle processing operations. She is NASA's chief point of contact on periodic maintenance, upgrades, modifications and full systems testing to ensure Discovery is safe for flight. [“NASA Engineer Sits In Driver’s Seat Of ‘Discovery’,” **NASA News Release #04-115**, April 7, 2004.]

◆ NASA's successful X-43A hypersonic research aircraft flight resulted in a treasure trove of scramjet data. The initial data review, conducted on March 31, confirmed high-fidelity flight data was obtained throughout the vehicle's boost, stage separation and descent to splash down. The milestones included the first controlled accelerating flight at Mach 7 under scramjet power; the first air breathing scramjet-powered free flight; and the first successful stage separation at high dynamic pressure of two non-axisymmetric vehicles. The flight also set a new aeronautical speed record. The X-43A reached more than Mach 7, approximately 5,000 mph. That was faster than any known aircraft powered by an air-breathing engine has ever flown. [“NASA Proves Scramjets Work,” **NASA News Release #04-117**, April 7, 2004.]

**April 8:** Spacecraft and Expendable Launch Vehicles Status Report: Mission: Gravity Probe B (GP-B), Launch vehicle: Delta II; Launch pad: SLC-2, Vandenberg Air Force Base, Launch date: April 19, 2004 NET, Launch time: 1:01:20 p.m. EDT (10:01:20 a.m. PDT). The launch of the Gravity Probe B spacecraft has been postponed to no earlier than Monday, April 19. The additional time is necessary to allow engineers to troubleshoot an apparent short in launch pad ground support equipment. It is associated with a spacecraft battery monitoring circuit. Without this circuit, the battery voltage on the spacecraft cannot be remotely monitored from the pad during certain essential operations. The launch time for Monday, April 19 is 10:01:20 PDT. Should the launch be postponed 24 hours for any reason, the launch time is 9:57:24 a.m. PDT. The spacecraft was moved from the payload processing facility to Space Launch Complex 2 on Thursday, April 1 and mated to the Boeing Delta II rocket. A spacecraft state-of-health check was successfully performed. The next major test is the Flight Program Verification to be conducted on Friday, April 9. This is an integrated test of the Delta II vehicle and the Gravity Probe B spacecraft. The two-day operation to install the two halves of the payload fairing around the spacecraft will follow on April 12 and is the final major spacecraft associated activity to be performed before launch. Two days of major activities remain to be performed. On April 16, the loading of the second stage with its complement of hypergolic propellants is scheduled. On April 17, Flight Slews, which are launch vehicle engine steering checks, will be performed. Also, the final Range Safety

beacon checks are scheduled. Retraction of the mobile service tower, the gantry surrounding the Delta II, is scheduled to occur at 11:30 p.m. on Sunday, April 18. Loading of RP-1, a highly refined kerosene fuel, aboard the first stage, is scheduled to begin at approximately 7:30 a.m. on Monday, April 19. Loading of the cryogenic liquid oxygen into the first stage will begin approximately an hour later. Mission: MESSENGER, Launch vehicle: Delta II Heavy, Launch pad: 17-B, Launch date: July 30, 2004 NET, Launch window: 2:17:44 a.m. – 2:17:56 a.m. EDT. MESSENGER is at the Astrotech Space Operations facilities near Kennedy Space Center where it is undergoing prelaunch testing. Testing of the spacecraft's radio system uplink and downlinks through the KSC/JPL interface with the Deep Space Network (MIL-71) continues. Autonomy testing is also continuing. This verifies MESSENGER's ability to operate on its own when not in direct contact with Earth. Installation of thermal blankets continues. On April 13, the spacecraft will be moved from its current location in the hazardous processing facility, where it has been since arrival, to an adjacent non-hazardous payload processing facility. The remainder of its final assembly and testing will be completed there. The spacecraft will return to the hazardous processing facility when ready for fueling, spin balance testing and mating to the upper stage. Mission: Aura, Launch vehicle: Delta II, Launch pad: SLC-2, Vandenberg Air Force Base, Launch date: June 17, 2004, Launch time: 6:01:53 a.m. – 9:04:53 a.m. EDT (3:01:53 – 3:04:53 a.m. PDT). NASA's Aura spacecraft, the latest in the Earth Observing System (EOS) series, arrived at Vandenberg Air Force Base, Calif., on April 1 to begin launch preparations. Packed in a special shipping container, Aura was transported from Northrop Grumman Space Technology (NGST) in Redondo Beach, Calif. This week the Spacecraft Aliveness Test is under way. This test verifies the spacecraft's state of health after its trip from Redondo Beach. Next week the Spacecraft Comprehensive Performance Test will begin. This is a test of Aura's instruments and onboard systems. Aura's four state-of-the-art instruments will study the dynamics of chemistry occurring in the atmosphere. The spacecraft will provide data to help scientists better understand the Earth ozone, air quality and climate change. KSC News Center (2004). **Spacecraft and Expendable Launch Vehicles Status Report** [Online]. Available E-mail: ksc@newsletters.nasa.gov [2004, April 8].]

◆ NASA selected Garry M. Lyles as Deputy Director of Project Constellation and Charles J. Precourt as Program Director of the Crew Exploration Vehicle (CEV). "I am very excited about the addition of these two excellent managers to the Office of Exploration Systems' team," said Craig Steidle, Associate Administrator for the Office of Exploration Systems. "Their experience and skills will be critical as we begin developing plans for extending human presence to the moon by 2015," he added. As the Deputy Director of Project Constellation, Lyles is responsible for the development of all exploration transportation and support systems needed to achieve the Vision for Space Exploration. That includes returning to the moon and then on to Mars. Precourt is responsible for developing the CEV. It is NASA's first human exploratory spacecraft since Apollo. The CEV will carry astronauts to the moon as early as 2015. ["NASA Names Exploration Project Directors," **NASA News Release #04-120**, April 8, 2004.]

◆ The following is a message from the NASA Administrator: The Columbia Accident Investigation Board (CAIB) found that our organizational culture and structure contributed as much to the Columbia accident as any mechanical failure. Each of us should be determined to change those aspects of our culture that need improvement, and to build upon those that are working well. In February, we asked Behavioral Science Technology, Inc. (BST) to conduct a comprehensive employee Safety Climate and Culture Survey. Using input from the survey, BST has made their first recommendations on how we can effectively implement changes to our organizational culture and mission safety. In its report, BST measured the agency by a set of organizational categories, comparing us against 222 other manufacturing, research, construction and transportation firms. Although we must improve in many key areas, the agency scored well in categories such as teamwork, work group relations, approaching coworkers about safety concerns, and reporting incidents or deviations that affect safety. Given our commitment to exceed expectations, we will work to make these areas even stronger. While the survey supports our legacy of technical excellence, teamwork and pride, it also identifies important safety and organizational issues that must be addressed before we can initiate positive changes within the agency. Deficiencies in the perception of organizational support, or concern for the needs and interests of employees, as well as the quality and quantity of upward communication about safety, are two of the areas cited in the survey that need improvement. One of our leadership team's first steps to addressing the deficiencies found in the survey will be to validate and embrace NASA's Core Values as we prepare for Return-to-Flight and fulfill the Vision for space exploration. After analyzing the survey results, BST recommended specific steps for achieving a positive change in our culture. During the next month, NASA management and BST plan to visit each Center to share its specific results and assist each of them in developing implementation plans driven by NASA's Core Values. The group's activities will include leadership practices assessments, development of individual action plans for Center leadership, behavioral observation and feedback, and behavior-based project team effectiveness training. Once refined at several selected Centers and Directorates, these new strategies will be deployed agency-wide. At the end of five months, we will use specific data and feedback to evaluate whether NASA leadership has adopted behaviors that support the desired culture. From now on, all of our internal efforts, including initiatives like One NASA, Return-to-Flight, and the Diaz and CAIB Implementation, will be coordinated through the culture change process. E-mail distribution. (2004). [O'Keefe, Sean Re: "Safety Climate and Culture Survey Results," [Electronic]. **Special Message From the NASA Administrator** [April 8, 2004.].]

**April 9:** Space Shuttle Processing Status Report S04-06: **Discovery** (OV-103); Technicians continue to prepare Discovery for its Return to Flight mission to the International Space Station. The left- hand Orbiter Maneuvering System pod was moved from the Hypergolic Maintenance Facility (HMF) to the Orbiter Processing Facility (OPF) on Monday for installation on the vehicle. Build-up of left-hand Reinforced Carbon-Carbon (RCC) panels and associated fittings is ongoing with 16 left-hand spar fittings installed on the vehicle. Thermal Protection System blanket installation is in work inside of Discovery's nose cap in the low bay area outside of the Orbiter Processing Facility. Thermography has been performed on 43 of the 44 panels, with nose cap

thermography scheduled for next week. **Atlantis** (OV-104); Processing work continues in the OPF as technicians prepare Atlantis for its future flight to the International Space Station. Technicians continue steps toward removal of the rudder speed brake actuators. All of Atlantis' 44 RCC panels have been received at KSC, and all 22 panels have been hung on the left-hand wing. Sixteen left-hand T-seals, the C-shaped seals that fit between each panel, have been installed. Build-up of right-hand RCC panels and associated fittings is ongoing. Nose cap thermography is complete. **Endeavour** (OV-105); Endeavour is in its Orbiter Major Modification period, which began in December 2003. The Orbiter Maneuvering System left- hand pod was transferred from the OPF to the HMF, where it will undergo routine inspections and maintenance. Rudder Speed Brake panel removal began yesterday. Actuators scheduled for removal as early as Monday. RCC thermography continues with only eight of the 44 panels remaining. Owner-press-release. (2004). **Space Shuttle Processing Status Report** [Online]. Available E-mail: owner-press-release@spinoza.public.hq.nasa.gov [2004, April 9].]

◆ NASA has awarded The Boeing Company of Houston a contract extension for payload integration work in support of the International Space Station. NASA plans to exercise the fiscal year 2005 option with Boeing to extend the International Space Station Payload Integration Contract (IPIC). The option is worth $70,398,844, bringing the total contract value to $203,666,284. Work covered under the extension will begin in October 2004 and continue through September 2005. Under the IPIC, Boeing performs Space Station payload integration work, including payload software integration and flight software production; payload facility sustaining engineering and logistics support; and payload engineering integration. Awarded in 2002, the IPIC consolidated payload integration work is performed at NASA's Marshall Space Flight Center, Huntsville, Ala., and Johnson Space Center, Houston. It is a cost-plus-award-fee, completion form contract. Additional work will be performed at Boeing facilities in Houston, Huntsville and Kennedy Space Center, Fla. [“NASA Extends Space Station Payload Integration Contract,” **NASA Contract Release #C04-g**, April 9, 2004.]

**April 12:** NASA’s Gravity Probe B will launch aboard a Boeing Delta II rocket at 1:01:20 p.m. EDT (10:01:20 a.m. PDT) Monday, April 19 from NASA’s Space Launch Complex 2 at Vandenberg Air Force Base, Calif. Should the launch be postponed 24 hours for any reason, the launch time is 12:57:24 p.m. EDT (9:57:24 a.m. PDT). The Gravity Probe B spacecraft and the mission were developed by NASA’s Marshall Space Flight Center, Stanford University and Lockheed Martin. The spacecraft will test two extraordinary predictions of Albert Einstein’s general theory of relativity that he advanced in 1916. Gravity Probe B consists of four sophisticated gyroscopes that will provide an almost perfect space-time reference system. The mission will look in a precise manner for tiny changes in the spin axis direction. Gravity Probe B will be launched into a 400-nautical-mile-high polar orbit for a 16-month mission. [“Gravity Probe B Ready For Launch On Delta II Rocket April 19,” **KSC Press Release #19-04**, April 12, 2004.]

**April 15:** The Partnership for Public Service and the American University Institute for the Study of Public Policy Implementation (ISPPI) released today the second set of

rankings of the "Best Places to Work in the Federal Government." Young people, women and minorities selected NASA as the best place to work in the federal government. The rankings were compiled from an employee satisfaction survey administered to more than 100,000 federal employees by the U.S. Office of Personnel Management. With the new rankings, job seekers will be able to see, for the first time, which federal agencies are rated best by employees under 40, minorities, women and a variety of other groups. "We're very proud and excited to learn of the rankings. NASA values the diversity of thought, ideas and perspectives so essential to an R&D organization. We strongly believe an inclusive One-NASA environment, in which all employees are treated fairly, respected by management and their peers, and valued for their contribution to the agency's mission, is critical to success," said Vicki Novak, NASA's Associate Administrator, Office of Human Resources. [“NASA Voted Best Place To Work In Federal Government,” **NASA Press Release #04-128**, April 15, 2004.]

◆ Spacecraft and Expendable Launch Vehicles Status Report: Mission: Gravity Probe B (GP-B), Launch vehicle: Delta II; Launch pad: SLC-2, Vandenberg Air Force Base, Launch date: April 19, 2004 Launch time: 10:01:20 a.m. PDT (instantaneous). The team has resolved the short in the launch pad ground support equipment and is proceeding forward with a launch date of Monday, April 19, at 10:01:20 a.m. PDT. The spacecraft was moved from the payload processing facility to Space Launch Complex 2 on Thursday, April 1 and mated to the Boeing Delta II rocket. A spacecraft state-of-health check was successfully performed. The Flight Program Verification was conducted on April 9. This was an integrated test of the Delta II vehicle and the Gravity Probe B spacecraft. The two-day operation to install the two halves of the payload fairing around the spacecraft is underway and was completed April 14. This is the final major spacecraft-associated activity to be performed before launch. Two days of major activities remain to be performed. On Friday, the loading of the second stage with its complement of hypergolic propellants is scheduled. On Saturday, Flight Slews, which are launch vehicle engine steering checks, will be performed. The final Range Safety beacon checks also are scheduled. Retraction of the mobile service tower, the gantry surrounding the Delta II, is scheduled to occur at 11:30 p.m. Sunday. Loading of RP-1, a highly refined kerosene fuel, aboard the first stage is scheduled to begin at approximately 7:30 a.m. Monday. Loading of the cryogenic liquid oxygen into the first stage will begin approximately an hour later. Mission: Aura, Launch vehicle: Delta II, Launch pad: SLC-2, Vandenberg Air Force Base (VAFB), Launch date: June 17, 2004, Launch window: 3:01:53 - 3:04:53 a.m. (PDT). NASA’s Aura spacecraft, the latest in the Earth Observing System (EOS) series, arrived at Vandenberg Air Force Base, Calif., on April 1 to begin launch preparations. Packed in a special shipping container, Aura was transported from Northrop Grumman Space Technology (NGST) in Redondo Beach, Calif. The Spacecraft Aliveness Test was successfully completed on April 12. This test verifies the spacecraft’s state of health after its trip from Redondo Beach. This week, the Spacecraft Comprehensive Performance Test is underway. This is a test of Aura’s instruments and onboard systems. The Delta II first and second stage have arrived at Vandenberg after successfully completing checkout at Cape Canaveral Air Force Station. The erection of the Boeing Delta II launch vehicle on Space Launch Complex 2, located on North Vandenberg Air Force Base, is currently scheduled to begin on April 26 with the erection

of the first stage. The second stage is planned for hoisting atop the first stage on April 28. Erection of the nine solid rocket boosters is scheduled for April 29 through May 1. Aura's four state-of-the-art instruments will study the dynamics of chemistry occurring in the atmosphere. The spacecraft will provide data to help scientists better understand the Earth ozone, air quality and climate change. The EOS Aura satellite, instruments and science investigations are managed by NASA's Goddard Space Flight Center in Greenbelt, Md. Mission: MESSENGER, Launch vehicle: Delta II Heavy, Launch pad: SLC-17B, Cape Canaveral Air Force Station, Launch date: July 30, 2004 (NET), Launch window: 2:17:44 a.m. – 2:17:56 a.m. (EDT). MESSENGER is at the Astrotech Space Operations facilities near Kennedy Space Center, where it is undergoing prelaunch testing. Testing of the spacecraft's radio system uplink and downlinks through the KSC/JPL interface with the Deep Space Network (MIL-71) continues. Autonomy testing is also continuing. This verifies MESSENGER's ability to operate on its own when not in direct contact with Earth. Installation of thermal blankets continues. The spacecraft was moved from its current location in the hazardous processing facility, where it has been since arrival, to an adjacent non-hazardous payload processing facility on Tuesday. The remainder of its final assembly and testing will be completed there. The spacecraft will return to the hazardous processing facility when ready for fueling, spin balance testing and mating to the upper stage. The erection of the Boeing Delta II launch vehicle on Pad 17-B is currently scheduled to begin on June 18 with the erection of the first stage. KSC News Center (2004). **Spacecraft and Expendable Launch Vehicles Status Report** [Online]. Available E-mail: ksc@newsletters.nasa.gov [2004, April 15].]

◆ Space Shuttle Processing Status Report S04-07: **Discovery** (OV-103); Discovery is a step closer to its Return to Flight mission, STS-114, to the International Space Station. Vehicle power up work continues with communications system testing, drag chute instrumentation retest and wireless video system testing. The left-hand Orbital Maneuvering System pod is scheduled for installation Saturday. The launch planning window for STS-114 opens in March 2005. Technicians successfully installed the four new Rudder Speed Brake actuators Wednesday. Panel installation is scheduled to begin early next week. Build-up of left-hand Reinforced Carbon-Carbon (RCC) panels and associated fittings is ongoing with 17 left-hand and six right-hand spar fittings installed on the vehicle. **Atlantis** (OV-104); Technicians continue to prepare Atlantis in the Orbiter Processing Facility for future flight to the International Space Station. Preparations for right and left Orbital Maneuvering System Main Engine removal are complete. All of Atlantis' 44 RCC panels are at KSC, and all 22 panels have been hung on the left-hand wing. Nineteen left-hand T- seals, the C-shaped seals that fit between each panel, have been installed. Build-up of right-hand RCC panels and associated fittings is ongoing. **Endeavour** (OV-105); Space Shuttle Endeavour is in its Orbiter Major Modification (OMM) period, which began in December 2003. Electrical modifications associated with OMM continue in the crew module with the Multi-functional Electronic Display System, or the "glass cockpit." The four Rudder Speed Brake actuators were removed from the vehicle and sent to the Titan X-ray Facility at Cape Canaveral Air Force Station to be X-rayed. The actuators will be sent to the vendor for a complete inspection. Owner-press-release. (2004). **Space Shuttle Processing**

**Status Report** [Online]. Available E-mail: owner-press-release @spinoza.public.hq.nasa.gov [2004, April 15].]

**April 16:** NASA Kennedy Space Center Director James W. Kennedy announced today that James. L. "Larry" Crawford was named as the Director of the newly created Safety and Mission Assurance organization at KSC. Crawford will be responsible for the nearly 250 professionals assigned to ensure KSC is a safe workplace and mission success is accomplished. Prior to his selection for the KSC post, he served as the Deputy Director for Safety at the NASA Engineering and Safety Center at the Langley Research Center in Virginia. "I'm extremely excited to have a person with Larry's diverse background, including his numerous years of experience in the Safety and Mission Assurance arena, join the NASA KSC team," said Kennedy. "He brings exceptional credibility and leadership to this position and is ideally suited to lead our new S&MA directorate." The new S&MA Directorate at KSC is being created to centralize the safety and mission assurance mission into one organization. The new directorate will help address recommendations documented in the Columbia Accident Investigation Board report released in August 2003. This change will tremendously strengthen KSC's safety reporting structure within the Space Shuttle Program and in all areas at the Center. Crawford began his NASA career in 1980 as NASA Director of Safety and has served in various positions, including program engineering manager for the International Space Station, technical assistant to the Director of Shuttle engineering at KSC, Director of System Engineering at NASA Headquarters in Washington, D.C., X-34 Project Manager and Director of Research Engineering at Dryden Flight Research Center, in Edwards, Calif. He brings 33 years of engineering, project management and safety experience to KSC. In addition to his NASA service, Crawford has held key safety positions at three U.S. Army field sites and was named Chief of the Safety Office for the Army Material Command. Crawford holds a Bachelor of Science degree in aerospace engineering from Mississippi State University and a master's degree in industrial engineering from Texas A&M. He is a graduate of the Army's two-year safety engineering intern program. ["Safety Expert James L. Crawford Named Kennedy Space Center Director of Safety and Mission Assurance," **KSC Press Release #20-04**, April 16, 2004.]

**April 17:** An anticipated boom in the commercial space launch market is fizzling, but the number of rocket missions blasting off from Florida's Space Coast still is expected to edge up slightly during the remainder of the decade. That's the gist of an exclusive launch forecast prepared for FLORIDA TODAY by Teal Group Corp., a defense and aerospace consulting firm that provides competitive market intelligence to industry and government. The outlook forecasts a total of 119 civil, commercial and military launches at Kennedy Space Center and Cape Canaveral Air Force Station between now and the end of 2010. Look for an annual average of 17 launches from the sites during that timeframe. The prediction, however, is predicated on a safe return of NASA's shuttle fleet to flight, the debut of a new generation of U.S. military satellites and the launch of advance robotic scouts to support President Bush's plan to send astronauts back to the moon. Web posted. (2004). [Slump shouldn't shake Cape forecast [Online]. Available WWW: http://www.floridatoday.com/ [2004, April 17].]

**April 19:** Kennedy Space Center Director James W. Kennedy recently announced that Dennis A. Kross was selected as Space Shuttle Deputy Program Manager at Kennedy Space Center in Florida. Kross will assume his new role April 19. In this capacity, he is responsible for all aspects of Space Shuttle preparation, launch, and return of the orbiter to KSC following flight. Joining KSC from NASA's Marshall Space Flight Center in Huntsville, Ala., Kross served as the Director of the Space Transportation Directorate since 2000. Last year, he was selected to lead the efforts associated with the External Tank Return to Flight Team. "We are delighted to have Denny join the team here at KSC and welcome him to Florida," said Kennedy. "His extensive understanding of the Space Shuttle Program, coupled with his superior leadership abilities, will be a tremendous asset in ensuring the Shuttle fleet is safely returned to flight." Kross began his NASA career in 1967 as a Structural Dynamics Engineer at the Propulsion and Vehicle Engineering Laboratory at MSFC. Over the last 30 years, Kross has served in numerous roles in both the Space Shuttle and International Space Station Programs at NASA Headquarters, Johnson Space Center in Houston, and MSFC. During the past 10 years, Kross held critical positions such as Manager, Engineering Systems Department; Manager, International Space Station Vehicle Office; Technical Lead, ISS; and Level II Space Station Chief Engineer. "I could not be more pleased that Denny accepted the position of Deputy Program Manager," said Bill Parsons, NASA's Space Shuttle Program Manager. "This is a pivotal position as we move toward Return to Flight, and I have the utmost confidence that he is the right person to lead the Program at KSC." Kross is the recipient of many distinguished NASA awards, including the Meritorious Executive Award, NASA Exceptional Service Medal, Space Flight Honoree Award, Exceptional Engineering Achievement and Silver Snoopy Award. Formerly of Detroit, Mich., Kross holds a Bachelor of Science degree in aeronautical engineering from the University of Michigan and a master's degree in engineering mechanics from the University of Alabama in Huntsville. ["Dennis A. Kross Named Space Shuttle Deputy Program Manager At Kennedy Space Center," **KSC News Release #21-04**, April 19, 2004.]

◆ The launch of NASA's Gravity Probe B spacecraft aboard a Boeing Delta II rocket has been scrubbed for 24 hours. A hold was called approximately three minutes before lift off, after it was determined there was insufficient time to confirm before launch the correct wind profile had been loaded aboard the Delta II based on the data from the final weather balloon. The team was waiting on this final weather balloon data due to marginal upper level wind conditions that were observed throughout the countdown. The launch is scheduled for 12:57:24 p.m. EDT on Tuesday. ["Gravity Probe B Launch Postponed For 24 Hours," **NASA News Release #N04-057**, April 19, 2004.]

**April 20:** The NASA space vehicle designed to test two important predictions of Albert Einstein's Theory of General Relativity launched today from Vandenberg Air Force Base, Calif., aboard a Boeing Delta II expendable launch vehicle. The spacecraft is being inserted into an almost perfect circular polar orbit around the Earth at an altitude of 400 statute miles. "The solar arrays are deployed, and we have received initial data that indicates all systems are operating smoothly. We are very pleased," said Gravity Probe B (GP-B) program manager Rex Geveden of NASA's Marshall Space Flight Center

(MSFC), Huntsville, Ala. "The Gravity Probe B space vehicle houses one of the most challenging science instruments ever devised and seeks to answer some of the most important questions about the structure of our universe," he said. The GP-B mission will use four ultra-precise gyroscopes to test Einstein's theory that space and time are distorted by the presence of massive objects. To accomplish this, the mission will measure two factors, how space and time are very slightly warped by the presence of the Earth, and how the Earth's rotation very slightly drags space-time around with it. [“NASA Successfully Launches Gravity Probe B Mission,” **NASA News Release #04-136**, April 20, 2004.]

◆ For the time being, NASA is denying a Russian proposal to extend to a year an International Space Station expedition planned for launch this fall, a move that would have freed up seats for paying customers. The Russian Space agency wants to extend an expedition scheduled for launch in October. Doing so would enable the cash-strapped Russians to see two seats – at about $20 million each – to customers paying for weeklong trips to the space station. [“NASA waits on yearlong space stay,” **Florida Today**, April 21, 2004, p 1A]

**April 21:** NASA wants to make the historic imagery captured by the agency's exploration activities accessible to the public. NASA has requested proposals to digitize and consolidate agency analog, still, film, video and graphic imagery for easier public online research and retrieval. A comprehensive database of historical, educational and commercially viable material will be developed by a partnership between NASA and an organization or group. NASA has more than 115,000 film and video titles and millions of still images documenting the history of America's space program. NASA will review proposals from organizations sharing the agency's mission, values and goals that could provide entrepreneurial opportunities, in a non-reimbursable relationship, to provide public access to these vast imagery archives. Through partnerships with the private sector, NASA hopes to continue to inspire the next generation of explorers, while sharing the tremendous archives of imagery gathered during America's exploration of space. [“NASA Seeks Partnership In Digital Imagery,” **NASA News Release #04-137**, April 21, 2004.]

◆ David Robertson, a quality assurance specialist in the Shuttle Processing Directorate at Kennedy Space Center, recently received NASA’s prestigious Quality and Safety Achievement Recognition (QASAR) Award. Robertson was recognized April 14 during NASA’s Continual Improvement and Reinvention Conference in Alexandria, Va. Safety and Mission Assurance Deputy Administrator Fred Gregory and Associate Administrator Bryan O’Connor made the presentation. Robertson received the award for his work identifying an orbiter vehicle anomaly to the left Orbital Maneuvering System (OMS) pod to Shuttle Endeavor. During installation preparations, Robertson found a carrier panel incorrectly installed on the leading edge of the OMS pod deck. If not corrected, the situation may have negatively impacted flight hardware. The QASAR Award is sponsored by NASA Headquarters’ Office of Safety and Mission Assurance. This Agency-wide award recognizes NASA employees and other government and prime subcontractor employees for significant quality improvements and safety initiatives. “I

felt proud that KSC was recognized for our excellent work," Robertson said. "Receiving this award exemplifies the professionalism of the Shuttle processing team." ["KSC Quality Assurance Specialist's Safety Efforts Lead To Prestigious 'QASAR' Award," **KSC News Release #22-04**, April 21, 2004.]

◆ NASA might not be able to get its space shuttles flying again if Congress doesn't give the agency the spending increase it asked for, NASA Administrator Sean O'Keefe said Wednesday. O'Keefe told lawmakers most of the $866 million increase the agency asked for in the next fiscal year will pay for fixing the shuttles and maintaining the International Space Station. That would represent a 5.6 percent increase over current spending levels. About $736 million of the increase would go to the shuttle fleet and the space station, O'Keefe said. The rest is earmarked for President Bush's new moon-Mars exploration initiative, he said. The effort to increase shuttle safety in the wake of the Columbia disaster and to get the space trucks flying again "all becomes very compromised" if Congress doesn't give NASA the money it says it needs, O'Keefe said. O'Keefe made his comments Wednesday at a hearing before the House Appropriations subcommittee that handles NASA's budget. ["O'Keefe tells committee fund hike vital to shuttle," **Florida Today**, April 22, 2004, p 9A.]

**April 22:** Space Shuttle Processing Status Report S04-08: **Discovery** (OV-103); Discovery passed two important processing milestones this week, as progress continues in preparation for the Return to Flight mission, STS-114, to the International Space Station. The left-hand Orbital Maneuvering System pod was installed yesterday. The nose cap could be reinstalled as early as tomorrow. The nose cap was removed from the vehicle in the summer of 2003 and returned to the vendor, where it underwent numerous forms of Non-Destructive Evaluation. The tests included X- rays, ultrasound and eddy current to ensure structural integrity prior to installation on the vehicle. The nose cap was also recoated. When returned to KSC, new Thermal Protection System (TPS) blankets were assembled inside the nose cap and thermography was performed to document preflight conditions. **Atlantis** (OV-104); Atlantis is powered up in support of mission processing to prepare the Space Shuttle for flight to the International Space Station. Preparations continue for Rudder Speed Brake actuator removal. Panel removal is scheduled for early next month, followed shortly by actuator removal. Build up of all 22 of the left-hand T-seals, the C-shaped seals that fit between each panel on the wings, is complete, and 19 have been installed. Right-hand panel assembly is ongoing, with eight of the 22 completed. **Endeavour** (OV-105); Space Shuttle Endeavour is in Orbiter Major Modification (OMM) period, which began in December 2003. Structural and wire inspections in support of the OMM continue in the forward, mid-body and aft. X-rays of the four Rudder Speed Brake actuators, which were removed from the vehicle, showed all of the gears were correctly installed. The actuators were shipped to the vendor for a complete inspection. The vendor will begin inspections with actuators No. 1 and 3, followed by No. 2 and 4. Owner-press-release. (2004). **Space Shuttle Processing Status Report** [Online]. Available E-mail: owner-press-release @spinoza.public.hq.nasa.gov [2004, April 22].]

**April 23:** Many news organizations across the country are mistakenly identifying the flag-draped caskets of the Space Shuttle Columbia's crew as those of war casualties from Iraq. Editors are being asked to confirm that the images used in news reports are in fact those of American casualties and not those of the NASA astronauts who were killed Feb.1, 2003, in the Columbia tragedy. [“Columbia Crew Mistakenly Identified As Iraqi War Casualties,” **NASA News Release #N04-59**, April 23, 2004.]

**April 28:** Both of NASA's Mars Exploration Rovers have completed their originally planned mission and are tackling extra-credit assignments. "Spirit and Opportunity have completed all the primary objectives of the mission. The terrific success achieved is a tribute to a superb team whose commitment to excellence, and keeping the public engaged, is hard to match," said Orlando Figueroa, director of the Mars Exploration Program, NASA Headquarters, Washington. Opportunity finished its 90th martian day of surface operations on Monday. That was the last of several criteria set in advance for full mission success. Spirit passed its 90-day mark on April 5. Both rovers have met all goals for numbers of locations examined in detail, distances traveled, and scientific measurements with all instruments. Both rovers are healthy. In early April, NASA approved funding for extending operation of Spirit and Opportunity through September. [“Mars Rovers Finish Primary Mission and Roll Onward,” **NASA News Release #04-142**, April 28, 2004.]

**April 29:** For the fourth time in Space Shuttle Program history, 350,000 gallons of water will be released on a Mobile Launcher Platform (MLP) at Launch Pad 39A during a water sound suppression test. The test will take place at 8 a.m. May 7. This test is being conducted following the replacement of the six main system valves, which had been in place since the beginning of the Shuttle Program and had reached the end of their service life. Also, the hydraulic portion of the valve actuators has been redesigned and simplified to reduce maintenance costs. The sound suppression water system is installed on the launch pads to protect the orbiter and its payloads from damage by acoustical energy reflected from the MLP during launch. The system includes an elevated water tank with a capacity of 300,000 gallons. The tank is 290 feet high and stands on the northeast side of the Pad. The water is released just before the ignition of the orbiter's three main engines and twin solid rocket boosters, and flows through parallel 7-foot-diameter pipes to the Pad area. [“KSC To Release 350,000 Gallons Of Water During Sound Suppression Test, **KSC News Release #23-04**, April 29, 2004.]

◆ Spacecraft and Expendable Launch Vehicles Status Report: Mission: Gravity Probe B (GP-B), Launch vehicle: Delta II; Launch pad: SLC-2, Vandenberg Air Force Base, Launch date: April 20, 2004 Launch time: 9:57:24 a.m. PDT. NASA’s Gravity Probe B was launched successfully from Space Launch Complex 2 at Vandenberg Air Force Base on April 20 at 9:57:24 a.m. PDT. The solar arrays had a nominal deployment while still attached to the Boeing Delta II second stage. Once acquired by the tracking station in Kiruna, Sweden, onboard cameras confirmed that deployment of the four arrays had been completed 72 minutes after launch, followed by live video of spacecraft separation from the Delta II launch vehicle 75 minutes after liftoff. Gravity Probe B was launched into a 400-nautical-mile-high polar orbit for a 16-month mission. All four gyro systems have

been activated and are undergoing checkout. The full Initialization & Orbit Checkout phase of the Gravity Probe B mission is planned to last 45 to 60 days, after which the science data collection will begin. The Gravity Probe B mission is a relativity experiment developed by NASA's Marshall Space Flight Center, Stanford University and Lockheed Martin. The spacecraft will test two extraordinary predictions of Albert Einstein's general theory of relativity that he advanced in 1916: the geodetic effect (how space and time are warped by the presence of the Earth) and frame dragging (how Earth's rotation drags space and time around with it). The spacecraft consists of four sophisticated gyroscopes that will provide an almost perfect space-time reference system. The mission will look in a precise manner for tiny changes in the spin axis direction. Mission: Aura, Launch vehicle: Delta II, Launch pad: SLC-2, Vandenberg Air Force Base, Launch date: June 17, 2004 NET Under Review, Launch time: 6:01:50 a.m. – 9:04:50 a.m. EDT (3:01:50 – 3:04:50 a.m. PDT). NASA's Aura spacecraft, the latest in the Earth Observing System (EOS) series, is at the Astrotech payload processing facility located on North Vandenberg Air Force Base. The Spacecraft Comprehensive Performance Test was successfully completed last week. This was a test of Aura's instruments and onboard systems. This week, spacecraft propulsion system testing and preparations for fueling are underway. The erection of the Boeing Delta II launch vehicle on Space Launch Complex 2, located on North Vandenberg Air Force Base, begins today with the erection of the first stage. The payload fairing will be hoisted into the tower tomorrow, April 30. The second stage is planned for hoisting atop the first stage on May 1. Erection of the nine solid rocket boosters will occur in sets of three on May 3 - 5. Aura's four state-of-the-art instruments will study the dynamics of chemistry occurring in the atmosphere. The spacecraft will provide data to help scientists better understand the Earth ozone, air quality and climate change. Mission: MESSENGER, Launch vehicle: Delta II Heavy, Launch pad: 17-B, Launch date: July 30, 2004, Launch window: 2:17:44 a.m. – 2:17:56 a.m. EDT. MESSENGER is at the Astrotech Space Operations facilities near Kennedy Space Center, where it is undergoing prelaunch testing. Testing of the spacecraft's radio system uplink and downlinks through the KSC/JPL interface with the Deep Space Network (MIL-71) has been successfully completed. Autonomy testing continues. This verifies MESSENGER's ability to operate on its own when not in direct contact with Earth. Installation of thermal blankets has been completed as required on the schedule up to this time. The erection of the Boeing Delta II launch vehicle on Pad 17-B is currently scheduled to begin on June 18 with the erection of the first stage. The launch period for MESSENGER extends through Aug. 13. KSC News Center (2004). **Spacecraft and Expendable Launch Vehicles Status Report** [Online]. Available E-mail: ksc@newsletters.nasa.gov [2004, April 29].]

**April 30:** NASA's Deputy Administrator Frederick D. Gregory is one of five explorers being inducted into the Astronaut Hall of Fame. Gregory and the other inductees will be honored Saturday during a public ceremony at NASA's Kennedy Space Center Visitor Complex, Fla. Other inductees at Saturday's ceremony: Kathryn D. Sullivan, Ph.D., was NASA's first female spacewalker in 1984. Sullivan also helped launch the Hubble Space Telescope in 1990. Richard O. Covey, Col., USAF (Ret.). He was pilot of the first Space Shuttle return to flight mission in 1988 following the Challenger accident. He commanded the 1993 Hubble Space Telescope repair mission. He is leading the task

group making an independent assessment of NASA's Return to Flight efforts. Norman E. Thagard, M.D., the first American to live on Russia's Mir space station. He spent 115 days working on Mir in 1995. Francis R. Scobee, commander of the 1986 Challenger mission that ended in disaster 58 seconds after liftoff. Scobee will be represented Saturday by his widow, June. [“Hall of Fame Honors NASA Deputy Administrator,” **NASA News Release #04-146**, April 30, 2004.]

◆ Space Shuttle Processing Status Report S04-09: **Discovery** (OV-103); Processing work continues in the Orbiter Processing Facility to prepare Discovery for the Return to Flight mission, STS-114, to the International Space Station. Vehicle power-up work continues with Ku- band communications and radar system testing. Following installation of the four new Rudder Speed Brake (RSB) actuators, RSB panel installation is scheduled to begin late next week. Reinforced Carbon-Carbon (RCC) build-up of panels and associated fittings is ongoing. Twenty left-hand and 14 right-hand spar fittings are installed. Spar fittings are a series of mechanical joints that attach the RCC panel to the wing. Discovery's nose cap was installed April 23, and the Ground Support Equipment was removed Wednesday. **Atlantis** (OV-104); Atlantis continues its power-up period in support of mission processing to prepare the vehicle for its future flight to the International Space Station. Technicians began work in preparation for airlock removal. RSB panel removal is scheduled to begin as early as this weekend, followed by actuator removal early next week. Thermography has been performed on Atlantis' nose cap, and Thermal Protection System blanket installation is continuing. Build-up of the panels and associated fittings is ongoing, with 22 left-hand T-seals completed and 20 installed on the vehicle. **Endeavour** (OV-105); Space Shuttle Endeavour is in its Orbiter Major Modification period, which began in December. Electrical modifications continue in the crew module in support of the Multi-functional Electrical Display System (MEDS), or "glass cockpit" upgrade. Endeavour is the final vehicle to receive the MEDS upgrade. Now that all of the 44 RCC panels and associated fittings have been removed from the vehicle, preparations are under way for bead blasting the wing leading edge of Endeavour. Owner-press-release. (2004). **Space Shuttle Processing Status Report** [Online]. Available E-mail: owner-press-release@spinoza.public.hq.nasa.gov [2004, April 30].]

◆ NASA for the first time Friday detailed its reasons for a controversial decision to scrap a servicing mission to the Hubble Space Telescope, saying the flight would entail higher risk to astronauts. Those aboard a crippled shuttle in open space could only survive a month at most, significantly cutting time available to stage a rescue mission, the agency said. Ground teams would face an "unprecedented double workload" to ensure a second shuttle would be ready for timely flight, and it would be dangerous to carry out spacewalks to move astronauts on a stranded shuttle to a rescue ship. "This was a response to the Hubble discussion that's been in the media lately," said former astronaut John Casper, who now is a shuttle program manager. Casper said NASA felt it "needed to articulate a little bit better" the reasons for canceling a planned Hubble servicing flight in mid-2006 -- "or at least identify the risks." NASA's thinking on the matter was outlined in a new version of its Return-To-Flight Implementation Plan, which outlines efforts to respond to recommendations from Columbia accident investigators. The investigators

ordered NASA to develop a way to carry out orbital inspections and repairs of the type of damage that doomed Columbia's crew in February 2003. It also told NASA to "explore all options" for providing future crews with safe havens in orbit. NASA now plans to fly shuttles only to the station. Stranded crews could await a rescue flight at the outpost for more than two months. The agency had planned to fly a fifth servicing mission to the Hubble telescope. But the agency cancelled the flight in January, saying it was too dangerous to carry out in light of board recommendations. [“NASA details risks to astronauts on mission to Hubble,” **Florida Today**, May 1, 2004, p 4A.]

**During April:** About 500 U.S. Air Force, Navy, Coast Guard, NASA and contractor personnel completed a major simulation in the Atlantic off Kennedy Space Center to sharpen coordination for the rescue of any space shuttle crew forced to bail out during a launch or landing emergency. Of particular concern are some Return-To-Launch-Site abort cases where the shuttle could not reach the Kennedy runway, forcing the crew to bail out offshore. The Defense Dept. Manned Space Flight Support Office at Patrick AFB, Fla., coordinated the exercise, as it has for previous simulations. Military assets involved in the exercise included USAF HH-60 helicopters, HC-130 and KSC-130 transports, a USCG HU-25 Falcon, a Navy E-2C Hawkeye command-and-control aircraft and the frigate USS Simpson. The United Space Alliance solid rocket booster recovery ships Liberty Star and Freedom Star also participated. [“Astronaut Rescue,” **Aviation Week & Space Technology**, May 3, 2004, p 19.]

Water is released onto the Mobile Launcher Platform (MLP) on Launch Pad 39A at the start of a water sound suppression test. Workers and the media (left) are on hand to witness the rare event. This test is being conducted following the replacement of the six main system valves, which had been in place since the beginning of the Shuttle Program and had reached the end of their service life. Also, the hydraulic portion of the valve actuators has been redesigned and simplified to reduce maintenance costs.

## MAY

**May 1:** President Bush's moon-Mars initiative must become the nation's vision if astronauts once again are going to explore space beyond Earth orbit, a newly inducted member of the U.S. Astronaut Hall of Fame said Saturday. Bush in January called for astronauts to return to the moon by 2020 in preparation for missions to Mars. Politicians and the public are lukewarm on the idea, and a similar plan proposed by Bush's father in 1989 was dead on arrival in Congress. "The really important question is this: Is this going to become the nation's vision?" asked Kathryn Sullivan, who became the first American woman to walk in space in 1984. Sullivan's comments came after she and four other colleagues were inducted into the hall of fame during a ceremony at Kennedy Space Center. With an estimated crowd of 2,500 gathered beneath a Saturn 5 moon rocket, Sullivan was inducted along with: Francis "Dick" Scobee, commander of the ill-fated 1986 Challenger mission. Norm Thagard, the first American to work on a Russian space station. Frederick Gregory, the first African-American to command a U.S. space mission. Dick Covey, who piloted NASA's first post-Challenger shuttle flight and commanded a make-or-break mission to repair the once-myopic Hubble Space Telescope. On hand were 18 of 52 astronauts already in the hall of fame, including four surviving Mercury astronauts: John Glenn, Scott Carpenter, Wally Schirra and Leroy "Gordo" Cooper. Web posted. (2004). [Five astronauts join hall of fame [Online]. Available WWW: http://www.floridatoday.com/ [2004, May 2].]

**May 3:** NASA's Kennedy Space Center recently was recognized by the Occupational Safety and Health Administration (OSHA) as a Voluntary Protection Program (VPP) Star site, joining an elite group of organizations considered to have the best safety programs in the nation. VPP is a national program designed to recognize and promote effective safety and health management. Currently, only approximately 600 organizations have received this honor nationwide. KSC was recommended for Star certification, this program's highest level, in July 2003 after an intense OSHA review of the Center's safety and health programs. The Center was presented with the official Star flag by OSHA Deputy Regional Administrator Teresa Harrison on April 26 at KSC. "It's exciting to know we did this together as a team," said KSC Director Jim Kennedy. "I came here with the expression, 'KSC and proud to be,' and now we are also 'VPP and proud to be.'" VPP is a cooperative effort between OSHA, employers, employees and unions that recognizes exemplary safety programs that go above and beyond regulatory compliance. To qualify for Star certification, an organization's average injury, illness, and lost worktime rates for the previous three years must be below the current comparable private sector average rates as reported by the Bureau of Labor Statistics. ["Award Honors KSC Among Safest Workplaces In Nation," **KSC News Release #24-04**, May 3, 2004.]

**May 4:** The GOES-8 weather satellite that gave Americans an overhead shot of hurricanes for the last several years is being retired. The National Oceanic and Atmospheric Administration will move GOES-8 into an orbit about 200 miles higher than normal starting today and will then dispose of it in three controlled burns. The satellite was replaced by GOES-12 last year. GOES-8, launched in 1994, tracked some

memorable tropical storms and hurricanes. [“NOAA retires, replaces weather satellite,” **Florida Today**, May 5, 2004, p 7A.]

**May 5:** Five distinguished NASA executives were invited to a White House ceremony Wednesday afternoon to receive the prestigious Presidential Rank Awards for 2003. Dr. John Mather, a Senior Astrophysicist in the Infrared Astrophysics Branch, at NASA's Goddard Space Flight Center, Greenbelt, Md. received a 2003 Presidential Rank Award for Distinguished Senior Professionals. NASA Deputy Administrator, Frederick Gregory; NASA Assistant Administrator, Office of Procurement, Tom Luedtke; NASA Assistant Administrator, Office of Human Resources, Vicki Novak; and John Talone, Director of International Space Station/Payload Processing at NASA's Kennedy Space Center, Fla. received 2003 Presidential Rank Awards for Distinguished Executives. The President annually honors a select group of career members of the Senior Executive Service (SES) and Senior Level Scientific and Professional (SL/ST) corps. The honorees are selected for outstanding leadership accomplishments and service over an extended period of time in some of the nation's most critical positions in the federal government. "The entire NASA family is proud of the accomplishments of these fine senior executives," said NASA Administrator Sean O'Keefe. "They have demonstrated leadership by personal example, backed by a thorough knowledge of their areas of expertise, is the most effective way to operate in a fast moving, stressful environment," Administrator O'Keefe said. President Bush conferred the rank of Distinguished Executive on 55 members of the SES, and the rank of Distinguished Senior Professional on six members of the SL/ST corps. "President George W. Bush's actions highlight these exemplary leaders and confirm that these executives and senior professionals are some of our best who achieve great results and demonstrate a strong commitment to the call of public service," said Office of Personnel Management (OPM) Director Kay Coles James. [“NASA Senior Executives Recognized By White House,” **NASA News Release #04-150**, May 5, 2004.]

◆ Merritt Island's Air Liquide plant, where manager Rudi Strickland has worked for 20 years, has a new "cold box" to extract nitrogen and oxygen from the air. The plant, whose sister facility is in Orlando, is a familiar sight for people driving north on State Road 3 to Kennedy Space Center. The towering tangle of pipes and tanks vents clean, cold, white vapor as it works 24 hours a day. In the nitrogen storage tank, Strickland said, "the liquid is actually boiling." As it's vented, the vapor coats nearby pipes with ice. Occasionally the crew will knock off a chunk if they need some to chill a cooler, he said. Air Liquide supplies the gaseous nitrogen through a network of pipes that runs under Kennedy Space Center and Cape Canaveral Air Force Station. Space facilities use the gas to purge equipment and perform other functions at launch pads, maintenance shops and the Vehicle Assembly Building, Strickland said. Re-dedicated in March, the plant -- one of many Air Liquide facilities in more than 65 countries -- now also has the capability to make liquid and gaseous oxygen. Web posted. (2004). [Air Liquide moves into oxygen market [Online]. Available WWW: http://www.floridatoday.com/ [2004, May 5].]

◆ Scrapping the space shuttle before the International Space Station is completed would be expensive and could delay the station’s construction by years, NASA officials said Wednesday. But U.S. Sen. Sam Brownback, who repeatedly pressed the agency’s

representatives about alternatives to the shuttle, said he intends to keep asking until he's sure the National Aeronautics and Space Administration has fully examined his question. William Readdy, NASA's top spaceflight official, said the shuttle is the only vehicle capable of hauling heavy cargo – such as the large pieces of the station – into orbit. Those components were built with the intention that they would be launched on the shuttle, he said, and putting them on another vehicle would require major modifications. Brownback, R-Kan., asked several times whether NASA has asked the Russian Space Agency, or any of its other 14 international partners in the station project, whether one or several could step in and fill the gap if the shuttle were retired early rather than on its current schedule of about 2010. Readdy replied that the Russians themselves are reliant on the shuttle for ferrying large equipment to the station. NASA estimates that developing a system using an expendable rocket to construct the station could cost more than $700 million and delay station construction by at least four to five years, he said. Web posted. (2004). [NASA defends keeping shuttle flying, but senator still unconvinced [Online]. Available WWW: http://www.orlandosentinel.com/ [2004, May 6].]

**May 6:** NASA named 11 new astronauts Thursday, including three educators who will get the chance to teach from space. The class, which will begin training at Johnson Space Center in Houston this summer, includes two men with Florida ties: Joe Acaba, a middle-school teacher from Dunnellon, and Army Maj. R. Shane Kimbrough. Though the nine men and two women introduced will be trained for both the Space Shuttle and International Space Station, their chance to fly probably won't come until the proposed crew exploration vehicle is ready. ["NASA chooses 11 new astronauts," **Orlando Sentinel**, May 7, 2004, p A6.]

**May 7:** Space Shuttle Processing Status Report S04-10: **Discovery** (OV-103); Discovery continues to be processed for the Return to Flight mission, STS-114, to the International Space Station. Left- hand Orbital Maneuvering System pod-interface verification testing continues. Installation of Discovery's airlock is scheduled to begin as early as Monday. Left-hand inboard elevon X-rays are complete. Four new Rudder Speed Brake (RSB) actuators have been installed on the vehicle. The RSB panels have been bead blasted and painted, with installation scheduled to begin today. **Atlantis** (OV-104); Technicians continue to process Atlantis for its future flight to the International Space Station. The airlock was removed from the vehicle last week and fuel cell removal is underway. The first RSB panel was removed Tuesday; the remaining three panels currently are in the process of being removed. Once the other panels are removed, the actuators will be taken off the vehicle and sent to the vendor for a complete inspection. **Endeavour** (OV-105); Space Shuttle Endeavour is in its Orbiter Major Modification period, which began in December. Electrical modifications continue in the crew module. Thermal Control System blanket work continues in support of payload-bay radiator installation. Preparations are underway for a fit check of Endeavour's nose cap. Technicians began flex hose inspections this week in the Environmental Control and Life Support bay. Structural and wire inspections are ongoing in the forward, midbody and aft of the vehicle. Owner-press-release. (2004). **Space Shuttle Processing Status Report** [Online]. Available E-mail: owner-press-release@spinoza.public.hq.nasa.gov [2004, May 7].]

◆ Spacecraft Expendable Launch Vehicles Status Report: Mission**:** AURA, Launch vehicle: Delta II, Launch vehicle: Delta II, Launch pad: SLC-2, Vandenberg Air Force Base (VAFB), Launch date: June 19, 2004, Launch window: 3:01:50 a.m. - 3:04:50 (PDT). NASA's Aura spacecraft, the latest in the Earth Observing System (EOS) series, is at the Astrotech payload processing facility on North Vandenberg Air Force Base. The spacecraft propulsion system testing was completed. Final preparation for fueling is scheduled to be completed on May 12. The spacecraft will be fueled on May 13, followed by preparation for spacecraft mate to payload attached fitting currently scheduled for May 24. The assembly of the Boeing Delta II launch vehicle on Space Launch Complex 2, located on North Vandenberg Air Force Base, began on April 29 with the stacking of the first stage. The payload fairing was hoisted into the tower on April 30. The second stage was hoisted atop the first stage on May 1. Installation of the nine solid rocket boosters was completed Wednesday. Aura's four state-of-the-art instruments will study the dynamics of chemistry occurring in the atmosphere. The spacecraft will provide data to help scientists better understand the Earth's ozone, air quality and climate change. The EOS Aura satellite, instruments and science investigations are managed by NASA's Goddard Space Flight Center in Greenbelt, Md. Government oversight of launch preparations and the countdown management on launch day is the responsibility of the NASA Launch Services Program based at John F. Kennedy Space Center. The launch service is provided to NASA by Boeing Launch Services. Mission: MESSENGER, Launch vehicle: Delta II Heavy, Launch pad: SLC-17B, Cape Canaveral Air Force Station, Launch date: July 30, 2004 NET, Launch window: 2:17:44 a.m. – 2:17:56 a.m. (EDT). MESSENGER is at the Astrotech Space Operations facilities near Kennedy Space Center, where it is undergoing pre-launch testing. Testing of the spacecraft's radio system uplink and downlinks through the KSC/JPL interface with the Deep Space Network (MIL-71) has been successfully completed. Autonomy testing continues. This verifies MESSENGER's ability to operate on its own when not in direct contact with Earth. Installation of thermal blankets has been completed as required on the schedule up to this time. The assembly of the Boeing Delta II launch vehicle on Pad 17-B is currently scheduled to begin on June 18 with the stacking of the first stage. The launch period for MESSENGER extends through Aug. 13 of this year. KSC News Center (2004). **Spacecraft and Expendable Launch Vehicles Status Report** [Online]. Available E-mail: ksc@newsletters.nasa.gov [2004, May 7].]

◆ NASA staged a flash flood at Kennedy Space Center on Friday during an eye-popping, ear-splitting test of a critical shuttle launch pad system. Two-hundred workers and a hoard of news media watched as 360,000 gallons of water gushed onto Pad 39A, inundating a mobile launcher platform in a mere 41 seconds. The torrent, equivalent to the water in about 50 average-sized backyard swimming pools, tested new valves in a sound-suppression water system designed to protect shuttles and their payloads from earth-shaking acoustical energy created during launch. "That was an awesome test," said Steve Altemus, chief of the launch and landing division at KSC. "The roar that comes out of there is really neat." The sound-suppression system consists of a 290-foot-tall water tower on the northeast side of the pad. During a launch, water is released from the tank just before ignition of the shuttle's three liquid-fueled main engines and twin solid rocket

boosters. Seven-foot-wide pipes funnel the violent flow of water to outlets that include six giant nozzles. Mounted on the mobile launcher platform, each "rainbird" stands 12 feet tall. The system now includes six new main valves installed recently to replace regulators that had been in place since the early 1980s. Hydraulic valve actuators also were replaced. NASA test conductor Steve Payne said data showed the new equipment operated as expected. And that's a good thing considering the importance of the system. The rolling thunder that accompanies a shuttle launch sends out a loud, rumbling sound wave that could seriously damage a solid rocket booster steering system. "If you damage that at liftoff, you could certainly have a bad day," KSC Director James Kennedy said. [“NASA tests launch muffler,” **Florida Today**, May 8, 2004, p 1B.]

**May 11:** Kennedy Space Center Director Jim Kennedy recently appointed Patrick Simpkins as the Director of Human Resources. In this position, Simpkins will oversee the Center’s civil service staffing requirements, manage employee classifications and compensation, and build training and leadership development programs. Simpkins began his NASA career in 1983 as a Shuttle engineer and served in various roles of increasing responsibility for 15 years. After realizing his strengths in helping others maximize their abilities, he pursued an education in human resource management and served as KSC’s Personnel Officer. After completing the Senior Executive Service Candidate Development Program, he worked in human resources at NASA Headquarters in Washington, D.C., for two years. “Pat is an excellent and welcome addition to the senior staff at KSC,” said Kennedy. “He has a strong KSC background in Shuttle and has earned the respect of everyone during his tenure in human resources.” Simpkins helped modernize NASA’s human resources information systems and led in the design, development and implementation of the Agency’s competency management system. [“Patrick Simpkins Named Director of KSC Human Resources,” **KSC News Release #26-04**, May 11, 2004.]

**May 12:** NASA has granted two nonexclusive patent license agreements for imaging software technologies for application in commercial markets. The software programs Fuzzy Reasoning Edge Detection (FRED); Fuzzy Reasoning Adaptive Thresholding (FRAT); and Pose Invariant Pattern Recognition (PIPR) were developed at NASA's Kennedy Space Center, Fla. The PIPR software program is used to search through large amounts of data to determine links and patterns. The software also investigates what has already occurred and can predict what will occur. PIPR requires no advance knowledge of the characteristics of images to be analyzed and provides an explicit indicator-of-match. NASA signed an agreement with Barton Medical Imaging, New Haven, Conn., for the software programs FRED, FRAT, and PIPR. Barton, a small high-tech company, plans on using the programs to enhance the performance, processing time and range of applications in their medical imaging systems. [“NASA Grants Two New Imaging Software Patents,” **NASA News Release #04-156**, May 12, 2004.]

◆ The Director of NASA's Engineering and Safety Center (NESC), based at NASA's Langley Research Center, Hampton, Va., reported on the results of initial assessments today. The NESC was created after the Space Shuttle Columbia accident to serve as a source of expertise for evaluating the merits of technical concerns identified by agency

employees. Assessments are performed from a source of funding not directly linked to any single NASA program or project and therefore free from any programmatic bias of schedule or cost. The initial assessments were related to four major projects: The Cloud-Aerosol Light Detection and Ranging and Infrared Pathfinder Satellite Observation (CALIPSO) spacecraft, an Earth Science satellite set to launch in 2005; the X-43A, a hypersonic research vehicle that successfully flew in March; the Space Shuttle orbiter rudder/speed brake system; and the Mars Exploration Rovers. During review of hardware in a Space Shuttle orbiter rudder/speed brake system, a concern was raised about the effectiveness of grease in the gear set of the replacement hardware retrieved from long-term storage. NESC conducted extensive tests and analyses to determine the grease is still effective. A lesson learned was programs should periodically review hardware components to ensure qualification and certification limits are not exceeded. ["NASA Safety Center Releases Initial Assessments," **NASA News Release #04-155**, May 12, 2004.]

◆ NASA Kennedy Space Center's John J. "Tip" Talone Jr. was awarded the prestigious rank of Distinguished Executive in a May 5 ceremony on the grounds of the White House. The award is presented each year to a small group of career senior executives within the federal government who have demonstrated outstanding leadership accomplishments and a personal commitment to public service in some of our nation's most critical postions. Talone serves as Director of the International Space Station (ISS) and Payloads Processing Directorate at KSC. He is responsible for the management and integration of ISS assembly elements pre-flight support ground processing, the testing and verification of elements prior to launch, and on-orbit assembly. He also manages ISS research/science testing and serves as the KSC primary interface for ISS international partners and Shuttle payload scientists. "KSC is so proud of Tip and his many accomplishments," said KSC Director Jim Kennedy. "Tip's excellent leadership skills, extensive knowledge and commitment to the Space Program demonstrate that he is truly a distinguished executive." Talone began his NASA career in 1965 and has held several key managerial positions. During his early years with the Agency, Talone served in various capacities in the Saturn/Apollo lunar landing, Skylab and Apollo-Soyuz programs. During his assignment to the Space Shuttle Program, he served as launch pad manager, Shuttle operations integration manager and flow director for Space Shuttles Columbia, Discovery and Endeavour. He also served as special assistant to the KSC Director. Talone was appointed a member of the Senior Executive Service in 1997 and has served in his current position since May 2000. Throughout his career, Talone has received numerous awards, including two NASA Exceptional Service Awards, the prestigious Silver Snoopy Award, the National Space Club Eagle Manned Success Award, KSC Equal Opportunity Award, NASA Outstanding Leadership Medal, Presidential Rank Meritorious Executive, Aviation Week and Space Technology's Laurel Award, Rotary Club Stellar Award, Spaceflight Awareness Leadership Award, and most recently the 2004 Dr. Kurth H. Debus Award. ["John J. Talone, Jr., Receives Presidential Award For Leadership," **KSC News Release #28-04**, May 12, 2004.]

◆ Two International Space Station (ISS) managers are taking on new positions in the program. Michael T. Suffredini has been named ISS deputy program manager at NASA's

Johnson Space Center in Houston. Mark S. Geyer will replace Suffredini as mission operations integration manager for the ISS Program. After a transition period, the assignments formally begin in August. [“NASA Selects International Space Station Managers,” **NASA News Release #04-157**, May 12, 2004.]

**May 13:** Spacecraft and Expendable Launch Vehicles Status Report: Mission: AURA, Launch vehicle: Delta II, Launch pad: SLC-2, Vandenberg Air Force Base (VAFB), Launch date: June 19, 2004, Launch window: 3:01:50 a.m.-3:04:50 (PDT). NASA’s Aura spacecraft, the latest in the Earth Observing System (EOS) series, is at the Astrotech payload processing facility on North VAFB. Calif. The spacecraft propulsion system testing was completed. Fueling of the spacecraft is happening today. Spacecraft mate to the payload attach fitting (PAF) is scheduled to occur on May 24. The assembly of the Boeing Delta II launch vehicle on Space Launch Complex 2, on North VAFB, began on April 29 with the stacking of the first stage. The payload fairing was hoisted into the tower on April 30. The second stage was hoisted atop the first stage on May 1. Installation of the nine solid rocket boosters was completed May 5. The Boeing PAF preparation for flight installation continues. The first power-on testing was completed on May 11. A vehicle control check is scheduled to occur on May 17. This procedure qualifies the first and second stage subsystems through a series of detailed tests. The first stage leak check, scheduled for May 21, will include a simulated countdown and the loading of liquid oxygen. A Simulated Flight (SimFlight) or flight test of the vehicle’s electrical and mechanical systems will follow on May 24. Aura’s four state-of-the-art instruments will study the dynamics of chemistry occurring in the atmosphere. The spacecraft will provide data to help scientists better understand the Earth’s ozone, air quality and climate change. The EOS Aura satellite, instruments and science investigations are managed by NASA’s Goddard Space Flight Center in Greenbelt, Md. Government oversight of launch preparations and the countdown management on launch day is the responsibility of the NASA Launch Services Program based at John F. Kennedy Space Center. The launch service is provided to NASA by Boeing Launch Services. Mission: MESSENGER, Launch vehicle: Delta II Heavy, Launch pad: SLC-17B, Cape Canaveral Air Force Station, Launch date: July 30, 2004, Launch window: 2:17:44 a.m. – 2:17:56 a.m. (EDT). MESSENGER is at the Astrotech Space Operations facilities near Kennedy Space Center, where it is undergoing pre-launch testing. Testing of the spacecraft’s radio system uplink and downlinks through the KSC/JPL interface with the Deep Space Network (MIL-71) has been successfully completed. Autonomy testing continues. This verifies MESSENGER’s ability to operate on its own when not in direct contact with Earth. Installation of thermal blankets has been completed as required on the schedule up to this time. The review to determine the readiness to begin stacking the launch vehicle is scheduled to occur May 19. The assembly of the Boeing Delta II launch vehicle on Pad 17-B is currently scheduled to begin on June 18 with the stacking of the first stage. The launch period for MESSENGER extends through Aug. 13 of this year. KSC News Center (2004). **Spacecraft and Expendable Launch Vehicles Status Report** [Online]. Available E-mail: ksc@newsletters.nasa.gov [2004, May 13].]

◆ NASA's Kennedy Space Center will play a key role in carrying out President Bush's plan to send astronauts back to the moon and on to Mars, the head of the agency's new

exploration office said Thursday. That means the center stands a good chance of serving as the launch site for future missions beyond Earth orbit. "This is certainly the operations center of the future," said retired Navy Rear Adm. Craig Steidle, chief of NASA's Office of Exploration Systems, which was formed a day after Bush unveiled his moon-Mars initiative in January. In their first visit to Florida's Space Coast, Steidle and a group of his key deputies toured KSC to learn first-hand the ways in which the center can play a part in executing the Bush plan. Specific areas the group was interested in included: * Preflight test and check-out of spacecraft and launch vehicles. * Management of supercold rocket propellants. * Advanced rocket-range and spaceport technologies. * Life-support system research. * Final preflight crew training. Steidle said he also was interested in determining how KSC could help the agency prepare for launching spacecraft from the surface of the moon and ultimately Mars. The program calls for NASA to develop a new crew exploration vehicle to replace the agency's three remaining shuttles. The ship would first ferry astronauts to the International Space Station. Later versions would fly crews to the moon and Mars. Prototypes of the new ship are expected to make test flights in 2008. The first flights with crews aboard would follow in 2014. The new vehicle then would be ready to send an expedition to the moon around 2015. [“Official: KSC has key role in space plans,” **Florida Today**, May 14, 2004, p 1A.]

**May 14:** Space Shuttle Processing Status Report S04-11: **Discovery** (OV-103)**;** Processing continues in the Orbiter Processing Facility in preparation for Discovery's Return to Flight mission, STS-114, to the International Space Station. Vehicle power-up work continues with Orbital Maneuvering System pod continuity checks and verification testing. Following the installation of the four new Rudder Speed Brake (RSB) actuators, technicians continue to re-hang the four panels. On Tuesday, workers completed the installation of Discovery's external airlock and hung the first Reinforced Carbon-Carbon (RCC) panel on the right-hand leading edge of the wing. **Atlantis** (OV-104); Atlantis was powered up in support of mission processing for its future flight to the International Space Station. Fuel cell removal began on Monday. The four RSB panels and actuators were removed from the vehicle. The actuators will be X-rayed to determine whether the gears were assembled in the proper orientation and then be sent to the vendor for a complete inspection. Left-hand RCC panel installation is complete, and 20 right-hand panels have been assembled prior to being hung. **Endeavour** (OV-105); Space Shuttle Endeavour is in its Orbiter Major Modification period, which began in December 2003. Electrical modifications continue in the crew module. Wire inspections on Endeavour are complete in all areas except the Environmental Control and Life Support System bay. Inspections in that bay are ongoing. Technicians continue to bond Thermal Protection System tiles to the External Tank door. Right-hand radiators No. 3 and 4 arrived in the Orbiter Processing Facility and were installed on the vehicle. Owner-press-release. (2004). **Space Shuttle Processing Status Report** [Online]. Available E-mail: owner-press-release@spinoza.public.hq.nasa.gov [2004, May 14].]

◆ Dr. Victor Lebacqz, NASA's Associate Administrator of the Office of Aeronautics, selected Dr. Jaiwon Shin as Deputy Associate Administrator (DAA). The Office of Aeronautics was created in January to reflect NASA's commitment to aviation research and aeronautics technologies for the nation's civil and defense interests. He will assist

Lebacqz with technical, programmatic and personnel management of NASA's aeronautics research and development. [“NASA Selects Deputy For Aeronautics Office, **NASA News Release #04-160**, May 14, 2004.]

**May 17:** NASA’s finances are in disarray, with significant errors in its last financial statements and inadequate documentation for $565 billion posted to its accounts, its former auditor reported. The U.S. space agency’s chief for international financial management said the problem stemmed from a rough transition from 10 different internal accounting programs to a new integrated one. But audit firm Price Waterhouse Coopers notes basic accounting errors and a breakdown in NASA’s financial controls. Price Waterhouse Coopers and NASA parted ways earlier this year, according to the space agency’s inspector general, Robert Cobb. “The documentation NASA provided in support of its September 30, 2003, financial statements was not adequate to support $565 billion in adjustments to various financial statement accounts,” the auditor wrote in a January 20 report to Cobb. That big number was the result of posting problems, new software and a “massive cleanup” of 12 years of NASA’s financial records, said Patrick Ciganer, NASA’s chief for integrated financial management. With a current annual budget of $16.2 billion, NASA’s priorities include an ambitious multi-year mission to the moon and possibly Mars, finishing construction on the International Space Station and returning the grounded shuttle fleet to flight. Web posted. (2004). [NASA’s finances ‘in disarray’ [Online]. Available WWW: http://www.cnn.com/ [2004, May 17].]

**May 19:** The second-to-last Lockheed Martin Atlas 2AS rocket was launched from Cape Canaveral Air Force Station, carrying a cable television satellite. The mission, under the auspices of International Launch Services, carried the AMC-11 satellite into orbit for SES Americom. The company's satellites carry programming for such channels as Discovery, The Weather Channel, Telemundo, Univision and HGTV, some of it in high-definition. The flight marked the 72nd straight success for the Atlas-Centaur [“Rocket will carry cable TV satellite,” **Florida Today**, May 19, 2004, p 1B. “HDTV Rockets Up,” **Aviation Week & Space Technology**, May 24, p 34.]

◆ Technical challenges involved in developing a new orbital inspection boom could force NASA to delay launch of its first post-Columbia shuttle mission next March, an independent oversight group said Wednesday. Former astronaut Richard Covey, a co-chair of a group overseeing NASA efforts to implement the recommendations of Columbia accident investigators, said boom development remains on schedule for a planned March 6 launch. But the group noted in an interim report that the development schedule "is very aggressive and has no slack time reserve." "I will tell you that we believe it is a success-oriented schedule," Covey told reporters. "There are always going to be (schedule) risks in a development effort because you're doing something for the first time." Accident investigators ordered NASA to develop a way to inspect orbiting shuttles for the type of heat-shield damage that led to the February 2003 Columbia disaster. A hole punched in a wing panel by external tank foam insulation allowed hot gasses to rip the ship apart during an ill-fated atmospheric re-entry. Seven astronauts were killed.

NASA is developing a sensor-laden boom to inspect shuttle wing panels and thermal tiles on future flights. The 50-foot extension will be attached to the shuttle's 50-foot robot arm. It will use cameras to spot heat-shield damage. Laser sensors will measure the severity of damage. Covey said sensor development is proving to be formidable. Also a challenge: Making the boom strong enough to serve as an anchor for astronauts doing spacewalking repair work. The difficulties are prompting NASA to look for other ways to carry out orbital inspections. Among the possibilities: Spotting damage with International Space Station cameras and sending spacewalkers out to do inspections. The latter would seriously limit the amount of station assembly work that could be carried out on future shuttle flights. ["Group: Shuttle plan omits slack time," **Florida Today**, May 20, 2004, p 1A & 3A.]

**May 20:** Spacecraft and Expendable Launch Vehicles Status Report: Mission: Aura, Launch vehicle: Delta II, Launch pad: SLC-2, Vandenberg Air Force Base, Launch date: June 19, 2004, Launch time: 6:01:50 a.m. – 9:04:50 a.m. EDT (3:01:50 – 3:04:50 a.m. PDT). NASA's Aura spacecraft, the latest in the Earth Observing System (EOS) series, is at the Astrotech payload processing facility located on North Vandenberg Air Force Base, Calif. Fueling of the spacecraft was completed May 14. The next major activity is the mating to the payload attach fitting, the interface with the Delta II, scheduled to occur on May 24. Transportation of the spacecraft to Space Launch Complex 2 for mating to the second stage of the Delta II is scheduled for June 2. The build-up of the Boeing Delta II launch vehicle on Space Launch Complex 2, located on North Vandenberg Air Force Base, has been completed. The first stage was stacked April 29 and the second stage May 1. Work to install the nine solid rocket boosters was completed May 5. A vehicle control system check was successfully completed Monday. This procedure qualifies the first and second stage subsystems through a series of detailed tests. The first stage leak check is scheduled for Friday. It will include a simulated countdown and the loading of liquid oxygen aboard the first stage. A Simulated Flight test of the vehicle's electrical and mechanical systems will follow on May 24. Aura's four state-of-the-art instruments will study the dynamics of chemistry occurring in the atmosphere. The spacecraft will provide data to help scientists better understand the Earth's ozone, air quality and climate change. The EOS Aura satellite, instruments and science investigations are managed by NASA's Goddard Space Flight Center in Greenbelt, Md. Government oversight of launch preparations and the countdown management on launch day is the responsibility of the NASA Launch Services Program based at John F. Kennedy Space Center. The launch service is provided to NASA by Boeing Launch Services. Mission: MESSENGER, Launch vehicle: Delta II Heavy, Launch pad: 17-B Cape Canaveral Air Force Station, Launch date: July 30, 2004, Launch window: 2:17:44 a.m. – 2:17:56 a.m. EDT. MESSENGER is undergoing prelaunch testing at the Astrotech Space Operations facilities near Kennedy Space Center. Autonomy testing of the spacecraft continues. This verifies MESSENGER's ability to operate on its own when not in direct contact with Earth. Installation of thermal blankets has been completed as required by the schedule up to this time. In upcoming work, the flight battery is scheduled for installation June 8 and the solar arrays will be installed June 22. The review to assess readiness to begin stacking the Boeing Delta II rocket on Pad 17-B was successfully completed Wednesday. The work begins June 18 with the first stage. The launch period for

MESSENGER extends through Aug. 13. KSC News Center (2004). **Spacecraft and Expendable Launch Vehicles Status Report** [Online]. Available E-mail: ksc@newsletters.nasa.gov [2004, May 20].]

◆ The first pieces of Space Shuttle Columbia debris, loaned to a non-governmental agency for testing and research, are on their way from NASA's Kennedy Space Center (KSC), Fla., to The Aerospace Corporation in El Segundo, Calif. The Aerospace Corporation requested and will receive graphite/epoxy honeycomb skins from an Orbital Maneuvering System pod, Main Propulsion System Helium tanks, a Reaction Control System Helium tank and a Power Reactant Storage Distribution system tank. The company will use the parts to study re-entry effects on composite materials. NASA notified the Columbia crew's families about the loan before releasing the items for study. Earlier this year, Dr. Gary Steckel, senior scientist in the Materials Science Department in the Space Materials Laboratory at The Aerospace Corporation, viewed the items. "We believe these items are representative of the structural composite materials flown on Columbia. They will enable us to successfully meet our objective of calibrating analytical models for predicting reentry behavior of composite structures," Steckel said. Researchers believe the testing will show how materials are expected to respond to various heating and loads' environments. The findings will help calibrate tools and models used to predict hazards to people and property from reentering hardware. The Aerospace Corporation will have the debris for one year to perform analyses to estimate maximum temperatures during reentry based upon the geometry and mass of the recovered composite. The request from The Aerospace Corporation was one of several "Request for Information" applications NASA received to study Columbia debris. The eight pieces of hardware were inventoried inside the KSC Vehicle Assembly Building, where Columbia's debris is stored and prepared for shipment. [“First Columbia Debris Loaned For Research,” **KSC News Release #31-04**, May 20, 2004.]

◆ NASA Administrator Sean O’Keefe said Thursday that problems with the agency’s new accounting system had been expected and that they should not affect his effort to sell Congress on a more ambitious direction for the space program. Speaking to reporters, O’Keefe – who joined NASA in late 2001 with a mission to fix its financial management problems – said he knew making the switch to one system would be difficult. “I concluded early on that the likelihood of actually turning this corner in a period of time that was going to be either instant or soon was just about impossible,” he said. But, he added, there have been some positive accomplishments, such as straightening the books of the International Space Station and improving relationships with contractors. [“NASA chief: Accounting woes were foreseen,” **Orlando Sentinel**, May 21, 2004, p A14.]

◆ Congress is poised to give NASA all the money it asked for in 2005, including funding to start work on human missions to the moon and Mars. The Senate postponed a planned Thursday night vote on the federal budget until after its Memorial Day break. But Republicans and Democrats are bickering over tax cuts, not NASA. Indeed, a deal reached earlier this week by House and Senate negotiators would give NASA the entire $16.2 billion that President Bush requested. The committee that worked out the budget compromise wrote a report endorsing the Bush space plan, saying the budget gives

"sufficient funding to initiate the process." The House voted 216-213 to adopt the $2.4 trillion federal budget Wednesday. [“NASA may land full funding,” **Florida Today**, May 21, 2004, p 1A.]

**May 21:** Space Shuttle Processing Status Report S04-12: **Discovery** (OV-103); Processing of Discovery continues in the Orbiter Processing Facility (OPF) for its Return to Flight mission, STS-114, to the International Space Station (ISS). Following the installation of the left-hand Orbital Maneuvering System pod on the vehicle, technicians began installing the thrusters. The Forward Reaction Control System is scheduled for delivery to the OPF early next week. The four Rudder Speed Brake (RSB) actuators and panels have been reinstalled on the vehicle following a complete inspection, bead blasting and painting of the panels. Bead blasting is a process using a pressurized pneumatic gun containing silica carbide, plastic pellets or glass beads to remove primer, paint and corrosion from orbiter vehicle surfaces. **Atlantis** (OV-104); Atlantis was powered up in support of mission processing for its future flight to the ISS. The four RSB actuators were removed from the vehicle and X-rayed at the Titan X-ray Facility at Cape Canaveral Air Force Station. All four actuators showed the gears were assembled in the proper orientation. At the vendor, the actuators are undergoing a complete inspection. Thermal Protection System blanket installation continues on Reinforced Carbon-Carbon nose cap. The nose cap was removed from the vehicle and sent back to the vendor for thorough Non-Destructive Engineering evaluation and recoating. The blankets are being reinstalled prior to technicians re-hanging the nose cap on the vehicle. **Endeavour** (OV-105); Endeavour is in its Orbiter Major Modification period, which began in December 2003. Electrical modifications continue in the crew module. Wire inspections are ongoing in the Environmental Control and Life Support System bay. Right-hand radiator No. 1 installation is scheduled for today, with right-hand radiator No. 2 scheduled for no earlier than the middle of next week. Owner-press-release. (2004). **Space Shuttle Processing Status Report** [Online]. Available E-mail: owner-press-release@spinoza.public.hq.nasa.gov [2004, May 21].]

**May 23:** The two men living on the International Space Station are running out of food and water, and may have to evacuate by early July if a Russian supply ship fails to reach the outpost this week. The Russian Progress supply ship is scheduled to blast off on Tuesday, May 25th. [“Space station evacuation possible,” **Florida Today**, May 23, 2004, p 12A.]

**May 24:** Kennedy Space Center is boosting the local economy even as the shuttles remain grounded, its director, Jim Kennedy, said Monday at a breakfast for community leaders. As the center works to return the shuttles to flight as early as March 2005, NASA is hiring about 200 workers there. The new jobs are in science and engineering, administration, and technical and clerical areas. Many are safety-related, NASA spokeswoman Jessica Rye said. Chief shuttle contractor United Space Alliance also is hiring, he said. "The prospect for KSC is very, very strong," Kennedy said at the Visitor Complex. Florida benefited from NASA spending $1.41 billion there in fiscal year 2003, with $1.32 billion of that amount in Brevard County, he said. Kennedy noted landmarks of the past year. They included launches of the Mars rovers and the Spitzer Space

Telescope from Cape Canaveral Air Force Station and enshrining the Columbia crew's names at the Space Mirror memorial. He outlined the vision for space announced by President Bush, saying it needed grass-roots support. "This cannot be viewed as President Bush's vision for space exploration . . . it has to be our vision," he said. Web posted. (2004). [KSC is good to local economy [Online]. Available WWW: http://www.floridatoday.com/ [2004, May 24].]

◆ Kennedy Space Center wants to add 55 new workers to help make its safety office a stronger, independent watchdog over the space shuttle and other programs. The move is aimed directly at fixing the problems exposed by last year's loss of the shuttle Columbia. In recent weeks, KSC Director James Kennedy has hired a NASA veteran to run the new operation and is reorganizing the office to give it more control over the programs it monitors. And, in a reversal of a trend at KSC stretching back more than a decade, Kennedy plans to ask top National Aeronautics and Space Administration officials for as many as 55 new safety workers at the center – a staffing increase of more than 20 percent. Most critical, the pool of NASA specialists that includes shuttle flight-safety inspectors would grow by 25, to 137. Web posted. (2004). [Loss of Columbia spurs changes in safety at KSC [Online]. Available WWW: http://www.orlandosentinel.com/ [2004, May 24].]

◆ Yang Liwei, the first Chinese citizen to orbit the Earth, received warm greetings as he and his delegation toured Kennedy Space Center and attended a reception at the Florida Space Authority. Winston Scott, a former astronaut and executive director of the Florida Space Authority, presented Yang with a large compass in a wooden box, saying it exemplified what humans do in space. Yang and Su Shuangning, deputy chief of the China Manned Space Engineering Program Office, thanked the Florida officials for their experiences at "Canaveral Cape," as the interpreter put it. They gave Scott a crystal taikonaut and a gleaming golden model of the Shenzhou 5 spacecraft that Yang flew to orbit. ["China's taikonaut visits space center," **Florida Today**, May 25, 2004, p 1A & 5A.]

**May 25:** NASA Administrator Sean O'Keefe applauded a Congressional Conference Agreement today that supported the President's Vision for Space Exploration. The Conference Agreement for General Science, Space and Technology announced support for the Vision and committed to providing sufficient funding during fiscal year 2005 to initiate it. Administrator O'Keefe said, "I am extremely pleased by the achievement last week of a House/Senate Conference Agreement on the FY 2005 Budget Resolution. It provides a total of $23.9 billion in budget authority for Function 250, General Science, Technology and Space, and the adoption by the House of Representatives, on May 19, of the Conference Report. ["NASA Administrator Statement About Budget Conference Agreement," **NASA News Release #04-169**, May 25, 2004.]

**May 26:** Patricia Grace Smith, associate administrator for Commercial Space Transportation with the Federal Aviation Administration (FAA), will be the keynote speaker at the Eighth Annual Cape Canaveral Spaceport Symposium in June. The Symposium, sponsored by the U.S. Air Force 45th Space Wing, NASA Kennedy Space

Center and the Florida Space Authority, will be held June 15 and 16 at the Radisson Resort in Cape Canaveral, Fla. Smith will address the continuing role of the FAA in all facets of future airspace and spacelift operations. The Symposium will feature presentations from Jim Kennedy, KSC director, Brig. Gen. J. Gregory Pavlovich, commander of the 45th Space Wing and director, Eastern Range, and Winston Scott, executive director of the Florida Space Authority. Other speakers include key government and industry executives serving on the following panels: Global Aerospace Operations, Future Military Space Operations, Future Space Transportation, Exploration Frontiers and Space Recreation and Tourism. Topics of the symposium will include emerging space markets, spaceport and range technologies, utilization of military space assets and space policy initiatives. ["FAA Associate Administrator Is Keynote Speaker At Cape Canaveral Spaceport Symposium in June," **KSC News Release #33-04**, May 26, 2004.]

◆ Spacecraft and Expendable Launch Vehicles Status Report: Mission: AURA, Launch vehicle: Delta II, Launch pad: SLC-2, Vandenberg Air Force Base, Launch date: June 19, 2004, Launch window: 3:01:50 a.m. - 3:04:50 (PDT). NASA's Aura spacecraft, the latest in the Earth Observing System (EOS) series, is at the Astrotech payload processing facility located on North Vandenberg Air Force Base, Calif. Fueling of the spacecraft was completed May 14. The next major activity is the mating to the payload attach fitting, the interface with the Delta II, which was scheduled to occur on May 24. This was delayed until today for resolution of a configuration problem with the secondary latch system that secures the spacecraft to the payload attach fitting. Transportation of the spacecraft to Space Launch Complex 2 for mating to the second stage of the Delta II is scheduled for June 2. The build-up of the Boeing Delta II launch vehicle on Space Launch Complex 2, located on North VAFB, was completed. The first stage was stacked April 29 and the second stage May 1. Work to install the nine solid rocket boosters was completed May 5. A vehicle control system check was successfully completed Monday. This procedure qualifies the first and second stage subsystems through a series of detailed tests. The first stage liquid oxygen leak check was completed May 21. It included a simulated countdown and the loading of liquid oxygen aboard the first stage. A simulated flight test of the vehicle's electrical and mechanical systems was successfully completed Monday. Aura's four state-of-the-art instruments will study the dynamics of chemistry occurring in the atmosphere. The spacecraft will provide data to help scientists better understand the Earth's ozone, air quality and climate change. The EOS Aura satellite, instruments and science investigations are managed by NASA's Goddard Space Flight Center in Greenbelt, Md. Government oversight of launch preparations and the countdown management on launch day is the responsibility of the NASA Launch Services Program based at John F. Kennedy Space Center (KSC). The launch service is provided to NASA by Boeing Launch Services. Mission: MESSENGER, Launch vehicle: Delta II Heavy, Launch pad: 17-B Cape Canaveral Air Force Station, Launch date: July 30, 2004, Launch window: 2:17:44 a.m. – 2:17:56 a.m. EDT. MESSENGER is undergoing pre-launch testing at the Astrotech Space Operations facilities near KSC. Autonomy testing of the spacecraft continues. This verifies MESSENGER's ability to operate on its own when not in direct contact with Earth. Installation of thermal blankets has been completed as required by the schedule up to this time. In upcoming work, the

flight battery is scheduled for installation June 8 and the solar arrays will be installed June 22. The review to assess readiness to begin stacking the Boeing Delta II rocket on Pad 17-B was successfully completed May 19. Vehicle stacking begins with the first stage June 18. The launch period for MESSENGER extends through Aug. 13. KSC News Center (2004). **Spacecraft and Expendable Launch Vehicles Status Report** [Online]. Available E-mail: ksc@newsletters.nasa.gov [2004, May 26].]

**May 28:** Space Shuttle Processing Status report S04-13: **Discovery** (OV-103); Technicians continue to process Discovery in the Orbiter Processing Facility (OPF) for its Return to Flight mission, STS-114, to the International Space Station. Vehicle power up work continues with Orbiter Maneuvering System pod thruster installations, an Air Data Probe leak test, Main Propulsion System actuator and latch system leak checks, and S-band communications system checks. As early as next week, Discovery will enter a month-long power down period in which modifications will be made for Return to Flight. Modifications include wiring that will support the addition of the boom sensor system and installation of the wing leading-edge sensors. **Atlantis** (OV-104); In the OPF, processing continues on Atlantis in preparation for its future flight to the International Space Station. Today, Atlantis will begin a four-month power down period for modifications including detailed wire inspections, wiring that will support the addition of the boom sensor system, and installation of the wing leading-edge sensors. Structural and baseline wire inspections, as well as preparations for Freon Coolant Loop No. 2 deservicing, are in progress. Left-hand Reinforced Carbon-Carbon panel installation is complete, and all but one of the left-hand T- seals has been installed on the vehicle. **Endeavour** (OV-105); Space Shuttle Endeavour is in its Orbiter Major Modification period, which began in December. Electrical modifications continue in the crew module. Wire inspections are ongoing in the Environmental Control and Life Support System bay. Three of the four right-hand radiators are installed on the vehicle, with the final radiator to be installed next week. Thermal Control System blanket work continues in support of the first two left-hand payload bay door radiators, which are scheduled for installation next week. Bead blasting of Endeavour's wing leading edge is ongoing in support of reinstalling the RCC panels and associated fittings. Owner-press-release. (2004). **Space Shuttle Processing Status Report** [Online]. Available E-mail: owner-press-release@spinoza.public.hq.nasa.gov [2004, May 28].]

◆ The Air Force and Boeing delayed next Friday's (June 4) scheduled launch of a Boeing Delta 2 rocket from Cape Canaveral Air Force Station after a problem on another rocket raised technical concerns. The rocket will hoist the Global Positioning System 2R-12 navigation satellite into orbit after workers replace a hydraulic pump on the Delta 2's first stage. No new date has been set. ["Delta 2 rocket launch delayed, no date set," **Florida Today**, May 29, 2004, p 2B.]

The Remote Manipulator System (RMS), also known as the Canadian robotic arm, for the orbiter Discovery has arrived at KSC's Vehicle Assembly Building Lab. The RMS is used to deploy and retrieve payloads, provide a mobile extension ladder or foot restraints for crew members during extravehicular activities; and to aid the flight crew members in viewing surfaces of the orbiter or payloads through a television camera on the RMS. The arm is also serving as the base for the new Orbiter Boom Sensor System (OBSS), one of the safety measures for Return to Flight, equipping the Shuttle with cameras and laser systems to inspect the Shuttle's Thermal Protection System while in space.

## JUNE

**June 1**: NASA announced Tuesday afternoon that it plans to solicit proposals for robotic missions to service the Hubble Space Telescope as well as deorbit it at the end of its mission. NASA issued a formal Request For Proposals (RFP) for robotic servicing of Hubble, with a deadline for submissions of July 16. Such a mission could provide new batteries and gyroscopes, and possibly install new instruments on the venerable orbiting observatory. The primary purpose of the mission, though, would be to install a engine that would deorbit the spacecraft safely at the end of its mission; any proposals that offer to perform servicing of the telescope must also include an option to simply deorbit the spacecraft. The goal would be to launch some kind of robotic mission to Hubble by the end of 2007. The fate of Hubble has been a focus of intense debate since NASA announced in mid-January that it would cancel the final shuttle servicing mission, SM4, to the telescope. The scientific community, as well as some members of Congress, have lobbied NASA to reverse its decision or else come up with some alternatives to keep the telescope operating. O'Keefe announced the decision to issue the RFP during a speech at the American Astronomical Society's conference in Denver. Web posted. (2004). [NASA to pursue robotic servicing of Hubble [Online]. Available WWW: http://www.spacetoday.net/ [2004, June 1].]

**June 3:** Expendable Launch Vehicle Status Report: Mission: Aura, Launch vehicle: Delta II, Launch pad: SLC-2, Vandenberg Air Force Base (VAFB), Launch date: June 19, 2004, Launch window: 3:01:50 a.m.-3:04:50 (PDT). NASA's Aura spacecraft, the latest in the Earth Observing System (EOS) series, is at the Astrotech payload processing facility located on North VAFB, Calif. A launch site readiness review was conducted on June 1. A subsequent decision was made to delay transportation and mate of the spacecraft to the Delta II launch vehicle until an issue with the Delta II second stage helium pressurization system is assessed by the launch team. Fueling of the spacecraft was completed May 14. On May 26, the spacecraft was mated to the payload attach fitting, the interface with the Delta II. The spacecraft canning was completed June 1 in preparation for transportation to Space Launch Complex (SLC) 2. The build-up of the Boeing Delta II launch vehicle on SLC 2, located on North VAFB, was completed. The first stage was stacked April 29 and the second stage May 1. Work to install the nine solid rocket boosters was completed May 5. Aura's four state-of-the-art instruments will study the dynamics of chemistry occurring in the atmosphere. The spacecraft will provide data to help scientists better understand the Earth's ozone, air quality and climate change. The EOS Aura satellite, instruments and science investigations are managed by NASA's Goddard Space Flight Center in Greenbelt, Md. Government oversight of launch preparations and the countdown management on launch day is the responsibility of the NASA Launch Services Program based at John F. Kennedy Space Center (KSC). The launch service is provided to NASA by Boeing Launch Services. Mission: MESSENGER, Launch vehicle: Delta II Heavy, Launch pad: SLC-17B, Cape Canaveral Air Force Station, Launch date: July 30, 2004, Launch window: 2:17:44 a.m. – 2:17:56 a.m. (EDT). MESSENGER is undergoing prelaunch testing at the Astrotech Space Operations facilities near KSC. Autonomy testing of the spacecraft continues. This verifies MESSENGER's ability to operate on its own when not in direct contact with

Earth. Installation of thermal blankets has been completed as required by the schedule up to this time. In upcoming work, the flight battery is scheduled for installation June 8 and the solar arrays will be installed June 21. Spacecraft fueling is planned for the end of this month. The review to assess readiness to begin stacking the Boeing Delta II rocket on Pad 17-B was successfully completed May 19. Vehicle stacking is currently scheduled to begin on June 21, after the Global Positioning System (GPS) II-R12 launch, tentatively scheduled to launch on June 9. The launch period for MESSENGER extends through Aug. 13. KSC News Center (2004). **Expendable Launch Vehicle Status Report** [Online]. Available E-mail: ksc@newsletters.nasa.gov [2004, June 3].]

**June 4:** Space Shuttle Processing Status Report S04-14: **Discovery** (OV-103); Discovery entered a month-long power-down period on Wednesday in the Orbiter Processing Facility (OPF) for its Return to Flight mission, STS-114, to the International Space Station. During this period modifications will be made for Return to Flight, including wiring that will support the addition of the boom sensor system, External Tank separation camera and installation of the wing leading-edge sensors. Work completed prior to the power-down period included left- hand Orbital Maneuvering System (OMS) pod thruster installation, air data probe leak tests and KU-Band system testing and antenna deploy. In addition, the right-hand OMS pod was moved to the OPF and should be installed within the next few weeks. **Atlantis** (OV-104); In the OPF, Atlantis is in a four-month power-down period to complete Return to Flight modifications, as well as structural and baseline wire inspections. Freon Coolant Loop No.1 and 2 have been drained and configured for power down. Radiators have been stowed and latched. Rudder Speed Brake removal and replacement continues on schedule. **Endeavour** (OV-105); Endeavour is in its Orbiter Major Modification period begun in December. Electrical modifications continue in the crew module. Wire inspections are ongoing in the Environmental Control and Life Support System bay. All four of the right-hand radiators are installed on the vehicle for flight. Bead blasting of Endeavour's left-hand wing leading edge are complete, and preparations are being made to work on the right-hand wing and body flap cove area. Tile bonds on the External Tank door continue, with the fit check of the nose cap scheduled for no earlier than late next week. Owner-press-release. (2004). **Space Shuttle Processing Status Report** [Online]. Available E-mail: owner-press-release@spinoza.public.hq.nasa.gov [2004, June 4].]

◆ NASA Administrator Sean O'Keefe today selected Rear Admiral (Ret.) Walter H. Cantrell to help establish and lead the agency's independent technical authority within its engineering, operations and safety organizations. Cantrell joins NASA as Deputy Chief Engineer for Independent Technical Authority (ITA), effective June 7. He has served on NASA's Aerospace Safety Advisory Panel (ASAP) and as a member of the Stafford-Covey Task Group (SCTG) assessing the agency's return to flight implementation efforts. [“NASA Selects Admiral Cantrell For Independent Technical Authority,” **NASA News Release #04-180**, June 4, 2004.]

**June 7:** Kennedy Space Center’s newest Web site seeks to encourage middle school students across the nation to develop an interest in science and math by viewing real working experts in these fields. The “Enter the Firing Room” online Web site provides

interactive games and information linking these subjects to exciting careers with NASA. The Web site highlights system engineers who work in KSC's launch firing rooms. The site includes a firing room tour, fun facts, pictures and a special page for educators. Students get a chance to meet actual engineers through videos and biographies. Videos of astronauts are also featured on the site. After a virtual tour, students can test their knowledge by taking the Launch Simulation Quiz. "Enter the Firing Room" is a Web site funded through NASA's Human Exploration and Development of Space enterprise. ["New KSC Web Site Helps Students Enjoy Science and Math, **KSC News Release #35-04**, June 7, 2004.]

**June 9:** More power to the International Space Station. That's what former Kennedy Space Center engineer-turned-astronaut Joan Higginbotham and crewmates plan to give the orbiting outpost once shuttle flights resume. Higginbotham will serve as a mission specialist on STS-117, which is tentatively scheduled to launch in March 2006. The job at hand: Outfitting the station with a massive electrical power tower that consists of two central truss segments and a pair of power-generating solar wings. The blue and gold solar panels will have a wingspan greater than that of a 747 jumbo jet, stretching some 240 feet from tip to tip once they are unfurled in space. "It's a pretty critical element," Higginbotham said. The mission will be the first spaceflight for Higginbotham, who joined NASA's astronaut corps in 1996 after serving as a shuttle project engineer at KSC for nine years. Higginbotham began her NASA career in 1987 and soon became the lead engineer for the same flight data recorder whose recovery in east Texas enabled investigators to determine the root cause of the 2003 Columbia accident. A few years later, Higginbotham was promoted to lead project engineer for Columbia, a job that required her to know NASA's first shuttle orbiter inside and out. Still, it was the loss of three colleagues from NASA's 1996 astronaut class -- Willie McCool, Laurel Clark and Dave Brown -- that stunned Higginbotham Feb. 1, 2003. "It wasn't so much the vehicle as it was the people," she said. "I had an attachment to the vehicle because I did work on it. I had super ownership and pride in it, but that wasn't necessarily the focus of my concern." Higginbotham's ascent to the astronaut corps came after former KSC Director Jay Honeycutt encouraged her to apply. It took two tries and an extra degree to get there. She first applied in 1995 and was one of 100 interviewed out of a field of 3,000 applicants. But she wasn't selected. So she sought a second master's degree from Florida Tech and then applied again -- this time successfully -- in 1996. The extra degree "seemed to have done the trick," she said. Her advice to youngsters following in her footsteps: "Take math and science, tons of it." Being a team player also is key - an "absolutely necessary" characteristic, she said. "Oh, and perseverance," Higginbotham added. "Can't forget that." Web posted. (2004). [NASA engineer's career path turns to astronaut corps [Online]. Available WWW: http://www.floridatoday.com/ [2004, June 9].]

◆ A Delta 2 rocket launch previously delayed because of a technical issue has been moved from Sunday to Monday evening. The rocket is to carry a Global Positioning System 2R-12 navigation satellite into orbit for the Air Force from Cape Canaveral Air Force Station. The launch was delayed so Boeing and the Air Force could replace a part similar to a troubled pump on another Delta 2 rocket, which is to carry NASA's Aura spacecraft from California's Vandenberg Air Force Base on June 19. At the Cape,

Boeing also was investigating an issue with a wire harness on the rocket, company spokesman Robert Villanueva said Tuesday. Wire harnesses act as conduits for electronic signals throughout the rocket system. Today, managers decided to move the launch from Sunday - the date announced Tuesday - to Monday (June 14). The launch window extends from 7:31 to 7:58 p.m. EDT. Web posted. (2004). [Delta 2 rocket launch now scheduled for Monday [Online]. Available WWW: http://www.floridatoday.com/ [2004, June 9].]

◆ Images of the 1998 wildfires at Kennedy Space Center and last year's fires in California prompted the partnering of NASA and the U. S. Fish and Wildlife Service to remove some of the dense foliage and trees from the KSC Industrial Area to reduce the risk of potential future wildfires. The project, referred to as "thinning", began this month and requires the removal of 70 to 80 percent of the pine trees in the area. The goal of the project is to reduce the intensity of wildfires and provide a safer working environment for firefighters and KSC employees. "Thinning the pines benefits the firefighters who protect KSC facilities and also benefits the native wildlife that need an open natural condition," said Boyd Blihove, fire management specialist for the U. S. Fish and Wildlife Service. "The protection of human life, space exploration equipment and the buildings they are housed in make this fuel-reduction project a worthwhile endeavor for NASA and the Fish and Wildlife Service." ["NASA Partners With Fish and Wildlife Service To Reduce Wildfires," **KSC News Release #36-04**, June 9, 2004.]

◆ Space Shuttle Processing Status Report S04-15: **Discovery** (OV-103); In the Orbiter Processing Facility (OPF), Discovery continues its month-long power-down period for its Return to Flight mission, STS-114, to the International Space Station. Return to Flight modifications are underway, including the orbiter boom sensor system wiring and preparations for installation of the wing leading edge sensors. The External Tank separation camera cable harness is due to arrive at KSC this week. Other work continues, including Orbital Maneuvering System (OMS) pod thruster X-rays. And one flex hose remains to be installed in Discovery's Environmental Control and Life Support System bay. Reinforced Carbon-Carbon panel installation is 50 percent complete on the right-hand side and 90 percent complete on the left-hand side. **Atlantis** (OV-104); In the OPF, Atlantis' four-month power-down period is underway in support of Return to Flight modifications, as well as structural and baseline wire inspections. Nose cap Thermal Protection System blanket installation continues, with the nose cap scheduled to be installed on the vehicle as soon as next week. Body Flap actuator inspection and the majority of the external flex hose inspections are complete. **Endeavour** (OV-105); Space Shuttle Endeavour is in its Orbiter Major Modification period, which began last December. Electrical modifications continue in the crew module. Wire inspections are ongoing in the Environmental Control and Life Support System bay. The left-hand No. 3 radiator has been installed, with the No. 2 radiator scheduled for installation this week. Tile bonds on the External Tank door and aft flex hose inspections continue. Owner-press-release. (2004). **Space Shuttle Processing Status Report** [Online]. Available E-mail: owner-press-release@spinoza.public.hq.nasa.gov [2004, June 9].]

**June 10:** Astronaut Mike Fincke and cosmonaut Gennady Padalka paid tribute to President Ronald Reagan during a video downlink message from the International Space Station. The following is text of that message: "We, the crew of the International Space Station, join millions of others in mourning the passing of President Reagan, who worked tirelessly to bring the world closer together," Padalka said. "President Reagan proposed building the Space Station," Fincke said, "which Gennady and I are privileged to be working aboard today for the benefit of all humankind. He spoke to astronauts in space during his tenure in the White House, greeted the crew of Columbia at Edwards Air Force Base after its fourth voyage and mourned the loss of the Challenger crew along with the rest of us. "President Reagan realized that freedom would ring in a new era of International cooperation and with his vision guiding us, the United States again began to work with our former Cold War rivals, the Russians. Within a decade, the American Space Shuttle Atlantis docked to the Russian Mir Space Station, and President Reagan's Space Station Freedom became the International Space Station. "As the ninth expedition to the International Space Station, and in honor of President Ronald Reagan, our 40th president, we remember him on behalf of all of NASA with 40 chimes of the ISS's ship's bell. We all mourn his passing as freedom loving people around the world. God bless him, and God bless America." Web posted. (2004). [President Reagan Honored From Space by Crew of International Space Station [Online]. Available WWW: http://www.spaceref.com/ [2004, June 10].]

◆ The planned launch of a Delta 2 rocket and a military navigation satellite is being delayed until Tuesday (June 15) so workers can replace a faulty engine component, officials said Thursday. The 12-story rocket and its payload - a Navstar Global Positioning System satellite - now are slated to blast off from Cape Canaveral Air Force Station at 7:26 p.m. Tuesday. The launch window that night will extend until 7:54 p.m. The flight originally had been scheduled for June 4 but was delayed so workers could replace another suspect engine part. The Navstar GPS satellite will join a constellation of more than two dozen similar craft in orbit. The spacecraft are used to help guide U.S. troops, ships, submarines, fighter jets and bombers on missions around the world. [“Delta 2 launch reset for Tuesday,” **Florida Today**, June 10, 2004, p 1B.]

◆ Spacecraft and Expendable Launch Vehicles Status Report: Mission: Aura, Launch vehicle: Delta II, Launch pad: SLC-2, Vandenberg Air Force Base (VAFB), Launch date: NET July 8, 2004, Launch window: 6:01:57 a.m. – 6:04:57 a.m. EDT (3:01:57 – 3:04:57 a.m. PDT). The launch of NASA’s Aura spacecraft, the latest in the Earth Observing System (EOS) series, has been rescheduled for no earlier than July 8, 2004. During testing of the Delta II launch vehicle on the pad at Space Launch Complex 2, a helium leak was observed in the second stage fuel tank shutoff valve. It must be removed and replaced, and this work will be done tomorrow. The associated retesting will be complete on Tuesday, June 15. The spacecraft is at the Astrotech payload processing facility located on North Vandenberg Air Force Base, Calif., and is ready to go to the launch pad, now rescheduled to occur on June 18. The spacecraft’s batteries are being charged during the interim. The Flight Program Verification, an integrated test involving the Boeing Delta II launch vehicle and the Aura spacecraft is scheduled to occur on June 24. The Flight Readiness Review is planned for July 1. Aura’s four state-of-the-art

instruments will study the dynamics of chemistry occurring in the atmosphere. The spacecraft will provide data to help scientists better understand the Earth's ozone, air quality and climate change. The EOS Aura satellite, instruments and science investigations are managed by NASA's Goddard Space Flight Center in Greenbelt, Md. Government oversight of launch preparations and the countdown management on launch day is the responsibility of the NASA Launch Services Program based at John F. Kennedy Space Center. The launch service is provided to NASA by Boeing Launch Services. Mission: MESSENGER, Launch vehicle: Delta II Heavy, Launch pad: 17B, Cape Canaveral Air Force Station, Launch date: July 30, 2004, Launch window: 2:17:44 a.m. – 2:17:56 a.m. (EDT). MESSENGER is undergoing prelaunch testing at the Astrotech Space operations facilities near Kennedy Space Center. Autonomy testing of the spacecraft has been successfully completed. This verifies MESSENGER's ability to operate on its own when not in direct contact with Earth. Installation of thermal blankets continues. The solar arrays will be installed June 21, followed by release tests on June 23-24. Spacecraft propellant loading is scheduled for June 28 – July 2. Spacecraft spin balance testing is planned for July 7 and mating to the upper stage booster will occur July 12. The spacecraft will leave Astrotech for Cape Canaveral Air Force Station on July 16 and be mated to the Delta II rocket at Pad 17-B. Meanwhile, stacking of the launch vehicle on the pad is currently planned to begin on June 23. There are no technical issues or concerns with MESSENGER or the Delta II at this time. The launch period for MESSENGER extends through Aug. 13. KSC News Center (2004). **Spacecraft and Expendable Launch Vehicles Status Report** [Online]. Available E-mail: ksc@newsletters.nasa.gov [2004, June 10].]

◆ NASA's Space Shuttle program successfully fired a full- scale Reusable Solid Rocket Motor today, testing modifications that will enhance the safety of the Space Shuttle. A slightly different propellant grain was tested. The new design improves flight safety by decreasing the risk of cracks in the propellant during storage and transportation, according to Jody Singer. Singer is manager of NASA's Reusable Solid Rocket Motor Project, Space Shuttle Propulsion Office, Marshall Space Flight Center, Huntsville, Ala. ["Successful Test Leads Way For Safer Shuttle Solid Rocket Motor," **NASA News Release #04-190**, June 10, 2004.]

**June 11:** After a series of delays prompted by technical glitches, the Delta 2 rocket scheduled to launch Tuesday from the Cape now will fly Wednesday (June 16), according to Boeing. The rocket is due to carry a Global Positioning System navigation satellite into orbit for the Air Force. It will join a constellation of GPS satellites whose signals are used by civilians and soldiers alike to pinpoint their location by latitude and longitude. The 27-minute launch window will open at 7:22 p.m. EDT Wednesday. Workers needed more time to install a new part for the steering system. Previously, a faulty pump on another Delta 2 - which will carry NASA's Aura spacecraft from California - prompted a replacement on the rocket scheduled to fly from the Cape. Web posted. (2004). [Delta 2 rocket launch delayed again [Online]. Available WWW: http://www.floridatoday.com/ [2004, June 11].]

**June 13:** NASA must radically change the way it does business to send astronauts to the moon and Mars, a White House commission will tell President Bush this week. A high-level government council should be created to coordinate the venture, bringing to bear not only the resources and technical know-how of NASA but also the Department of Defense and other federal agencies. Private companies -- including small entrepreneurial firms -- should be engaged in a way that will create a national space industry rather than an exclusive NASA space program. International partners should be sought. And U.S. taxpayers must buy into the plan if political support is to be sustained through as many as 10 presidential administrations, 20 congresses and 40 annual federal budgets. "We cannot continue business as usual," former Air Force Secretary Edward "Pete" Aldridge, head of President's Commission on Moon, Mars and Beyond, said during deliberations after the panel's final hearing last month. "It's really a case where the culture . . . that worked so well during the Apollo years has become a hindrance to future development," added commissioner and former congressman Robert Walker. "There has to be a restructuring . . . That transformation is going to be absolutely essential to accomplish the mission." The commission will not recommend specific designs for rockets and spaceships, leaving those details to NASA. Formed after Bush announced a new vision for space exploration in January, the nine-member panel will deliver its report to the president on Wednesday. The report will lay out recommendations for carrying out the plan, which calls for NASA to complete International Space Station construction by 2010 and then retire its shuttles. Robotic probes would fly precursor missions by 2008. A new crew exploration vehicle is supposed to be ready by 2014 and astronauts are to return to the moon between 2015 and 2020. The idea is to use the moon as a proving ground for subsequent expeditions to Mars. The report follows a cross-country fact-finding trip that included public hearings in five cities and stops at five NASA field centers. The panel heard advice from experts from the aerospace industry, the military, labor unions, foreign space agencies and the media. Investment professionals, educators, entertainers and space advocacy groups also testified before the commission. Web posted. (2004). [Report: Business of space must shift [Online]. Available WWW: http://www.floridatoday.com/ [2004, June 13].]

**June 14:** The launch of a Delta 2 rocket with a navigation satellite for the Air Force has been delayed at least until Friday (June 18). A series of technical issues had pushed the launch to Wednesday. Now, rocket-builder Boeing has requested that the Air Force clear the range at Cape Canaveral Air Force Station for a Friday evening launch. The Air Force is certifying the repairs and considering the request, Boeing spokesman Robert Villanueva said. The 27-minute launch window would open at 7:14 p.m. EDT. The rocket will carry the 2R-12 Global Positioning System satellite into orbit. The constellation of GPS satellites provides military personnel and civilians with navigation services around the world. Web posted. (2004). [Delta 2 rocket to launch Friday at earliest [Online]. Available WWW: http://www.floridatoday.com/ [2004, June 14].]

◆ NASA is getting ready to roll out a new organization chart in response to recommendations, due this week, from the presidential space exploration panel headed by former Air Force Secretary Edward (Pete) Aldridge. Insiders look for the new exploration systems office to assume line authority over spaceflight, biological and

physical research and aerospace technology, reflecting the agency's redirected focus. Space and Earth science will merge on the theory that Earth is "a card-carrying member of the Solar System too," in the words of one agency adviser. No field center shutdowns are planned, although some may eventually become Federally Funded Research and Development Centers like the Jet Propulsion Laboratory. Administrator Sean O'Keefe has hinted changes also are afoot in the way NASA relates to industry, with more opportunities for contractors outside the traditional aerospace tent. Just last week Ames Research Center announced a "technology partnership" with Xerox for collaborative software supporting exploration work. ["Shake-up," **Aviation Week & Space Technology**, June 14, 2004, p 21.]

**June 15:** Hard hit by a downturn in demand at the turn of the century, the U.S. commercial space launch industry is in the midst of a rebound that should continue as the national economy improves. That was the word Tuesday from Patricia Grace Smith, associate administrator for commercial space transportation at the Federal Aviation Administration. Smith delivered the keynote address at the eighth annual Cape Canaveral Spaceport Symposium. "These past few years have not been easy for the launch industry," Smith told a crowd of 200. "As the economy bounces back, so will our industry." The commercial launch industry plays a key role in the Brevard County economy, augmenting launch business brought into the area by NASA and the Department of Defense. A sharp slip in demand for commercial launch services, coupled with an oversupply of launch vehicles, triggered a downturn in the industry in recent years, Smith noted. In 2001, for example, manufacturing orders for commercial satellites in the U.S. dropped to six, largely the result of a severe downturn in the telecommunications industry. But that number nearly tripled in 2003, a year when manufacturers fielded orders for 17 commercial satellites, Smith said. "With satellite orders increasing, that definitely means better news for the launch industry because after all, it takes launch vehicles to put those satellites up there," Smith said. "So we're very encouraged by that. We hope that that trend will increase, and increase in an even more aggressive way." A gathering of key government and industry leaders, the two-day symposium focuses on business at the Cape Canaveral Spaceport, which consists of NASA's Kennedy Space Center at the Cape Canaveral Air Force Station. The conference will wrap up today at the Radisson Resort at the Port. Web posted. (2004). [Satellite launch industry enjoys orders' rebound [Online]. Available WWW: http://www.floridatoday.com/ [2004, June 16].]

**June 16:** After a false alarm at the launch pad at Cape Canaveral Air Force Station, Boeing and the Air Force have delayed the launch of a Delta 2 rocket until Saturday (June 19) night. Tuesday, a false alarm from the vapor detection system forced the Air Force to clear the launch pad, putting workers behind schedule. The new launch window is 7:10 p.m. to 7:37 p.m. EDT on Saturday. The Delta 2 rocket, which has been delayed several times because of technical issues, is to carry a Global Positioning System navigation satellite into orbit for the Air Force. Web posted. (2004). [Delta 2 rocket delayed again; set to launch Saturday [Online]. Available WWW: http://www.floridatoday.com/ [2004, June 16].]

◆ NASA must move out swiftly and develop a launch vehicle capable of hauling huge cargoes into orbit to carry out missions to the moon and Mars, a White House commission said Wednesday. The reason: NASA's space shuttles and existing rockets such as the Lockheed Martin Atlas 5 and the Boeing Delta 4 -- known as Evolved Expendable Launch Vehicles, or EELVs -- cannot lift the type of heavy payloads that will be required to stage expeditions beyond Earth orbit. That conclusion came from the President's Commission on Moon, Mars and Beyond, which delivered its final report to Vice President Dick Cheney after four months of fact-finding. The nine-member panel was created in late January to determine the best ways to implement a new vision for space exploration proposed by President Bush earlier that month. The plan calls for NASA to complete construction of the International Space Station by 2010 and then retire its shuttle fleet. A new crew exploration vehicle would be ready to fly in 2014 and astronauts would return to the moon between 2015 and 2020. "The missions to be undertaken as part of the exploration vision will likely require a lift capability beyond today's space shuttle and EELVs," the commission report said. "Heavy-lift capability is a critical enabling technology for mission accomplishment and a plan for achieving this capability needs to be developed now." NASA relied on Saturn 5 moon rockets to carry out Apollo lunar landing missions in the late 1960s and early 1970s. Those rockets could loft 250,000 pounds into low Earth orbit. Shuttles can carry roughly 55,000 pounds, and upgraded EELVs soon will be able to launch about 50,000 pounds. But launchers that can carry at least 80,000 to 100,000 pounds or more likely will be needed for future moon and Mars missions. The commission's conclusion bodes well for Kennedy Space Center. The best option now available for a heavy-lift launcher is developing a vehicle that employs shuttle solid rocket boosters, external tanks and engines. Such a shuttle-derived vehicle could be launched from existing KSC pads without major modifications to the existing gantries. KSC Deputy Director Woodrow Whitlow said it remains unclear whether NASA will develop a shuttle-derived vehicle for the moon-Mars initiative. But he noted the head of NASA's new exploration systems division recently termed KSC ‘the operations center of the future.’ "I don't know what the vehicle will be, but I'm confident we will have a major role in implementing this vision," Whitlow said. Others, however, said KSC officials must recognize states other than Florida likely will vie to become the launch site for moon and Mars missions. Web posted. (2004). [NASA needs launch vehicle with heavy-lift capabilities [Online]. Available WWW: http://www.floridatoday.com/ [2004, June 17].]

◆ Converting Kennedy Space Center into a university-run research facility won't work, Florida lawmakers said Thursday. The concept, introduced Wednesday by a presidential commission reviewing U.S. space policy, could succeed at other NASA centers but not at Kennedy, said Rep. Dave Weldon, R-Melbourne. "Kennedy is an operational center," Weldon said. "It's not going to be workable." The commission's final report, which was hand-delivered to Vice President Dick Cheney, called for a wholesale reorganization of NASA's 10 major field centers and related facilities. The nine-member panel said NASA could save money and get better results if the centers were modeled after the Jet Propulsion Laboratory in Pasadena, Calif. At JPL, NASA contracts with the California Institute of Technology to carry out specific missions and programs. Weldon and Sen. Bill Nelson, D-Melbourne, said they would oppose any such move at Kennedy Space

Center if it involved shuttle and launch operations, currently carried out for the most part by United Space Alliance, a private, for-profit consortium. At an afternoon hearing before the Senate Science, Technology and Space Subcommittee, Nelson asked commission chairman Pete Aldridge to explain how the concept would apply at Kennedy, the only NASA center where humans are launched into space. "You can't turn that over to the private sector," Nelson said. Aldridge acknowledged that much of Kennedy's mission would remain unchanged. However, he speculated that some functions not directly related to launch or shuttle maintenance, could be handed over to the private sector. He did not elaborate on which functions. The JPL model of doing business is more applicable to NASA centers involved in research, rather than operations, Aldridge said. Weldon said he would welcome the creation of a university or nonprofit entity taking over control of research responsibilities at Kennedy Space Center. "I've tried to promote Kennedy Space Center as a research center in the past, but there has always been internal resistance from NASA," Weldon said. The thought of large-scale reorganization of NASA's centers naturally sends shudders through many of the 15,000 men and women engaged in launch and space flight control operations at Kennedy Space Center. The average salary at Kennedy Space Center is already $70,000, more than twice the average salary of other non-space workers in Brevard County, according to a 2002 study by the University of Central Florida. In the past, the region has seen wide swings in employment and spending at the center as the space agency's goals and missions changed. For much of the 1990s, NASA spending fell but began to pick up again in 1998. By 2002, total NASA and Kennedy Space Center spending in Florida amounted to $1.4 billion -- with most of that money spent on salaries for space workers who live in Brevard County, according to the study. Web posted. (2004). [Officials shun KSC- university concept [Online]. Available WWW: http://www.floridatoday.com/ [2004, June 17].]

**June 17:** Spacecraft and Expendable Launch Vehicles Status Report: Mission: Aura, Launch vehicle: Delta II, Launch pad: SLC-2, Vandenberg Air Force Base, Launch date: NET July 8, 2004, Launch window: 6:01:57 a.m. – 6:04:57 a.m. EDT (3:01:57 – 3:04:57 a.m. PDT). The launch of NASA's Aura spacecraft, the latest in the Earth Observing System (EOS) series, has been tentatively rescheduled for no earlier than July 8. During testing of the Delta II launch vehicle on the pad at Space Launch Complex 2, a helium leak was observed in the second stage fuel tank shutoff valve. It was removed and replaced on June 11. The retesting was successfully completed Tuesday. An engineering review board must complete failure analysis of the valve that was removed. The spacecraft is at the Astrotech payload processing facility located on North Vandenberg Air Force Base, Calif., and the spacecraft's batteries are currently being charged. It is ready to be moved to Space Launch Complex 2 on Friday pending closure of open items which are under review. There will be an Aura state-of-health check on Monday, June 21, with the spacecraft atop the Delta II. The Flight Program Verification, an integrated test involving the Boeing Delta II launch vehicle and the Aura spacecraft, is scheduled to occur on June 24. The Flight Readiness Review is planned for July 1. Aura's four state-of-the-art instruments will study the dynamics of chemistry occurring in the atmosphere. The spacecraft will provide data to help scientists better understand the Earth's ozone, air quality and climate change. The EOS Aura satellite, instruments and science investigations are managed by NASA's Goddard Space Flight Center in Greenbelt, Md.

Government oversight of launch preparations and the countdown management on launch day is the responsibility of the NASA Launch Services Program based at Kennedy Space Center. The launch service is provided to NASA by Boeing Launch Services. Mission: MESSENGER, Launch vehicle: Delta II Heavy, Launch pad: 17-B, Cape Canaveral Air Force Station, Launch date: July 30, 2004, Launch window: 2:17:44 a.m. – 2:17:56 a.m. (EDT). MESSENGER is undergoing prelaunch testing at the Astrotech Space Operations facilities near Kennedy Space Center. Autonomy testing of the spacecraft has been successfully completed. This verifies MESSENGER's ability to operate on its own when not in direct contact with Earth. Installation of thermal blankets continues. The two solar arrays will be installed June 23 -24 and deployment tests conducted. Spacecraft propellant loading is currently scheduled for June 28 – July 2. Spacecraft spin balance testing is planned for July 7 and mating to the upper stage booster will occur July 12. The spacecraft will leave Astrotech for Cape Canaveral Air Force Station on July 16 and be mated to the Delta II rocket at Pad 17-B. Meanwhile, stacking of the launch vehicle on the pad is currently planned to begin on June 26, one week after the launch of the Delta II carrying the Air Force Global Positioning Satellite is currently scheduled to occur. There are no technical issues or concerns with MESSENGER or its associated Delta II at this time. The launch period for MESSENGER extends through Aug. 13. KSC News Center (2004). **Spacecraft and Expendable Launch Vehicles Status Report** [Online]. Available E-mail: ksc@newsletters.nasa.gov [2004, June 17].]

**June 18:** The weather looks good for tonight's scheduled launch of a Boeing Delta 2 rocket with an Air Force cargo, but storms could mean further delays. The rocket has been delayed several times for technical fixes. It was delayed again when the vapor-detection system at Pad 17B at Cape Canaveral Air Force Station signaled a false alarm, putting workers behind schedule. Friday, the Air Force said the team was ready to put a Global Positioning System navigation satellite into orbit Saturday. Forecasters called for an 80 percent chance of good weather for the 27-minute launch window, which opens at 7:10 p.m. "Right now there's a 20 percent chance of violation, with basically a chance for showers in the local area around launch time," said forecaster Joel Tumbiolo of the 45th Weather Squadron. Chances of unacceptable weather would increase to 40 percent on Sunday and 60 percent on Monday, as the possibility rises for thunderstorms on Florida's east coast. NASA plans to use the same pad to launch its MESSENGER craft to Mercury on a Delta 2 rocket on July 30. Preparations can't start until the GPS 2R-12 is off the pad. Web posted. (2004). [Weather promising for Delta launch [Online]. Available WWW: http://www.floridatoday.com/ [2004, June 19].]

**June 19:** A Boeing Delta 2 rocket was delayed again by Florida's trademark summer storms. Bad weather bumped the rocket on Saturday, too. Before that, a series of technical delays pushed back the launch of a satellite for the Air Force. Boeing will make another launch attempt tonight. The 27-minute window opens at 7:02 p.m. EDT. The rocket is expected to put into orbit a Global Positioning System satellite, built by Lockheed Martin. Soldiers or civilians with GPS receivers can learn their location, altitude and velocity from the constellation of satellites. Web posted. (2004). [Storms again delay launch of Delta 2 [Online]. Available WWW: http://www.floridatoday.com/ [2004, June 20].]

**June 20:** U.S. Sen. Bill Nelson is expected to call for an investigation today into what he called "deadbeat" NASA contractors that get high-dollar government work despite failing to pay all federal taxes. The Florida Democrat reviewed a study by the U.S. General Accounting Office that found at least 27,000 defense and aerospace contractors owe back taxes totaling more than $3 billion. "I'm asking to the federal government to crack down because NASA is going to expand with even more private contracting in the future," Nelson said Sunday. "And if NASA is going to more private contractors, they need to be paying those who pay their federal taxes." A Kennedy Space Center spokesman referred comment on the issue to NASA headquarters, where no one could be reached Sunday. The names of companies behind in taxes was not released Sunday. Nelson, a longtime advocate of the space program, spoke last week with the head of the GAO about the report. NASA contractors receive about 85 percent of the agency's funds each year, Nelson said. The request, according to the senator's office, also is prompted by a recent recommendation by a presidential commission that private companies take on a greater share of the space agency's work. Nelson, however, said the comptroller general confirmed several NASA contractors were on the list. "They're getting government money on one hand and not paying federal taxes with the other hand," he said. Web posted. (2004). [Nelson: NASA suppliers owe $3B in taxes [Online]. Available WWW: http://www.floridatoday.com/ [2004, June 20].]

**June 21:** A private citizen flew to space and back this morning aboard a spaceship not built and managed by the government, a historic first for space travel that began and ended on a remote desert runway in California rather than the United States' longtime spaceport in Brevard County. "Yeeee-haw!" shouted new astronaut Mike Melvill just moments before the 62-year-old test pilot put the football-shaped craft's wheels back on the runway and officially transformed the tiny Mojave airport into the nation's second spaceport. Official readings from the flight are not yet available, but Melvill said instrumentation inside SpaceShipOne showed him he reached 330,000 feet - or precisely the 62.5 miles that spacecraft-developer Scaled Composites was aiming for when the craft roared off the runway just after 9:30 a.m. Eastern time this morning. A carrier plane called White Knight lifted SpaceShipOne to an altitude of about 47,000 feet, then dropped it, at which point a throng of onlookers gasped at the sight of the spacecraft rocketing straight upward at high speed. Melvill had flipped two switches inside the ship to fire the engines for almost 90 seconds, reaching the 62.5- mile mark that would have qualified the flight for the $10 million X Prize had the craft carried three people - or the weight of three people - instead of just one. A little over an hour after starting, Melvill circled the airport and touched down, rolling to a stop. Not long afterward, he climbed out and had words with spacecraft designer Burt Rutan and others on the Scaled Composites flight team. Web posted. (2004). [SpaceShipOne makes history with jaunt 62.5 miles high [Online]. Available WWW: http://www.floridatoday.com/ [2004, June 21].]

The following is a statement from NASA Administrator Sean O'Keefe about the first sub-orbital flight of a person on a private spacecraft. "We applaud the remarkable achievement of Burt Rutan, Paul Allen and test pilot Mike Melvill following the first

successful suborbital flight of SpaceShip One. Not unlike the first U.S. and Soviet space travelers in 1961, and China's first successful spaceflight this year, these private citizens are pioneers in their own right. They are doing much to open the door to a new marketplace offering the experience of weightlessness and suborbital space flight to the public. We congratulate the SpaceShip One team and wish all those who may follow safe flights." [“NASA Administrator Lauds Successful Human Space Flight,” **NASA News Release #04-199**, June 21, 2004.]

◆ Spacecraft and Expendable Launch Vehicles Status Report: Mission: Aura, Launch vehicle: Delta II, Launch pad: SLC-2, Vandenberg Air Force Base, Launch date: July 10, 2004 NET, Launch window: 6:01:59 a.m. – 6:04:59 a.m. EDT (3:01:59 – 3:04:59 a.m. PDT). The launch of NASA’s Aura spacecraft, the latest in the Earth Observing System (EOS) series, has been rescheduled to no earlier than July 10 due to two issues. Additional time was needed to assure that suspect computer chips causing difficulty on a different satellite were not of the same lot as those aboard the Aura spacecraft. Also, the engineering review board needed additional time to clear the concern over the second stage fuel tank shutoff valve failure. It was resolved satisfactorily June 18. NASA is awaiting word from the Western Range that the request for a launch date of July 10 has been confirmed. The spacecraft is at the Astrotech payload processing facility located on North Vandenberg Air Force Base, Calif. Although planned to be moved to Space Launch Complex 2 today, the wind is too high for hoisting atop the Delta II rocket. It remains on the transporter in the spacecraft hangar ready for rollout. What effect this may have on the launch date, if any, will be evaluated when the spacecraft arrives at the pad. An Aura stand-alone state-of-health check at the pad is currently planned for Thursday or Friday. The Flight Program Verification, an integrated test involving the Boeing Delta II launch vehicle and the Aura spacecraft, is scheduled to occur June 28. Payload fairing installation is scheduled to begin July 1. The Flight Readiness Review has been rescheduled for July 6. Aura’s four state-of-the-art instruments will study the dynamics of chemistry occurring in the atmosphere. The spacecraft will provide data to help scientists better understand the Earth’s ozone, air quality and climate change. The EOS Aura satellite, instruments and science investigations are managed by NASA’s Goddard Space Flight Center in Greenbelt, Md. Government oversight of launch preparations and the countdown management on launch day is the responsibility of the NASA Launch Services Program based at Kennedy Space Center. The launch service is provided to NASA by Boeing Launch Services. Mission: MESSENGER, Launch vehicle: Delta II Heavy, Launch pad: 17-B, Cape Canaveral Air Force Station, Launch date: July 30, 2004, Launch window: 2:17:44 a.m. – 2:17:56 a.m. (EDT). MESSENGER is undergoing prelaunch testing at the Astrotech Space Operations facilities near Kennedy Space Center. The spacecraft’s two solar arrays are undergoing cleaning today in preparation for installation on June 24 -25. One array will be installed each day. After an array is installed, a deployment test is conducted. Installation of thermal blankets continues. Spacecraft propellant loading is currently scheduled for June 29 – July 2. Spacecraft spin balance testing is planned for July 7. Autonomy testing of the spacecraft has been successfully completed. This verified that MESSENGER can operate on its own when not in direct contact with Earth. The stacking of the Boeing Delta II launch vehicle on pad 17-B is currently planned to begin one week after the launch of the Delta

II carrying the Air Force Global Positioning Satellite occurs. There are no technical issues or concerns with MESSENGER or its associated Delta II at this time. The launch period for MESSENGER extends through Aug. 13. KSC News Center (2004). **Spacecraft and Expendable Launch Vehicles Status Report** [Online]. Available E-mail: ksc@newsletters.nasa.gov [2004, June 21].]

◆ Jay Feaster, general manager of the National Hockey League's 2004 Champion Tampa Bay Lightning brought the Stanley Cup to KSC on a tour**.** The Stanley Cup weighs 35 pounds and is more than 100 years old. In the Orbiter Processing Facility, Mike Bolt held the Stanley Cup, won this year by the National Hockey League's Tampa Bay Lightning. Bolt is the Stanley Cup keeper. The cup was also available for viewing by employees in the KSC Training Auditorium. ["NHL's 'Lord Stanley' Pays Royal Visit To Kennedy Space Center," **KSC Photo Release #P02-04**, June 21, 2004.]

**June 22:** The launch of NASA's Aura spacecraft, the latest in the Earth Observing System (EOS) series, has been rescheduled to no earlier than July 10 due to two issues. Additional time was needed to assure that suspect computer chips causing difficulty on a different satellite were not of the same lot as those aboard the Aura spacecraft. Also, the engineering review board needed additional time to clear the concern over the second stage fuel tank shutoff valve failure. It was resolved satisfactorily June 18. NASA is awaiting word from the Western Range that the request for a launch date of July 10 has been confirmed. MESSENGER is undergoing pre-launch testing at the Astrotech Space Operations facilities near KSC. The spacecraft's two solar arrays are undergoing cleaning today in preparation for installation on June 24 -25. One array will be installed each day. After each array is installed, a deployment test is conducted. ["Component concerns delay Aura launch to no earlier than July 10," **KSC Countdown**, June 22, 2004.]

**June 23:** Tonight's rocket launch attempt will be made in the face of overwhelming odds -- weather odds, that is -- as pressure on the launch team intensifies. After three straight delays because of storms, then a rest on Tuesday, the Boeing team will try to send up a Delta 2 rocket with a Global Positioning System satellite during a 27-minute window that opens at 6:54 p.m. Pressure is high on Boeing to launch the rocket, which also suffered technical delays. As soon as possible, NASA needs to use the same pad at Cape Canaveral Air Force Station to get its MESSENGER mission to Mercury ready for a July 30 launch. NASA's launch window for that mission is 15 days. "If we don't, then we're into the time frame for next summer," NASA spokesman George Diller said at Kennedy Space Center. The chances of acceptable weather are just 20 percent this evening, according to the 45th Weather Squadron. The forecast is slightly better for Thursday and Friday -- with 30 percent and 40 percent no-go, respectively. Web posted. (2004). [Pressure mounts to launch Delta 2 rocket [Online]. Available WWW: http://www.floridatoday.com/ [2004, June 23].]

◆ A Boeing Delta 2 rocket found a wide patch of blue to punch through on Wednesday, launching with a navigation satellite for the Air Force after three delays because of storms. The forecast got progressively better as the day rolled on, and the rocket roared into a hazy sky at 6:54 p.m. The Lockheed Martin-built GPS 2R-12 is a

replacement and will be the 28th operational satellite in a constellation that operates on a minimum of 24. "We launch in anticipation of anything breaking," said Maj. Alan Edmiaston of the Space and Missile Systems Center at Los Angeles Air Force Base. Signals from the navigation satellites are used around the world by the military and civilians alike to get on-the-spot time, location, altitude and velocity information. The launch was dedicated in the memory of the former President Ronald Reagan. A banner on the side of the rocket's umbilical tower said "Launch One For 'The Gipper.' "The liftoff clears the way for NASA to get its MESSENGER mission ready to launch. The probe is to fly to Mercury, boosted into space on a Delta 2 rocket, from the same launch pad at Cape Canaveral Air Force Station. Web posted. (2004). [Delta 2, satellite roar into hazy sky [Online]. Available WWW: http://www.floridatoday.com/ [2004, June 24].]

**June 25:** NASA and Boeing will discuss today whether the MESSENGER mission to Mercury can launch at the opening of its planetary window, after another mission on the same launch pad cut into MESSENGER's work time. "We're very happy the Air Force got off yesterday," NASA Launch Director Chuck Dovale said Thursday. After several delays, Boeing launched a Delta 2 rocket Wednesday with a Global Positioning System satellite for the Air Force. The MESSENGER window extends from July 30 to Aug. 13, Dovale said at Kennedy Space Center. Boeing has proposed an intense work schedule to launch that Delta 2 rocket on time, he said. "It's tight," Dovale said. "Every day's a work day, including July 4th and every weekend." They will discuss whether they want to make that schedule or add some margin and go a few days into the window, he said. If NASA's MESSENGER - shorthand for MErcury Surface, Space ENvironment, GEochemistry and Ranging - misses its planetary window, the mission would be delayed until next year. Web posted. (2004). [NASA eyes tight Mercury mission schedule [Online]. Available WWW: http://www.floridatoday.com/ [2004, June 25].]

◆ Administrator Sean O'Keefe today selected retired Marine Brigadier General Michael Wholley as the NASA General Counsel, effective immediately. Wholley succeeds Paul G. Pastorek and joins NASA after a distinguished career of public service in the Marine Corps. [“Michael Wholley Selected As NASA General Counsel,” **NASA Press Release #04-208**, June 25, 2004.]

◆ Space Shuttle Processing Status Report S04-17: **Discovery** (OV-103); In the Obiter Processing Facility, Discovery continues its scheduled power-down period for its Return to Flight mission, STS-114, to the International Space Station. The Return to Flight modifications, including the orbiter boom sensor system wiring and preparations for installation of the wing leading edge sensors are progressing on schedule. The Forward Reaction Control System, which provides the thrust for attitude (rotational) maneuvers (pitch, yaw and roll) and for small velocity changes along the orbiter axis (translation maneuvers), was installed Wednesday. **Atlantis** (OV-104); Technicians are processing Atlantis in the Orbiter Processing Facility in support of its future mission. The four-month power-down period continues so that workers can perform Return to Flight modifications, as well as structural and baseline wire inspections. Following the modification period, Atlantis is scheduled to be powered-up on Oct. 1, 2004. Installation of the left-hand carrier panels, the Thermal Protection System panels that attach the

Reinforced Carbon- Carbon panels to the wing leading edge, is underway. On the right-hand side, all of the 22 panels and T-seals, the C- shaped seals that fit between each panel, are assembled and ready for installation. **Endeavour** (OV-105); Space Shuttle Endeavour is in its Orbiter Major Modification period, which began last December. Electrical modifications continue in the crew module. Wire inspections are ongoing in the Environmental Control and Life Support System bay. Bead blasting of Endeavour's body flap area, right-hand wing leading edge and dome heat shield area continues. Bead blasting is a process using a pressurized pneumatic gun containing silica carbide, plastic pellets or glass beads to remove primer, paint and corrosion from orbiter vehicle surfaces. Flex hose inspections in the Environmental Control and Life Support System are underway. Owner-press-release. (2004). **Space Shuttle Processing Status Report** [Online]. Available E-mail: owner-press-release@spinoza.public.hq.nasa.gov [2004, June 25].]

**June 27:** While a number of NASA missions over the years have carried some kind of nuclear fuel, the Cassini mission ignited an explosion of protests when it launched from Cape Canaveral in October 1997. Many people were concerned about the spacecraft's highly toxic plutonium, though NASA said the risks were small. Sixteen protesters got probation for trespassing after their group rushed the fence at Cape Canaveral Air Force Station. "There was a huge mass of, just a solid wall of military behind the fence," said Peg McIntire of St. Augustine, a 93-year-old "Grandmothers for Peace" protester from the Florida Coalition for Peace and Justice. "It was a barbed-wire fence that they said had glass on the top, and actually some of our people threw a small carpet over the top, climbed up and went over the fence that way, and of course all of them were arrested. Three of us managed to get through the gate, because we were all pretty old." The tumult over Cassini, which is due to arrive at Saturn on Wednesday, helped NASA rethink how it talks to the public about the new nuclear propulsion initiative, Project Prometheus. "Part of that idea is to be open and transparent in everything we do," said Alan Newhouse, the project's director, when he spoke at April's Space Congress in Cape Canaveral. The week before, he visited the local Sierra Club chapter to outline the goals of the project and answer questions. To get its message out and understand the concerns of protesters, NASA enlisted the help of the nonprofit Keystone Center in 2001. The center helps facilitate understanding between people on opposite sides of science and public policy issues. Its final recommendations, released this month, warn NASA that "nuclear power is a hard sell" and that some people are skeptical that NASA will spend enough on nuclear projects to be safe. Keystone recommended NASA strengthen its written materials on Project Prometheus; interact more with professional and community groups, as well as state and local regulators and Congress; invite people with different perspectives to discuss the issues; and use independent reviews that will be available to people with concerns. McIntire still says launching Cassini was immoral, and she's skeptical about future nuclear launches. "I'm entirely in favor of scientific research and the use of nuclear energy if it can be used safely, but plutonium cannot and will not be safe," she said. NASA's first Prometheus mission is to be the Jupiter Icy Moons Orbiter, which, at such a great distance from the sun, would need "football fields of solar arrays" if it didn't have nuclear power, Newhouse said. "It's a real challenge to do a science investigation with limited power," he said. It's not clear what kind of nuclear fuel the

Jupiter mission will use. Cassini's Radioisotope Thermoelectric Generators produce electricity from heat caused by the radioactive decay of plutonium. Web posted. (2004). [Public reaction to Cassini taught NASA a lesson [Online]. Available WWW: http://www.floridatoday.com/ [2004, June 27].]

◆ A spy satellite launch is being delayed about one week so engineers can perform additional tests on its Atlas 2AS rocket. Electronics problems in a similar rocket in Lockheed Martin's factory prompted the launch team to take a second look at the one on the launch pad at Cape Canaveral Air Force Station. A statement issued by the launch services contractor, International Launch Services, said the team should be ready to announce a new date and time for launch late this week. The Nemesis mission, carrying a classified payload for the National Reconnaissance Office, was set to blast off late Wednesday night from Launch Complex 36A at the Air Force station. The spacecraft is known only as NROL-1. Web posted. (2004). [Electronic problem delays spy satellite launch. [Online]. Available WWW: http://www.floridatoday.com/ [2004, June 27].]

**June 29:** NASA's Aura spacecraft, a next-generation Earth-observing satellite that will supply the most complete information to date on the health of the Earth's atmosphere, is scheduled for launch Saturday, July 10. Liftoff will occur aboard a Boeing Delta II rocket at approximately 6:01:57 a.m. EDT (3:01:57 a.m. PDT) at the opening of a three-minute launch window. Spacecraft separation from the launch vehicle will occur one hour and four minutes later. Launch will be from NASA's Space Launch Complex 2 at Vandenberg Air Force Base (VAFB), Calif. ["Aura Satellite Ready For July 10 Launch On Delta II Rocket," **NASA News Release #N04-100**, June 29, 2004.]

**During June:** NASA will begin naming "a few hundred" engineers soon who will constitute the Independent Technical Authority (ITA) recommended by the Columbia Accident Investigation Board to "provide an effective check and balance" on space programs for safety. Within the next month, the directors of Johnson and Kennedy space centers will name "a couple of dozen at each place" to backstop human spaceflight engineers, according to Theron M. Bradley, Jr., NASA chief engineer. By the time the new fiscal year begins Oct. 1, the ITA should be fully staffed across the agency, with a system of "warrants" delineating who is an expert in what. Overseeing the who organization will be Walter H. Cantrell, a retired rear admiral named to the post of deputy chief engineer for ITA June 4. A former head of the Space and Naval Warfare Systems Command, Cantrell has been advising NASA on returning the space shuttle fleet to service as a member of two different advisory panels. Bradley said the resulting ITA organization ultimately will cover both human and robotic spaceflight, although it will focus on getting the shuttle back in service at first. ["Lesson Learned," **Aviation Week & Space Technology**, June 14, 2004, p 32-33.]

Workers in the Space Station Processing Facility prepare Raffaello, the MPLM scheduled to fly on the STS-114 Return to Flight mission, for transfer from a cargo element work stand to an element rotation stand formerly used by the Leonardo MPLM. The latter allows the module to be rotated around its x-axis to facilitate better access to the MPLM during final pre-flight processing operations. STS-114 is a logistics flight (LF1) that will carry the External Stowage Platform plus supplies and equipment to the International Space Station. The planning window for launch is May 12 to June 3, 2005.

## JULY

**July 2:** Space Shuttle Processing Status Report: **Discovery (OV-103):** Orbiter Discovery's scheduled power-down period for its Return to Flight mission, STS-114, to the International Space Station is progressing well. The Return to Flight modifications, including the orbiter boom sensor-system wiring and preparations for installation of the wing leading-edge sensors are almost complete. The External Tank camera wiring harness is installed. Reinforced Carbon-Carbon (RCC) panel installation is almost complete on both of the wing leading edges, with two panels remaining to be hung on the left-hand side and three panels remaining to be hung on the right-hand side. **Atlantis (OV-104):** Processing continues on Atlantis in the Orbiter Processing Facility in support of its future mission to the International Space Station. The majority of the external flex hose inspections are complete, and the internal flex hose inspections have begun. Each vehicle has about 300 flex hoses, which are flexible tubing between two fixed ends. Four left-hand carrier panels have been installed. They are Thermal Protection System panels that attach the RCC panels to the wing leading edge. On the right-hand side, work has begun to install the spar fittings. The RCC panels are mechanically attached to the wing with spar fittings, which are a series of floating joints to reduce stress on the panels when the Shuttles are in flight. **Endeavour (OV-105):** Space Shuttle Endeavour is in its Orbiter Major Modification period, which began last December. Electrical modifications continue in the crew module. Wire inspections are ongoing in the Environmental Control and Life Support System bay. Both right-hand and left-hand radiators have been installed for flight. Bead blasting of Endeavour's body flap area is complete. Bead blasting is a process using a pressurized pneumatic gun containing silica carbide, plastic pellets or glass beads to remove primer, paint and corrosion from orbiter vehicle surfaces. Bruce Buckingham (2004). **Space Shuttle Processing Status Report: Vol. 1 No. 19** [Online]. Available E-mail: domo@news.ksc.nasa.gov/subscribe shuttle-status [2004, July 2].]

**July 6:** James E. Fesmire, NASA lead engineer for the Cryogenics Testbed here, recently acquired three patents for testing thermal insulation materials for cryogenic systems. All the methods were developed at KSC. * The Multi-purpose Thermal Insulation Test Apparatus: tests insulation materials in cylindrical and multi-layer forms. It is designed to provide a calibrated thermal performance value for the total insulation system under cryogenic-vacuum conditions. * The Apparatus and Method for Thermal Performance Testing of Pipelines and Piping Systems: evaluates the exact thermal performance aspects of cryogenic piping systems. It uses two cold boxes that eliminate any heat transfer from the ends of the piping, to determine accurate measurements of heat leak rates from the sides of the piping segment. * The Methods of Testing Thermal Insulation and Association Test Apparatus, also called Cryostat-1: provides absolute thermal performance values of cryogenic insulation systems under real-world conditions. Cryogenic liquid is supplied to a test chamber and two guard chambers, and temperatures are sensed within the vacuum chamber to test aerogels, foams or other materials. The new technologies were proven through nearly 1,000 tests of more than 100 different material systems. The research team of the Cryogenics Testbed offers testing and support for a number of programs and initiatives for NASA and commercial customers. The Cryostat-1 machine can detect the absolute heat leakage rates through materials under the

full range of vacuum conditions, according to Fesmire and co-inventor Dr. Stan Augustynowicz, chief scientist with Sierra Lobo Inc. in Milan, Ohio. "This approach sets us apart from other labs," said Fesmire. Cryogenics is an energy-intensive field and thermal insulation conserves energy. As technology develops, insulation systems are reaching the highest standards of performance and efficiency. According to Fesmire, the future for industry and space exploration requires more efficient thermal insulation systems for low-temperature applications. ["NASA Engineer Patents three insulation test methods," **KSC News Release #50-04**, July 6, 2004.]

**July 7:** Alphonso V. Diaz, who will assume leadership of NASA's new Science Mission Directorate as its Associate Administrator on Aug. 1, today named Orlando Figueroa Deputy Associate Administrator for Programs and Allison L. McNally Deputy Associate Administrator for Management in the directorate, effective Aug. 1. ["Two Deputy Associate Administrators Named For New Science Mission Directorate," **NASA News Release #04-214**, July 7, 2004.]

**July 8:** Lockheed Martin on Wednesday picked a new date for a postponed spy satellite-delivery mission out of Cape Canaveral Air Force Station. Launch of the classified National Reconnaissance Office spacecraft aboard an Atlas 2AS rocket is slated for July 27. Next up: the planned Aug. 2 launch of a NASA probe to planet Mercury. The Atlas 2AS mission was scheduled to blast off June 30 but its mission was postponed when engineers uncovered problems with an electronics box at the vendor factory. The same problem prompted NASA to delay the planned launch of an atmospheric research satellite called Aura from Vandenberg Air Force Base in California by 24 hours, to early Sunday (July 11) morning. ["Spy satellite's date with space set for July 27," **Florida Today**, July 8, 2004, p 1B.]

**July 9:** The numbers are impressive – 4,400 pounds of paper-based products and 3,500 gallons of liquid waste. That's the amount of materials recycled by the Kennedy Space Center Visitor Complex in 2003. Host to more than 2 million people a year, the Visitor Complex has gone green, implementing a comprehensive environmental management initiative. The Visitor Complex environmental efforts are part of GreenPath, the environmental arm of Delaware North Companies Parks and Resorts, the business that operates the Visitor Complex. Because of the environmentally sensitive nature of its many contracts, Delaware North created GreenPath to incorporate environmental considerations into all business decisions. In addition to managing the recycling operations, the Visitor Complex also explores opportunities for better choice of materials, from paper towels to computer paper. Whenever possible, recycled products are chosen. Even gift shop inventory is included. The complex purchases more than $70,000 in environmentally friendly products annually. The GreenPath program at KSC is also particularly conscious of the need for wildlife protection. Because of its unique location adjacent to Merritt Island National Wildlife Refuge, KSC serves as a model of technology coexisting harmoniously with the natural world. ["KSC's Visitor Complex goes 'green'," **Florida Today**, July 10, 2004, p 3B.]

◆ Space Shuttle Processing Status Report: **Discovery (OV-103):** Technicians in the Orbiter Processing Facility continue work on Discovery prior to the vehicle coming out of its scheduled power-down period for its Return to Flight mission, STS-114, to the International Space Station. Following the replacement of the Rudder Speed Brake actuators on Discovery, all four panels are reinstalled. Now workers are rigging the lower panels for a standard optics shoot. This test ensures that the panels are reinstalled properly and will function correctly during the mission. Dome Heat Shield No. 1 is removed, while DHS No. 2 installation for fit check is complete. The DHS comprises two semi-circle sections of Thermal Protection System tile mounted on an aluminum structure that are installed to make a ring around each of the three Space Shuttle Main Engines. **Atlantis (OV-104):** Atlantis continues to be processed in the Orbiter Processing Facility for its future mission to the International Space Station. The vehicle remains in a scheduled four-month power-down period in which Return to Flight modifications are progressing well. On the right-hand wing leading edge, 13 spar fittings are installed. The Reinforced Carbon-Carbon panels are mechanically attached to the wing with spar fittings, which are a series of floating joints that reduce stress on the panels when the Shuttles are in flight. Chin panel installation is continuing. The chin panel is the smile-shaped section of RCC that is installed directly below the nose cap to provide a thermal barrier during re-entry. **Endeavour (OV-105):** Space Shuttle Endeavour is in its Orbiter Major Modification period, which began last December. Electrical modifications continue in the crew module. The fit check of the nose cap is scheduled for today. External Tank door and DHS tile bonds continue. Flex hose inspections have begun in the aft of the vehicle. Right-hand wing leading edge bead blasting is complete. Bead blasting is a process using a pressurized pneumatic gun containing silica carbide, plastic pellets or glass beads to remove primer, paint and corrosion from orbiter vehicle surfaces. Bruce Buckingham (2004). **Space Shuttle Processing Status Report: Vol. 1 No. 20** [Online]. Available E-mail: domo@news.ksc.nasa.gov/subscribe shuttle-status [2004, July 9].]

**July 10:** A bolt popped loose on an astronaut training plane last December, causing a heavy chunk of one engine to plop into the Banana River as a pilot practiced shuttle landings over Kennedy Space Center. Ignored repair procedures, skipped inspections, excessively long work days and poorly designed bolts all were listed as possible contributors to the Dec. 2 incident that led to a temporary grounding of NASA's fleet of Shuttle Training Aircraft, space agency investigators found. The fleet is back in service, and NASA officials pledged greater diligence in maintaining the custom-modified jets used by shuttle commanders and pilots to practice landing the orbiter. "It scared us all because we don't want things like that to happen," said Ken Bowersox, the former International Space Station commander who recently was promoted to manage NASA's astronaut corps. "It made a lot of people more sensitive. . .There is plenty of life left in those airplanes, but we need to watch them because they are getting old. It's something that needs to be in the forefront of our minds." The two trainers and astronaut pilot aboard the modified Gulfstream 2 jet were not hurt. NASA refused to release the statements of the crew or witnesses, providing only a report summarizing the accident and investigators' findings. The severity of the mishap remains unclear. The pilot, not identified in the investigation report or other documents about the mishap, was making a

final approach to the three-mile long Kennedy Space Center landing strip on Dec. 2 as part of a series of simulated shuttle landings. The plane was flying at 13,000 feet when a light flashed in the cockpit. Something was wrong with one of the thrust reversers, which are metal components that slide into place behind the jet engines to slow the plane and put it into a steep dive toward the runway. The plane's computers ended the simulation and the training pilot took over to land safely. During a post-landing inspection, technicians noticed the thrust reverser and related parts fell off. All told, the metal package weighed 585 pounds. It was five feet long and four feet wide. It plopped into the river a couple hundred feet from a highway bridge. Divers found it weeks later. Investigators found several problems with parts and procedures as they delved into the accident, leaving the training planes grounded until they were sure what had gone wrong. First, just days before the fateful flight, a repair crew at NASA's Ellington Field near Houston did not follow procedures for installing and inspecting the thrust reverser. And the lack of proper paperwork made it hard for investigators to trace the parts that were used for the repair. Second, the day before the incident, a support crew that came with the aircraft to Florida worked a 19.5-hour day -- including a series of landing simulations late on the evening of Dec. 1. At the end of the workday, they apparently were too tired to conduct the routine post-flight inspections and did not file paperwork indicating the inspections were not done. On Dec. 2, the crew preparing the jet for another round of flights was not aware the inspections had not been done the night before. So the plane flew without the engine area being inspected, though investigators noted there is no way to know if inspections would have caught the problem or prevented the accident. The investigators were not able to determine if the bolt that failed was installed properly. Inspections of other NASA aircraft using similar assemblies found that the bolts might not be long enough to be tightened securely enough to lock in place. Changes were made to installation procedures to fix the problem, but NASA has not decided whether to redesign the system used to fasten the thrust reverser parts into place. "It's possible the guys did everything right, but did not document it exactly and that what really happened is the bolts vibrated apart," Bowersox said. "Maybe what we should have done is redesign the bolts six months earlier." Overall, however, the incident prompted the agency to take a closer look at its fleet of astronaut-flown aircraft. That includes the jets used for landing simulations and the T-38 jets flown by astronauts to maintain piloting skills. The findings of the Shuttle Training Aircraft incident, however, are strikingly similar to another mishap involving a T-38 in 1999. Ground crews and an astronaut pilot, apparently not following official maintenance and inspection checklists, missed a small part that got stuck in one of the plane's engines. No one was hurt, but safety officials issued a memo imploring everyone who works on and flies astronaut aircraft to follow procedures carefully to avoid accidents. [“NASA ties bolt to training scare,” **Florida Today**, July 11, 2004, p 1A & 7A.]

◆ The planned launch of a NASA atmospheric research satellite is being delayed until at least Tuesday to give technicians time to fix a problem with a rocket nose cone, officials said Saturday. The Aura spacecraft will launch aboard a Boeing Delta 2 rocket at 6:02 a.m. EDT Tuesday from Vandenberg Air Force Base in central California. Engineers from Kennedy Space Center are managing the launch. [“Aura launch on hold until Tuesday,” **Florida Today**, July 11, 2004, p 1A.]

**July 12:** MESSENGER (Mercury Surface, Space Environment, Geochemistry and Ranging) was mated to the Delta II Payload Assist Module, or third stage, on Monday. The Boeing Delta II rocket is ready and waiting on Pad 17-B at Cape Canaveral Air Force Station for the spacecraft. Launch is scheduled no earlier than Aug. 2 at 2:16 a.m. EDT. [“MESSENGER completed, ready to move to launch pad,” **KSC Countdown**, July 15, 2004.]

**July 13:** The launch of NASA's Aura spacecraft atop a Boeing Delta II rocket from California has been delayed for at least 24 hours. Launch will occur no earlier than Wednesday, July 14, with a three-minute window at 6:01:59 a.m. EDT (3:01:59 a.m. PDT). During the final T-20 minute hold before the scheduled launch this morning, spacecraft engineers decided they could not resolve an outstanding issue with a solid-state recorder. The mission management team will convene this afternoon at 6 p.m. EDT to confirm the new launch date of July 14. [“Aura Launch Postponed,” **NASA News Release #N04-104**, July 13, 2004.]

◆ NASA's Kennedy Space Center (KSC), will extend its Joint Base Operations Support Contract (JBOSC) for two years to Space Gateway Support (SGS) of Herndon, Va. The contract extension, valued at approximately $588.7 million, covers Oct. 1 through Sept. 30, 2006. The total contract value including exercised options is more than $2 billion. The JBOSC is a performance-based, cost-plus award fee contract to provide base operation and support services at KSC; Cape Canaveral Air Force Station, Fla.; and Patrick Air Force Base, Fla. Under the contract, SGS provides facility and infrastructure operations and maintenance, fire protection, security services, transportation support, grounds maintenance and other base support services. SGS is a joint venture of Northrop Grumman Technical Services, Herndon, Va.; Shaw Environmental & Infrastructure, Baton Rouge, La.; and Wackenhut Services, Palm Beach Gardens, Fla. Web posted. (2004). [It's Business As Usual At KSC [Online]. Available WWW: http://www.spacedaily.com/ [2004, July 19].]

◆ NASA should not scrap a shuttle mission to repair the Hubble Space Telescope unless it can prove robots could do the complex job, the National Academy of Sciences said on Tuesday. "NASA should take no actions that would preclude a space shuttle servicing mission to the Hubble Space Telescope," wrote a panel of scientists, retired astronauts and former NASA managers in an interim report to NASA Administrator Sean O'Keefe. O'Keefe in January called off a planned shuttle servicing mission to Hubble, saying shuttle flights to anywhere but the International Space Station are too dangerous. NASA now plans to try a robotic repair mission, but the committee questioned whether such a flight could be pulled off in time to save the observatory. Whether astronauts or robots do the work, the committee urged NASA to commit to making all repairs and upgrades planned for the canceled shuttle mission. In the wake of the Feb. 1, 2003, Columbia disaster, O'Keefe continues to insist he would not risk astronauts' lives to service the telescope. The academy committee stopped short of recommending NASA reinstate the shuttle mission to Hubble, saying it's "arguably the most important telescope in history." Recommendations in its final report, due this fall, are not binding. But they could provide political firepower for Congressional leaders who support a shuttle

servicing mission. [“Group: Hubble needs shuttle,” **Florida Today**, July 14, 2004, p 1A & 3A.]

**July 14:** The launch of NASA's Aura spacecraft atop a Boeing Delta II rocket was scrubbed this morning due to an issue with one of the two batteries on the second stage of the Delta II launch vehicle. At approximately three minutes before the scheduled liftoff time, as the batteries were being transferred to internal power, the battery current level dropped below prescribed limits, triggering a launch hold. Engineers and mission managers are assessing the situation and will meet at 6 p.m. EDT (3 p.m. PDT) today to decide a date for the next launch attempt. Two options are being considered. The first is to attempt a launch on Thursday morning, July 15, during a three-minute launch window that opens at 6:01:59 a.m. EDT (3:01:59 a.m. PDT). The second option under consideration is to stand down until Saturday, July 17, due to range conflicts at Vandenberg Air Force Base. Weather is a concern for a launch attempt on Thursday morning. The current forecast calls for only a 60 percent probability of acceptable weather conditions. The primary concerns are for thick clouds and the possibility of triggered lightning in the launch area due to the remnants of daytime thunderstorm activity in Southern California. In addition, Tropical Storm Blas, off the coast of Baja California, could prevent a P3 aircraft from flying to its launch support position. The P3 relays telemetry from the launch vehicle back to the launch team at Vandenberg. [“Launch Advisory: Aura Launch Postponed,” **NASA News Release #N04-106**, July 14, 2004.]

◆ The Demonstration for Autonomous Rendezvous Technology (DART) flight demonstrator, a spacecraft developed to prove technologies to locate and maneuver near an orbiting satellite, today arrived at Vandenberg Air Force Base, Calif., in preparation for a fall 2004 launch. Future applications of technologies developed by the DART project will benefit the nation in future space-vehicle systems development requiring in-space assembly, services or other autonomous rendezvous operations. Designed and developed for NASA by Orbital Sciences Corporation, Dulles, Va., the DART spacecraft will be launched on a Pegasus launch vehicle. [“Autonomous Rendezvous Spacecraft Arrives at Vandenberg,” **NASA News Release #04-128**, July 14, 2004.]

**July 15:** Aura, a mission dedicated to the health of the Earth's atmosphere, successfully launched today at 6:01:59 a.m. EDT (3:01:59 a.m. PDT) from the Western Range of Vandenberg Air Force Base (VAFB), Calif., aboard a Boeing Delta II rocket. Spacecraft separation occurred at 7:06 a.m. EDT (4:06 a.m. PDT), inserting Aura into a 438-mile (705-kilometer) orbit. NASA's latest Earth-observing satellite, Aura will help us understand and protect the air we breathe. "This moment marks a tremendous achievement for the NASA family and our international partners. We look forward to the Aura satellite offering us historic insight into the tough issues of global air quality, ozone recovery and climate change," said NASA Associate Administrator for Earth Science Dr. Ghassem Asrar. "This mission advances NASA's exploration of Earth and will also better our understanding of our neighbors in the planetary system," he added. “Aura joins its siblings, Terra, Aqua and 10 more research satellites developed and launched by NASA during the past decade, to study our home planet, Earth.” Aura will help answer three key

scientific questions: Is the Earth's protective ozone layer recovering? What are the processes controlling air quality? How is the Earth's climate changing? NASA expects early scientific data from Aura within 30-90 days. ["Aura Spacecraft Launched, To Better Understand The Air We Breathe," **NASA News Release #04-217**, July 15, 2004.]

◆ NASA has named Astronaut Piers J. Sellers to replace Carlos I. Noriega as a mission specialist on STS-121, the second Space Shuttle mission to the International Space Station once flights resume. Noriega is being replaced due to a temporary medical condition that affects his qualification for flight. Because of medical privacy considerations, no other information on Noriega's condition will be made public. While he awaits a possible future flight assignment, Noriega will be assigned to a management role at NASA's Johnson Space Center, Houston. Sellers will make his second trip on the Space Shuttle with the rest of the STS-121 crew: Commander Steven W. Lindsey (Col., USAF), Pilot Mark E. Kelly (Cmdr., U.S. Navy) and Mission Specialist Michael E. Fossum. STS-121 currently is assigned to Space Shuttle Atlantis and will carry supplies and equipment to the International Space Station. During the flight, the crew will test new Space Shuttle safety changes, procedures and equipment. The current target window for the STS-121 mission begins in May 2005**.** ["Crew changed for future Shuttle mission," **NASA News Release #04-223**, July 15, 2004.]

**July 16:** During a special ceremony to commemorate the 35th anniversary of human exploration of the Moon, Administrator Sean O'Keefe will name NASA's first generation of astronauts and former CBS News anchor Walter Cronkite "Ambassadors of Exploration." The awards will be presented during a special ceremony Tuesday night in Washington. On this date in 1969 at 9:32 a.m. EDT, a Saturn V rocket lifted off from launch complex 39A at NASA's Kennedy Space Center in Florida. About 12 minutes later, the Apollo 11 crew was in orbit and ready for their journey into the history books. On July 20, with Command Module pilot Michael Collins in lunar orbit, astronauts Neil Armstrong and Buzz Aldrin left the Lunar Module and set foot on the surface of the Moon -- an accomplishment that today symbolizes American ingenuity, adventure and spirit. The award celebrates the realization of a vision for exploration first articulated by President John F. Kennedy in May 1961, when NASA's fledgling human space flight program had little more than 15 minutes of experience. To recognize the sacrifices and dedication of the Mercury, Gemini and Apollo astronauts, each will be presented a lunar sample, part of the 842 pounds of Moon rocks and soil returned during the six lunar expeditions from 1969 to 1972. Also among the honorees is famed CBS journalist Walter Cronkite, the only non-astronaut selected as an Ambassador of Exploration. Millions of Americans experienced the drama and excitement of NASA's early years through the knowledgeable reports of Cronkite, who considered the space race as one of the most important events of the 20th century. During the Apollo 11 mission, Cronkite was on the air for 27 of the 30 hours it took for the Apollo 11 astronauts to complete their mission on the lunar surface. The awards will remain the property of NASA, but Cronkite, the astronauts and their surviving families, in coordination with the agency, will select a museum or other education institution where their awards will be publicly displayed in their name to help inspire a new generation of explorers. ["NASA'S First Generation Of

Astronauts and Walter Cronkite Named Ambassadors of Exploration," **NASA News Release #04-229**, July 16, 2004.]

◆ Jack King remembers the massive traffic jams. Ron Woods remembers helping Neil Armstrong, Buzz Aldrin and Michael Collins suit up in crew quarters before they boarded a Saturn 5 rocket the size of a skyscraper. Roy Tharpe remembers the round-the-clock work that was required at Kennedy Space Center to pull off one of the greatest accomplishments in history. And Norm Carlson remembers how the momentous Apollo 11 mission -- which blasted off from Brevard County 35 years ago today -- transcended international politics and ideology, bringing together an entire world. "For a brief instant, we were no longer Americans or Russians or black or white. We were all one family -- humans," Carlson said. "We all participated, and we all wanted to be in Armstrong and Aldrin's shoes. We were proud and we were humble and we were thrilled." Carlson was a lead launch vehicle test conductor for the Apollo 11 mission. The Titusville resident joined King and Woods Thursday for an Apollo 11 tribute at KSC. The trio recalled the massive crowds who flocked into Brevard County for the launch, which took place at 9:32 a.m. EDT. An estimated 1 million visitors -- the largest tourist contingent in county history -- herded into Cocoa Beach, Merritt Island and Titusville in particular. King said the streets of Cocoa Beach already were jammed by the time he left his home and headed to Firing Room One, where he served as "the voice of NASA," providing launch commentary during the historic countdown. "1:30 in the morning, and the town was alive and jumping," said King, now a communications specialist with United Space Alliance, NASA's single prime shuttle contractor. Some 2,700 media representatives from 56 nations gathered at KSC to cover the launch, King said. Among them, the most famous journalists of their generation, including Walter Cronkite, Chet Huntley and David Brinkley. "There was organized chaos as we tried to run the briefings, give status reports and answer the thousands of questions that (the media) wanted to have answered," he said. "Really it was a relief to come out to the Firing Room that morning." The countdown that day proceeded nearly flawlessly. Only two minor problems cropped up. The weather was warm -- 85 degrees Fahrenheit -- the skies were clear and the powerful Saturn 5 shook the doors of the 52-story Vehicle Assembly Building as it lumbered off launch pad 39A. What followed was a four-day flight that took Armstrong, Aldrin and Collins about a quarter-million miles across the black void between the blue Earth and the moon. Some 600 million people -- or one-fifth of the world's population then -- were watching on television as Armstrong and Aldrin set foot on the lunar surface while Collins circled the moon in the Apollo 11 command module. The moonwalkers spent a little less than a full day on the Sea of Tranquility before rendezvousing with Collins and then heading back home. The crew splashed down in the Pacific Ocean on July 24, fulfilling President Kennedy's 1961 challenge to send men to the moon, and return then safely to Earth, before the end of that decade. ["T-plus 35 years, Apollo 11 team looks back," **Florida Today**, July 16, 2004, p 1A & 9A.]

◆ Fixing the U.S. space shuttle fleet will be more expensive than originally estimated, top NASA officials said Friday. It could cost as much as $1.1 billion to accomplish all the safety upgrades and changes now under way and planned, said Steven Isakowitz, NASA comptroller. That's more than double the estimate NASA gave earlier this year. The price

increase was caused by additional shuttle improvements NASA has begun and more extensive work on repairs it was already undertaking, said Michael Kostelnik, deputy associate administrator for the International Space Station and space shuttle programs. "It's not as if we couldn't estimate the cost," Kostelnik told reporters at a briefing at NASA headquarters in Washington. "We could not estimate the content." For example, Kostelnik said modifications to the insulation foam on the shuttle's external fuel tank, the culprit in the loss of shuttle Columbia, have been far more extensive than originally thought. Additionally, shuttle program managers are tackling far more improvements to the remaining three space planes than the 15 enhancements mandated by the Columbia Accident Investigation Board last summer, Kostelnik said. The new shuttle repair estimates come just days before a House appropriations subcommittee is scheduled to take up an annual spending bill that will set NASA's funding for fiscal year 2005, which begins Oct. 1. Isakowitz said NASA officials briefed members of Congress on the increased cost estimates. [“Shuttle costs surge,” **Florida Today**, July 17, 2004, p 1A & 7A.]

◆ Space Shuttle Processing Status Report: **Discovery (OV-103):** Work continues to progress well on Discovery for its Return to Flight mission, STS-114, to the International Space Station. The right-hand Orbital Maneuvering System pod has been transferred to the Orbiter Processing Facility, with final inspection scheduled for today and final installation for flight scheduled for next week. Freon Coolant Loop No. 2 is reassembled and leak checks on loops No. 1 and 2 are complete. Water Coolant Loop No. 2 servicing is in progress and Loop No. 1 will start being drained next week. **Atlantis (OV-104):** In the Orbiter Processing Facility, technicians continue processing Atlantis for its future mission to the International Space Station. The vehicle remains in a scheduled four-month power-down period in which Return to Flight modifications are progressing well. Body flap removal preparations have begun, with body flap and actuator removal scheduled for next week. The chin panel, the smile-shaped section of Reinforced Carbon-Carbon that fits directly below the nose cap to provide a thermal barrier during reentry, is installed. Thermal Protection System blankets continue being installed in the nose cap, with installation of the nose cap scheduled for next week. Four left-hand carrier panels are installed. **Endeavour (OV-105):** Space Shuttle Endeavour is in its Orbiter Major Modification period, which began last December. Electrical modifications continue in the crew module. The nose cap fit check was successfully completed. External Tank door and Dome Heat Shield tile bonds continue. Fit checks for the Global Positioning Satellite antennas are complete. The antennas were removed and sent to the NASA Shuttle Logistics Depot in Cape Canaveral, Fla., for the final modifications prior to installation for flight. Bruce Buckingham (2004). **Space Shuttle Processing Status Report: Vol. 1 No. 21** [Online]. Available E-mail: domo@news.ksc.nasa.gov/subscribe shuttle-status [2004, July 16].]

**July 19:** Engineers at NASA's Stennis Space Center (SSC) in Mississippi have successfully tested one of the engines that will carry the next Space Shuttle into orbit. The test was the first on a complete Space Shuttle Main Engine (SSME) that will be used on the Return to Flight mission. The engine will be shipped to NASA's Kennedy Space Center for installation on the Space Shuttle Discovery. The Return to Flight mission,

designated STS-114, will launch no earlier than next March and will go to the International Space Station. The test began at about 4:59 p.m. EDT July 16. It ran for 520 seconds, the length of time it takes a Space Shuttle to reach orbit. Initial indications are all test objectives were successfully met. Web posted. (2004). [First engine tested for shuttle return to flight [Online]. Available WWW: http://www.spaceflightnow.com/ [2004, July 19].]

**July 20:** Today, NASA commemorates the 35th anniversary of the landmark day in 1969 when humans first set foot on another celestial body. This year, the Apollo 11 moon landing evokes anticipation along with nostalgia. NASA is celebrating the past -- with a new vision for the future. NASA is marking the accomplishments of Apollo 11 this year with thoughts focused once again on the moon. The Vision for Space Exploration calls for NASA to lead the return to the lunar surface and to fantastic points beyond. Around the country today, members of the NASA family plan a variety of activities to remember the determination and ingenuity that put Neil Armstrong, Buzz Aldrin and Michael Collins into the history books. Many former employees who worked on the Apollo 11 mission have been visiting NASA's Kennedy Space Center, Fla., to speak with employees and visitors. Guests include moon-walking astronauts Charlie Duke and Gene Cernan. [“Nostalgia and Anticipation Follow Apollo 11 Anniversary,” **NASA News Release #N04-110**, July 20, 2004.]

◆ A House panel dealt President Bush's moon-Mars exploration plan a setback Tuesday. Members of a House appropriations subcommittee passed a tentative spending plan for NASA that stops short of what the president and the space agency wanted. The action coincided with the 35th anniversary of the historic Apollo 11 moon landing. The three-man crew of that mission was in town Tuesday for a rare joint appearance at a celebration marking the occasion. The House panel agreed to provide NASA with $15.1 billion in the fiscal year that starts Oct. 1. If enacted, that would be $229 million below the current year's spending level and $1.1 billion short of the total requested by the Bush administration. NASA sought a 5.6 percent budget increase to help fund its new exploration initiative, outlined by Bush in a January speech, and to continue preparing the grounded shuttle fleet for return to flight next year. In a statement accompanying the budget document, members of the Veterans Affairs and Housing and Urban Development, and Independent Agencies Subcommittee stated their position. "The committee is supportive of the new (Bush administration) vision, and believes that it will serve to preserve our nation's leadership in space," the document said. "At this time, the committee does not have sufficient resources to meet the full budget request for NASA." Lawmakers representing key NASA centers described the setback as temporary. [“Panel cuts $1.1B from NASA budget,” **Florida Today**, July 21, 2004, p 5A.]

◆ NASA recently granted two partially exclusive patent license agreements for the manufacturing and sale of a high-performance wireless data acquisition and control system involving work done at the Kennedy Space Center. Developers of the patent-pending technology, known as the “wireless instrumentation system and power management scheme therefore,” include: Angel Lucena and Jose’ Perotti of NASA; Anthony Eckhoff, Carlos Mata, and Pedro Medelius of ASRC Aerospace; and Norman

Blalock of Sierra Lobo, Inc. The system acquires and processes data remotely without the need of cabling installation. "This technology provides a highly reliable, high-performance, low-cost alternative to similar technologies in the market," said Perotti. In operational use at KSC, the system meets stringent requirements for reliability, data integrity and power consumption. The design enables sensors to operate in a network configuration and can be easily reconfigured for different types of sensors. The power management scheme allows the wireless remote stations to operate on battery power, increasing the life of the stations while reducing size, weight and cost. NASA signed an agreement with Nivis in Atlanta for use of the technology. Nivis creates components to remotely monitor and control industrial devices. By integrating these components with wireless and Internet technologies, the company produces high-end business intelligence systems. ["NASA Grants two New Technology Patent Licenses," **KSC News Release #54-04**, July 20, 2004.]

**July 21:** Spacecraft and Expendable Vehicles Status Report: Mission: MESSENGER; Launch Vehicle: Delta II Heavy; Launch Pad: 17-B, Cape Canaveral Air Force Station; Launch Date: Aug. 2, 2004; Launch Window: 2:16:11 a.m. – 2:16:23 a.m. EDT. MESSENGER, riding atop its spacecraft transporter, departed the Astrotech Space Operations facilities in Titusville at 12:27 a.m. today. It arrived at Pad 17-B on Cape Canaveral Air Force Station at 4:30 a.m. and was hoisted atop the Boeing Delta II rocket at 6:20 a.m. The Flight Program Verification, an integrated test of the spacecraft/launch vehicle combination and the last major test before launch, is scheduled to occur on July 24. The spacecraft was mated to the Delta third stage, or upper stage, on July 12 at Astrotech. Meanwhile, the stacking of the Boeing Delta II launch vehicle on Pad 17-B began on June 30 with the hoisting of the first stage atop the launcher. Attachment of the nine strap-on solid rocket boosters in sets of three was completed July 6. The second stage was hoisted into position atop the first stage on July 8. The first "power-on" testing was completed on July 12. A vehicle control check was performed on July 14. This test procedure qualifies the first and second stage steering systems. A Simulated Flight (SimFlight) or flight test of the launch vehicle electrical and mechanical systems was completed on July 15. The first stage leak check, or LOX leak check, occurred on July 16 with the loading aboard of liquid oxygen. This test also exercises the first stage propulsion team using a procedure similar to that which will be during the countdown on launch day. On Monday, July 19, the first stage fuel system was then qualified by loading RP-1, a highly refined kerosene fuel. There are no technical issues or concerns with MESSENGER or the Boeing Delta II at this time. The launch period extends through Aug. 14. Mission: Demonstration of Autonomous Rendezvous Technology (DART); Launch Vehicle: Pegasus XL; Launch Site: Vandenberg Air Force Base, Calif.; Launch Date: October 18, 2004 NET. On the Pegasus XL launch vehicle, the aft skirt has been installed. The fins are mechanically mated and alignment is underway. The GPS and UHF antennas have also been installed. The DART spacecraft arrived at Vandenberg Air Force Base on July 13 to begin final preparations for launch. The spacecraft's Reaction Control System (RCS) has been charged with gaseous nitrogen and leak checks are underway. DART has been designed and built for NASA by Orbital Sciences Corporation as a flight demonstrator to locate and maneuver near an orbiting satellite. The DART spacecraft weighs about 800 pounds, is nearly 6 feet long and 3 feet

in diameter. The Orbital Sciences Pegasus XL vehicle will launch DART into a circular polar orbit of approximately 475 miles. The Demonstration of Autonomous Rendezvous Technology (DART) satellite is an advanced flight demonstrator that provides a key step in establishing autonomous rendezvous capabilities for the U.S. Space Program. While previous rendezvous and docking efforts have been piloted by astronauts, the unmanned DART satellite will have computers and cameras to perform all of its rendezvous functions. Bruce Buckingham. (2004). **Spacecraft and Expendable Vehicles Status Report** [Online]. Available E-mail: domo@news.ksc.nasa.gov/subscribe shuttle-status [2004, July 21].]

◆ A proposed budget boost for NASA appears headed in the opposite direction as the agency falls victim to competing priorities and tighter federal purse strings. While President Bush requested an $866 million increase for the space agency for the 2005 fiscal year, a House budget panel Tuesday passed a plan that would cut the agency's budget by $229 million. The space-shuttle program would get all $4.3 billion requested by the National Aeronautics and Space Administration, and the agency's Mars exploration program would receive the full $691 million. But the House is offering nearly $1.1 billion less than the $16.2 billion requested by Bush -- with most cuts coming in programs that are part of the agency's plan to return astronauts to the moon and, eventually, send them to Mars. U.S. Rep. James Walsh, the New York Republican who chairs the subcommittee that controls NASA's budget as well as that of the Department of Veterans Affairs, among others, said NASA and many other agencies could not get everything they wanted because of a shrinking pot of federal money and the need to funnel more cash into health care for veterans. [“Panel pinches NASA’s budget,” **Orlando Sentinel**, July 21, 2004, p A1 & A4.]

**July 22:** NASA Television will improve coverage to viewers in Alaska and Hawaii, as well as the continental United States, when it switches its signal from one satellite to two different ones. Beginning July 24, NASA Television will be seen in the continental United States on AMC-6, at 72 degrees west longitude, Transponder 9, 3880 MHz, vertical polarization, audio at 6.8 MHz. People living in Alaska or Hawaii can see NASA TV on AMC-7, at 137 degrees west longitude, Transponder 18, at 4060 MHz, vertical polarization, audio at 6.8 MHz. NASA Television will no longer broadcast from its present satellite, AMC-9, after July 24. [“NASA Television Expands Reach With Satellite Switch July 24,” **KSC Countdown**, July 22, 2004.]

**July 23:** NASA and its space partners Friday approved a scaled-down International Space Station with fewer astronauts and less science so the United States can meet a 2010 deadline for ending shuttle flights, a top NASA official said. Space agencies in Russia, Europe, Canada and Japan gave unanimous approval to a NASA plan that means the orbiting platform, now about half completed, will never become the beehive of scientific and commercial research once envisaged. In exchange, NASA will continue with plans to launch research modules owned by its partners, some of them already built. The agreement means the station will never support long duration crews of seven astronauts, as intended, but will be able to house at least four astronauts starting in 2009, said NASA's deputy administrator, Fred Gregory. He was speaking to reporters by

teleconference from Noordwijk, The Netherlands, where space agency heads met this week. Web posted. (2004). [NASA cuts back plans for space station [Online]. Available WWW: http://www.cnn.com/ [2004, July 23].]

◆ The families of the Space Shuttle Challenger's crew today accepted the Congressional Space Medal of Honor from NASA Administrator Sean O'Keefe. The honors, presented in the name of Congress and on behalf of President George W. Bush, were made during a private ceremony with the families of the seven astronauts in Washington. "The Challenger tragedy was a defining moment in American history and demonstrated that achieving great things often comes with great sacrifice. We honor the bravery and dedication of the crew and their families with a renewed commitment to the causes to which they devoted their lives -- exploration and discovery," said Administrator O'Keefe. "Not a single day goes by that the entire NASA family doesn't think about the incredible spirit of these brave explorers. We will never forget our fallen astronaut heroes and their courageous families." The Space Shuttle Challenger's crew of seven astronauts died in the explosion of their spacecraft during the launch of STS-51-L on January 28, 1986, from NASA's Kennedy Space Center in Florida. The explosion occurred 73 seconds into the flight, as a result of a leak in one of two Solid Rocket Boosters that ignited the main liquid fuel tank. The STS-51-L crew included Commander Francis R. (Dick) Scobee, Pilot Michael J. Smith, Mission Specialists Judith A. Resnik, Ronald E. McNair and Ellison S. Onizuka, Payload Specialist Gregory B. Jarvis and Sharon Christa McAuliffe, the first teacher to fly in space. The Congressional Space Medal of Honor was authorized by Congress in 1969 to recognize "any astronaut who in the performance of his duties has distinguished himself by exceptionally meritorious efforts and contributions to the welfare of the Nation and mankind." [“Challenger Crew Honored With Congressional Space Medal of Honor,” **NASA News Release #04-238**, July 23, 2004.]

◆ NASA has met two more recommendations that are required for the space agency to return to flight, but remains stymied on inspection and repair methods for shuttles in orbit. Inspection and repair, along with the elimination of fuel-tank foam shedding, are the most technically challenging issues facing NASA as it aims for a spring 2005 launch, the head of an oversight panel said Thursday. Despite the lingering hurdles, there is no reason to believe shuttle flights won't resume next March or April, said Richard Covey, a former shuttle commander who is chairman of the task force overseeing NASA's progress following the Columbia disaster. The task force gave conditional approval Thursday to NASA's response to two return-to-flight recommendations, one requiring digital photography for critical shuttle systems to augment engineering drawings and create a robust database. The other requires a standard definition for debris discovered during shuttle flight preparations. That brings to five the number of Columbia Accident Investigation Board recommendations that NASA has successfully met; 10 remain before Discovery can take off on the first post-Columbia flight. Web posted. (2004). [Shuttle inches closer to flight next spring [Online]. Available WWW: http://www.cnn.com/ [2004, July 23].]

◆ Space Shuttle Processing Status Report: **Discovery (OV-103):** As early as next week, Discovery will be powered up following an extensive power-down period in which modifications associated with Return to Flight were performed. During this period, technicians installed wiring that will support the orbiter boom sensor system that will be used to inspect the Shuttle, the wire harness to support the new External Tank cameras and prepared for installing the new wing leading edge sensors. In the Orbiter Processing Facility, Discovery's right-hand Orbital Maneuvering System pod has undergone final inspections and has been installed for flight. **Atlantis (OV-104):** Technicians continue to process Atlantis for its future mission to the International Space Station. The vehicle remains in a scheduled four-month power-down period. Return to Flight and wire modifications are progressing well. Body flap actuators have been removed and quality control is performing post-removal inspections. Wing leading edge work continues with four right-hand Reinforced Carbon-Carbon panels hung and 17 spar fittings installed. The spar fittings, which are a series of floating joints that reduce stress on the panels when the Shuttles are in flight, mechanically attach the RCC panels to the wing. **Endeavour (OV-105):** Space Shuttle Endeavour is in its Orbiter Major Modification period, which began last December. Electrical modifications continue in the crew module. Technicians are working on installing the new Multi-functional Electronics Display System, or "glass cockpit." Endeavour is the last vehicle to have the new display system installed. Wire routing and flight deck preparations are progressing for the three-string Global Positioning System. Build-up of the chin panel, the smile-shaped section of RCC that fits directly below the nose cap to provide a thermal barrier during reentry, is progressing. Bruce Buckingham (2004). **Space Shuttle Processing Status Report: Vol. 1 No. 22** [Online]. Available E-mail: domo@news.ksc.nasa.gov/subscribe shuttle-status [2004, July 23].]

**July 24:** Discovery is starting to look like a space shuttle again. Workers have secured nearly all of its refurbished wing panels. Its nose is back. And while it's missing engines and needs some tile work, the orbiter is expected to be powered up this weekend, the prelude to important pre-flight tests. "We've had this orbiter torn apart for structural inspections, wire inspections," NASA vehicle manager Stephanie Stilson said Friday at Kennedy Space Center. "We've put it back together. Now we've got to power up those systems and make sure they're working properly. So there's a lot of work still ahead of us to do." Discovery was in the middle of an overhaul when Columbia was destroyed a year and a half ago. Eventually, it was designated as the ship that would return the fleet to space. One of those essential changes was protecting the wing from another fiery breach like the one that doomed Columbia, caused by foam from the external tank that struck the orbiter shortly after launch. The reinforced carbon-carbon wing panels have been refurbished by their manufacturer, Lockheed Martin Vought Systems in Dallas. They were tested with ultrasound, electrical currents and X-rays. "We've established a good baseline," said Ken Wagner of shuttle contractor United Space Alliance. In each wing, he said, workers will install sensors that can detect impacts and temperature changes. The information will flow through relays to a laptop computer on the shuttle, then will be sent to mission controllers in Houston for analysis. The sensors are designed to work, starting at launch, for 30 minutes. They also can be turned on selectively during the mission to sense hits from orbital debris, as long as their batteries hold out. The installation should

be finished this fall. Web posted. (2004). [Shuttle slowly regains shape [Online]. Available WWW: http://www.floridatoday.com/ [2004, July 24].]

◆ The White House is threatening to veto a spending bill that funds veterans hospitals and public housing if Congress doesn't increase money allocated to the U.S. space program. In a letter sent to key House leaders, the Office of Management and Budget indicated President Bush is contemplating a veto of the $92.9 billion appropriations bill for Veterans, Housing and Urban Development and Independent Agencies. The letter follows Thursday's vote by the House Appropriations Committee approving $15.1 billion for NASA for the fiscal year that begins Oct. 1. That spending level is $229 million below this year's and $1.1 billion less than the Bush administration requested. Much of that money was to pay for new programs NASA officials said are necessary to begin work on Bush's initiative to return astronauts to the moon and eventually send them to Mars. "The Administration is disappointed, however, that many of the other priorities outlined in the President's FY 2005 Budget are not adequately funded in this bill, including the President's 'Vision for Space Exploration,' "according to the letter from OMB Director Joshua B. Bolten. NASA Administrator Sean O'Keefe also sent a letter expressing concern over the panel's failure to provide the space agency with the funds it requested. [“White House threatens veto to save NASA spending bill,” **Florida Today,** July 24, 2004, p 8A.]

◆ The countries partnered in the International Space Station plan to increase the crew to six people by about 2009 under a deal reached this week in the Netherlands. Important details must still be worked out, but the partners endorsed a plan to install the European and Japanese science laboratories as well as most of the other major components called for under the original international agreements to build the $100 million station. The two biggest exceptions are no surprise: a U.S.-built escape vehicle and habitation module that were critical to a larger crew. NASA stopped work on those projects in 2001, shortly after President Bush took office and ordered the agency to control the costs of a station program that was at least $5 billion over budget. However, the deal requires the U.S. to provide an advanced life support system and other elements that would make room for as many as six astronauts and cosmonauts, Associate Administrator Fred Gregory told reporters during a teleconference from Noordwijk, The Netherlands, where the heads of the world's space agencies met to discuss the station's future. NASA says that if the shuttle returns to flight next spring as planned, it can finish building the station by 2010. That's the date President Bush asked the agency to finish construction and retire the aging shuttles, so the U.S. can move on with plans to send people to the moon and Mars. Completing the job will take 25 to 30 more shuttle flights, a rate of four to five missions per year. [“Station partners agree to add more residents,” **Florida Today**, July 24, 2004, p 8A.]

**July 26:** Sen. John Kerry is making his pitch for his health care policies in Brevard County today. But last night he was making another pitch, for his hometown Boston Red Sox. Kerry threw out the first pitch at Fenway Park in Boston as the Sox took on their arch-rival New York Yankees. While Kerry might have enjoyed his side trip to Beantown -- the Sox won 9-6 over the Yanks -- it delayed his arrival to the Space Coast. Kerry, who

will return to Boston on Thursday to accept the Democratic Party nomination for president, was originally expected to arrive at Space Coast Regional Airport early Sunday evening. Kerry, who spoke in Columbus, Ohio, earlier in the day, brought former astronaut and Ohio Sen. John Glenn to Brevard with him on the visit to the Space Coast. The Brevard County stop is halfway through what the Kerry campaign is calling "America's Freedom Trail to Boston." Kerry landed in Titusville at 2:48 a.m. and was expected to resume his schedule today in Brevard County, with invitation-only events at Kennedy Space Center Visitor Complex. Web posted. (2004). [Kerry arrives in Brevard in early morning [Online]. Available WWW: http://www.floridatoday.com/ [2004, July 26].]

◆ NASA is moving ahead with plans to redesign a part of the Space Shuttle external fuel tank that investigators believe played a critical role in the Space Shuttle Columbia accident. The Space Shuttle program will soon begin manufacturing and installing an improved bipod fitting, which connects the external fuel tank to the Shuttle during launch. A Critical Design Review Board of NASA managers, engineers and aerospace contractors last month approved the new design, a significant milestone in the effort to return the Shuttle to safe flight. The approval allows workers to begin incorporating the new fitting on External Tank No. 120, the tank slated for flight on the next Shuttle mission, designated STS-114. Investigators believe that during Columbia's launch in January 2003, insulating foam from the bipod area fell off the external tank and damaged the left wing of the Space Shuttle. The new design addresses the Columbia Accident Investigation Board recommendation to reduce the risk to the Shuttle from falling debris during liftoff. It eliminates the foam covering from the bipod fitting and replaces it with four rod-shaped heaters. The heaters will serve the same primary function as the foam, preventing ice buildup on the tank's bipod fittings. [“NASA Approves New Design For Shuttle External Tank Fitting,” **NASA News Release #04-240**, July 26, 2004.]

**July 27:** MESSENGER, a NASA space probe set to conduct the first scientific investigation of Mercury as it orbits the planet, will be launched aboard a Boeing Delta II Heavy expendable launch vehicle Monday, Aug. 2. Liftoff is targeted for the opening of a 12-second launch window that begins at 2:16:11 a.m. EDT. The mission will begin with a liftoff from Pad 17-B on Cape Canaveral Air Force Station. Should launch be postponed for any reason, the next launch time is Aug. 3 at 2:15:56 a.m. EDT. MESSENGER’s cameras and sensors will provide the first images of the entire planet and collect important information on the composition and structure of Mercury’s crust, its geologic history, the nature of its thin atmosphere and active magnetosphere, and the makeup of its core and mysterious polar materials. [“MESSENGER Spacecraft To Be Launched Aboard Delta II Aug. 2,” **KSC News Release #56-04**, July 27, 2004.]

◆ Howard Benedict, called the "dean of aerospace journalism," has retired as the executive director of the Astronaut Scholarship Association. Benedict was honored Tuesday night at a private celebration at the Kennedy Space Center Visitor Complex, attended by about 80 friends and co-workers. "When you get to be 76, your bones get a little achy," Benedict said. But he doesn't plan on sitting idle during his retirement. The Sioux City, S.D., native said he's going to contribute to a book about the history of The

Associated Press. He'll write about how the agency covered aerospace. Benedict worked for AP for 37 years, 31 as senior aerospace writer. Throughout his career, he covered more than 2,000 missile and rocket launches. [“Longtime AP space reporter retires,” **Florida Today**, July 28, 2004, p 2B.]

**July 28:** Spacecraft and Expendable Vehicles Status Report: Mission: MESSENGER; Launch Vehicle: Delta II Heavy; Launch Pad: 17-B, Cape Canaveral Air Force Station; Launch Date: Aug. 2, 2004; Launch Window: 2:16:11 a.m. – 2:16:23 a.m. EDT. On Tuesday, July 27 at Pad 17-B, the two halves of the Delta payload fairing were placed around the MESSENGER spacecraft. The securing of the fairing is being completed today. The Flight Readiness Review is scheduled for Thursday, July 29. On Friday, July 30, the loading of the second stage with its complement of hypergolic propellants is scheduled. On Saturday, July 31, Flight Slews which are checks of the launch vehicle steering system, will be performed. The final Range Safety beacon checks are also scheduled. For launch, retraction of the mobile service tower that is the gantry surrounding the Delta II is scheduled to begin at approximately 4:30 p.m. Sunday, Aug. 1. Loading aboard the Delta first stage of RP-1, a highly refined kerosene fuel is scheduled to begin at 11:36 p.m. The cryogenic liquid oxygen will be loaded aboard the first stage approximately one hour later. Mission: Demonstration of Autonomous Rendezvous Technology (DART); Launch Vehicle: Pegasus XL; Launch Site: Vandenberg Air Force Base, Calif.; Launch Date: October 18, 2004 (tentative). On the Pegasus XL launch vehicle, the aft skirt has been installed. The fins are mechanically mated and alignment continues. The GPS and UHF antennas have been installed. Installation of fillet, material that acts as an interface between the first stage and the wing of the Pegasus, is currently undergoing installation. The Demonstration of Autonomous Rendezvous Technology (DART) spacecraft was rotated from horizontal to vertical and lifted onto a test stand July 27 for further launch processing activities. The spacecraft’s Reaction Control System (RCS) has been charged with gaseous nitrogen and leak checks are underway. DART has been designed and built for NASA by Orbital Sciences Corporation as a flight demonstrator to locate and maneuver near an orbiting satellite. The DART spacecraft weighs about 800 pounds, is nearly 6 feet long and 3 feet in diameter. The Orbital Sciences Pegasus XL vehicle will launch DART into a circular polar orbit of approximately 475 miles. The DART satellite is an advanced flight demonstrator that provides a key step in establishing autonomous rendezvous capabilities for the U.S. Space Program. Bruce Buckingham. (2004). **Spacecraft and Expendable Vehicles Status Report** [Online]. Available E-mail: domo@news.ksc.nasa.gov/subscribe shuttle-status [2004, July 28].]

◆ Cheryle Mako has had a hand in space-shuttle payloads, the International Space Station and a number of scientific missions. Now, her hopes are flying to Mercury. Mako is NASA's mission integration manager for MESSENGER's flight to the hot planet closest to the sun. "It's working with a matrix team of very bright, intelligent engineers and analysts," she said recently at Kennedy Space Center. "I enjoy working with a variety of spacecraft missions." Her next assignment will be more earthbound -- she'll shadow the assistant KSC director, Woodrow Whitlow Jr., for six months. "I really am very curious to see how the center's run day to day," said Mako, who lives in Merritt Island.

She has had to delay the start of her internship as the MESSENGER launch slipped from March to May to August. The spacecraft and the Boeing Delta 2 rocket's upper stage were moved from Astrotech in Titusville to the launch pad last week. [“MESSENGER manager ready for flight,” **Florida Today**, July 28, 2004, 3B.]

**July 29:** NASA is rebuilding the next shuttle's external fuel tank without the large chunks of foam blamed for the deaths of seven astronauts last year. Given the go-ahead in a critical review last month, NASA is proceeding with a plan announced last year to eliminate the foam "bipod ramps" from the design of the 15-story orange tank. Workers at a Lockheed factory near New Orleans will retrofit that fuel tank, which was built before the accident and had to be shipped back from Kennedy Space Center for the overhaul. Seven other tanks, which were completely or partially built before the accident, also will be overhauled. Discovery's tank is to be shipped back to Kennedy Space Center, via barge around the tip of Florida, sometime in October. If plans to launch in March or April hold, the tank, two solid rocket boosters and Discovery likely would be assembled in December and sent to the launch pad in January. The removal of the large foam ramps is just one of the major design changes to the fuel tank. Most of the changes focus on the orange-colored insulation that coats the aluminum tank to protect it from the heat of launch and to stop ice from forming outside the tank and hitting the orbiter on the way to space. [“Foam ramps removed from shuttle fuel tank,” **Florida Today**, July 29, 2004, p 1A.]

◆ There was no "dirty trick" behind the photographs of Sen. John Kerry wearing the blue anti-contamination suit while touring the shuttle Discovery on Monday. As political pundits and comedians pounced on the pictures of Kerry in what outsiders might deem a goofy-looking costume, the senator's campaign aides alleged the pictures were not supposed to be released publicly. Not true, said NASA. Government photographers routinely snap pictures of visiting dignitaries. Kerry's group more than qualified as dignitaries: four U.S. senators, two of whom were former astronauts, John Glenn and Bill Nelson. NASA often posts such pictures on its Internet sites for the public and reporters. Furthermore, NASA spokesman Bill Johnson said the Kerry campaign asked that the pictures be taken of the senator's unusually up-close tour of the Discovery and that processing be expedited so reporters could have them. The pictures have prompted chuckles and jokes among political pundits covering the Democratic National Convention in Boston because, to people unfamiliar with shuttle operations, the head-to-toe light-blue suits look goofy. However, astronauts, workers or anyone else getting inside a shuttle or near other spacecraft and rockets being readied for launch wears such coveralls to protect the delicate vehicles from contamination. [“NASA defends photos of Kerry during his tour of space center,” **Florida Today**, July 29, 2004, p 4A.]

**July 30:** Space Shuttle Processing Status Report: **Discovery (OV-103):** On Tuesday, Discovery completed its last major power-down period when it was powered up in preparation for its Return to Flight mission to the International Space Center. The event follows the addition of new modifications that will help monitor the vehicle for safe flight. In response to the Columbia Accident Investigation Board’s recommendation to monitor the orbiter and wing leading edge during ascent and view the External Tank upon

separating from the Space Shuttle, technicians finished installing wiring to support the addition of a new External Tank separation camera, wing leading edge sensors, and the orbiter boom sensor system. **Atlantis (OV-104):** Work is progressing on schedule during Atlantis's scheduled four-month power-down period. Structural and baseline wire inspections continue throughout the vehicle, along with wire separation and Return to Flight modifications. Technicians are performing the wire separation modification as a safety measure so that redundant wires are not located next to each other. Wing leading edge work continues with 13 right-hand Reinforced Carbon-Carbon (RCC) panels hung and 19 spar fittings installed. The spar fittings, which are a series of floating joints that reduce stress on the panels when the Shuttles are in flight, mechanically attach the RCC panels to the wing. Following the installation of the chin panel, workers continue final closeout of the area. The chin panel is the smile-shaped section of RCC that fits directly below the nose cap to provide a thermal barrier during reentry. **Endeavour (OV-105):** Space Shuttle Endeavour is in its Orbiter Major Modification period, which began last December. Electrical modifications continue in the crew module. Body flap and left-hand wing leading edge bead blasting is complete, with final detailed clean up of minor corrosion underway. Next week, the nose cap and chin panel are scheduled for a temporary installation so technicians can begin the work on the Thermal Protection System tiles surrounding the area. After two to three months, the nose cap and chin panel will be taken down, and the nose cap sent to the Thermal Protection System Facility at Kennedy Space Center for the installation and fit check of the more than 200 Thermal Protection System blankets that line the nose cap. Bruce Buckingham (2004). **Space Shuttle Processing Status Report: Vol. 1 No. 23** [Online]. Available E-mail: domo@news.ksc.nasa.gov/subscribe shuttle-status [2004, July 30].]

◆ The "bunny suit" pictures of Sen. John Kerry climbing around inside the shuttle Discovery earlier this week disappeared from NASA's Web site for several hours today, but the bizarre political flap surrounding them will not go away. NASA's lawyers advised the agency to delete from its Internet sites the pictures of Kerry and three current and former senators, including legend John Glenn, getting an exclusive tour of Kennedy Space Center and the shuttle during a campaign swing through here Monday. Later in the day, after a legal review, NASA decided to put the photos back online. NASA lawyers claim the pictures might violate the Hatch Act, a federal law prohibiting campaign activities on government installations. "To ensure NASA's apolitical stance, general counsel wanted to review the photographs and some of the photographs will go back online. The ones that won't be up there are the ones from the (Visitor Complex) rally itself," said Bob Jacobs, a spokesman at the space agency's headquarters in Washington. ["NASA flip-flops on 'bunny' pics," **Florida Today**, July 30, 2004, p 1A & 8A.]

**July 31:** A Delaware company is suing a competing NASA contractor, alleging defective bolts -- not foam -- doomed shuttle Columbia. Hi-Shear Technology Corp., which made the booster-rocket connecting bolts for shuttles before Columbia's final launch last year, last week sued the company that replaced it, Pacific Scientific Energetic Materials Co. Hi-Shear alleges that the new company was handed its exclusive technology. They also say that the new company's bolts, eight of which attach the twin solid rocket boosters to the orange fuel tank, did not work as designed during Columbia's

launch. About two minutes after launch, the assembly explodes to split the bolts in half, releasing the boosters. NASA discounted the lawsuit's allegation that bolts had anything to do with the hole in the left wing that allowed Columbia to break up during re-entry on Feb. 1, 2003. The agency said the Columbia Accident Investigation Board determined the bolts and related "bolt catcher" did not cause the disaster. "We have total confidence after a seven-month investigation that the CAIB was right," Kennedy Space Center spokesman Mike Rein said. "They conducted a very thorough investigation." Web posted. (2004). [Suit claims bad bolts doomed Columbia [Online]. Available WWW: http://www.space.com/ [2004, July 31].]

**During July:** The transition to the new exploration program of a large number of people with critical propulsion and other skills will depend largely on how well the phaseout of the space shuttle is managed. The shuttle must be phased out such that it aids the transition of manned space systems experience into the new programs. Such critical skills are not currently being developed on their own at a fast enough rate to fully support the new initiatives, said Don McMonagle, Pratt & Whitney Space Propulsion director for strategy and development. He is a former astronaut with three shuttle flights. Howard DeCastro, United Space Alliance vice president and shuttle program manager, said attrition of the shuttle workforce before the Columbia accident had been about 4.5% per year, but it's now at 7.5%. The company is trying to instill in its employees that United Space Alliance is a "launch services company" that will stay part of operations with the new CEV and other exploration developments. "No job is more important to NASA or the overall U.S. space program than getting the shuttle program back to flight," said former shuttle astronaut Bob Crippen, who flew four missions including piloting the first flight with John Young in 1981. There was universal agreement with that view among industry leaders at the 40th AIAA Propulsion Conference. NASA shuttle program manager Bill Parsons said the agency is comparing benchmarks with how other large programs were phased out to make a smooth transition to CEV operations. Shuttle flights are to end about 2010 after about 28-30 more missions. The program is on track for a return to flight by mid-March into May with "about seven months of work to get done in the next five," not an unusual scheduling posture, Parsons said. More importantly, the program personnel over the last two months have begun to feel "they are ready to go fly." ["Shuttle Is Crucial," **Aviation Week & Space Technology**, July 19, 2004, p 59.]

Workers in the Orbiter Processing Facility carefully guide the placement of the third Space Shuttle Main Engine (SSME) for installation on Discovery. Discovery is designated as the Return to Flight vehicle for mission STS-114. Recent improvements to the SSME include the introduction of redesigned high-pressure turbopumps into the SSME fleet. The new pumps are designed and built by Pratt & Whitney at West Palm Beach, Fla. SSMEs and the Pratt & Whitney turbopumps are tested at Stennis Space Center in Mississippi. Engines and engine components are delivered to Kennedy Space Center to be prepared for flight.

## AUGUST

**August 1:** Is NASA on the Hatch Act launching pad? The Office of Special Counsel, which prosecutes Hatch Act violations, has sent a letter to the National Aeronautics and Space Administration asking for information on a campaign stop by Sen**.** John F. Kerry, the Democratic presidential candidate, at the Kennedy Space Center in Florida last week. The Hatch Act limits political activities by federal employees and prohibits partisan activities on federal property. On July 26, Kerry held a "town hall" meeting in the NASA visitor center near the space shuttle launch pads. The visitors center is managed by a vendor, Delaware North Cos., and often rents out rooms to conventions and corporate groups. When Democrats called to see if they could book Kerry, the appearance was deemed "a permissible event" by the center's staff members and their counterparts at NASA, said Dan LeBlanc, chief operating officer for the visitor complex. LeBlanc said Kerry was accompanied by Florida's two senators, Bill Nelson and Bob Graham, as well as former senator John Glenn, the legendary astronaut. All are Democrats. "It was not a campaign event but a town hall meeting," LeBlanc said. "It was not in a federal workplace but in a public facility on federal property." According to news reports, about 400 Floridians attended the meeting, during which Kerry said the nation needs a president who believes in science and supports stem-cell medical research. The campaign provided 25 tickets to NASA employees, and about 30 employees attended. "Any NASA employee who attended the town hall meeting had to take leave [vacation time] in order to go, and they did that," said Bob Jacobs, a NASA spokesman. Jacobs said NASA has taken photographs of Kerry at the town hall meeting off its Web site "to ensure NASA's apolitical stance." The photos were removed at the request of the NASA general counsel, Jacobs said. After the meeting, one of the Florida senators suggested that the group take a tour, and the NASA staff suggested that Kerry, Glenn and the Florida senators visit the building where the space shuttle Discovery is being prepared for launch. If the Office of Special Counsel, headed by Scott J. Bloch, determines that the Kerry appearance represented a misuse of federal property, it can recommend that disciplinary action be taken against NASA employees who coordinated or approved the activities. The possible sanctions include dismissal from government employment. Web posted. (2004). [Kerry could put NASA in the hot seat [Online]. Available WWW: http://www.washingtonpost.com/ [2004, August 1].]

◆ Over the weekend, an unprecedented transformation of NASA's organizational structure occurred, streamlining the agency and putting it in a better position to implement the Vision for Space Exploration. In June, the President's Commission on Implementation of U.S. Space Exploration Policy found that NASA needed to transform itself into a leaner, more focused agency. "The Commission recognized that to make the Vision a success we needed a more integrated approach to science, management and systems and mission development," said NASA Administrator Sean O'Keefe. "Since we made this announcement in June, we've worked these past weeks to remove the 'stove pipes' and to streamline the agency in a way that will allow us to support the Vision for Exploration in a more efficient and affordable way." This transformation fundamentally restructures NASA's Strategic Enterprises into Mission Offices. Headquarters support functions also have been realigned to better clarify organizational roles and

responsibilities. The agency has redefined its relationships with the NASA Field Centers by developing clear and straightforward lines of responsibility and accountability. Specific Mission Associate Administrators are now assigned as Headquarters Center Executives. They have oversight of field center performance in implementing agency policies and programs. The changes that went into effect over the weekend represent not only the next step in implementing the recommendations of the President's Commission on Implementation of U.S. Space Exploration Policy, they also reflect NASA's ongoing efforts to apply the findings and recommendations of the Columbia Accident Investigation Board across the agency. "The changes that went into effect Aug. 1 are significant, but our work isn't complete," Administrator O'Keefe added. "This transformation will be an ongoing, evolutionary process. As we identify innovative ways to do our jobs better, we'll move forward and implement those changes. This is truly an exciting time to be a part of NASA." [“NASA Transformation in Effect,” **NASA News Release #04-253,** August 2, 2004.]

**August 2:** The launch of NASA’s MESSENGER spacecraft aboard a Boeing Delta II rocket was postponed this morning due to lightning potential from residual clouds that were associated with Tropical Storm Alex. The launch has been rescheduled for Tuesday, August 3 at 2:15:56 a.m. EDT at the opening of a 12-second launch window. The weather forecast calls for a 30% chance of not meeting the launch weather criteria. [“Messenger Launch Rescheduled for Tuesday, Aug. 3,” **KSC News Release #58-04,** August 2, 2004.]

◆ NASA has exercised an option to extend for two years the Space Flight Operations Contract (SFOC), which supports the Space Shuttle Program. This two-year option, valued at $3.6 billion, extends the contract period of performance with United Space Alliance (USA), LLC, of Houston through Sept. 30, 2006. Efforts under this contract include continuation of Return to Flight work and support for mission design and planning; software development and integration; astronaut and flight controller training; system integration; flight operations; vehicle processing, launch and recovery; vehicle sustaining engineering; and flight crew equipment processing. The SFOC is a cost reimbursement contract, with provisions for award fee and performance fees. This option is the final extension under the SFOC awarded in 1996. NASA also has begun proceedings to establish a new contract with USA covering Space Shuttle operations from Oct. 1, 2006, through the planned retirement of the Shuttle fleet. Work in support of this contract is performed at USA's facilities in Houston; Huntsville, Ala.; Kennedy Space Center, Fla.; and major subcontractor facilities in Huntington Beach, Calif.; Houston; and Cape Canaveral, Fla. [“NASA Exercises $3.6B Option on Space Flight Operations Contract,” **NASA News Release #c04-q,** August 2, 2004.]

**August 3:** The first of five engines to be fully assembled at KSC was unveiled Tuesday. Space Shuttle Main Engine (SSME) 2058 is being shipped to NASA’s Stennis Space Center in Mississippi to undergo a hot fire acceptance test. The Space Shuttle program aims to have 15 engines ready for launch at any given time. Historically, SSMEs were assembled in Canoga Park, Calif., with post-flight inspections performed at KSC. Both functions were consolidated in February 2002. The Rocketdyne Propulsion and Power

division of The Boeing Co. manufactures the engines for NASA. [“Shuttle Main Engine prepares to get “fired up,” **KSC Countdown**, August 5, 2004.]

◆ NASA launched its first mission to the planet Mercury in a generation early on Tuesday, one that scientists hope will strip away much of the mystery surrounding the tiny planet closest to the sun. The MESSENGER (MErcury Surface, Space ENvironment, GEochemistry and Ranging) spacecraft, riding a Boeing Co. Delta 2 rocket, blazed across the nighttime sky above Florida's Cape Canaveral Air Force Station as the $427 million mission got underway with lift off at 2:16 a.m. EDT on Tuesday. Among the questions scientists hope to answer is whether Mercury, just slightly larger than Earth's moon, was once Earth-sized itself but lost its rocky exterior either to some cataclysmic collision or to slow ablation by the solar winds. Scientists also believe there may be frozen water there, trapped in shadowy craters at the planet's poles, never exposed to the sunlight that creates a 1,100 degree F difference between daytime and nighttime temperatures on the planet. "The inner planets (Mercury, Venus, Earth and Mars) all formed from the disk of gas and dust, the solar nebula that surrounded our young sun. They formed by the same processes, they formed at the same time, (but) their outcomes were extremely different. And Mercury is the most extreme of those four planets," said Sean Solomon, principle scientist for the $426 million mission. MESSENGER will reach Mercury after a seven-year sojourn through the solar system that will take it 15 times around the sun, making near passes of Earth once, Venus twice, and Mercury itself three times. Each planetary pass will act as a gravitational tug to slow MESSENGER's speed so that it can eventually slip into Mercury's orbit for a year-long study. The only other up-close look planetologists have had of Mercury came in the mid-1970s when NASA's Mariner 10 spacecraft made three fly-bys, photographing about 45 percent of the planet and discovering that it had a strong magnetic field, an indication, scientists say, that Mercury is about two-thirds iron. MESSENGER was developed by the Applied Physics Laboratory at John Hopkins University and is the seventh in NASA's Discovery series of relatively low-cost solar system missions. Web posted. (2004). [NASA launches first Mercury mission in 3 decades [Online]. Available WWW: http://www.reuters.com/ [2004, August 3].]

◆ NASA officials said that the costs of returning the grounded space shuttle to flight have risen as much as $900 million over original projections, raising the possibility that the agency may have to seek extra money from Congress next year or cut other space programs to fund the shortfall. NASA Deputy Associate Administrator Michael Kostelnik said that "we'll be easily able to handle 2004," by searching within the agency for between $100 million and $200 million in extra money. But funding for 2005, with a projected shortfall between $400 million and $700 million, "is still an uncertainty," he added. Nevertheless, Kostelnik emphasized that the cost projections may change and that even with a $700 million shortage, "we wouldn't need help in that regard until the fall of next year." He said NASA was unlikely to seek congressional help until 2005, and only if necessary. "First we would look for resources with Space Operations and second within the agency," Kostelnik told reporters during a telephone news conference. "Then we would look to do something outside the agency later in the year." NASA's announcement came 12 days after a key congressional committee passed a bill cutting the Bush

administration's 2005 NASA budget proposal by more than $1 billion, dealing a sharp blow to the president's initiative to return humans to the moon and eventually send them to Mars. Bush has threatened to veto the bill. The budget shortfalls were outlined in the newest version of NASA's "Implementation Plan for Space Shuttle Return to Flight and Beyond," which described the agency's ongoing efforts to ready the shuttle for a trip to the international space station in March. Kostelnik said preparations were "on track." NASA grounded the orbiter after the Feb. 1, 2003, Columbia tragedy. The agency has been striving to implement 15 key recommendations by the blue-ribbon Columbia Accident Investigation Board, which analyzed the causes of the accident. Web posted. (2004). [Cost of Shuttle's return escalates [Online]. Available WWW: http://www.washingtonpost.com/ [2004, August 4].]

**August 4:** Before America leaves any more tracks in lunar or Martian soil, NASA has to reconsider the way its research centers are shaped to do space agency business. To that end, NASA put out a call to aerospace industry and research groups last week to look for someone to assess work performed at research centers and whether that work could be better done by private industry or universities, said David Stietz, a NASA spokesman in Washington, D.C. Responses are due Aug. 31. "We are looking for any and all potential solutions to better the way we do business," Stietz said. "We are looking for any innovative or creative ideas from across" industry or academia. "We'll consider any option," Stietz said. "If IBM wanted to buy a NASA center, then that might certainly be something we would want to consider. I'm not saying that's what (NASA) would do, but it is something that would be considered." NASA leaders discussed turning over space shuttle operations, including the crews, to a private company in 2000 and 2001. But the move was blocked over concerns of liability in the event of an accident. The United Space Alliance, a partnership between Lockheed Martin Corp. and Boeing Co., became the prime contractor for shuttle operations in the mid-90s. The review NASA asked for last week was suggested by the Aldridge Commission - the presidential panel that recommended NASA change the way its research centers work. In a report released in June, the panel suggested NASA look at the way the Jet Propulsion Lab in Pasadena, Calif., is operated as a federally funded research and development center. The lab is run by the California Institute of Technology but paid for by the federal government. There are 36 similar research labs administered by either universities or private businesses. Following that model would give NASA flexibility for its projects and could save money, the commission suggested. Web posted. (2004). [NASA looks to outsource space work [Online]. Available WWW: http://www.al.com/ [2004, August 4].]

◆ NASA plans to have a rescue shuttle ready for just the first two post-Columbia missions. After that, they might go back to business as usual. If the first two flights make NASA confident the safety fixes to the shuttles are working, agency managers said they might determine it's no longer necessary to have a rescue vehicle on standby for future missions. "After that, we will take a look and evaluate . . . and see where we need to go from there," said John Casper, a former astronaut now leading NASA's effort to implement recommendations made by the Columbia Accident Investigation Board. When Discovery blasts off on the first return-to-flight mission, as early as the spring, NASA says Kennedy Space Center will be ready to launch Atlantis on a rescue mission within

45 days. On the second flight, a rescue shuttle will be ready to go within 58 days. That's the amount of time that engineers estimate there would be food, water and working life support systems aboard the International Space Station to keep a larger crew of 10 people alive if the shuttle somehow becomes stranded there on one of the first two flights. Safety changes, such as reducing the amount of external tank foam debris battering the orbiters' heat shields, will be tested on those flights. "We need to understand the fixes that we've done we need to understand how well the systems work," shuttle program manager Bill Parsons said. Having a rescue shuttle on standby never was a requirement before Columbia because the agency was confident it was flying a reliable vehicle, Parsons said. If the safety modifications work as planned, engineers and managers may regain confidence that a rescue shuttle is not necessary. That's not the only post-Columbia change that might only last two launches. A requirement to launch during the daytime so that tracking cameras can get clear images of possible debris strikes also may go away after the first two launches, NASA has said. Getting rid of those two requirements would be a big boost to meeting President Bush's directive to finish building the space station and retire the aging shuttles by 2010. Doing so will require flying four to six times per year, a rate that was difficult to meet prior to Columbia. They dismissed suggestions by people inside and outside the agency that a rescue can't be pulled off, however. "We know it's do-able," Parsons said. [“Shuttle backups likely for 2 launches,” **Florida Today**, August 4, 2004, p 1A.]

**August 5:** Rocketdyne Propulsion and Power, a business unit of The Boeing Company, recently completed the build-up and avionics testing of engine 2058, the first Space Shuttle Main Engine (SSME) fully assembled at Kennedy Space Center. This week, in the SSME Processing Facility, technicians hoisted the more than 7,500-pound engine from its vertical work stand into a horizontal position in preparation for shipment to NASA's Stennis Space Center in Mississippi to undergo a hot fire acceptance test. Historically, SSMEs were built and assembled at Rocketdyne facilities in Canoga Park, Calif., with post-flight inspections performed at KSC. Both functions were consolidated in February 2002. Engine 2058 is the first of five engines to be fully assembled on site, to reach the desired number of 15 SSMEs ready for launch at any given time in the Space Shuttle Program. [“Boeing Completes First Fully Assembled Shuttle Main Engine At Kennedy Space Center,” **KSC News Release #61-04**, August 5, 2004.]

**August 6:** Space Shuttle Processing Status Report: **Discovery (OV-103):** Following the Return to Flight modifications performed on Discovery during its scheduled power-down period, work on the orbiter is returning to a more normal processing flow in preparing for its future mission to the International Space Station. This week, the conical seal installation on the Rudder Speed Brake (RSB) is continuing. The conical seals provide thermal protection for the RSB hinges and drum actuators. Work also continues on reassembling water coolant loop one, as does the routine post-operations testing on the left-hand Orbital Maneuvering System Pod thruster. **Atlantis (OV-104):** Atlantis is in a four-month power-down period, and the critical path wiring inspections and Return to flight modifications continue on schedule. Wing leading edge work continues with 13 right-hand Reinforced Carbon-Carbon (RCC) panels hung and 17 left-hand panels hung. Installation of the nose cap blankets also continues. These thermal blankets, which are

manufactured at Kennedy Space Center using heat-resistant fibers, line the inside of the nose cap, which is made of RCC, to provide further insulation for the orbiter. Workers continue checking the main landing gear door rigging this week, and also prepared water coolant loop one for draining. **Endeavour (OV-105):** Space Shuttle Endeavour is in its Orbiter Major Modification period, which began last December. Electrical modifications continue in the crew module. Removal began this week of the right outboard elevon actuator, which will be replaced with an upgraded one. As part of a planned modification effort. Three-string Global Positioning System wire routing in the avionics bay continues. This week, the nose cap and chin panel were temporarily installed so technicians can begin work on the Thermal Protection System tiles surrounding the area. The nose cap and chin panel will be removed in two to three months for fit checks of the more than 200 Thermal Protection System blankets that line the nose cap. Bruce Buckingham. (2004). **Space Shuttle Processing Status Report Vol. 1 No. 24** [Online]. Available E-mail: domo@news.ksc.nasa.gov/subscribe shuttle-status [2004, August 6].]

◆ Spacecraft and Expendable Vehicles Status Report: Mission: Swift**;** Launch Vehicle: Delta II; Launch Pad: 17-A; Launch Date: Oct. 7, 2004; Launch Window: 12:57 p.m. – 1:57 p.m. EDT. The Swift satellite, which will pinpoint the location of distant yet fleeting explosions that appear to signal the births of black holes, arrived at Kennedy Space Center on July 29 to begin preparations for launch. Today the Observatory Abbreviated Integrated System Test is being performed. This is a state-of-health test of the spacecraft's systems. Upcoming activity next week includes software installation and testing and the Observatory Integrated Systems Test. The stacking of the Boeing Delta II launch vehicle on Pad 17-A will begin on Sept. 1 with the hoisting of the first stage into the launcher. Attachment of the nine strap-on solid rocket boosters, in sets of three, is scheduled for Sept. 2-6. The second stage will be hoisted into position atop the first stage on Sept. 7. The payload fairing will be lifted inside the clean room within the mobile service tower on Sept. 8. Mission: Demonstration of Autonomous Rendezvous Technology (DART); Launch Vehicle: Pegasus XL; Launch Site: Vandenberg Air Force Base, Calif.; Launch Date: October 18, 2004 (tentative). The Pegasus XL launch vehicle's fourth stage has arrived and the initial testing has been completed. It is a hydrazine fuel upper stage that will be mated to the satellite. Later the combination will be integrated with the Pegasus. In other work, the aft skirt has been installed. The fins are mechanically mated and alignment continues. The GPS and UHF antennas have also been installed. Installation of fillet, material that acts as an interface between the first stage and the wing of the Pegasus, continues to undergo installation. The Demonstration of Autonomous Rendezvous Technology (DART) spacecraft was rotated from a horizontal to vertical position and lifted onto a test stand July 27 for further launch processing activities. The DART spacecraft arrived at Vandenberg Air Force Base on July 13 to begin final preparations for launch. The Advanced Guidance Sensor (AVGS) hardware, the primary technology demonstration experiment for the satellite, is completing final testing at the Marshall Space Flight Center in Huntsville, Ala. The optical characterization testing and final performance verification test will be conducted this month. The AVGS will be shipped to Vandenberg for installation aboard the satellite in early September. Bruce Buckingham. (2004). **Spacecraft and Expendable Vehicles**

**Status Report** [Online]. Available E-mail: domo@news.ksc.nasa.gov/subscribe shuttle-status [2004, August 6].]

**August 9:** NASA chief Sean O'Keefe gave scientists and engineers the go-ahead Monday to start planning an ambitious robotic mission to save the popular but ailing Hubble Space Telescope. The challenge for NASA is to come up with a way to replace the groundbreaking telescope's aging batteries and gyroscopes, as well as some of its scientific instruments. O'Keefe said the Hubble team at the Goddard Space Flight Center in Maryland would essentially cobble together a mission from ideas the agency received earlier this year. He met with the group Monday afternoon. The agency chief said the mission would cost $1 billion to $1.6 billion. But he warned that it is almost impossible to estimate the cost until a plan is developed. That won't happen for another nine months to a year, O'Keefe said, at which point a final decision on whether to proceed will be made. "There's a lot of real significant milestones that have to be met in the time ahead," he said. In an interview at agency headquarters, O'Keefe said that the decision to go ahead with the robotic mission was made after exhaustive analysis of proposals submitted earlier this summer. Since O'Keefe announced in January that he was canceling a planned shuttle mission to the Hubble -- which prompted an outcry from scientists and laymen alike -- the National Aeronautics and Space Administration has been looking for a way to repair the telescope without risking the lives of astronauts. Without servicing, the Hubble will die in orbit in late 2007 or 2008, as its gyroscopes fail and its batteries run down. Before the loss of the shuttle Columbia in February 2003, NASA had planned a manned mission to the telescope in 2006, to replace the batteries and gyroscopes and install new instruments. Web posted. (2004). [NASA: 'Let's go save the Hubble' [Online]. Available WWW: http://www.orlandosentinel.com/ [2004, August 10].]

**August 10:** Space Gateway Support, a major contractor at Kennedy Space Center and Cape Canaveral Air Force Station, laid off 63 workers from its staff of 3,000, company officials said Tuesday. Samuel Gutierrez, public-affairs manager for the company, said the bulk of the cuts came in the skilled-craft area, with some others in administrative and custodial positions. The majority of jobs lost are at Cape Canaveral Air Force Station. He attributed the layoffs to "budgetary constraints," and said they were unrelated to the grounding of the space shuttle fleet after the Columbia accident in February 2003. The affected workers were notified of the cuts Friday, and will remain on the job for at least two weeks, Gutierrez said. Because of union procedures, some of the affected workers who are union members will stay on the job longer than that as a "bumping-rights" procedure based on seniority takes place. Space Gateway Support was formed in 1998 by Wackenhut Corp. and Northrop Grumman Corp. to provide launch and base operations support services to Kennedy Space Center and the 45th Space Wing at Patrick Air Force Base. [“Local space services firm lays off 63,” **Florida Today**, August 11, 2004, p 1C.]

**August 11:** The Cape Canaveral spaceport and Patrick Air Force Base increased their hurricane alert status Wednesday, securing rockets and facilities. Wednesday, they moved to Hurcon 3, in anticipation of winds 58 mph or greater within 48 hours. They could raise the alert higher today, possibly canceling work for all but a skeleton crew when the storm comes through. "If this thing goes farther north, there may not be a need

to have a rideout," NASA spokesman George Diller said at Kennedy Space Center. The shuttles are snug in their hangars, but workers were adding protective wraps to the Swift spacecraft in its hangar to prevent water damage, he said. At Cape Canaveral Air Force Station, both Boeing and Lockheed Martin were securing rockets on launch pads. An Atlas 2AS is "tucked in the tower," Lockheed Martin spokeswoman Julie Andrews said. "The service towers are built to withstand hurricane-force winds." A Titan 4 is safe in a processing facility, she said. Boeing delayed delivering one rocket to the launch pad, leaving it in its processing facility until Monday, while it secured the pad holding the Delta 4 Heavy, which awaits a September launch. Another Delta 4 is in the horizontal integration facility, spokesman Brian Nelson said. The Delta Mariner ship, which delivers rockets to and from the Cape, was sent out to sea Wednesday night to ride out the storm, he said. [“Workers tuck in spacecraft,” **Florida Today**, August 11, 2004, p 1B.]

◆ Spacecraft and Expendable Launch Vehicles Status Report: Mission: Swift, Launch vehicle: Delta II, Launch pad: 17-A, Launch date: Oct. 7, 2004, Launch window: 12:57 p.m. – 1:57 p.m. EDT. The Swift satellite, which will pinpoint the location of distant yet fleeting explosions that appear to signal the births of black holes, arrived at Kennedy Space Center on July 29 to begin preparations for launch. The Observatory Integrated Systems Test is underway this week and will be completed tomorrow, Aug. 12. This is an unabridged performance evaluation of the spacecraft’s on-board systems. The Observatory Abbreviated Integrated System Test was successfully completed on Aug. 6. This was a “quick-look” state of health test of the spacecraft’s systems conducted after it was shipped to KSC. The spacecraft is being powered down, secured and temporarily covered as part of pre-determined hurricane procedures based on the threat of tropical storm conditions on Friday. Fault protection system testing is scheduled Aug. 13 followed by software regression testing on August 14. This tests the overall software programming to evaluate performance since were installed. The installation of the flight blankets is planned next week, Aug. 16-17. Gamma-ray bursts are the most powerful explosions known in the universe, emitting more than 100 billion times the energy that the Sun does in a year. Yet they last only from a few milliseconds to a few minutes, never to appear in the same spot again. The stacking of the Boeing Delta II launch vehicle on Pad 17-A will begin on Sept. 1 with the hoisting of the first stage into the launcher. Attachment of the nine strap-on solid rocket boosters, in sets of three, is scheduled for Sept. 2-6. The second stage will be hoisted into position atop the first stage on Sept. 7. The payload fairing will be lifted inside the clean room within the mobile service tower on Sept. 8. The Swift satellite is named for the nimble bird, because it can swiftly turn and point its instruments to catch a burst “on the fly” to study both the burst and its afterglow. This afterglow phenomenon follows the initial gamma-ray flash in most bursts and it can linger in X-ray light, visible light and radio waves for hours or weeks, providing great detail for observations. Swift, a medium-class explorer mission, is managed by NASA’s Goddard Space Flight Center in Greenbelt, Md., and built by Spectrum Astro, a division of General Dynamics. Mission: Demonstration of Autonomous Rendezvous Technology (DART), Launch vehicle: Pegasus XL, Launch site: Vandenberg Air Force Base, Calif. , Launch date: Oct. 18, 2004 (tentative). The Pegasus XL launch vehicle’s fourth stage has arrived and the initial testing is complete. The hydrazine fuel upper stage will be mated to the satellite. Later, the combination will

be integrated with the Pegasus. In other work, the aft skirt has been installed. The fins are mechanically mated and alignment continues. The GPS and UHF antennas have also been installed. Installation of fillet, material that acts as an interface between the first stage and the wing of the Pegasus, continues to undergo installation. The Demonstration of Autonomous Rendezvous Technology (DART) spacecraft was rotated from a horizontal to vertical position and lifted onto a test stand July 27 for current launch processing activities. The DART spacecraft arrived at Vandenberg Air Force Base on July 13 to begin its final preparations for launch. The Advanced Guidance Sensor (AVGS) hardware, the primary technology demonstration experiment for the satellite, is completing final testing at the Marshall Space Flight Center in Huntsville, Ala. The optical characterization testing and final performance verification test will be conducted this month. The AVGS will be shipped to Vandenberg for installation aboard the satellite in early September. DART has been designed and built for NASA by Orbital Sciences Corporation as a flight demonstrator to locate and maneuver near an orbiting satellite. The DART spacecraft weighs about 800 pounds, is nearly 6 feet long and 3 feet in diameter. The Orbital Sciences Pegasus XL vehicle will launch DART into a circular polar orbit of approximately 475 miles. The DART satellite is an advanced flight demonstrator that provides a key step in establishing autonomous rendezvous capabilities for the U.S. Space Program. While previous rendezvous and docking efforts have been piloted by astronauts, the unmanned DART satellite will have computers and cameras to perform all of its rendezvous functions. Once in orbit, DART will rendezvous with a target satellite, the Multiple Paths, Beyond-Line-of-Site Communications (MUBLCOM), also built by Orbital Sciences and launched in 1999. DART will then perform several close-proximity operations, such as moving toward and away from the satellite using navigation data provided by onboard sensors. The entire mission will last only 24 hours and will be accomplished without human intervention. The DART flight computer will determine its own path to accomplish its mission objectives. DART is designed to demonstrate technologies required for a spacecraft to locate and rendezvous, or maneuver close to, other craft in space. Results from the DART mission will aid in the development of NASA's Crew Exploration Vehicle and will also assist in vehicle development for crew transfer and crew rescue capability to and from the International Space Station. KSC News Center (2004). **Spacecraft and Expendable Launch Vehicles Status Report** [Online]. Available E-mail: ksc@newsletters.nasa.gov [2004, August 11].]

**August 12:** The Florida Space Research Institute (FSRI) has awarded a grant to Analex Corp. to support planning for a Range Technology Qualification (RTQ) initiative to demonstrate new transformational launch technologies at the Cape Canaveral Spaceport. The initiative is aimed at accommodating emerging military requirements for "operationally responsive" launch capabilities that would increase efficiency at the spaceport while making Florida more competitive for both government and commercial space missions. "Several technologies that are now available or are under development hold promise to reduce the cost and complexity of launch operations at Florida's spaceport," said Sam Durrance, executive director of FSRI. "We look forward to working with Analex to develop ways to test and qualify these technologies in cooperation with the Air Force and NASA." Analex, NASA's contractor for expendable launch vehicle

integrated services at Kennedy Space Center, will work with FSRI to develop an RTQ implementation plan that would enable technology demonstrations aboard a new class of launch vehicles. The RTQ program is intended to support the qualification of a variety of technologies, such as the Ballistic Missile Range Safety Technology (BMRST) system developed by Honeywell, and others being developed in coordination with a Future Interagency Range and Spaceport Technology (FIRST) program led by Kennedy Space Center. FSRI was established by Florida's Governor and Legislature in 1999 to promote collaboration among the state's academic institutions, industry, and federal agencies to support statewide aerospace-related technology development, research, education and training, research. ["FSRI Grant Supports range Technology Development At Spaceport," **Florida Space News Release, 3rdQuarter 2004**, August 12, 2004.]

◆ A video camera on the space shuttle Discovery's external fuel tank will record the launch planned for spring 2005, including any flyaway foam of the sort that led to last year's Columbia disaster. The camera, to be placed in a recessed spot toward the top of the fuel tank, will transmit live footage for about 15 minutes after launch, Neil Otte, chief engineer on Lockheed Martin's external tank project, said Thursday. A group of NASA officials will review the images and determine how much insulating foam flew off the tank. "They will categorize any anomalous issues that we have," Otte said. An investigation into the Columbia disaster determined a briefcase-sized chunk of foam flew off the external tank during liftoff and struck the shuttle's left wing, creating a hole. Engineers still expect small pieces of the foam to fly off after launch, but they should be harmless, many about the size of popcorn kernels, Otte said. Next year's launch, planned for March or April, will be the first since the Columbia disaster on February 1, 2003. The only other shuttle with a camera on the external tank was used on the 2002 Atlantis mission. That camera's lens was obscured by exhaust particles when the external tank was jettisoned minutes after launch. The camera on next year's mission will be positioned on the opposite side of the tank, away from the shuttle, Otte said, so the vessel's exhaust will not smear the lens when the tank detaches. Web posted. (2004). [Fuel tank camera to record shuttle launch [Online]. Available WWW: http://www.cnn.com/ [2004, August 12].]

**August 13:** NASA and the U.S. Air Force secured America's space shuttles, rockets and launch facilities and sent thousands home early as Hurricane Charley approached the state of Florida. At Kennedy Space Center, a 200-member "ride-out crew" is keeping watch overnight over billions of dollars worth of space vehicles and infrastructure as Charley made landfall near Ft. Myers and barreled toward north Brevard County. An orderly evacuation began at noon Friday at NASA's Kennedy Space Center, Cape Canaveral Air Force Station and Patrick Air Force Base. The Kennedy Space Center Visitor Complex ran its last bus tour at noon and closed its doors at 3 p.m., four hours earlier than normal. The whole idea was to get workers and visitors home early on so they could take care of their families. Space center spokesman George Diller said meteorologists expected tropical storm-like conditions at the shuttles' homeport with peak winds of 65 mph between 11 p.m. and midnight. Winds were expected to taper off to 45 mph by 3 a.m. Saturday. Meteorologists at both the space center and the Air Force bases expected heavy rains. Both NASA and the Air Force plan to send teams to assess the

damage on their installations early Saturday morning. Shuttles Discovery, Atlantis and Endeavour are powered down with payload bay doors closed in their Orbiter Processing Facility hangars, which can withstand winds up to 110 mph. NASA's Swift spacecraft, which sports a gamma ray telescope and is scheduled for launch Oct. 7, was secured in Hangar AE at Cape Canaveral Air Force Station. The hangar can withstand winds up to 100 mph. NASA cancelled second and third shift work at KSC because of the impending threat. However, the agency Friday night expected to pick up with business as usual on Saturday. First-shift workers were told to report at 10 a.m. The KSC Visitor Complex is scheduled to open back up for normal hours — 9 a.m. to 7 p.m. — on Saturday. ["KSC, Canaveral, Patrick dig in," **Florida Today**, August 14, 2004, p 7A.]

◆ NASA and Lockheed Martin Space Systems Co. admit they will never completely eliminate the decades-old problem of foam popping off the tank during shuttle launches. They're convinced, however, that they've figured out how to dramatically reduce the size and amount of the foam chunks that batter the orbiters' brittle heat shields. "This tank is going to be much safer," said Sandy Coleman, the manager of NASA's external tank project office at the Marshall Space Flight Center in Alabama. "We want more than anything to protect our astronauts. They're part of our family." She is not alone delivering that message. In the hallway just outside the doors the tank-builders must pass through is a poster of the next shuttle commander, Eileen Collins, holding her daughter. The poster's sobering slogan: "Are you ready for us to go? Think safety." Making the tank much safer, NASA found, goes far beyond the decision to lop off the suitcase-sized foam triangles called "bipod ramps." It was one of those foam ramps that popped free during Columbia's flight, punching a hole the size of a car tire in the orbiter's left wing. As Columbia plunged back through the atmosphere on Feb. 1, 2003, the superhot gases that envelop the orbiter got inside the wing and ripped the spaceship apart. So the ramps on External Tank No. 120 are gone. Instead of the foam, a heated copper plate will keep ice from building up on the V-shaped metal struts that hook the tank to the orbiter. A slight change in the metal will keep the material from overheating on the way to space. NASA decided on that change a few months after the accident, but engineers and managers gave the final go-ahead for workers to retrofit Discovery's tank a month ago. ["Columbia adds urgency to shuttle fuel tank repairs," **Florida Today**, August 13, 2004, p 1A & 3A.]

◆ Space Shuttle Processing Status Report: S04-027: **Discovery** (OV-103); Following the Return to Flight modifications performed on Discovery during its power-down period, work on the orbiter is returning to a more normal processing flow in preparing for its future mission to the International Space Station. Freon coolant loop No. 2 was serviced this week, including the successful completion of leak checks. The final stage of Rudder Speed Brake panel installation continues. Due to the impending arrival of Hurricane Charley, which was expected to affect the Kennedy Space Center area today, much of the normal workflow was inhibited on Wednesday and Thursday while employees prepared the vehicles, equipment and buildings for the storm. **Atlantis** (OV-104); Atlantis is in a four-month power-down period, and the critical path wiring inspections and Return to Flight electrical modifications continue on schedule. The right-hand Orbital Maneuvering System main engine was installed. Water coolant loop No. 1 has been drained and X- rays completed. The main landing gear was lowered for

technicians to perform checks and optical measurements to ensure the landing gear will perform properly during the mission. Workers also began checkout of the nose cap, including temperature and impact sensor instrumentation. **Endeavour** (OV-105); Space Shuttle Endeavour is in its Orbiter Major Modification period, which began in December. Electrical modifications continue in the crew module. The Flash Evaporator System, which helps to cool the vehicle while in flight, was installed in the aft of the orbiter. Three String Global Positioning System wire routing in the avionics bay and flight deck continues. The temporary installation of the nose cap is complete. The chin panel, which is the semicircle-shaped piece of Reinforced Carbon-Carbon insulation under the nose cap, is undergoing a fit-check. Owner-press-release. (2004). **Space Shuttle Processing Status Report** [Online]. Available E-mail: owner-press-release@spinoza.public.hq.nasa.gov [2004, August 13].]

**August 15:** The nation's primary East Coast space launch sites came through Hurricane Charley without major damage, and then opened back up for business early Saturday. Tropical storm-strength winds caused some minor roof damage at NASA's Kennedy Space Center and Patrick Air Force Base. Some trees were downed at the Kennedy Space Center Visitor Complex, Cape Canaveral Air Force Station and Patrick, officials said. But neither NASA's three-orbiter shuttle fleet nor rockets being readied for launch from Cape Canaveral were damaged during the storm. "We're relieved. It's always a good thing when you can come through something like this pretty much unscathed," said Maj. Adrian Craig, chief of the Public Affairs Office for the 45th Space Wing, which is headquartered at Patrick and oversees operations at Cape Canaveral. "There will be some clean-up to do, just like everywhere else in town," added space center spokesman George Diller. "It's just about what you would expect from tropical storm-like winds." Sensors on launch towers at Cape Canaveral recorded sustained winds of 64 mph with gusts up to 86 mph during the storm, Craig said. But no damage was done to either a Lockheed Martin Atlas 2AS rocket at Cape Canaveral's Launch Complex 36 or a Boeing Delta 4 heavy vehicle at Launch Complex 37. The Atlas is scheduled to carry a classified National Reconnaissance Office satellite into orbit on Aug. 27. The Delta 4 is slated for launch in September. At Kennedy, a few traffic lights were out, signs were blown down and some water intrusion and minor roof damage was noted in a few buildings. "There's really nothing major," Diller said. The KSC Visitors Complex opened at 9 a.m. Saturday and first-shift personnel reported to work an hour later at NASA's shuttle homeport. Shuttles Discovery, Atlantis and Endeavour had been powered down in their Orbiter Processing Facility hangars — which were designed to withstand winds up to 110 mph — in advance of the storm. Web posted. (2004). [Damage at KSC, Air Force bases minor [Online]. Available WWW: http://www.floridatoday.com/ [2004, August 14].]

**August 18:** The pace of preparations for Return to Flight is picking up, with several key milestones in recent weeks marking important progress in readying the Space Shuttle Discovery for its next mission. Discovery is progressing after the completion of extensive wiring for Return to Flight, as well as the transition from its modification period to more regular processing at Kennedy Space Center. Meanwhile, the first piece of Discovery's twin Solid Rocket Boosters was moved to a processing facility on site and workers are installing several important components. Though Discovery appears unchanged from the

outside, the orbiter is very different on the inside. The power-up on July 27 follows safety improvements and modifications to enhance vehicle monitoring during flight. Technicians have installed cabling for wing leading edge sensors and to support a digital camera to document the External Tank as it separates from Discovery. Wiring also has been installed to support a boom extension for the Shuttle's robotic arm, which will provide the ability to inspect nearly all of the outside areas of the orbiter's Thermal Protection System in detail. On August 9, the first segment of the Solid Rocket Boosters designated for Discovery's flight was moved to the Rotation Processing and Surge Facility at KSC. The aft skirt -- the bottom, skirt-shaped section of the boosters -- will have two other components installed: an aft motor segment and an External Tank attach ring. Next month, the structure will move to the Vehicle Assembly Building for stacking operations. Engineers and technicians have applied many of the modifications laid out in NASA's Implementation Plan for Space Shuttle Return to Flight and Beyond. [“Discovery Milestones Set Stage For Return To Flight, **NASA News Release #62-04**, August 18, 2004.]

◆ Spacecraft and Expendable Launch Vehicles Status Report: Mission: Swift, Launch vehicle: Delta II, Launch pad: 17-A Cape Canaveral, Launch date: Oct. 7, 2004, Launch window: 12:57 p.m. – 1:57 p.m. EDT. The Swift satellite, which will pinpoint the location of distant yet fleeting explosions that appear to signal the births of black holes, arrived at Kennedy Space Center on July 29 to begin preparations for launch. The Observatory Integrated Systems Test was completed on Aug. 12. This was an unabridged performance evaluation of the spacecraft’s on-board systems. The spacecraft was powered down, secured and temporarily covered as part of predetermined hurricane procedures based on the threat of tropical storm conditions on Friday. There were no issues with the spacecraft that occurred during Hurricane Charley. With severe thunderstorms forecasted to occur over the next several days during the afternoon, the spacecraft will remain covered for the present time. With a spacecraft cooling purge on the observatory, this will not prevent powered-up tests from continuing. Fault protection system testing was completed on Aug. 10, followed by the software regression testing on Aug. 15. These tested the overall software programming to evaluate performance since they were updated previously. The installation of the flight blankets has been rescheduled for mid-September. The stacking of the Boeing Delta II launch vehicle on Pad 17-A will begin on Sept. 1 with the hoisting of the first stage into the pad launcher mechanism. Attachment of the nine strap-on solid rocket boosters, in sets of three, is scheduled for Sept. 2-6. The second stage will be hoisted into position atop the first stage on Sept. 7. The payload fairing will be lifted inside the clean room within the mobile service tower on Sept. 8. Mission: Demonstration of Autonomous Rendezvous Technology (DART), Launch vehicle: Pegasus XL, Launch site: Vandenberg Air Force Base, Calif. , Launch date: Oct. 18, 2004 (tentative). Testing is complete on the Pegasus XL launch vehicle’s fourth stage. This is a hydrazine fuel upper stage that will later be integrated with the satellite before the combination is mated with the Pegasus XL rocket. This stage will perform DART’s maneuvering during the mission. In other work, the first Pegasus Simulated Flight test is underway today. The aft skirt of the launch vehicle has been installed. The fins are mechanically mated and the alignment continues. The GPS and UHF antennas have also been installed. Installation of fillet, material that acts as an

interface between the first stage and the wing of the Pegasus, continues. The Demonstration of Autonomous Rendezvous Technology (DART) spacecraft was rotated from a horizontal to vertical position and lifted onto a test stand July 27 for current launch processing activities. The DART spacecraft arrived at Vandenberg Air Force Base on July 13 to begin its final preparations for launch. The Advanced Guidance Sensor (AVGS) hardware, the primary technology demonstration experiment for the satellite, is completing final testing at the Marshall Space Flight Center in Huntsville, Ala. The optical characterization testing and final performance verification test will be conducted this month. The AVGS will be shipped to Vandenberg for installation aboard the satellite in early September. DART was designed and built for NASA by Orbital Sciences Corporation as a flight demonstrator to locate and maneuver near an orbiting satellite. The DART spacecraft weighs about 800 pounds and is nearly 6 feet long and 3 feet in diameter. The Orbital Sciences Pegasus XL vehicle will launch DART into a circular polar orbit of approximately 475 miles. The DART satellite is an advanced flight demonstrator that provides a key step in establishing autonomous rendezvous capabilities for the U.S. Space Program. While previous rendezvous and docking efforts have been piloted by astronauts, the unmanned DART satellite will have computers and cameras to perform all of its rendezvous functions. KSC News Center (2004). **Spacecraft and Expendable Launch Vehicles Status Report** [Online]. Available E-mail: ksc@newsletters.nasa.gov [2004, August 18].]

**August 20:** Boeing delayed the inaugural launch of its Delta 4 Heavy rocket from Cape Canaveral Air Force Station until at least Oct. 15 to replace a faulty valve. "It didn't operate properly during the first wet dress rehearsal," spokesman Brian Nelson said. The Delta 4 was developed under the Air Force's Evolved Expendable Launch Vehicle program, along with Lockheed Martin's Atlas 5. The massive Delta 4 Heavy has three common booster core rockets. Web posted. (2004). [Boeing delays first launch of Delta 4 Heavy rocket [Online]. Available WWW: http://www.floridatoday.com/ [2004, August 20].]

◆ Space Shuttle Processing Status Report S04-028: **Discovery** (OV-103); Discovery is making significant progress for its Return to Flight mission to the International Space Station planned for next March. Prior to the arrival of Hurricane Charley last week, workers in the Orbiter Processing Facility prepared Discovery for the impending storm by closing the payload bay doors and powering down the vehicle. On Sunday, technicians reinstated power to the orbiter and resumed normal processing activities. Both Freon coolant loops No. 1 and 2 are ready for flight, following servicing and successful leak checks. The Space Shuttle commander and pilot seats are mounted for the mission, and technicians are currently installing the seat harnesses. **Atlantis**(OV-104); Atlantis is in a four-month power-down period, and the critical path wiring inspections and Return to Flight electrical modifications continue on schedule. Preparations for Rudder Speed Brake actuator and panel installations continue. Reinforced Carbon-Carbon (RCC) panel installation continues with 14 right-hand panels and 21 spar fittings installed. A spar fitting is the floating joint that mechanically attaches the RCC panel to the orbiter's wing leading edge. Technicians continue to install Thermal Protection System blankets in the nose cap, with installation of the nose cap scheduled for early next week.

**Endeavour**(OV-105); Space Shuttle Endeavour is in its Orbiter Major Modification period, which began in December. Electrical modifications continue in the crew module. Body flap and left-hand wing leading edge corrosion clean-up work continues. Three string Global Positioning System wire routing in the avionics bay and flight deck continues. Preparations are underway for the removal of water spray boilers No. 1 and 2. Each orbiter has three water spray boilers that are responsible for cooling the Auxiliary Power Units that activate the orbiter's hydraulic system. Owner-press-release. (2004). **Space Shuttle Processing Status Report** [Online]. Available E-mail: owner-press-release@spinoza.public.hq.nasa.gov [2004, August 20].]

**August 25:** Air Force Col. Susan Helms boarded NASA shuttles and launched into orbit from Kennedy Space Center five times between 1993 and 2001. Now she's back, serving as vice commander of the Air Force rocket range where NASA shuttles fly. And she has a new appreciation for what it takes to send people into space. Helms, 46, is second-in-command at the Air Force's 45th Space Wing, which provides range safety, tracking and weather forecasting services for all launches from KSC and Cape Canaveral Air Force Station. She graduated from the U.S. Air Force Academy in 1980 and was named outstanding flight test engineer at Air Force Test Pilot School in 1987. Helms joined NASA's astronaut corps in 1990 and became the first U.S. military woman to fly into space in 1993. She also served on the International Space Station in 2001, becoming the first woman to inhabit the orbiting outpost. Web posted. (2004). [Astronaut lands job at Patrick [Online]. Available WWW: http://www.floridatoday.com/ [2004, August 25].]

◆ Radar tracking data gathered during the Delta II launch of the MESSENGER spacecraft earlier this month has provided promising results that may benefit NASA's Space Shuttle Program and Discovery's Return to Flight. A pair of radars installed at NASA's Kennedy Space Center, Fla., tracked the launch of the Delta II. They tracked separation of the nine solid rocket boosters and jettison of the first stage and the payload fairing, the "nose" of the rocket that protected the MESSENGER spacecraft during launch. "This test was quite successful for us in proving a concept," said NASA project manager Tony Griffith. "The use of high- resolution wide-band and Doppler radars allows us to observe almost any possible debris during ascent, and means we can observe the Space Shuttle without regard to limitations of visibility, cloud cover and darkness," he added. The antennas have been on loan to NASA from the USNS Pathfinder, a U.S. Navy instrumentation ship. The 30-foot- diameter C-band wide-band radar antenna and the smaller X- band Doppler radar worked together to image the Delta in flight. The Navy operated the radars for NASA during the MESSENGER launch. NASA was responsible for analyzing the imagery. Later this fall, a 50-foot-diameter C-band wide-band radar will be installed on this site for a similar Return-to-Flight application and for use by the Navy. The radar is being relocated to KSC from the Roosevelt Roads Naval Station in Puerto Rico. [“Radar Test During Messenger Launch May Help ‘Return To Flight’,” **NASA News Release #04-275**, August 25, 2004.]

**August 26:** On the spring day when Discovery sits out there on its launch pad waiting to return to space, saying "go" or "no go" for launch won't be so hard. Wayne Hale, a veteran shuttle flight director, is accustomed to making tough choices on the spot.

Instead, for Hale, the stuff to sweat over includes the countless wrenching decisions that must be made during this two-plus years between the last shuttle flight and the next one. Most of those changes and choices will be made long before launch day. Hale is in the midst of one of the toughest changes NASA must make as it recovers from the loss of the shuttle Columbia and seven astronauts and prepares to fly again next spring. The task: changing the way NASA managers, engineers and flight controllers think. Some called it "miscommunication" or "mismanagement." Others defined it as "broken culture." No matter what the label, the point is investigators found that bad decisions were as much to blame for the disaster as that chunk of foam that punched a hole in Columbia's wing. A year after the Columbia Accident Investigation Board released its report, Hale is trying to fix something that is difficult to identify, let alone change in any measurable way. "It's a very difficult thing to change the culture," Hale said. "It won't be all changed next spring or a year from next spring. It's something we've got to keep working on for the rest of the program." Web posted. (2004). [Fixing culture may be toughest task [Online]. Available WWW: http://www.floridatoday.com/ [2004, August 26].]

◆ Significant technical challenges, particularly trouble encountered while developing a way to repair severe wing panel damage, have led NASA to develop an unprecedented backup plan. Shuttles will be on standby to fly rescue missions should potentially catastrophic damage endanger astronaut crews on NASA's first two post-Columbia flights. The shuttle astronauts would seek safe haven on the International Space Station until a rescue mission could be carried out. Some within NASA question whether station life support systems are robust enough to keep two outpost tenants and seven shuttle astronauts alive long enough for NASA to pull off a rescue. "The debate is over how long we could operate some of the equipment in an emergency mode," NASA deputy shuttle program manager Wayne Hale admitted. The station now is designed to support three people and can sustain six for short periods. Life support systems would have to be cranked up to maximum capacity to accommodate nine. The question is how long those critical systems would operate under those circumstances. NASA's estimate: About 60 days. "All of this has to do with planning and having staged and prepared for an eventuality we certainly hope doesn't come about," Hale said. Web posted. (2004). [NASA's backup plan involves rescue shuttles, space station [Online]. Available WWW: http://www.floridatoday.com/ [2004, August 26].]

◆ Spacecraft and Expendable Launch Vehicles Status Report: Mission: Swift, Launch vehicle: Delta II, Launch pad: 17-A Cape Canaveral, Launch date: Oct. 7, 2004, Launch window: 12:57 p.m. – 1:57 p.m. EDT. Testing of the Burst Alert Telescope instrument is currently underway. Testing of the X-Ray Telescope and Ultraviolet Telescope is scheduled for next week with the Mission Operations Center at Goddard Space Flight Center in Greenbelt, Md. Solar array testing will occur the first week of September and installation of flight blankets is scheduled for mid-September. Observatory testing with the Tracking and Data Relay Satellite System was completed earlier this week. The Observatory Integrated Systems Test was completed on Aug. 12. This was an unabridged performance evaluation of the spacecraft's on-board systems. The stacking of the Boeing Delta II launch vehicle on Pad 17-A will begin on Sept. 1 with the hoisting of the first stage into the pad launcher mechanism. Attachment of the nine strap-on solid

rocket boosters, in sets of three, is scheduled for Sept. 2-6. The second stage will be hoisted into position atop the first stage on Sept. 7. The payload fairing will be lifted inside the clean room within the mobile service tower on Sept. 8. Mission: Demonstration of Autonomous Rendezvous Technology (DART), Launch vehicle: Pegasus XL, Launch site: Vandenberg Air Force Base, Calif., Launch date: Oct. 18, 2004 NET. At Vandenberg Air Force Base, processing of the Pegasus XL launch vehicle is going well. The first of three Pegasus Flight Simulations has been successfully completed. The second simulation is scheduled for Sept. 7, and the third is currently planned for Sept. 23. Testing is complete on the Pegasus XL launch vehicle's fourth stage. This is a hydrazine fuel upper stage that will later be integrated with the satellite before the combination is mated with the Pegasus XL rocket. This stage will perform maneuvering capability for the spacecraft during the mission. The Demonstration of Autonomous Rendezvous Technology (DART) satellite arrived at Vandenberg Air Force Base on July 13 to begin its final preparations for launch. The Advanced Guidance Sensor (AVGS) hardware, the primary technology demonstration experiment for the satellite, is completing final testing at the Marshall Space Flight Center in Huntsville, Ala. The optical characterization testing and final performance verification test will be conducted this month. The AVGS will be shipped to Vandenberg for installation aboard the satellite in early September. DART was designed and built for NASA by Orbital Sciences Corporation as an advanced flight demonstrator to locate and maneuver near an orbiting satellite. The DART spacecraft weighs about 800 pounds and is nearly 6 feet long and 3 feet in diameter. The Orbital Sciences Pegasus XL vehicle will launch DART into a circular polar orbit of approximately 475 miles. KSC News Center (2004). **Spacecraft and Expendable Launch Vehicles Status Report** [Online]. Available E-mail: ksc@newsletters.nasa.gov [2004, August 26].]

**August 27:** NASA aims to launch its first post-Columbia shuttle mission during a shortened nine-day window March, and failure to do so likely would delay a planned return to flight until at least May. But agency officials said Thursday that they are making steady progress on finishing work ordered by Columbia accident investigators and would keep striving to meet the narrower window, which originally covered 57 days in March and April. "We only need one (day). We're just going to continue to march through the work we have to do, and if we make it, we make it," said former astronaut William Readdy, NASA's Associate Administrator for Space Operations. As it stands, NASA is looking to launch Discovery to the International Space Station between March 16 and March 25. The agency previously had set up a launch window that extended from March 6 to April 18. The tapered time period is the combined result of lighting constraints NASA is placing upon itself for at least the first two post-Columbia missions and a planned Russian Soyuz flight to the international outpost. NASA hopes to lift daylight restrictions -- which reduce the number of launch opportunities to the station in any given year by about 180 days -- after its next two missions. On both those flights, NASA plans to test ground-based radar that could track shuttles during nighttime launches and detect any debris coming off. The concept was successfully tested using borrowed Navy radar sets during the Aug. 3 launch of NASA's Mercury-bound Messenger spacecraft on a Delta rocket at Cape Canaveral Air Force Station. Web posted. (2004). [NASA aims to

launch shuttle nine-day window in March [Online]. Available WWW: http://www.floridatoday.com/ [2004, August 27].]

◆ Even as NASA scrambles to fix the space shuttle in hopes of launching in the spring, a parallel effort to strengthen its safety culture is making progress, a consultant said Thursday. On the first anniversary of the Columbia Accident Investigation Board's sweeping -- and scathing -- review of the February 2003 tragedy, the chairman of a company hired to help the National Aeronautics and Space Administration tackle the problem said early signs point to long-term success. In its report, the board famously called NASA's safety culture "broken" and said it was as much of a factor in the accident as the insulating foam that flew off Columbia's external tank and punched a hole in its left wing. But Thomas Krause, whose company, Behavioral Science Technology Inc., has a five-year contract, said observers from his firm already are seeing positive changes. "If the present actions and trends continue, it is likely that NASA will be successful in transforming its culture," Krause said Thursday during a conference call with reporters. In April, BST released the results of a survey of nearly half of NASA workers that indicated employees are committed to safety in concept, but that the agency's culture is not fully supportive of it -- and that some workers were not totally comfortable raising concerns. Though the company will not take the survey again until next month, Krause said that in shuttle-program meetings and individual sessions with senior managers, he and others see greater willingness to promote communication and dissent. But changing NASA's culture will take time, he said. Web posted. (2004). [NASA's safety culture praised [Online]. Available WWW: http://www.orlandosentinel.com/ [2004, August 27].]

◆ Space Shuttle Processing Status Report: **Discovery** (OV-103); Steady progress continues on Discovery for its Return to Flight mission to the International Space Station, currently planned for the March timeframe of next year. Following the installation of the right-hand Orbiter Maneuvering System pod, interface verifications and electrical connector work will begin this weekend. The vehicle will be powered down with the payload bay doors closed for technicians to perform the optical alignment of the heads up display. The display provides visual alignment cues to Space Shuttle commanders and pilots during approach and landing. The right-hand main landing gear wheels are installed. **Atlantis** (OV-104); Atlantis is in a four-month power-down period, and the critical path wiring inspections and Return to Flight electrical modifications continue on schedule. Critical wire separation modifications continue and flight deck switch panel installations are under way for the scheduled power up in early October. The Reinforced Carbon-Carbon nose cap was installed on the vehicle on Tuesday. Removed from the vehicle in October, the nose cap was sent back to the vendor for thorough non-destructive evaluation and recoating. Thermography was also performed at KSC to check for internal flaws. This procedure uses high-intensity light to heat areas that are immediately scanned with an infrared camera for temperature variations, which would indicate flaws. **Endeavour** (OV-105); Space Shuttle Endeavour is in its Orbiter Major Modification period that began in December. Electrical modifications continue in the crew module. Three-string Global Positioning System wire routing in the avionics bay and flight deck continues. The right outboard elevon actuator installation and right

inboard elevon actuator removal is scheduled for next week. Dome Mounted Heat Shield (DMHS) tile bonds continue. The DMHS is made of two semi-circle sections of Thermal Protection System tiles that surround each of the three Space Shuttle main engines. Owner-press-release. (2004). **Space Shuttle Processing Status Report** [Online]. Available E-mail: owner-press-release@spinoza.public.hq.nasa.gov [2004, August 27].]

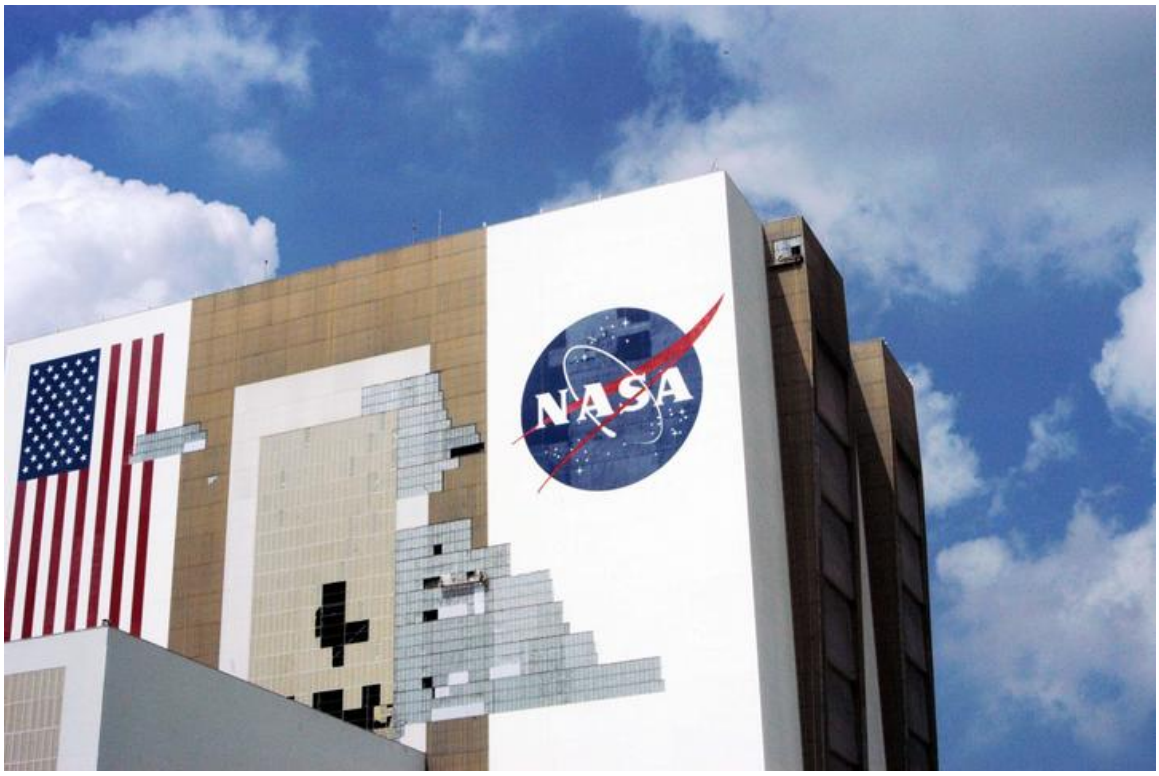
**August 28:** A technical reason was cited as the cause of Friday night's scrub of a rocket launch, even though thunderstorms swept over the Space Coast around launch time. More testing was needed on the Lockheed Martin Atlas 2AS rocket's batteries, according to International Launch Services. Tonight's launch attempt is set for 7:02 p.m. EDT. More storms are expected this evening, with just a 20 percent chance of acceptable conditions. The rocket is to carry a classified military satellite into orbit. This launch of a military satellite for the National Reconnaissance Office is the final Atlas 2AS mission. Web posted. (2004). [Technical problem delays Atlas launch [Online]. Available WWW: http://www.floridatoday.com/ [2004, August 28].]

◆ NASA cracked a wing panel this week in a successful test aimed at gauging how much force the shuttle's thermal armor can withstand if struck by debris. A year after accident investigators issued their report on the February 2003 Columbia accident, NASA on Thursday shot a 0.06-pound chunk of foam at a wing panel at Southwest Research Institute in San Antonio, Texas. About the size of a small dinner plate, the foam struck the reinforced carbon-carbon panel with about 16 percent more force than engineers expect it to withstand, creating a six-inch crack. In another recent test, the panel suffered no damage when an identically sized foam chunk struck the panel with about 3.4 percent more force than the engineering threshold. The foam shots were designed to determine the exact magnitude of debris strikes that could cause catastrophic damage to a wing panel. "The intent was to damage the panel -- to test until you could damage it so that you could understand what the thresholds are," said Kyle Herring, a NASA's Johnson Space Center spokesman in Houston. Doing so is considered key to returning NASA's shuttle fleet to service next March. Shuttle external tanks are being redesigned to prevent foam chunks larger than a coffee cup from flying off the fuel reservoirs during flight. NASA also aims to prove that debris that small could not cause damage that would endanger a shuttle or its astronaut crew. Concurrently, NASA is putting in place techniques that would enable spacewalking astronauts to repair wing panel cracks and small holes up to four inches in diameter. Columbia was downed by a briefcase-sized chunk of foam that weighed about 1.7 pounds and created a hole that investigators said was six to 10 inches in diameter. The ongoing tests date back to May 2003 and are expected to continue until October or November. Web posted. (2004). [Shuttle wing test exceeds threshold expectations [Online]. Available WWW: http://www.floridatoday.com/ [2004, August 28].]

**August 29:** A spill of about 10,000 gallons of liquid oxygen prompted the delay of Saturday night's attempt to launch the last Atlas 2AS rocket. The spill occurred when a valve on a ground storage tank inadvertently was left open, International Launch Services spokeswoman Fran Slimmer said. Though the leakage was stopped, the launch team decided less than an hour before launch that it probably didn't have enough margin to

make the attempt. The liquid oxygen boiled off when exposed to the atmosphere, Lockheed Martin spokeswoman Julie Andrews said. The launch team will make another attempt at 6:57 p.m. today after topping off the stored fuel, Slimmer said. This will be the third try in a row to get the classified military satellite into orbit for the National Reconnaissance Office. Friday night's attempt was delayed by an issue with batteries on the rocket, and the weather also was poor. The forecast for tonight's attempt calls for a 40 percent chance of acceptable conditions. Web posted. (2004). [Liquid oxygen spill stalls rocket launch [Online]. Available WWW: http://www.floridatoday.com/ [2004, August 29].]

**August 30:** This evening at 6:53 p.m. EDT, the Lockheed Martin team hopes to launch an Atlas 2AS rocket on behalf of International Launch Services, if glitches and weather are forgiving. The forecast is for 60 percent no-go - with storms again a risk. The team will have about a half-hour to get the rocket off the ground with its secret military intelligence payload. This will be the fourth attempt to launch the rocket. The first was halted by a battery issue; the second, by a liquid oxygen spill that took down reserves too much to make the attempt; and the third, by lingering storm clouds, though bad weather has been pervasive throughout the period. Web posted. (2004). [Another launch attempt [Online]. Available WWW: http://www.floridatoday.com/ [2004, August 30].]




On a scaffold barely visible along the south wall of the Vehicle Assembly Building near the NASA logo, workers are covering the holes with corrugated steel so the facility can be returned to performing operational activities. The VAB lost 820 panels from the south wall during the storm, and 25 additional panels pulled off the east wall by Hurricane Jeanne. Another scaffold is suspended near the top of the east wall (right side) for repairs. The VAB stands 525 feet tall. Central Florida, including Kennedy Space Center, has been battered by four hurricanes between Aug. 13 and Sept. 26.

## SEPTEMBER

**September 1:** Effective 8:30 a.m. today, Kennedy Space Center (KSC) was placed in HURCON III. Based on the extremely dangerous potential of Hurricane Frances and the safety concerns for employees and families, Center Director Jim Kennedy has announced an immediate liberal leave policy is in effect for all employees for today. A liberal leave policy is a situation where supervisors let it be known that annual leave will be granted in all situations except for those personnel who are engaged in critical securing activities. The Center Director has also declared that the Center will be closed for normal business beginning with first shift on Thursday, September 2, and extending through all day Friday, September 3. Civil service employees are granted administrative leave (excused absence) for Thursday and Friday. It is anticipated that the Center Director will place KSC in HURCON II today at 3:30 p.m., with all securing activities to be completed by the end of third shift, Thursday, September 2. In that event and in accordance with JDP-KSC-P-3006, effective first shift Thursday, September 2, all nonessential personnel at KSC, both NASA and contractors, are to be released from duty or directed not to report. Civil service supervisors and contractor management should take appropriate steps to effect an orderly release and shutdown. Nonessential personnel (those not involved in the shutdown of activities and securing of the Center) should be released by supervisors in accordance with the above schedule. As such, any steps necessary to be completed by these nonessential personnel to secure their immediate work areas (e.g., covering electronic equipment, securing GSA vehicles, etc.) should be completed prior to departing their work site today. Release from duty must be cleared with the employee's supervisor. After that time of release, only essential personnel should report for, or remain on, duty until the All Clear has been declared. All essential personnel should contact their supervisors to be released from duty. Supervisors should release those remaining employees (other than the Rideout Team) as each employee's actions related to preparation, shutdown, and securing the facility are completed. Center management has determined that a reduced Rideout Team will be assembled for Hurricane Frances; only the identified members from fire, security, and the Emergency Preparedness Office will assemble at their designated duty stations around the Center when HURCON II condition is announced. Supervisors of employees serving on this reduced Rideout Team should allow these employees sufficient time for attention to personal matters in advance of the declaration of HURCON II and prior to reporting for duty. The team will remain intact until the All Clear has been declared. The Rideout Team will leave the Center and the gates will be locked should forecasted conditions become extreme. [Memoranda (NASA). James E. Hattaway, Jr. Subject: "Hurricane Frances, Associate Director Office," September 1, 2004.]

Due to the approach of Hurricane Frances, NASA shut down Kennedy Space Center today and kept the nation's shuttle homeport closed through the Labor Day weekend. The KSC Visitor Complex also closed today and will remain shuttered until at least Sunday, with a possible reopening on Monday. NASA meteorologists expect the possibility that the spaceport might be exposed to the north wall of the hurricane. "That's the most intense winds of the storm," KSC public affairs director Mike Rein said. NASA managers, consequently, decided to shutter KSC so that the center's 12,500 civil service

and contract workers could prepare their homes and families for the storm. "It's just the prudent thing to do," Rein said. NASA three shuttle orbiters have been secured in hangars designed to withstand sustained winds of 105 mph, or about 35 mph less than winds churned up by Frances on Wednesday. The steel-reinforced concrete hangars were built in the 1970s to standards set by the American Society of Civil Engineers at the time. NASA also secured several modules and trusses being prepared for launch to the International Space Station. The station parts are in a processing facility built to withstand sustained winds of 110 mph with gusts to 132 mph. In addition, NASA postponed the build-up of a Boeing Delta 2 rocket at Launch Complex 17A at nearby Cape Canaveral Air Station. The Delta is slated to launch a spacecraft equipped with a Gamma Ray Telescope on Oct. 7. [“Space center closing down, giving workers 2 days,” **Florida Today**, September 2, 2004, p 2B.]

◆ Spacecraft and Expendable Launch Vehicles Status Report: Mission: Swift, Launch vehicle: Delta II, Launch pad: 17-A Cape Canaveral, Launch date: Oct. 7, 2004, Launch window: 12:57 p.m. – 1:57 p.m. EDT. The Swift observatory is in the clean room at NASA’s Hangar AE on Cape Canaveral Air Force Station. In preparation for Hurricane Frances, the spacecraft is covered in a protective double bag and has also been installed in its shipping container for additional protection. The stacking of the Boeing Delta II launch vehicle on Pad 17-A has been postponed until after the hurricane. Mission: Demonstration of Autonomous Rendezvous Technology (DART), Launch vehicle: Pegasus XL, Launch site: Vandenberg Air Force Base, Calif., Launch date: Oct. 19, 2004. At Vandenberg Air Force Base, processing of the Pegasus XL launch vehicle is going well. Mating of the second stage to the third stage is currently in progress. The first of three Pegasus Flight Simulations has been successfully completed. The second simulation is scheduled for Sept. 7, and the third is currently planned for Sept. 23. The upper stage that will provide maneuvering for the spacecraft during mission operations is scheduled to be mated to DART this week. The Advanced Guidance Sensor (AVGS) hardware, the primary technology demonstration experiment for the satellite, is completing final testing at the Marshall Space Flight Center in Huntsville, Ala. The optical characterization testing and final performance verification test will be conducted this month. The AVGS is expected to arrive at Vandenberg approximately Sept. 12 for installation aboard the satellite. KSC News Center (2004). **Spacecraft and Expendable Launch Vehicles Status Report** [Online]. Available E-mail: ksc@newsletters.nasa.gov [2004, September 1].]

**September 6:** NASA's Kennedy Space Center suffered more damage from Hurricane Frances than any storm in its history, but escaped devastation that could have ended the U.S. human space flight program. The nation's space shuttle fleet appears to have survived gusty winds that peaked at 94 mph, the spaceport's director said Monday. But it's uncertain whether NASA will be able to launch its first post-Columbia mission as scheduled in March. Components needed to complete the International Space Station came through the storm unscathed. Fierce winds from Frances battered the center's 52-story Vehicle Assembly Building, opening up exterior holes. The Air Force reported widespread damage at Kennedy Space Center and Cape Canaveral Air Force Station, but the three rockets being readied for launch appear undamaged. General damages are

expected to significantly exceed the $700,000 added up after Hurricane Charley skirted the northern tip of the 140,000-acre federal enclave Aug. 13. "I think it's the worst that KSC has experienced since its inception back in the early 1960s," KSC Director James Kennedy told reporters. Still, the initial feeling of the first NASA personnel back on the base "was that we had dodged a big bullet," he added. NASA meteorologists a week ago predicted that Frances could slam directly into KSC with winds potentially topping 155 mph. None of the shuttle hangars or other KSC buildings were designed to withstand such an onslaught. "I was significantly worried about the future of human space flight based upon that doomsday scenario," Kennedy said. But first responders Monday found most buildings at the center intact. Most power lines still were up. Some light poles, signs and trees were down and the assembly building sustained significant exterior damage. Preliminary damage assessments show the hangars housing NASA's three shuttles appear to have suffered only minor water intrusion. But the roof of a critical shuttle tile manufacturing facility was partially destroyed, and water damage was discovered inside. That could the delay the shuttle's return to flight. NASA is considering restarting the tile manufacturing line in Palmdale, Calif., while repairs are made to the KSC facility. Also, an estimated 1,000 wall panels on the south and east sides of the VAB -- each measuring 4 feet by 10 feet -- were ripped off the facility, opening up about 40,000 square feet of the edifice to the elements. The 525-foot-tall building houses two shuttle external tanks and two shuttle solid rocket booster segments. Kennedy said managers didn't think the storm damage could be repaired or covered before Hurricane Ivan could near Florida's East Coast. He said some meteorological models show Ivan could hit the area as early as Saturday. Kennedy was uncertain whether the storm damage would force NASA to delay the planned launch of Discovery in March. NASA already has lost two workdays to the storm and the schedule for the shuttle's return to flight in March was tight. "I will tell you that I don't consider this to be a disaster by any stretch of the imagination," Kennedy said. Web posted. (2004). [Effects of hurricane could delay space shuttle launch [Online]. Available WWW: http://www.floridatoday.com/ [2004, September 6].]

◆ Hurricane Frances left its destructive mark on the Kennedy Space Center, ripping 40,000 square feet of siding from the spaceport's Vehicle Assembly Building and opening a gaping hole in the massive structure. The hurricane damage was easily the most extensive in the space center's recent history. NASA officials were hustling to assess the damage and shore up the facilities to prepare for Hurricane Ivan, which could threaten Florida's east coast this weekend. The Vehicle Assembly Building, 525-foot-tall landmark structure where the orbiter is connected to its external tank and solid rocket boosters, lost about 1,000 panels to Frances' punishing winds, said NASA spokeswoman Melissa Mathews. Each panel covers about 40 square feet. The storm ripped a 2,500-square-foot hole in the south side of the building, the side that displays the NASA logo and the American flag. "You could see into the building from the outside," Mathews said. A second building where the shuttle fleet's heat-deflecting tiles are manufactured and repaired also sustained damage, losing at least part of its roof. NASA officials couldn't say Monday how much repairs would cost. Last month, the space center sustained about $700,000 in damage from Hurricane Charley. KSC spokesman George Diller said the space center would try to tap a NASA disaster contingency fund. But he said major repairs probably wouldn't be started until after Hurricane Ivan. Hurricane Ivan

is a powerful storm in the eastern Caribbean that could reach Florida by the weekend. Diller noted that the storm had not damaged flight hardware or crippled the assembly building to the point that the building could not be used. "The VAB overall hasn't lost any functionality," Diller said. "Overall the building came through in good shape. There's no critical loss." ["Frances tears hole in 1 side of building at space center," **Florida Today**, September 7, 2004, p A16.]

**September 7:** Workers at NASA's Kennedy Space Center (KSC), Fla. are continuing damage assessments and making repairs to get the center back up and running after Hurricane Frances. There is no indication spaceflight hardware or spares were damaged, and there are no reports of injuries to any KSC employees. Numerous buildings and center infrastructure sustained wind and rain damage. KSC will remain closed to most personnel until Monday, while damage assessments and repairs continue. Video b-roll of KSC hurricane damage is airing on the NASA TV Video File. NASA will release additional footage as available. Approximately 1,000 operations people are working at KSC today, up from about 200 yesterday. Power and phone service was restored to most of the center. Preliminary assessments of the center's two launch pads indicate they're in good shape. The SWIFT spacecraft, which is scheduled for launch early next month, also appears fine, but the building where it rode out the storm did sustain damage. Also, power was restored today to the third and final Orbital Processing Facility, which houses the Space Shuttle Discovery. Assessment of KSC's landmark facility, the Vehicle Assembly Building (VAB), shows about 820 panels were torn off during the storm. Initial review of the VAB's interior indicates no serious damage to equipment, including two Space Shuttle External Tanks. Engineers are continuing their damage assessment. The Thermal Protection System Facility, where Space Shuttle tile and blankets are manufactured, suffered significant damage. Work is under way to recover critical spaceflight material, such as tile molds, from exposed areas. ["Kennedy Space Center Cleans Up After Hurricane," **NASA News Release #N04-140,** September 7, 2004.]

◆ The following is a statement from NASA Administrator Sean O'Keefe regarding the damage left behind at the Kennedy Space Center in Florida in the wake of Hurricane Frances. "The Kennedy Space Center suffered significant damage as Hurricane Frances swept across Florida. However, our primary concern is for the safety and well being of the entire NASA family along the Space Coast. The storm forced thousands of people to seek shelter away from their homes, and we want to make sure our colleagues and their families get the help they need in the coming days and weeks to rebuild their lives. We're very fortunate that no one was injured in the storm, and I want to thank center director Jim Kennedy and his dedicated staff for taking the necessary precautions to ensure the Kennedy Space Center was made as safe as possible in the face of a terrible hurricane. We're assessing how our resources across the entire agency can best be used to offer support to the Kennedy Space Center, as emergency crews begin the tedious and difficult work of clearing debris and restoring power and other services to the facilities on site. We're also tracking Hurricane Ivan very closely as it approaches the Caribbean. I urge the entire NASA family to keep everyone at the Kennedy Space Center in their prayers in the coming days. While there is considerable federal and state assistance on the way, the entire NASA family can get involved by contributing to the NASA Family Assistance

Fund or the Red Cross. "As people begin to return to their homes and careers, I recognize we have a monumental task ahead of us. But I know NASA is up to the challenge. We have a documented history of overcoming adversity and pulling together as a people to put America's space program back on track." [“NASA Administrator Offers Support For Kennedy Space Center,” **NASA News Release #04-289,** September 7, 2004.]

◆ The south wall of the gigantic Vehicle Assembly Building at Kennedy Space Center looks as if it's lost several teeth. The white citadel of the center has lost more than 52,000 square feet of the exterior walls, a larger area than previously estimated, Director Jim Kennedy said Tuesday. Checkerboard scars are scattered across the surface. In some cases, just exterior metal panels were ripped off. In others, the 16- by 4-foot rectangular holes go all the way through. Even the American flag painted on the building had a bite chewed out of it. During the storm, some panels had blown off the building's walls onto cars parked below, smashing windshields. Workers were told to abandon the roof after its damage was found to be so extensive it was "soggy" and unsafe, Kennedy said. "It was just very unsecure," he said. The building was created to house the moon rockets and is the place where shuttle orbiters are stacked with their external tank and solid rocket boosters. It is one of the facilities deemed critical to getting the shuttles back in the air. Fortunately, the shuttles and their hangars apparently survived without damage, as did space-station hardware. Kennedy wouldn't speculate on how much the target launch date of March would be affected. "It's very much to be determined," he said. Another crucial facility is the building where heat-protection tiles and blankets are made for the shuttles. Perhaps a quarter of the roof was ripped off. "It looks like a giant came along with a can opener and peeled the roof off, then took an egg beater" and scrambled the insides of the blanket manufacturing facility, U.S. Rep. Dave Weldon, R-Fla., said after a tour Tuesday. Though NASA is able to make tiles at a facility in Palmdale, Calif., workers at Kennedy Space Center manually fit the unique tiles onto the skin of each shuttle during the production process. Kennedy said KSC employees' jobs weren't in danger. "Workers here are going to be in bigger demand than ever as they work to help us recover," he said. Employees of NASA and contractors, including United Space Alliance, were told to stay home until Monday unless specifically called in to help the damage assessment team. KSC's Process Control Center also had severe water damage after losing part of its roof. It's the hub of the e-mail and Web system for the shuttle launch complex, but because the computers were covered with plastic, the damage assessors think they probably were protected, Kennedy said. Though many buildings suffered siding and roof damage at Cape Canaveral Air Force Station, preliminary assessments suggested rockets on the pads and in processing facilities survived the storm, Brig. Gen. select Mark Owen said. Launch pads for shuttles and rockets both looked good, he and Kennedy said. Workers were hanging netting under the roof of the Vehicle Assembly Building to catch falling debris and make it safer for people to be inside. Repairs to the walls seemed unlikely before the potential arrival of Hurricane Ivan this weekend. History buffs and tourists alike will be disappointed to hear the facility on KSC that holds a restored moon rocket and several exhibits has serious roof damage and won't be part of tours from the KSC Visitor Complex today. Web posted. (2004). [KSC takes beating, but shuttles are safe [Online]. Available WWW: http://www.floridatoday.com/ [2004, September 7].]

**September 8:** **General News:** KSC will not be fully operational until Monday, September 13. Currently, some essential personnel are reporting for duty earlier as required. AF employees working on CCAFS will report on Thursday. Work is continuing over the next few days to restore KSC facilities and institutional capabilities. This includes power, e-mail, air conditioning and other basic essential needs to operate and function. The KSC Child Development Center will reopen on Monday. It was inspected and has weathered the storm. The MFF Cafeteria is open today. All other KSC cafeterias will reopen on Monday. Pass & ID at Gate 3 on NASA Causeway is open. Pass & ID at Gate 1 on Cape Canaveral Air Force Station will reopen on Thursday. The KSC Visitor Complex is currently open; however, tours are not being conducted. The KSC Credit Union will reopen on Thursday. Many other centers and headquarters have offered help to KSC and its employees. JSC states KSC was there after the Columbia accident and they will be here for KSC. Managers are currently evaluating the best way to accept the help. The Columbia debris on the 16th floor of the VAB is in great shape and was not harmed in any way by the storm. DART teams will continue to work 1st and 2nd shifts through Monday. Hurricane Ivan is projected to be 100 miles southwest of Ft. Myers on Monday. A team will meet tomorrow to begin looking in earnest for possible preparation for the storm. Unfortunately, the Genesis spacecraft crashed in the Utah desert upon its return to Earth today. NASA is investigating the cause with more details to come. **Damage Assessment:** Approximately 820 exterior panels which are 16 X 4 inches in size are missing from the VAB. This leaves approximately 20 percent of the interior of the VAB open to outside conditions. Some roof damage is also of concern. Debris is being removed from the roof in preparation for assessment of any necessary repairs. The VAB roof was inspected today and is safe. The Thermal Protection System Facility (TPSF) also has significant damage and is unusable for work at the present time. The Florida Space Authority has offered their SLF Hangar for NASA's use. The equipment from the TPSF is being moved to that location so tile and blanket operations can resume as soon as next week. There was no damage to the Orbiter Processing Facilities (OPF's) or to the Space Shuttle orbiters. Equipment and computers in the Processing Control Center (PCC) appear to be in good shape due to effective pre-hurricane preparations. Wet ceiling tiles are being removed. No water was observed beneath the floor tiles. There is no damage to the SWIFT spacecraft in Hangar AE. There is no damage to the two external tanks located in the VAB. The Space Station Processing Facility is operational and ready for normal processing activities to resume on Monday. The O&C roof received some moderate damage. No damage was reported to the Expendable Launch Vehicles in the gantries at Pads 17, 37 and 41. No damage has occurred at the Space Shuttle launch pads. All facility shutters, sandbags and equipment coverings are to remain in place until after the threat of Hurricane Ivan has passed. [KSC Internal Comm (2004) **Hurricane Frances Recovery Newsletter** [Online]. Available E-mail: KSCInternalComm@kscems.ksc.nasa.gov [2004, September 8, 4 p.m. EDT].]

◆ The Genesis sample return capsule entered Earth's atmosphere at 9:52:47 MDT and entered the preplanned entry ellipse in the Utah Test and Training Range as predicted. However, the Genesis capsule, as a result of its parachute not deploying, impacted the ground at a speed of 311 kilometers per hour (193 mph). The impact occurred near

Granite Peak on a remote portion of the range. No people or structures were anywhere near the area. "We have the capsule," said Genesis project manager Don Sweetnam of NASA's Jet Propulsion Laboratory, Pasadena, Calif. "It is on the ground. We have previously written procedures and tools at our disposal for such an event. We are beginning capsule recovery operations at this time." By the time the capsule entered Earth's atmosphere, the flight crews tasked to capture Genesis were already in the air. Once it was confirmed the capsule touched down out on the range, the flight crews were guided toward the site to initiate a previously developed contingency plan. They landed close to the capsule and per the plan, began to document the capsule and the area. "For the velocity of the impact, I thought there was surprisingly little damage, said Roy Haggard of Vertigo Inc., Lake Elsinore, Calif., who took part in the initial reconnaissance of the capsule. "I observed the capsule penetrated the soil about 50 percent of its diameter. The shell had been breached about three inches and I could see the science canister inside and that also appeared to have a small breach," he said. The safety of recovery personnel has been the top priority. The capsule's separation charge had to be confirmed safe before the capsule could be moved. The recovery team is in the process of preparing to move the capsule to a clean room. The Genesis mission was launched in August 2001 on a journey to capture samples from the storehouse of 99 percent of all the material in our solar system -- the sun. The samples of solar wind particles, collected on ultra-pure wafers of gold, sapphire, silicon and diamond were designed to be returned for analysis by Earth-bound scientists. [“Genesis Mission Status Report,” **NASA News Release #04-292,** September 8, 2004.]

◆ President Bush’s space exploration plan is in jeopardy if Congress refuses to approve NASA’s request for $16.2 billion, the space agency’s top official said Wednesday. The construction of a crew exploration vehicle for a journey to the moon and the development of new deep-space propulsion systems for travel to Mars would be the first projects to feel the budget axe, NASA Administrator Sean O’Keefe warned a senate panel. With less than a month before the start of the fiscal year, Congress has not completed work on the appropriations bill that would fund NASA in 2005. The only progress so far came in July, when the House Appropriations Committee approved a $15.1 billion budget for NASA -- $1.1 billion less than the Bush administration requested. Republican Sen. Trent Lott of Mississippi said residents of his state are more interested in building highways than vague promises of a mission to Mars 20 years in the future. “They want something more tangible,” Lott said. “Some esoteric visionary space flight is no enough. You’re going to lose the support of the American people.” Sen. Bill Nelson, D-Melbourne, urged O’Keefe to submit a request for emergency hurricane funding immediately to repair damaged building at Kennedy Space Center. Noting that Congress already has passed legislation to provide $2 billion in hurricane relief and is likely to approve another $2.5 billion, Nelson said NASA should get its request in. “Strike while the iron is hot (or) you will have to take this out of your budget,” Nelson warned. [“NASA chief warns of space cuts,” **Florida Today**, September 9, 2004, p 1B.]

**September 9: General News:** Center Director Jim Kennedy announced that the current priority for KSC is to transition from Hurricane Frances recovery operations to preparation for the potential arrival of Hurricane Ivan in the KSC vicinity as early as

Monday. The Center is expected to go into an elevated Hurricane condition on Friday, September 10. Mr. Kennedy will make a decision on Saturday, September 11 on employee work status for Monday, September 13. Further information concerning the impending storm and work status will be made available as soon as possible on the KSC and NASA Headquarters Web Sites. Employees should also continue to call the Spaceport Emergency Operations Center update line. **Current Center Status:** Pass & ID Gate 3 at NASA Causeway and Pass & ID Gate 1 at Cape Canaveral Air Force Station are both open. The MFF Cafeteria is open. All other KSC cafeterias will reopen on Monday. The KSC Credit Union is open. The KSC Child Development Center is scheduled to reopen on Monday, September 13 if it remains a work day. The KSC Visitor Complex is currently open; however, tours are not being conducted. DART teams will continue to work 1st and 2nd shifts through Sunday. The CITGO service station in the KSC Industrial Area is currently open. **Hurricane Preparations:** Securing of flight hardware will occur on Friday, September 10 and Saturday, September 11. Final securing of facilities will be completed on Sunday, September 12. Utilities will remain on and a rideout team will be on site with flight hardware, critical facilities, and near locations where emergency securing may be necessary as a result of Hurricane Ivan. **Damage Assessment and Recovery:** Temporary roofing has been installed on the Processing Control Center (PCC) and to some of the Thermal Protection System Facility (TPSF). No damage other than water intrusion was reported at the Space Life Sciences Lab and all experiments are secure. Communications have been restored at the Shuttle Landing Facility (SLF) and it is currently open for aircraft operations. [KSC Internal Comm (2004) **Hurricane Frances Recovery Newsletter** [Online]. Available E-mail: KSCInternalComm@kscems.ksc.nasa.gov [2004, September 9, 4 p.m. EDT].]

**September 10:** **General News :** Kennedy Space Center and Cape Canaveral Air Force Station are in an elevated Hurricane condition. There are 718 people at KSC today securing facilities in preparation for Hurricane Ivan and mitigating the effects of Hurricane Frances. KSC work status for next week is to be determined on Saturday, September 11. Employees should continue to call the Spaceport Emergency Operations Center update line and continue to monitor TV news and radio stations for work status updates. Further information concerning the impending storm and work status will be made available as soon as possible on the KSC and NASA Headquarters Web Sites. The maximum wind at the surface from Hurricane Frances was 94 mph from the NE at 6:40 a.m. on Sunday, September 5. It was recorded at a weather tower located on the east shore of Mosquito Lagoon near the Cape Canaveral National Seashore. The highest period of sustained wind at KSC was 68 mph. Of special note, on Saturday, September 11 at 8:46 a.m. EDT, people throughout the nation will observe a moment of silence in memory of those we lost on September 11, 2001. **Current Center Status:** Pass & ID Gate 3 at NASA Causeway and Pass & ID Gate 1 at Cape Canaveral Air Force Station are both open. The MFF Cafeteria is open. All other KSC cafeterias will reopen on Monday if the center remains open. The KSC Child Development Center is scheduled to reopen on Monday, September 13 if it remains a work day. The KSC Visitor Complex is currently open; however, tours are not being conducted. DART teams will continue to work 1st and 2nd shifts through Sunday. The CITGO service station in the KSC Industrial Area is currently open. **Hurricane Preparations:** Securing of flight hardware will

occur on Friday, September 10 and Saturday, September 11. Final securing of facilities will be completed on Sunday, September 12. Utilities will remain on and a rideout team will be on site with flight hardware, critical facilities, and near locations where emergency securing may be necessary as a result of Hurricane Ivan. **Damage Assessment and Recovery:** Moving of all equipment from the Thermal Protection System Facility (TPSF) to the Florida Space Authority Hangar at the Shuttle Landing Facility which is also the Columbia Debris Hangar is being completed today. Clearing of debris from the VAB low bay roof is continuing and will be completed some time this weekend. High temperature degree, 0% dehumidified air is being used to dry out the Processing Control Center (PCC) where computers and instrumentation equipment are located. Early reports are it has been very effective. This will be the last newsletter until after the threat of Hurricane Ivan has passed. [KSC Internal Comm (2004) **Hurricane Frances Recovery Newsletter** [Online]. Available E-mail: KSCInternalComm@kscems.ksc.nasa.gov [2004, September 10, 1 p.m. EDT].]

◆ A faulty battery NASA learned about shortly after launch could be the reason the Genesis spacecraft's parachutes did not work as it tumbled toward Earth and crashed into the Utah desert, cracking open the container of solar dust it was bringing back from space. Engineers became concerned about the battery two months after the ship blasted off from Cape Canaveral Air Force Station in August 2001. Some worried higher-than-expected temperatures would prevent the re-entry system from working, endangering the entire mission. ["Battery leading Genesis suspect," **Florida Today**, September 10, 2004, p 11A.]

**September 12:** Kennedy Space Center officials said Saturday they believe powerful Hurricane Ivan will not come close enough to the spaceport to cause additional damage. Ivan, which as of Sunday morning was a powerful Category 4 hurricane with peak sustained winds of 250 km/h, is expected to pass well to the west of KSC, with the center of the storm passing more than 300 km from the spaceport. That passage should limit wind speeds at KSC to no more than about 75 km/h, preventing further damage to spaceport facilities. Hurricane Frances caused considerable damage to KSC a week ago, stripping several hundreds panels off the side of the Vehicle Assembly Building (VAB) and tore a hole in its roof. Two other buildings at KSC, including one that manufactures shuttle tiles, were also extensively damaged during the storm. KSC officials said there is little they could do to repair the damage of those buildings in advance of Ivan. Replacing the panels on the VAB is expected to take several weeks alone to complete. Web posted. (2004). [NASA: Ivan poses no risk to KSC [Online]. Available WWW: http://www.spacetoday.net/ [2004, September 12].]

**September 14:** Weather forecasts indicate some NASA centers and facilities could feel Ivan's terrible wrath. Preparations are under way to secure important space flight hardware. NASA's Stennis Space Center (SSC), Miss., and the Michoud Assembly Facility, New Orleans, are getting ready to ride out the storm. Other NASA installations, from Johnson Space Center, Houston, to Kennedy Space Center, Fla., are keeping a wary eye on Ivan's track. "We really saw our readiness for Hurricanes Charley and Frances pay off," said William Readdy, NASA's associate administrator for space operations. "KSC

was in the path of those two strong storms, and while some of our buildings were damaged, we made sure our workforce was safe and had no injuries. We were also able to protect our three Space Shuttles, our International Space Station components, and other key hardware. Ivan looks like it may be an even more powerful storm, so it's important that we do everything we can to prepare our people and our facilities," he said. At SSC, where Space Shuttle engines are tested before flight, workers were sent home this afternoon to prepare for the storm with their families. A team of essential personnel plans to ride out the storm. Two flight-qualified Space Shuttle Main Engines at were secured; one was put back into its container, and the other was wrapped in plastic. Two developmental engines were enclosed on their test stands and protected. A ride-out team will remain in place through the storm at Michoud, across the Mississippi-Louisiana border from SSC. Lockheed Martin and NASA workers were dismissed this morning to make preparations at home. The large Space Shuttle external fuel tanks manufactured and assembled at Michoud, a NASA facility operated by Lockheed-Martin, have been secured. NASA's Marshall Space Flight Center (MSFC), located well inland in Huntsville, Ala., is also taking precautions and making preparations for possible tornados or other effects from Ivan. [“NASA Prepares for Hurricane Ivan,” **NASA News Release #04-299,** September 14, 2004.]

◆ President George Bush asked Congress on Tuesday to approve a supplemental budget bill that includes $126 million to repair hurricane damage at NASA's Kennedy Space Center. The request, formally filed Tuesday with Rep. Dennis Hastert, Speaker of the House of Representatives, asks for $126 million "to repair facilities damaged and take other emergency measures due to the effects of hurricanes". That amount includes $89 million to cover repairs to the Vehicle Assembly Building and tile production facility, as well as "temporary relocation of its production capability". The request also calls for $23 million to repair equipment damaged by the storm as well as $14 million to provide temporary workspaces for displaced workers. KSC suffered significant damage when it was hit by Hurricane Frances over Labor Day weekend, including the loss of hundreds of exterior panels on the sides of the VAB. The request was part of a total of $3.1 billion in hurricane-related supplementary requests Bush made on Tuesday. An earlier request for $2 billion to cover hurricane damage was swiftly approved by Congress, which is also expected to act quickly on this measure. Web Posted. (2004). [Bush asks for $126 million for KSC hurricane repairs [Online]. Available WWW: http://www.spacetoday.net/ [2004, September 14].]

◆ The fury of Hurricane Frances put a Boeing Delta 2 launch on hold and prompted extensive inspections, but pre-flight preparations are resuming for the rocket's mission to haul a replacement Global Positioning System satellite into space. The rocket weathered the hurricane's powerful winds and heavy rains atop pad 17B at Cape Canaveral Air Force Station, Florida, where the booster was being readied for liftoff September 22. In advance of the Labor Day weekend blast from Frances, crews secured the rocket inside its mobile gantry. The Cape was closed and workers living along the coast evacuated. Once the storm cleared, inspections began immediately to check the rocket's condition. Initial looks revealed no major problems, but additional tests on four of the Delta 2's nine strap-on solid rocket motors are continuing. "For the past few weeks, the Boeing Delta 2

launch vehicle carrying the Lockheed Martin-built GPS 2R-13 spacecraft has been maintained in a 'hurricane safing' status at SLC-17B," Lt. Col. Gregory J. Schiller, manager of the Delta 2 launch program at the Air Force's Space and Missile Systems Center told Spaceflight Now. "Following a thorough inspection of the launch vehicle and ground support equipment, no significant damage to any launch asset has been identified. As such, Boeing and Lockheed Martin were given the clearance to resume normal operations and is currently targeting a new launch date of October 8." Officials were concerned about potential water intrusion and damage from flying debris. Inspections performed by the Air Force, the Boeing launch team and the company's design engineering personnel flown to Florida from California found no damage of any significance. "Witness paint" applied to the solid rocket motors to indicate impacts during vehicle handling and processing revealed that four boosters received minor debris hit during Frances. The GPS spacecraft had been undergoing its routine pre-flight processing inside a separate facility at Cape Canaveral. As a hurricane precaution, workers placed the satellite back into its shipping container to ride out the storm. Post-Frances checks have shown the satellite to be healthy. Liftoff on October 8 would occur during the day's 29-minute launch window that extends from 3:36 to 4:05 a.m. EDT. Meanwhile, the Delta 2 launch of NASA's gamma-ray burst detection spacecraft, called Swift, originally targeted for October 7 has been pushed back to late October because of Hurricane Frances. Stacking of that rocket on pad 17A, once set to begin September 1, is expected to start next week. Swift was inside the Cape's Hangar AE cleanroom during the storm. Web posted. (2004). [Hurricane Frances delays Delta 2 launch into October [Online]. Available WWW: http://www.spaceflightnow.com/ [2004, September 14].]

**September 16:** Representatives of Ford Motor Company are bringing a new hydrogen fuel cell Focus to the Kennedy Space Center Sept. 23. The vehicle, which is an example of NASA-inspired fuel cell technology, will be on display at the Kennedy Space Center Visitor Complex. NASA Fluid Propellants Manager H. T. Everett spoke about the many benefits of the technology and the evolution of its use in commercial markets for electrical power generation. Buildings, transportation vehicles and mobile electronics are beginning to utilize this clean and efficient technology. [“New Hydrogen Fuel Cell Ford Vehicle Visits KSC,” **NASA News Release #71-04**, September 16, 2004.]

◆ Hurricane Ivan, now a tropical storm, blasted the Gulf Coast with 130-mph winds Thursday and unleashed most of its fury on the Florida Panhandle, killing at least 20 people, collapsing a bridge and sending six tornadoes barreling through several hospitals and hundreds of homes. Web posted. (2004). [Ivan pummels Florida Panhandle; inland flooding predicted [Online]. Available WWW: http://www.usatoday.com/ [2004, September 16].]

**September 17:** Spacecraft and Expendable Launch Vehicles Status Report: Mission: Swift, Launch vehicle: Delta II, Launch pad: 17-A, Cape Canaveral, Launch date: Oct. 26, 2004, Launch window: 1:00 p.m. – 2:00 p.m. EDT. Launch of the Swift observatory has been rescheduled for Oct. 26 based on the recovery schedule developed after Hurricane Frances. The date is subject to change based on the track of Hurricane Jeanne next week. The one-hour launch window extends from 1 – 2 p.m. EDT. Swift is in the

clean room at NASA's Hangar AE on Cape Canaveral Air Force Station. The spacecraft was removed from its shipping container on Thursday, where it had been reinstalled as a precaution for Hurricane Frances. The spacecraft is covered in a protective double bag and will remain so until the threat from Hurricane Jeanne can be determined. However, some electrical testing can still be performed in the interim. The stacking of the Boeing Delta II launch vehicle on Pad 17-A has been rescheduled to begin on Tuesday, Sept. 21 with the hoisting of the first stage onto the launch pad. Attachment of the three strap-on solid rocket boosters is scheduled for Sept. 22. The payload fairing will be lifted inside the clean room with the mobile service tower on Sept. 23. The second stage will be hoisted into position atop the first stage on Sept. 25. Mission: Demonstration of Autonomous Rendezvous Technology (DART), Launch vehicle: Pegasus XL, Launch site: Vandenberg Air Force Base, Calif., Launch date: Oct. 19, 2004, Launch window: 11:19:13 a.m. – 11:26:13 a.m. PDT. At Vandenberg Air Force Base, the Pegasus XL launch vehicle completed its buildup and testing is in progress. The first of three Pegasus Flight Simulations was completed Aug. 18 and the second on Sept. 9. The final simulation is scheduled to be conducted on Sept. 30. The upper stage that will provide maneuvering for the spacecraft during mission operations is scheduled to be mated to DART this week. Installation of the Advanced Video Guidance Sensor (AVGS) hardware, the primary technology demonstration experiment, was completed into the satellite Sept. 15 after arriving at Vandenberg Sept. 12. The optical characterization testing and final performance verification test will be conducted later this month. KSC News Center (2004). **Spacecraft and Expendable Launch Vehicles Status Report** [Online]. Available E-mail: ksc@newsletters.nasa.gov [2004, September 17].]

◆ Space Shuttle Processing Status Report S04-031: Orbiters: None of NASA's three Space Shuttle orbiters, Discovery, Atlantis and Endeavour, along with the Shuttle launch pads, all critical flight hardware for the orbiters and the International Space Station, sustained damage during Hurricane Frances. On Monday, workers began taking the orbiters out of a hurricane preparedness status and returning to regular processing activities. Discovery was powered up on Tuesday and the landing gear lowered. The payload bay doors were closed during hurricane preparations, and they will remain that way so technicians can perform an optics check of the Heads Up Display, a standard check performed during processing activities. The display provides visual alignment cues to Space Shuttle commanders and pilots during approach and landing. The payload bay doors are scheduled to open Tuesday. Atlantis and Endeavour also returned to pre-hurricane processing activities. Space Shuttle facilities including the Vehicle Assembly Building, the Thermal Protection System Facility and the Processing Control Center received significant damage. The KSC Recovery Team continues to perform assessments of the damage and create recovery plans to ensure Space Shuttle facilities are safe and fully operational as quickly as possible. Processing activities associated with orbiter Thermal Protection System (TPS) tiles are scheduled to begin Monday. Following the move of the second floor TPS blanket area to a hangar at the Shuttle Landing Facility (offered by the Florida Space Authority), TPS blanket production could begin as early as Sept. 27. Managers at KSC are watching Hurricane Jeanne's track to determine what steps, if any, will be taken to prepare for the storm. A decision will be made Saturday to determine whether the Center will enter Hurricane Condition IV (50 knot winds expected

within 72 hours). If KSC enters Hurricane Condition III (50 knot winds expected within 48 hours), the orbiters will be prepared to ensure their safe ride-out of the storm. Owner-press-release. (2004). **Space Shuttle Processing Status Report** [Online]. Available E-mail: owner-press-release@spinoza.public.hq.nasa.gov [2004, September 17].]

**September 20:** The NASA Genesis Mishap Investigation Board (MIB) arrived at Dugway Proving Ground (DPG), Utah, September 10, to take charge of the investigation. The Genesis Sample Return Capsule (SRC) impacted the ground after its drogue and parafoil systems failed to deploy during re-entry September 8. Dr. Michael Ryschkewitsch is the leader of the MIB. ["Genesis Mishap Investigation Board Status Report #1, **NASA News Release #04-306**, September 20, 2004.]

**September 21:** As NASA's Spirit and Opportunity resumed reliable contact with Earth, after a period when Mars passed nearly behind the sun, the space agency extended funding for an additional six months of rover operations, as long as they keep working. Both rovers successfully completed their primary three-month missions on the surface of Mars in April and have already added about five months of bonus exploration during the first extension of their missions. ["Rover Missions Renewed As Mars Emerges From Behind Sun," **NASA News Release #04-307**, September 21, 2004.]

**September 22:** Spacecraft and Expendable Launch Vehicles Status Report: Mission: Demonstration of Autonomous Rendezvous Technology (DART), Launch vehicle: Pegasus XL, Launch site: Vandenberg Air Force Base, Calif., Launch date: Oct. 19, 2004, Launch window: 11:19:13 a.m. – 11:26:13 a.m. PDT. At Vandenberg Air Force Base, the Pegasus XL launch vehicle completed its buildup and testing is in progress. The first of three Pegasus Flight Simulations was completed Aug. 18 and the second on Sept. 9. The final simulation is scheduled to be conducted next week on Sept. 30. The upper stage that will provide maneuvering for the spacecraft during mission operations for DART was demated from the third stage this week to inspect its pressure transducer and associated electrical harness. Installation of the Advanced Video Guidance Sensor (AVGS) hardware, the primary technology demonstration experiment, was completed into the satellite Sept. 15 after arriving at Vandenberg Sept. 12. The optical characterization testing and final performance verification test will be conducted later this month. Mission: Swift, Launch vehicle: Delta II, Launch pad: 17-A Cape Canaveral, Launch date: Oct. 26, 2004, Launch window: 1:00 p.m. – 2:00 p.m. EDT. Swift is in the clean room at NASA's Hangar AE on Cape Canaveral Air Force Station. The Observatory Integrated Systems Tests is underway today. An Observatory Operational Simulation is scheduled for Sept. 23-24 with two others planned to occur next week. The start of stacking of the Boeing Delta II first stage on Pad 17-A has been rescheduled for Thursday, September 23 due to higher than allowable wind at the launch complex. Attachment of the three strap-on solid rocket boosters is scheduled for Sept. 24. The second stage will be hoisted into position atop the first stage on Sept. 25. KSC News Center (2004). **Spacecraft and Expendable Launch Vehicles Status Report** [Online]. Available E-mail: ksc@newsletters.nasa.gov [2004, September 22].]

**September 23:** In preparation for the arrival of Hurricane Jeanne, workers in the Reusable Launch Vehicle Hangar unrolled long pieces of plastic to place on shelves holding Thermal Protection System Facility (TPSF) equipment. The TPSF suffered extensive damage from Hurricane Frances, causing the relocation of equipment and materials to the hangar offered to Kennedy Space Center by the Florida Space Authority. Hurricane Jeanne is expected to impact Central Florida Sunday, and is the fourth hurricane in 45 days to make landfall somewhere in the state. ["Kennedy Space Center Prepares For Hurricane Jeanne," **NASA Photo Release #P14-04**, September 23, 2004.]

◆ NASA's storm-battered Kennedy Space Center went on hurricane alert again today as yet another tropical system threatened to hammer Florida's East Coast over the weekend. With Hurricane Jeanne now expected to make landfall and sweep up the coast Sunday, workers here began to secure NASA's three-orbiter shuttle fleet. KSC spokeswoman Jessica Rye said the payload bay doors of each of the $2 billion orbiters will be closed today and workers will raise the landing gear on each of the ships to protect them from any storm surge. Components destined for the International Space Station also are being secured along with a NASA gamma ray observatory slated for launch in late October. Hurricane preparations also are under way at Patrick Air Force Base and Cape Canaveral Air Force Station. Workers at the air station were securing a Titan 4 rocket at launch complex 40 and a Boeing Delta 4 rocket at complex 37. The storm preparations at KSC stalled repair work at buildings that were hit hard by Hurricane Frances, which caused more than $100 million in damage at the nation's shuttle homeport over the Labor Day weekend. "We're trying to do as much as we can in terms of recovery from the last storm and still prepare for the next one," said KSC spokesman Bruce Buckingham. Frances ripped more than 850 panels of siding off the 52-story Vehicle Assembly Building, leaving more than an acre of area open to the elements. NASA officials are concerned that heavy rains or high winds from Jeanne could cause further damage to the landmark building, where shuttles are outfitted with an external tank and twin rocket boosters prior to moving out to the launch pad. "We're buttoning up the VAB as best we can. But we won't be able to plug up holes before the storm," Rye said. "There's not much we can do but prepare as best we can and wait for what happens." Also damaged during Frances: a critical computer control center and a factory where workers make heat shield tiles and blankets that protect shuttles from extreme temperatures encountered during atmospheric reentry. A decision to close KSC to all but essential personnel on Friday might be made later today. In that case, a 140-member "ride-out crew" would report to work to keep an eye on facilities during the storm. Jeanne is the fourth hurricane this season to threaten the Cape and NASA facilities. Hurricane Charley caused about $1 million in damages at KSC and Ivan prompted NASA to temporarily shut down operations at Stennis Space Center in Bay St. Louis, Miss., and a shuttle external tank factory in New Orleans. Web posted. (2004). [Still in need of repair, KSC readies for Jeanne [Online]. Available WWW: http://www.floridatoday.com/ [2004, September 23].]

**September 24:** Effective 6:00 a.m. today, Kennedy Space Center (KSC) was placed in HURCON II. The Center will be closed for normal business beginning with first shift on

Friday, September 24. [Memoranda (NASA). James E. Hattaway, Jr. Subject: "Hurricane Jeanne," September 24, 2004.]

**September 25:** NASA's three space shuttles are just fine, but the already damaged Vehicle Assembly Building lost more of wall panels to Hurricane Jeanne overnight and this morning. The damage assessment team at the space center has not been able to venture far from the buildings where a "ride out crew" took cover during the worst of the storm overnight. Spokesman George Diller says, however, that quick peeks by people stationed at various locations indicate that the VAB lost more of the panels like the ones torn off during Hurricane Frances three weeks ago. "At one point we were losing one every 2 or 3 minutes, but that's abated we think," he said. Other than that, KSC so far has been able to identify mostly "routine" hurricane damage such as water getting inside some buildings. Shuttles Endeavour, Discovery and Atlantis and their Orbiter Processing Facility hangars all came through fine, although the wind continues to whip and some dangerous storm bands are still hitting Cape Canaveral and Titusville this morning.
All the International Space Station components stored inside a processing building at KSC survived in good shape, Diller said. "We think we can get a chance to get outside at 2 or 3 p.m.," Diller said. At that point, NASA officials will get a much better assessment of how bad the situation is at the VAB and elsewhere. And, of course, the team could find more damage. Diller said it was too early to tell whether the additional panels coming off the Vehicle Assembly Building have made worse the situation in that facility - where the orbiters are connected to the external fuel tanks and solid rocket boosters before launch. "It's too soon to say," Diller said. Weather devices at Kennedy Space Center measured peak gusts of 79 mph during the storm, and officials there felt like the storm's sudden westward turn - taking it slightly south of the projected path - may have cut the maximum winds at the space center by at least 30 miles per hour. Web posted. (2004). [Space shuttles survive Jeanne; assembly building loses more panels [Online]. Available WWW: http://www.floridatoday.com/ [2004, September 26].]

**September 27:** Jim Kennedy, director of NASA's Kennedy Space Center, Fla., and Brig. Gen. Select Mark Owen, commander of the Air Force's 45th Space Wing, will speak with media today at 3:30 p.m. EDT during a telephone news conference. Kennedy and Owen will talk about initial damage assessments following Hurricane Jeanne, which came ashore Sunday morning south of KSC. The center is closed today for most employees. Workers are allowed to stay home to take care of their families in the aftermath of the storm. Damage assessment teams are operating at KSC and Patrick AFB today. Initial observations at KSC indicate some damage to facilities, but spacecraft hardware appears safe. ["NASA, Air Force Evaluating Effects of Hurricane Jeanne," **NASA News Release #n04-153**, September 27, 2004.]

**September 28:** NASA's Kennedy Space Center escaped major additional damage from Hurricane Jeanne, center officials said late Monday, but the overall damage and disruptions could force a delay in next year's first post-Columbia shuttle flight. Jeanne, which struck Florida on Sunday, stripped about 30 panels from the sides of the Vehicles Assembly Building (VAB); that giant building lost over 800 panels when Hurricane Frances struck in early September. The Operations and Checkout Building also suffered

some water damage from roof leaks. However, the three shuttle orbiters, as well as space station hardware, escaped any damage from the storm, which KSC director Jim Kennedy called a "kinder, gentler" storm compared to Frances. Three rockets on launch pads at neighboring Cape Canaveral Air Force Station also survived the storm without damage. However, the overall damage from the hurricanes, as well as the work disruptions — KSC reopened Tuesday after being closed since Friday — could force NASA to delay the launch of the shuttle Discovery in March or April 2005 on the first shuttle mission since the Columbia accident. Shuttle managers are scheduled to meet Friday to weigh the effects of the storms on shuttle flight preparations and whether a launch postponement will be needed. Web posted. (2004). [KSC weathers Hurricane Jeanne [Online]. Available WWW: http://www.spacetoday.net/ [2004, September 28].]

**September 30:** NASA is planning to launch the Demonstration of Autonomous Rendezvous Technology (DART) flight demonstrator in late October. The launch is planned no earlier than Oct. 26 from Vandenberg Air Force Base, Calif. The mission is an in-space demonstration of an autonomous rendezvous prototype system. NASA successfully ground tested technologies that will enable unmanned spacecraft to rendezvous autonomously, something never done before in the history of U.S. spaceflight. The ground tests were performed at the Flight Robotics Laboratory at NASA's Marshall Space Flight Center, Huntsville, Ala. The tests demonstrated the capability of hardware and software to communicate with each other and to drive the spacecraft autonomously to achieve a safe, assured rendezvous and close approach to a target. Video guidance sensor and autonomous rendezvous guidance technologies have performed flawlessly, according to NASA managers. The tests verified critical autonomous rendezvous technologies, including the ability of the Advanced Video Guidance Sensor to combine with other technologies, such as the Global Positioning System and Automated Rendezvous and Proximity Operations calculations. [“NASA Spacecraft Moves One Step Closer To Fall Launch,” **NASA News Release #04-322**, September 30, 2004.]

◆ Spacecraft and Expendable Launch Vehicles Status Report: Mission: Demonstration of Autonomous Rendezvous Technology (DART), Launch vehicle: Pegasus XL, Launch site: Vandenberg Air Force Base, Calif., Launch date: Oct. 26, 2004 NET, Launch window: 11:13:32 a.m. – 11:20:32 a.m. PDT. Due to a failed pressure transducer on the DART upper stage, launch aboard a Pegasus XL has been rescheduled to no earlier than Oct. 26. The upper stage is necessary to deliver DART to its rendezvous point and to conduct proximity operations with the Multiple Paths, Beyond-Line-of-Site Communications (MUBLCOM) satellite. Three strain gauges have been installed on the upper stage to derive hydrazine fuel tank pressure. Verification testing is now under way to validate this alternate method of monitoring. A final flight simulation is now scheduled to be conducted on Oct. 7. Installation into the satellite of the Advanced Video Guidance Sensor hardware, the primary technology demonstration experiment, was completed Sept. 15 after arriving at Vandenberg Sept. 12. Mission: Swift, Launch vehicle: Delta II, Launch pad: 17-A Cape Canaveral Air Force Station, Fla., Launch date: Nov. 2, 2004 NET, Launch window: 12:02 p.m. – 1:02 p.m. EST. Due to Hurricane Jeanne, the launch of Swift has been retargeted to occur no earlier than

Nov. 2. Integrated schedules involving the launch of Swift from Pad 17-A and the pending launch of an Air Force Global Positioning Satellite from Pad 17-B are now being developed. A firm launch date for Swift should be known next week. Swift is in the clean room at NASA's Hangar AE on Cape Canaveral Air Force Station. The Observatory was covered in a protective double bag with a dry nitrogen purge during Hurricane Jeanne. The bag is being removed today in preparation for a resumption of testing. The final installation flight blankets to provide thermal stability during the mission will occur on Sunday, Oct. 3. The two remaining Observatory Operational Simulations are scheduled Oct. 6 through 8. The start of stacking of the Boeing Delta II first stage on Pad 17-A has been rescheduled for Friday, Oct. 1, due to Hurricane Jeanne. Attachment of the three strap-on solid rocket boosters is scheduled for Oct. 2. The payload fairing will be lifted into the clean room of the mobile service tower on Oct. 4. The second stage will be hoisted into position atop the first stage on Oct. 5. KSC News Center (2004). **Spacecraft and Expendable Launch Vehicles Status Report** [Online]. Available E-mail: ksc@newsletters.nasa.gov [2004, September 30].]

In Hangar AE at Cape Canaveral Air Force Station, the Swift spacecraft waits for final removal of the protective cover (at top). Swift is a first-of-its-kind, multi-wavelength observatory dedicated to the study of gamma-ray burst (GRB) science. Its three instruments will work together to observe GRBs and afterglows in the gamma-ray, X-ray and optical wavebands. Swift is part of NASA's medium explorer (MIDEX) program being developed by an international collaboration.

## OCTOBER

**October 1:** NASA has abandoned plans to resume flying the space shuttle next March because of the impact of four hurricanes on space agency centers and work schedules, officials said Friday. Officials running NASA's space flight program, meeting at the Johnson Space Center in Houston, said the record number of hurricanes that pummeled Florida this summer made the planned March-April launching window "no longer achievable." Space flight managers directed the shuttle program to determine whether it would be feasible to resume flights during the next available launching opportunity, a 22-day period that opens on May 14, 2005, or at a later time. This analysis is due by the end of October, when flight leaders have another meeting scheduled. The remaining three space shuttles have been grounded since the Columbia and its crew of seven was destroyed upon re-entry from space on Feb. 1, 2003. Accident investigators attributed the disaster to an undetected breach in one of the shuttle's wings at launching and a lax safety culture at NASA, and they stipulated 15 recommended reforms that must be carried out before the fleet flies again. NASA officials said they had met 5 of the 15 recommendations and would resume flights only when the benchmarks were met, not because of a time schedule. "More than a year ago, we set out a specific plans for return to flight with specific milestones," William Readdy, NASA's associate administrator for space operations, said in a statement. "Right now, those milestones are pointing us toward a new launch window." Because of launching restrictions recommended by the Columbia investigators, NASA can try shuttle flights only during certain times of the year when lighting and other conditions are optimum. If the flight window available next May does not prove workable, the next period officials could consider would open on July 12. Web posted. (2004). [NASA Delays Plans To Fly Shuttle Soon [Online]. Available WWW: http://www.nytimes.com/ [2004, October 2].]

◆ Space Shuttle Processing Status Report S04-032: Orbiters: NASA's three Space Shuttles, Discovery, Atlantis and Endeavour, Shuttle launch pads, critical flight hardware for the orbiters and the International Space Station were undamaged by Hurricane Jeanne. On Tuesday workers began the process of taking the orbiters out of a hurricane preparedness status and returning to regular processing activities. Discovery was powered up Tuesday, and the payload bay doors were opened. Atlantis and Endeavour also returned to pre-hurricane processing activities. In the Orbiter Processing Facility, work is under way to install the new wing leading edge instrumentation on Discovery. The sensors are being placed on the backside of the Reinforced Carbon-Carbon (RCC) panels as impact detection devices. They will relay information about acceleration and temperature. On Sept. 17 a fit check was performed of the new External Tank (ET) digital still camera. NASA is pursuing use of the camera, beginning with the Shuttle's Return to Flight, to obtain and downlink high-resolution images of the ET after separation after orbiter launch. Atlantis is in a power-down period, during which all of the critical path wiring inspections and Return to Flight electrical modifications will be completed. Right-hand radiators No. 1, 2 and 3 are installed. The final right-hand RCC spar fitting, a series of floating joints that attach the RCC to the wing leading edge, was installed. Kennedy Space Center: Prior to Hurricane Jeanne, workers completed securing the panels on the south side of the Vehicle Assembly Building (VAB) loosened

by Hurricane Frances. During Jeanne, 25 additional aluminum panels were lost on the east side of the building. Workers are covering the holes with corrugated steel, so the VAB can return to performing operational activities. KSC was closed to all non-essential personal on Monday, so assessment teams could begin to determine damage sustained during Jeanne. The entire KSC workforce returned to work on Tuesday. Owner-press-release. (2004). **Space Shuttle Processing Status Report** [Online]. Available E-mail: owner-press-release@spinoza.public.hq.nasa.gov [2004, October 1].]

◆ NASA is working to determine how four hurricanes that affected several centers this year will impact efforts to return the Space Shuttle to flight. The agency has been working toward a launch-planning window that opens in March 2005. Top officials in NASA's human space flight program met today. They determined the March-April window is no longer achievable. The Space Flight Leadership Council met in an executive session at NASA's Johnson Space Center, Houston. The council directed the Space Shuttle Program to assess how it would meet Return to Flight milestones for the next available launch window, which opens May 14, 2005. The Shuttle program will present its analysis at a late October leadership council meeting. ["NASA Leaders Weigh Impact of Hurricane On Return To Flight Plans," **NASA News Release #04-328**, October 1, 2004.]

**October 4:** SpaceShipOne, the sleek combination of rocket and glider designed by Burt Rutan and financed by the billionaire Paul G. Allen, reached a record altitude of 368,000 feet, or 69.7 miles, blasting past the 337,600-foot altitude reached by the same ship last week. That feat earned Mojave Aerospace Ventures, the company formed by Mr. Rutan and Mr. Allen, the Ansari X Prize, a space competition modeled on the great contests of the early days of aviation. Members of the rocket team and organizers of the prize jubilantly predicted that the flight, made on the 47th anniversary of the first Sputnik launching, would mark the dawn of a new age of commercial human space flight. SpaceShipOne's journey into space began shortly before 7 a.m. Monday, when it was carried to an altitude of nearly 50,000 feet by its mother plane, the White Knight, and it was released at 7:49 a.m. The spacecraft's pilot, Brian Binnie, lit the experimental rocket motor, which burns a combination of rubber and nitrous oxide - also known as laughing gas - and ran the motor for its full planned duration of nearly 90 seconds. After its swift ride into the sky, SpaceShipOne returned to Earth and touched down at 8:13 a.m. Pacific time. The flight also far surpassed the previous flight-altitude record for an air-launched craft, 354,000 feet reached by the X-15 in 1963. Web posted. (2004). [Private Rocket Ship Earns $10 Million in New Space Race [Online]. Available WWW: http://www.nytimes.com/ [2004, October 5].]

◆ NASA Administrator Sean O'Keefe today congratulated the SpaceShipOne team on the third successful flight of a private human spacecraft. The team also wins the $10 million X Prize competition. "Burt Rutan, Paul Allen and the rest of the SpaceShipOne team are to be congratulated for this important achievement. They successfully demonstrated a new human spacecraft, a new propulsion system and a new high-altitude airborne launch platform," said Administrator O'Keefe. "The spirit of determination and innovation demonstrated today show that America is excited about a new century of

exploration and discovery. We wish the SpaceShipOne team continued success and many more safe flights," he added. [“NASA Congratulates SpaceShipOne’s X Prize Win,” **NASA News Release #04-329**, October 4, 2004,]

◆ Gordon Cooper, the youngest of the original Mercury 7 astronauts who risked their lives to blaze the trail that led to America's victory in the race to put men on the moon, died Monday. The fun-loving Air Force test pilot flew the last Mercury mission in 1963 and commanded the eight-day Gemini 5 mission that, when it happened in 1965, was the longest a human had flown in space. Cooper, 77, suffered cardiac arrest at his home in Ventura, Calif. Retiring from NASA in 1970, Cooper never relented as one of space's biggest boosters. Indeed, Cooper worked tirelessly for the Astronaut Scholarship Foundation in Titusville to help raise more than $2 million that put 188 kids through college to study science, math and other subjects that might replenish the ranks of big thinkers who could push America deeper into space. Cooper frequently returned to Brevard County, the starting point for his historic flights, to participate in charity events and reunions with fellow astronauts and space workers. Recently, at an event here on the 40th anniversary of John Glenn's historic flight, Cooper said the private sector -- not the government -- might recharge the space industry. Ironically, Cooper's death came on the same day as a $10 million prize was won by a maverick aerospace company that is the first private group to repeat what Cooper and his mates did four decades ago. Cooper's passing leaves just three survivors from the original astronauts chosen in 1959: Walter Schirra, Scott Carpenter and Glenn, the former U.S. Senator. Alan Shepard, Deke Slayton and Virgil I. "Gus" Grissom preceded Cooper in death. [“Mercury astronaut Cooper dies,” **Florida Today**, October 5, 2004, p 1A & 3A.]

◆ The Hubble Space Telescope (HST) team was selected by the International Academy of Astronautics (IAA) to receive the 2004 Laurels for Team Achievement award. The team consists of scientists, engineers, managers, and NASA, European Space Agency and Space Telescope Science Institute support staff. [“Hubble Team Receives International Academy Of Astronautics Award, **NASA News Release #04-331**, October 4, 2004.]

**October 5:** The following is a statement released by Jim Kennedy, Kennedy Space Center director, on the news of the passing of legendary Mercury Seven astronaut Gordon Cooper: “Gordon Cooper’s legacy is permanently woven into the fabric of the Kennedy Space Center as a Mercury Seven astronaut. His achievements helped build the foundation of success for human space flight that NASA and KSC have benefited from for the past four decades. While the KSC family mourns the loss of this space pioneer, we honor his contributions and rest easy knowing his imprint on KSC will last forever. I consider it a privilege to have known Gordon Cooper. On behalf of the KSC family, I extend condolences to the Cooper family and our prayers are with them in their trying days ahead.” [“KSC Director Jim Kennedy Addresses Passing of Astronaut Gordon Cooper,” **KSC News Release #73-04**, October 5, 2004.]

◆ Billy T. Thornton, a fired NASA safety worker, was arraigned in federal court in Orlando on 83 counts of making false statements and 83 counts of fraud involving space

vehicle parts, according to NASA officials and his own attorney. A federal grand jury handed up an indictment against Thornton in September, the result of a yearlong probe by agents with NASA's Office of Inspector General. The allegations prompted NASA to fire the man in September 2003. Bruce Buckingham, a spokesman at Kennedy Space Center, could not provide details on what shuttle parts Thornton was supposed to inspect, or what kinds of work he was supposed to oversee in his job as a NASA quality assurance inspector. The man had been working at Kennedy Space Center for more than 15 years. ["Ex-NASA worker faces 83 counts," **Florida Today**, October 5, 2004.]

◆ After weathering hurricanes Frances and Jeanne on Cape Canaveral's launch pad 17B, a Boeing Delta 2 rocket launch has been rescheduled for October 8. The three-stage rocket was supposed to fly September 22, but the date was cancelled due to work stoppage and extra testing in the wake of Hurricane Frances that blew through Florida over Labor Day weekend. But then came Hurricane Jeanne on September 26, forcing officials to secure the rocket in its protective gantry and shut down Cape Canaveral Air Force Station for the second time in less than a month. Post-Jeanne tests have indicated the hurricane caused no harm to the rocket or launch pad. The Delta 2 will carry a Global Positioning System satellite for the U.S. Air Force. ["Hurricane-delayed delta looks for new launch date," www.spaceflightnow.com, October 5, 2004.]

◆ Shuttle Update: NASA's three Space Shuttle orbiters – Discovery, Atlantis and Endeavour – along with the Shuttle launch pads and all of the critical flight hardware for the orbiters and the International Space Station, sustained no damage during Hurricane Jeanne. Discovery was powered up Sept. 28 and the payload bay doors were opened. Atlantis and Endeavour also returned to pre-hurricane processing activities. In the Orbiter Processing Facility, work is under way to install the new wing leading edge instrumentation on Discovery. The sensors are being placed on the backside of the Reinforced Carbon-Carbon (RCC) panels as impact detection devices and will relay information about acceleration and temperature. Atlantis is currently in a power-down period, in which all of the critical path wiring inspections and Return to Flight electrical modifications will be completed. All right-hand radiators are installed. The final right-hand RCC spar fitting, a series of floating joints that attach the RCC to the wing leading edge, is installed. ["Orbiters back on track for processing," **KSC Countdown**, October 5, 2004.]

◆ ELV Update: Due to a failed pressure transducer on the Demonstration of Autonomous Rendezvous Technology (DART) upper stage, launch aboard a Pegasus XL from Vandenberg AFB in California has been rescheduled to no earlier than Oct. 26. The upper stage is necessary to deliver DART to its rendezvous point and to conduct proximity operations with the Multiple Paths, Beyond-Line-of-Site Communications (MUBLCOM) satellite. Three strain gauges have been installed on the upper stage to derive hydrazine fuel tank pressure. Verification testing is now under way to validate this alternate method of monitoring. A final flight simulation is now scheduled to be conducted Thursday. The Swift launch from Cape Canaveral Air Force Station has been postponed to no earlier than Nov. 2. The first stage of the Delta II rocket was erected on the Launch Pad 17-A Oct. 1. The second stage is being erected today. Other activity this

week includes attachment of the three strap-on solid rocket boosters, and lifting of the payload fairing. [“ELV Update,” **KSC Countdown,** October 5, 2004.]

◆ A year after a crucial weather satellite crashed to the floor of a Lockheed Martin plant, a NASA report blamed the failure to follow procedures partly on complacency and poor communications. Meanwhile, NOAA, NASA and Lockheed Martin announced Monday the satellite will be rebuilt and sent into orbit by its previously scheduled launch date, heading off a potential gap in weather-forecasting coverage. Lockheed Martin has overhauled procedures to prevent another accident such as the one that occurred at the plant in Sunnyvale, Calif., in September 2003, spokesman Buddy Nelson said Tuesday. "The evidence of our success is that our NASA/NOAA customer asked us to rebuild the NOAA N Prime satellite," he said. Lockheed Martin will help pay for the reconstruction, according to NOAA. NOAA N Prime, worth about $200 million, fell off its cart during a rotation maneuver because several bolts that should have held it in place were missing. A supervisor assumed they were there, based on paperwork, but didn't inspect the cart as required, the report said. Government oversight also was lax, the report found. Lockheed Martin followed the recommendations of outside experts and NASA's mishap investigation board, and audits have verified the problems were corrected, he said. The rebuilt satellite is expected to launch in December 2007, close to the previous launch date. [“Broken satellite back on schedule, company overhauls procedures,” **Florida Today**, October 6, 2004, p 6A.]

**October 6:** For years, government inspectors were not properly checking critical devices that catch 65-pound bolts so they don't hit the shuttle during launch, including bolt-catchers that failed on Columbia's flight, NASA investigators have found. The report marks the second case to come to light in less than two weeks in which the NASA Inspector General investigated and found that alleged inspections weren't done on shuttle components which, if they failed, could have led to another disaster like the Challenger or Columbia tragedies. In both cases, the investigations were going on about the same time as the probe into what caused the Columbia catastrophe. Earlier this week, federal agents arrested a Cocoa man for allegedly falsifying documents to say he conducted inspections on shuttle Discovery that he did not actually perform. NASA has rechecked all the work Billy T. Thornton did on shuttle Discovery, which is set next year to be the first shuttle to fly since the Columbia accident. The other case involves another government agency. NASA relies upon the Department of Defense's contract auditors to inspect some shuttle parts, including the bolt-catchers that are part of an assembly connecting the solid rocket boosters to the big orange external fuel tank. However, from 1995 through 1998, the military's inspectors did not examine at least 12 of the catchers, according to an inspector general's report dated Sept. 28 and made public last week. Of the inspections that were done, many were incomplete and others were undocumented. Some of the inspectors were not trained to do the job right, the investigators have found. Because of those flaws, the NASA Inspector General reported the military auditors "should have rejected all of the bolt-catchers manufactured from 1995 to 1998, including those used on Columbia during STS-107." Instead, the unchecked or under-checked parts flew. The Columbia Accident Investigation Board found the bolt-catchers on that mission failed, but did not deem that to be the cause of the shuttle's fatal disintegration during re-entry on Feb. 1,

2003. Still, the board recommended NASA redesign the devices before returning the shuttles to flight. That work is under way in preparation for the scheduled May launch. In response to the latest inspector general investigation, NASA safety officials said they are overhauling the inspection process for the bolt-catchers to make sure the new parts are carefully scrutinized when they are made and installed on the next shuttle. ["NASA: Shuttle parts not inspected," **Florida Today**, October 7, 2004, p 1A & 5A.]

◆ By a voice vote, the House of Representatives last night approved a resolution introduced by Space and Aeronautics Subcommittee Chairman Dana Rohrabacher (R-CA) congratulating Mojave Aerospace Ventures for winning the X Prize and commending the X Prize Foundation for spurring this achievement. Modeled on the 20th century aviation prizes like the Orteig Prize, which was awarded to Charles Lindbergh for the first nonstop transatlantic flight, the X Prize was established in 1996 to promote the emerging commercial space transportation industry and inspire privately funded human space flight. Web posted. (2004). [House Passes Resolution Honoring X Prize Recipients [Online]. Available WWW: http://www.comspacewatch.com/ [2004, October 7].]

◆ Spacehab, Incorporated, a leading provider of commercial space services, today announced its receipt of NASA's determination regarding the Company's claim for loss of its Research Double Module that was destroyed during the STS-107 space shuttle tragedy. NASA's determination states that its liability is limited to the contractually stipulated $8.0 million contract provision. The Company is pursuing receipt of the $8.0 million plus interest from NASA in this fiscal quarter. As reported in January 2004, Spacehab's contract with NASA included an indemnification provision providing for any loss of, or damage to, the Company's flight hardware up to $8.0 million. Spacehab filed a formal claim against NASA in the amount of $87.7 million for its loss in the shuttle accident which includes the $8.0 million contractually-stipulated provision. NASA's notification to Spacehab in response to the claim represents the final decision of NASA. Although Spacehab has agreed to accept the contract indemnification amount of $8.0 million, the Company has the right to file an appeal for the difference between the $8.0 million amount specified by NASA and the amount identified in Spacehab's claim. Web posted. (2004). [Spacehab receives response from NASA regarding claim for losses on space shuttle mission [Online]. Available WWW: http://www.businesswire.com/ [2004, October 6].]

**October 7:** Inside the KSC Engine Shop, Boeing-Rocketdyne technicians remove the container that enclosed the third and final Space Shuttle Main Engine (SSME) for Discovery's Return to Flight mission STS-114. The engine is returning from NASA's Stennis Space Center in Mississippi where it underwent a hot fire acceptance test. Typically, the three main engines are installed on an orbiter in the Orbiter Processing Facility approximately five months before launch. The SSME operates at greater temperature extremes than any mechanical system in common use today. The liquid hydrogen fuel is -423 degrees Fahrenheit, the second-coldest liquid on Earth. When the hydrogen is burned with liquid oxygen, the temperature in the engine's combustion chamber reaches +6000 degrees Fahrenheit. The maximum equivalent horsepower developed by the three SSMEs during launch is slightly more than 37 million

horsepower. The energy released is equivalent to the output of 23 Hoover Dams. Discovery is currently targeted for launch no earlier than May 14, 2005. ["Final Piece of Discovery's Driving Force Now At KSC," **NASA News Release #P15-04,** October 7, 2004.]

◆ Spacecraft and Expendable Launch Vehicles Status Report: Mission: Demonstration of Autonomous Rendezvous Technology (DART), Launch vehicle: Pegasus XL, Launch site: Vandenberg Air Force Base, Calif., Launch date: Oct. 26, 2004 NET, Launch window: 11:13:32 a.m. – 11:20:32 a.m. PDT. The DART satellite and Pegasus XL launch vehicle were successfully re-mated on Oct. 1 at Vandenberg Air Force Base in California. Verification testing is now under way to validate the alternate method of monitoring the upper stage hydrazine fuel tank pressure. Final testing of the Advanced Video Guidance Sensor hardware, the primary technology demonstration experiment, has been successfully completed. The final Pegasus/DART launch and mission simulation is under way today. The DART Mission Readiness Review will occur on Oct. 15 at NASA's Marshall Space Flight Center in Huntsville, Ala. At the conclusion of a successful review, the Oct. 26 launch date should become firm. Mission: Swift, Launch vehicle: Delta II, Launch pad: 17-A Cape Canaveral Air Force Station, Fla., Launch date: Nov. 8, 2004 NET, Launch window: 12:04 p.m. – 1:04 p.m. EST. The launch of Swift is scheduled to occur on Monday, Nov. 8 from Pad 17-A on Cape Canaveral Air Force Station. The launch time is 12:04 p.m. EST at the opening of a one-hour launch window. The stacking of the Boeing Delta II launch vehicle on Pad 17-A continues this week. Swift is in the clean room at NASA's Hangar AE on Cape Canaveral Air Force Station. Two Observatory Operational Simulations are underway this week. The final installation of the flight blankets to provide thermal stability during the mission was completed on Oct. 3. A "first motion" solar array deployment test is scheduled to occur on Oct. 11 and will be followed by an illumination test. The stacking of the Boeing Delta II first stage on Pad 17-A occurred Oct. 1, followed by attachment of the three strap-on solid rocket boosters on Oct. 2. The payload fairing was lifted into the clean room of the mobile service tower on Oct. 4. The second stage will be hoisted into position atop the first stage once the wind at the launch pad falls within allowable limits. The Kennedy Space Center in Florida is responsible for Swift's integration with the Boeing Delta II rocket and the countdown management on launch day. KSC News Center (2004). **Spacecraft and Expendable Launch Vehicles Status Report** [Online]. Available E-mail: ksc@newsletters.nasa.gov [2004, October 7].]

**October 8:** A fired NASA inspector pleaded not guilty in federal court Friday to 166 charges that he faked inspections on shuttle Discovery parts that, if they failed, could have led to catastrophe for the spaceship and its astronauts. Billy T. Thornton, 53, of Port St. John maintained during a hearing in an Orlando courtroom that he is innocent of 83 counts of making false statements and 83 additional counts of fraud involving space-vehicle parts. Trial is set for Dec. 1. NASA fired Thornton, whose co-workers had raised suspicions about him. As a result of the firing, NASA's Office of Inspector General launched an investigation that lasted more than a year. A federal grand jury last month indicted the 15-year NASA veteran. Federal agents arrested him Monday at his house. NASA has since re-checked the work Thornton was supposed to have overseen on

Discovery, the orbiter slated to fly the first shuttle mission since Columbia disintegrated over Texas trying to re-enter Earth's atmosphere on Feb. 1, 2003. Kennedy Space Center spokesman Mike Rein said re-inspections did not reveal any major problems threatening the safety of Discovery's launch, set for no earlier than May. ["Ex-NASA worker pleads not guilty," **Florida Today**, October 9, 2004, p 1B.]

◆ The Vehicle Assembly Building at KSC sports a patchwork façade after the holes created by recent hurricanes were covered with corrugated steel panels. The VAB lost 820 panels from the south wall during Hurricane Frances, and 25 additional panels pulled off the east wall by Hurricane Jeanne. Employees of Met-Con, a subcontractor in Cocoa, Fla., worked night and day on scaffolds hung from the 525-foot-high roof to close the holes and enable the facility to return to normal operations. ["Vehicle Assembly Building Back In Business, **NASA News Release #P16-04**, October 8, 2004.]

◆ Space Shuttle Processing Status Report S04-33: **Discovery** (OV-103); Processing continues in the Orbiter Processing Facility for Discovery's Return to Flight mission. Throughout the week, significant progress was made on orbiter system testing. Technicians continue to bond the new wing leading edge sensors on the interior of the Reinforced Carbon-Carbon (RCC) panels. Optics tests continue, with the alignment of the Manipulator Positioning Mechanisms, in preparation for the Remote Manipulator System (Space Shuttle arm) installation. Top NASA and Shuttle management met on Oct. 1. They determined the March/April target launch window for Return to Flight is not achievable, due to the impact of recent hurricanes on agency centers. The council directed the Space Shuttle Program to assess how it would meet Return to Flight milestones for the next available launch window, which opens May 14, 2005. The Shuttle program will present its analysis at a late October leadership council meeting. **Atlantis** (OV-104); Atlantis is in a four-month power-down period. The critical path wiring inspections and Return to Flight electrical modifications continue on schedule. Structural and wire inspections are ongoing throughout the vehicle. All right-hand radiators have been installed. Work starts on the left-hand radiators next week. Right-hand spar fittings have all been installed, with the full complement of 22 RCC panels hung on the vehicle. The left-hand wing leading edge is complete, including the T-seals, which are installed between each panel. **Endeavour** (OV-105); Space Shuttle Endeavour is in its Orbiter Major Modification period, which began in December. Electrical modifications continue in the crew module. Three-String Global Positioning System wire routing in the avionics bay and flight deck continues. Right and left-hand wing leading edge corrosion cleanup continues. Once the RCC panels and associated fittings were removed, technicians began to bead blast the wing leading edge of Endeavour to ensure there was no corrosion. The edge will be painted prior to the reinstallation of RCC panels for flight. While the panels are removed, they are undergoing extensive non-destructive testing including flash thermography and X-rays. Owner-press-release. (2004). **Space Shuttle Processing Status Report** [Online]. Available E-mail: owner-press-release@spinoza.public.hq.nasa.gov [2004, October 8].]

**October 9:** Maxime A. Faget, a pioneering NASA engineer who designed the original spacecraft for Project Mercury and whose work helped create every human spacecraft the

agency has launched since, has died. He was 83. Faget died Saturday at his home in Houston, the space agency announced Sunday on its Web site. In 1958, Faget joined the Space Task Group, which evolved into the NASA Johnson Space Center. “Without Max Faget’s innovative designs and thoughtful approach to problem solving, America’s space program would have had trouble getting off the ground,” said NASA Administrator Sean O’Keefe. “He also was an aeronautics pioneer. In fact, it was his work on supersonic flight research that eventually led to his interest in space flight.” Faget’s career with NASA began in 1946, when he joined the staff of Langley Research Center, Hampton, Virginia, as a research scientist. He worked in the Pilotless Aircraft Research Division and later directed the Performance Aerodynamics Branch. He conceived of and proposed the development of the one-man spacecraft used in Project Mercury, NASA said. “Max Faget was truly a legend of the manned space flight program,” said Christopher C. Kraft, former Johnson Space Center director. “There is no one in space flight history in this or any other country who has had a larger impact on man’s quest in space exploration. ... History will remember him as one of the really great scientists of the 20th century.” Faget was part of the original feasibility study for the space shuttle and helped develop the reusable spacecraft. After retiring from NASA, Faget was among the founders of one of the early private space companies, Space Industries Inc., established in 1982. Web posted. (2004). [NASA engineer Faget dies; designed spacecraft from Mercury missions to space shuttle [Online]. Available WWW: http://www.floridatoday.com/ [2004, October 11].]

**October 10:** The fall launch schedule at Cape Canaveral Air Force Station is reshuffled now, thanks to repeated hurricanes. A Global Positioning System satellite will be the next spacecraft launched from Cape Canaveral Air Force Station, in the early morning hours of Oct. 25 aboard a Delta 2 rocket. NASA's Swift observatory will go next, shortly after noon Nov. 8 aboard another Delta 2. Then, on Nov. 18, The Boeing Co. plans to launch the first heavy-lift version of its new Delta 4 rocket. The Delta 4 Heavy, which includes three common-core boosters instead of the normal single core, is poised to become the strongest rocket in America's fleet of space launchers. The vehicle will launch the first time with a dummy payload as a demonstration flight. The biggest reason for the delays was the combined time off for space workers at the Cape because of hurricanes Charley, Frances and Jeanne. In addition to evacuating the NASA and military spaceport facilities, workers got behind on normal duties because of days spent securing the rockets and spacecraft to withstand the storms and, later, undoing that work. None of the rockets or spacecraft were damaged during the storms. An Atlas 5 rocket carrying a telecommunications satellite also recently moved back about 10 days, to Dec. 16. Web posted. (2004). [Boeing, Air Force reset 3 launches [Online]. Available WWW: http://www.floridatoday.com/ [2004, October 10].]

**October 12:** The world's ultimate observation deck, a control tower for robotics in space, and a sunroom like no other, has arrived at NASA's Kennedy Space Center (KSC). It is bound for the International Space Station. Built in Italy for the United States segment of the Station, the Cupola traveled part way around the world to reach KSC. One day it will circle the Earth every 90 minutes, and crewmembers will peer through its 360-degree windows. It will serve as a literal skylight to control some of the most

sophisticated robotics ever built. "The Cupola module will be a fascinating addition to the Space Station," said International Space Station Program Manager Bill Gerstenmaier. "The crew will have an improved view of critical activities outside the Station and breathtaking views of the Earth below." The crew will use Cupola windows, six around the sides and one on the top, for line-of-sight monitoring of outside activities, including spacewalks, docking operations and exterior equipment surveys. The Cupola will be used specifically to monitor the approach and berthing of the Japanese H-2 supply craft and other visiting vehicles. The Cupola will serve as the primary location for controlling Canadarm2, the 60-foot Space Station robotic arm. [“Room With An Out-Of-This-World View Arrives At NASA,” **NASA News Release #04-338**, October 12, 2004.]

◆ Expedition 10 Commander Leroy Chiao and Flight Engineer Salizhan Sharipov begin their six-month Station stay, when they launch aboard a Russian Soyuz spacecraft Wednesday, at 11:06 p.m. EDT from the Baikonur Cosmodrome, Kazakhstan. Russian Space Forces Test Cosmonaut Yuri Shargin joins Chiao and Sharipov on their outbound trip. Expedition 9 Commander Gennady Padalka and NASA Station Science Officer and Flight Engineer Mike Fincke return to Earth aboard another Soyuz Saturday, Oct. 23, about 8:32 p.m. EDT, after their six-month journey. Shargin will join them for the return flight, after spending about a week with both crews on the Station. [“NASA TV Airs Space Station Launch & Landing Activities,” **NASA News Release #N04-161**, October 12, 2004.]

**October 13:** NASA's bid to return its shuttle fleet to service crossed a key milestone Wednesday as the astronauts for the first post-Columbia mission completed their first full dress rehearsal for the flight. Working side-by-side in a sophisticated flight simulator at Johnson Space Center in Houston, the crew practiced a rendezvous and docking at the International Space Station. A team of more than 100 ground controllers staffed NASA's Mission Control Center. Two other astronauts took part in a space station simulator. Another 40 to 50 people ensured Mission Control and simulator systems worked properly. Mission commander Eileen Collins practiced piloting Discovery through a 360-degree pirouette -- a first-time move that will enable station crewmates to photographically inspect shuttle heat shield components for the type of damage that doomed Columbia and its astronauts. She also ran through the precision piloting required to dock the 100-ton shuttle at the massive station as both vehicles circle Earth at 17,500 mph. "If I could use a metaphor, it's like you're trying to conduct an important play and you bring everybody on the stage and you do a full dress rehearsal," said astronaut Andy Thomas, who will serve as a mission specialist on the flight, now tentatively scheduled for launch next May. "So it's like we've done a major dress rehearsal for the show." NASA flight director Paul Hill, a Titusville native, said the exercise seemed like a demarcation point between post-Columbia recovery work and a return to normal flight training. "To me, it's like we are finally seeing that light at the end of the tunnel, where we are now running out of this tunnel and are really going to go fly this flight in space," he said. NASA's shuttle fleet has been grounded since the February 2003 Columbia accident, which was caused by severe damage to thermal armor designed to protect shuttle wings -- and crews -- from intense heat encountered during atmospheric reentry. The prime objectives of NASA's 114th shuttle mission: To demonstrate orbital inspection

and repair techniques while delivering badly needed supplies to the outpost. [“Shuttle crew completes dress rehearsal,” **Florida Today**, October 14, 2004, p 9A.]

◆ Spacecraft and Expendable Launch Vehicles Status Report: Mission: Demonstration of Autonomous Rendezvous Technology (DART), Launch vehicle: Pegasus XL, Launch site: Vandenberg Air Force Base, Calif., Launch date: Oct. 26, 2004 NET, Launch window: 11:13:32 a.m. – 11:20:32 a.m. PDT. he DART satellite and Pegasus XL launch vehicle were successfully re-mated on Oct. 1 at Vandenberg Air Force Base in California. Analysis of the alternate method of monitoring the upper stage hydrazine fuel tank pressure is planned to be completed this week. Final testing of the Advanced Video Guidance Sensor hardware, the primary technology demonstration experiment, has been successfully completed. The final Pegasus/DART launch and mission simulation was successfully completed on Oct. 8. The DART Mission Readiness Review will occur on Friday, Oct. 15 at NASA's Marshall Space Flight Center in Huntsville, Ala. At the conclusion of a successful review, the Oct. 26 launch date should become firm. Mission: Swift, Launch vehicle: Delta II, Launch pad: 17-A Cape Canaveral Air Force Station, Fla., Launch date: Nov. 8, 2004, Launch window: 12:04 p.m. – 1:04 p.m. EST. The launch of Swift is scheduled to occur on Monday, Nov. 8 from Pad 17-A on Cape Canaveral Air Force Station. The launch time is 12:04 p.m. EST at the opening of a one-hour launch window. The stacking of the Boeing Delta II launch vehicle on Pad 17-A continues this week. Swift is in the clean room at NASA’s Hangar AE on Cape Canaveral Air Force Station. A "first motion" solar array deployment test was completed on Tuesday, Oct. 12. An Aliveness Test, an overall state of health test for the spacecraft, is scheduled for Thursday, Oct. 14 followed by a solar array illumination test on Friday, Oct. 15. Swift will be mated to the payload attach fitting on Oct. 19. At Pad 17-A, the first major power-on testing of the Boeing Delta II launch vehicle is now under way. The stacking of the first stage on the pad occurred Oct. 1, followed by attachment of the three strap-on solid rocket boosters on Oct. 2. The payload fairing was lifted into the clean room of the mobile service tower on Oct. 4. The second stage was hoisted into position atop the first stage on Oct. 8. KSC News Center (2004). **Spacecraft and Expendable Launch Vehicles Status Report** [Online]. Available E-mail: ksc@newsletters.nasa.gov [2004, October 13].]

**October 14:** NASA Administrator Sean O'Keefe today named Rex Geveden as the agency's chief engineer and director of the independent technical authority, effective Nov. 1, 2004. Geveden succeeds Theron Bradley, Jr., who announced his retirement Oct. 4 after a distinguished career as a senior manager and nuclear engineer with the U.S Navy's nuclear propulsion community. Bradley had been chief engineer at NASA since June 2002. [“NASA Names Rex Geveden New Chief Engineer,” **NASA News Release #04-344**, October 14, 2004.]

**October 15:** The surviving astronauts of the Mercury 7 offered tribute Friday to compatriot Gordon "Gordo" Cooper, who died Oct. 4. At a memorial gathering at Johnson Space Center in Houston, former U.S. Sen. John Glenn, the first American to orbit Earth, remembered the old days at Cape Canaveral as they trained for spaceflight. Chimps flew before the men got their chance. "It was a time of great joking about the

astronauts and the chimps," he said, "and the chimps were in ascendancy back in those days." He remembered Cooper as straightforward and dependable. "I'm sure we'll all rendezvous out there, someday," he said. "We were welded into a fraternity that had no equal at that time, or this time, for that matter," said Scott Carpenter, another of the original seven astronauts who led America to space. "We regret losing Gordo," fellow Mercury astronaut Wally Schirra said. "He was one of our dear friends, not too bad a water skier, not too bad a pilot, but a heck of a good astronaut." Cooper flew Project Mercury's last flight in May 1963 and later landed a Gemini mission with Pete Conrad right on target, even though the capsule's automated systems failed. Speakers remembered his sense of humor and generous heart. "As we consider his life, we can catch a glimpse of the countless lives Gordon Cooper touched as a man, as a friend and an astronaut," said Henri Landwirth of the Astronaut Scholarship Foundation, who got to know the men when he ran the Starlight Hotel in Cocoa Beach. "Our nation and the world are better places because Gordon Cooper lived among us." "These were the superheroes of our time, and deservedly so," said NASA administrator Sean O'Keefe, who presented Cooper's widow, Susan, with a NASA Distinguished Service Medal in Cooper's honor. [“Memorial honors astronaut Cooper,” **Florida Today**, October 16, 2004, p 1B.]

◆ The Genesis space capsule that crashed into the Utah desert last month failed because four pencil stub-sized gravity switches designed to trigger release of the spacecraft’s parachutes were installed backward, NASA officials said Friday. Michael Ryschkewitsch, chairman of NASA’s Mishap Investigation Board, said engineers assembling the Genesis probe more than four years ago were misled by errors in designs prepared by Lockheed Martin Corp. “The drawings are not correct,” Ryschkewitsch said. The probe was launched three years ago to collect particles of solar wind on more than 200 ceramic tiles. On its return, the parachutes were supposed to allow it to drift gently toward Earth until a helicopter could pluck it out of the sky. Instead, neither the first drogue parachute nor a larger parafoil opened, and the 450-pound capsule smacked into Utah’s high desert at the U.S. Army’s Dugway Proving Ground at 193 mph. The capsule broke open and many of the tiles were shattered. Despite the damage, scientists have expressed optimism that they will find a way to clean the tile fragments to researchers’ satisfaction and enable samples to be sent out for study. [“NASA: Switches doomed probe,” **Orlando Sentinel**, October 16, 2004, p A3.]

◆ After the tourism downturn following the Sept. 11, 2001, terrorist attacks, tourist attractions banked on the local buck to fuel a recovery. And, now, following the devastation of Hurricanes Frances and Jeanne, it is the locals who once again are being called upon to support venues like Kennedy Space Center Visitor Complex, Brevard County’s most-popular paid tourist attraction. Aggressive marketing campaigns and promotions – like free visitors’ weekends, holiday celebrations and special pricing – are crucial to getting people in the door. Brevard residents can go to the Kennedy Space Center Visitor Complex and astronaut Hall of Fame for free this weekend. They are being urged to bring a canned food item to donate to families suffering from the hurricanes. The Visitor Complex itself also was hurt by the storms. There was roof damage at the Apollo Saturn 5 Center, and the complex lost the Juno Rocket in the Rocket Garden and the top of the Delta Rocket as a result of the hurricanes. The rockets

are going to be refurbished, and the roof will be replaced. [“Complex hopes for rebound,” **Florida Today**, October 16, 2004, p 1C & 3C.]

◆ Space Shuttle Processing Status Report S04-34: **Discovery** (OV-103); Processing continues in the Orbiter Processing Facility for Discovery's Return to Flight mission to the International Space Station. Installation of the Remote Manipulator System, or Space Shuttle arm, is scheduled for today. Testing continues on the Manipulator Positioning Mechanisms in preparation for that installation. During powered-up system testing, technicians performed numerous checks including Orbiter Maneuvering System and Reaction Control System heater checks, nitrogen and oxygen leak checks, and Ku-band system work. Closeouts continue on the Rudder Speed Brake with seal installations. **Atlantis** (OV-104); The power-down period for Atlantis continues with critical path wiring, structural inspections and electrical modifications throughout the vehicle. Return to Flight modifications, including the wiring for the Orbiter Boom Sensor System and installation of the wing leading edge sensors, are progressing on schedule. Right-hand radiators have been installed, as well as left-hand radiators No. 1, 2 and 3. The final radiator is scheduled to be put in place today. Thermal Protection System blanket installation and inspections on the left-hand payload bay door continue in preparation for closing out the area for flight. **Endeavour** (OV-105); Space Shuttle Endeavour is in its Orbiter Major Modification period, which began in December. Electrical modifications continue in the crew module. Three-String Global Positioning System wire routing in the avionics bay and flight deck continues. OPTIGO measurements continue on the main landing gear. Resembling a large camera, OPTIGO is an optical scanner that generates precise 3-D coordinates that are imported into a Computer Aided Design program for engineering analysis. It is used in many processing activities, but is most widely used for assisting in the manufacturing of Thermal Protection System tile. Owner-press-release. (2004). **Space Shuttle Processing Status Report** [Online]. Available E-mail: owner-press-release@spinoza.public.hq.nasa.gov [2004, October 15].]

◆ NASA’s two crawler transporter vehicles soon will sport new “shoes.” A $10 million project to replace the 456 tread belt shoes, weighing more than one ton each, on both crawlers at Kennedy Space Center begins mid-October. The shoes are critical for safely transporting the Space Shuttle to the launch pad. Cracks on old shoes can prevent the cleats from moving along the crawlerway and can compromise the structural integrity of the shoes. Each of the vehicles has eight belts, and each belt has 57 shoes. Most shoes on the crawlers date back to 1965, when the vehicles were built and first put into service for Apollo launches. Inspections in late 2003 revealed fatigue cracks in many of the shoes, leading to complete replacement of shoes on both crawlers. Crawler transporter No. 2, designated for Discovery's Return to Flight mission to the International Space Station, will receive its new shoes first. “The crawler transporters are going to be in great shape for Return to Flight and the crawler team is delivering,” said Mark Hamilton, NASA crawler transporter systems engineer. "This is by far the most active maintenance period in the history of the crawlers, requiring continuous heavy equipment crane support and the use of custom rigging and tooling." NASA and United Space Alliance (USA) crawler transporter systems engineers and USA technicians are repairing the sprockets and rollers on each belt before the new shoes are installed. Welding repair and inspection

of some of the sprockets and manufacture of some of the rollers also is being performed at KSC. The new shoes, each 7.5 feet long and 1.5 feet wide, are being made by ME Global Manufacturing of Duluth, Minn. They arrive at KSC in truckloads of 20 to comply with shipping load limits. Other upgrades or modifications recently completed on crawler No. 2 include complete electrical rewiring of the motor control center and installation of new driver cabs, mufflers, radiators and ventilation systems. The same work is now under way on crawler No. 1. Hamilton noted the majority of mechanical crawler parts are unique to the vehicle and are specially manufactured. "We are fortunate that the massive precision components, such as the large drive gear sets and gear shaft bearings, still look new." ["Crawler's New Shoes To Help Space Shuttle Move Toward Return To Flight, **NASA News Release #79-04**, October 15, 2004.]

**October 18:** NASA's Deep Impact spacecraft has arrived in Florida to begin final preparations for a launch on Dec. 30, 2004. The spacecraft was shipped from Ball Aerospace & Technologies in Boulder, Colo., to the Astrotech Space Operations facility located near the Kennedy Space Center. "Deep Impact has begun its journey to comet Tempel 1," said Rick Grammier, Deep Impact project manager at NASA's Jet Propulsion Laboratory. "First to Florida, then to space, and then to the comet itself. It will be quite a journey and one which we can all witness together." The Deep Impact spacecraft is designed to launch a copper projectile into the surface of Comet Tempel 1 on July 4, 2005, when the comet is 83 million miles from Earth. When this 820-pound "impactor" hits the surface of the comet at approximately 23,000 miles per hour, the 3-by-3 foot projectile will create a crater several hundred feet in size. Deep Impact's "flyby" spacecraft will collect pictures and data of the event. It will send the data back to Earth through the antennas of the Deep Space Network. Professional and amateur astronomers on Earth will also be able to observe the material flying from the comet's newly formed crater, adding to the data and images collected by the Deep Impact spacecraft and other telescopes. Tempel 1 poses no threat to Earth in the foreseeable future. Launch aboard the Boeing Delta II rocket is scheduled to occur on Dec. 30, 2004 from Launch Complex 17 at Cape Canaveral Air Force Station. The launch window extends from 2:39 - 3:19 p.m. EST. The overall Deep Impact mission management for this Discovery class program is conducted by the University of Maryland, College Park, Md. Deep Impact project management is by the Jet Propulsion Laboratory in Pasadena, Calif. The spacecraft has been built for NASA by Ball Aerospace and Technologies Corporation. The spacecraft/launch vehicle integration and launch countdown management are the responsibility of the Launch Services Program office headquartered at Kennedy Space Center. ["Deep Impact Arrives In Florida To Prepare For Launch," **KSC News Release #80-04**, October 18, 2004.]

◆ NASA's Demonstration of Autonomous Rendezvous Technology (DART) spacecraft is scheduled to launch Oct. 26, at 2:13 p.m. EDT, from Vandenberg Air Force Base (VAFB), Calif. DART will demonstrate key technologies required for spacecraft to rendezvous with other craft, such as satellites, without human intervention. DART will combine key autonomous technologies to actually rendezvous with a target satellite during the mission. It is the first demonstration program selected by NASA's Exploration Systems Mission Directorate to develop technologies for the Vision for Space

Exploration. [“NASA Announces DART Launch Schedule,” **NASA News Release #N04-164**, October 18, 2004.]

**October 19:** ELV Update: The NASA Discovery Mission Deep Impact spacecraft arrived yesterday from Ball Aerospace and Technologies Corp. in Boulder, Colo. It was taken to Astrotech Space Operations in Cape Canaveral, Fla. Deep Impact is designed to launch a copper projectile into the surface of Comet Tempel 1 on July 4, 2005, when the comet is 83 million miles from Earth. When this 820-pound “impactor” hits the surface of the comet at nearly 23,000 miles per hour, the 3- by 3-foot projectile will create a crater hundreds of feet in size. Deep Impact’s flyby spacecraft will collect pictures and data of how the crater forms, measuring the crater’s depth and diameter, as well as the composition of the interior of the crater and any material thrown out, and determining the changes in natural outgassing produced by the impact. It will send the data back to Earth through the antennas of the Deep Space Network. Deep Impact is scheduled to launch aboard a Boeing Delta II rocket from Launch Complex 17 at Cape Canaveral Air Force Station, Fla., on Dec. 30, 2004. Later this week the spacecraft will undergo functional testing to verify its “health” after the road trip from Colorado. [“Deep Impact arrives at KSC for December launch,” **KSC Countdown**, October 19, 2004.]

**October 20:** The crowning piece of the International Space Station, faceted like a high-tech jewel, awaits its flight at Kennedy Space Center. The Italian-built cupola was delivered this month. The small, round room with six windows around the sides and one on the top will be the last component installed on the station. A space shuttle is scheduled to carry it to orbit in 2009. "It's a very unique-looking piece of flight hardware," said NASA's Tom Howard, cupola element manager at KSC. Though it will provide spectacular views of space and Earth, not to mention important station activities, the cupola won't offer such views all the time. The windows have thick debris shields. "The covers open up like petals on a flower and allow the astronauts a panoramic 360-degree view around the sides and straight ahead," Howard said. Astronauts will have to turn a knob to open the shields. Even without shields, the portholes are tough, said Larry Sutton, a product manager at Corning, which made the windows. There are four layers of glass -- a debris pane on the outside, two pressure panes and a scratch pane inside to protect against bumps by humans and their tools. In addition, the glass has anti-reflective coatings to provide a clear view through all four panes. The cupola has a practical purpose: observation of spacewalks, robotic arm operations, Earth and space. One of the station's two robotic control workstations will be moved there from the U.S. laboratory. An astronaut controlling the robotic arm will be able to look out the windows and see it, rather than relying on a TV screen. Howard said the cupola will be put into storage until it's time to test it for flight. Originally scheduled to fly in 2005, the launch date has slipped with suspension of manned space flight aboard the shuttle. A number of station components are awaiting the shuttles' return to space, from reusable Italian cargo modules to several trusses and the sleek Japanese Experiment Module. "It can be frustrating," he acknowledged. "We're ready to go, and we're just . . . making sure that the shuttles are safe enough to fly, and we'll start back up." [“Final module will add bay window to station,” **Florida Today**, October 20,2004, p 1A & 8A.]

◆ In the cleanest room at the Cape, a spacecraft that survived hurricanes and delays awaits a chance to study the most energetic explosions in the universe. Swift is aptly named because it can turn 50 degrees in less than a minute to record fleeting gamma-ray bursts as they occur, as well as immediately inform scientists on Earth so they can observe the bursts, too. Swift came to Kennedy Space Center in August. The moment a spacecraft arrives is the most exciting for launch site integration manager Mike Miller of Rockledge. He works with staff from NASA's Goddard Space Flight Center to make sure they have the technical support they need to prepare for launch. Problems with Swift's Burst Alert Telescope, the early-detection instrument designed at Goddard Space Flight Center, delayed the $250 million mission by several months, said mission integration manager Rex Engelhardt, of Merritt Island. The hurricanes didn't help, either. "We probably lost somewhere between three weeks and a month due to the four hurricanes we went through since we got here," Edison said. For hurricanes Charley and Jeanne, the spacecraft was double-bagged and put under a nitrogen purge. For Frances and Ivan, it was placed in its shipping container. "Frances was coming in with 140 mph winds, and I was told that this building was rated to 110," Edison said, "and we looked at the storm surge." Despite damage to the building, the precautions paid off, and the craft is supposed to head out to its Boeing Delta 2 rocket next week for a Nov. 8 launch. Besides the Burst Alert Telescope, Swift has an X-ray Telescope and Ultraviolet/Optical Telescope that will observe the gamma-ray bursts simultaneously. Bursts could indicate the death of stars or the birth of black holes. KSC protects the spacecraft's delicate optics by processing it in an ultra-clean room in Hangar AE, a NASA facility at Cape Canaveral Air Force Station. [“Swift ready to quickly record gamma-rays,” **Florida Today**, October 20, 2004, p 3B.]

◆ NASA's DART satellite is scheduled to be launched aboard an Orbital Sciences Pegasus XL vehicle on Tuesday, Oct. 26, during a 7-minute launch window which extends from 11:13:32 - 11:20:32 a.m. PDT. The drop of the Pegasus from the L-1011 carrier aircraft is targeted to occur at a location over the Pacific Ocean approximately 100 miles offshore from Vandenberg Air Force Base, Calif. The DART satellite is about 6 feet long and 3 feet in diameter, weighing approximately 800 pounds. It will be placed into a 475-mile-high circular polar orbit at an inclination of 97.7 degrees. DART will demonstrate key technologies required for spacecraft to rendezvous with other craft, such as satellites, without human intervention. DART will combine key autonomous technologies to actually rendezvous with a target satellite during the mission. It is the first demonstration program selected by NASA's Exploration Systems Mission Directorate to develop technologies for the Vision for Space Exploration. [“DART Satellite To Launch On Pegasus XL Rocket Oct. 26,” **NASA News Release #82-04**, October 20, 2004.]

**October 21:** Floating around the Earth 230 miles up, NASA Astronaut Leroy Chiao is not too far from the polls to stand up and be counted on Election Day. From the International Space Station, Chiao will cast his vote in the Nov. 2, 2004, national election. [“Where There’s A Will To Vote, There’s A Way,” **NASA News Release #M-04-167**, October 21, 2004.]

◆ Spacecraft and Expendable Launch Vehicles Status Report: Mission: Demonstration of Autonomous Rendezvous Technology (DART), Launch vehicle: Pegasus XL, Launch site: Vandenberg Air Force Base, Calif., Launch date: Oct. 26, 2004, Launch window: 11:13:32 a.m. – 11:20:32 a.m. PDT. Mated to the Orbital Sciences Pegasus XL rocket at Vandenberg Air Force Base in California, NASA's DART spacecraft is being transported to the runway today for mating to the underside of Orbital's L-1011 carrier aircraft. A Combined System Test involving Pegasus/DART and the L-1011 is scheduled for Friday, Oct. 22, and will be followed by a DART Flight Line Test, a spacecraft state of health check. The DART Flight Readiness Review was successfully completed at Vandenberg Air Force Base on Wednesday, Oct. 20. The DART Mission Readiness Review was also successfully completed at NASA's Marshall Space Flight Center in Huntsville, Ala., on Oct. 15. With these two major reviews now finished, launch is on schedule for Tuesday, Oct. 26. Deployment from the L-1011 is targeted to occur at 11:13:32 a.m. PDT at a location approximately 100 miles West-Northwest of Vandenberg Air Force Base. The DART satellite and Pegasus XL launch vehicle were successfully re-mated on Oct. 1, followed by successful final testing of the Advanced Video Guidance Sensor hardware, the primary technology demonstration experiment. The final Pegasus/DART launch and mission simulation was successfully performed on Oct. 8. Installation of the dual fairing halves around the spacecraft atop the Pegasus rocket was completed Oct. 15. Mission: Swift, Launch vehicle: Delta II, Launch pad: 17-A Cape Canaveral Air Force Station, Fla., Launch date: Nov. 8, 2004 NET, Launch window: 12:04 p.m. – 1:04 p.m. EST. Today at Pad 17-A, a loading of liquid oxygen aboard the Delta first stage is being performed to check for leaks. This also serves as a "minus count" crew certification exercise for the launch team. Friday, Oct. 22, a Flight Simulation is scheduled. This is a "plus count" flight events test to very the operation of the vehicle's systems during powered flight. Testing of the guidance system aboard the Boeing Delta II rocket was completed Wednesday, Oct. 20. Swift is in the clean room at NASA's Hangar AE on Cape Canaveral Air Force Station. Wednesday, the spacecraft was weighed and early this morning it was mated to the payload attach fitting, the interface between the spacecraft and the second stage of the Delta II rocket. Work to prepare Swift for transportation to Pad 17-A will begin next week. Because of rescheduling the launch of an Air Force Global Positioning Satellite from adjacent pad 17-B, the launch date for Swift is under review but is currently expected be known within a day or so. KSC News Center (2004). **Spacecraft and Expendable Launch Vehicles Status Report** [Online]. Available E-mail: ksc@newsletters.nasa.gov [2004, October 21].]

◆ NASA Administrator Sean O'Keefe announced today Chief Scientist and veteran astronaut John Grunsfeld will return to NASA's Johnson Space Center in Houston. Administrator O'Keefe appointed Dr. James B. Garvin, chief scientist for NASA's Mars and lunar exploration programs, as the new Chief Scientist, effective immediately. ["NASA Administrator Names New Chief Scientist," **NASA News Release #04-349**, October 21, 2004.]

**October 22:** Space Shuttle Processing Status Report S04-35: **Discovery** (OV-103); In the Orbiter Processing Facility, technicians continue to perform system testing for

Discovery's Return to Flight mission, designated STS-114, to the International Space Station. The Remote Manipulator System (RMS), or Space Shuttle robotic arm, was installed in the payload bay on Oct. 15. The arm was powered up for testing on Wednesday. During testing, the end effector, or grappling end, saw an unexpected temperature increase. Managers have decided to remove the end effector and replace it. The RMS will not have to be removed to perform this work. **Atlantis** (OV-104); Atlantis will be powered up the week of Nov. 15, following an extensive power-down period during which Return to Flight modifications are being performed. These included the wiring for the Orbiter Boom Sensor System and installation of the wing leading edge sensors. All four right-hand and left-hand radiators have been installed for flight. Close out of the chin panel, the semi- circle-shaped section of Reinforced Carbon-Carbon under the nose cap, is ongoing. Technicians continue critical path wiring, structural inspections and electrical modifications throughout the vehicle. **Endeavour** (OV-105); Space Shuttle Endeavour is in its Orbiter Major Modification period, which began in December 2003. Electrical modifications continue in the crew module. Three-String Global Positioning System wire routing in the avionics bay and flight deck continues. Technicians are beginning elevon actuator inspections. Removal of the left outboard elevon actuator is complete. Once the actuator was removed, leak and flow checks were performed. Reinstallation is scheduled for tomorrow. Owner-press-release. (2004). **Space Shuttle Processing Status Report** [Online]. Available E-mail: owner-press-release@spinoza.public.hq.nasa.gov [2004, October 22].]

**October 24:** A sophisticated autopilot system that could play a vital role in missions to the moon or Mars will be tested this week during a $100 million demonstration 500 miles above Earth. Guided by a computer rather than a pilot, a NASA spacecraft called DART will track down a retired military satellite before flying a series of intricate maneuvers around it. The 800-pound DART craft also will close within 16 feet of the satellite repeatedly, and without assistance from either an astronaut or ground controllers. The idea is to test the type of rendezvous systems that would enable, for example, a crew exploration vehicle and a lunar lander to automatically link up in low Earth orbit for a joint trip to the moon. The technology is considered key to President Bush's plan to send astronauts back to the lunar surface by 2020 and later go on to Mars. The flight of DART, which stands for Demonstration of Automated Rendezvous Technology, is the first U.S. mission aimed at showing the job can be done with computers and sensors. Launch is scheduled for October 26 from Vandenberg Air Force Base onboard a Pegasus XL rocket. [“DART flight will test key autopilot system,” **Florida Today**, October 25, 2004, p 1A & 6A.]

**October 25:** Increased security at Kennedy Space Center reflects heightened fears of a terrorist attack before the Nov. 2 election, a NASA official said Monday. There's been "heightened interest to certain areas around the country," said Cal Burch, chief of the Protective Services Office at KSC, "and we believe we are a highly visible target, as other major government facilities are around the country." Among the stronger security measures are armed bulwarks at the gates, more officers at the Visitor Complex and hands-on badge checks. Burch said he couldn't confirm a specific threat, but the general concern is tied to the election. National security officials have been warning for months

of a possible terrorist attack tied to the vote. It's not clear how long the realignment of security forces at the space center will continue, Burch said. "We are looking at whether it is specifically related to the election time or sometime afterwards," he said. [“Guard goes up at KSC,” **Florida Today**, October 26, 2004, p 1B.]

◆ NASA’s Swift gamma ray observatory will not take off until at least Nov. 11, a three-day delay prompted by a postponement of another launch this week. The Delta 2 carrying a Global Positioning System satellite was delayed from Monday to Saturday, and the delicate NASA observatory cannot be moved into place atop its Delta 2 rocket until the first mission is off the ground. Swift is set to blast off between 12:05 p.m. and 1:05 p.m. Nov. 11 from Cape Canaveral Air Force Station. [“Three-day delay for NASA’s Swift launch,” **Florida Today**, October 26, 2004, p 2B.]

**October 26:** A small California company aims to resurrect a scrapped NASA project and use the technology to build a spaceship that could carry tourists into space by 2008. The so-called Dream Chaser also could serve as a hypersonic research plane for NASA or a piloted military spaceplane. The Dream Chaser would be based on the design of NASA's X-34, a suborbital spacecraft that never flew. NASA started work on the 58-foot craft in 1996 and planned 22 flights to test new technologies that would drive down the cost of launching people and cargo into space. The X-34 was designed to reach speeds up to Mach 8 at altitudes up to 50 miles. A small team would have demonstrated two-week turnarounds between test flights. NASA invested $205 million in the X-34 before development delays and cost overruns prompted the agency to cancel the project in 2001. The SpaceDev craft would launch like a rocket, carry at least three people to an altitude of 100 miles and then land like a conventional aircraft. a SpaceDev hybrid rocket motor fueled by synthetic rubber and liquefied laughing gas would power the Dream Chaser. A similar SpaceDev motor powered SpaceShipOne on the first privately financed space mission in June and two recent flights that won the $10 million Ansari X Prize. [“Scrapped X-34 to be reborn,” **Florida Today**, October 27, 2004, p 3B.]

◆ A technical glitch and bad weather prompted NASA to delay until at least Thursday a mission aimed at testing a new autopilot system in orbit, agency officials said Tuesday. NASA's DART spacecraft had been slated for launch Tuesday aboard an Orbital Sciences Corp. Pegasus rocket. Guided by a computer and sensors rather than an astronaut, the spacecraft then was to track down a retired military satellite in a high-flying test of a new automated rendezvous system. The mission, however, was postponed when the target satellite suffered a temporary loss of data from the Air Force's Global Positioning System, a satellite constellation that provides precise navigation information to military and civilian users. Both the DART spacecraft and the target satellite need GPS data to carry out a planned rendezvous 500 miles above Earth. The possibility of stormy weather also factored into the decision, NASA spokesman Michael Braukus said. NASA's next confirmed launch opportunity is Nov. 4. [“Weather, glitch help stall DART,” **Florida Today**, October 27, 2004, p 8A.]

◆ Shuttle Update: On Discovery, the Remote Manipulator System (RMS), or Space Shuttle robotic arm, was installed in the payload bay on Oct. 15. The arm was powered

up for testing Oct. 20. During testing, the end effector, or grappling end, saw an unexpected temperature increase. Managers have decided to remove the end effector and replace it. The RMS will not have to be removed to perform this work. Atlantis will be powered up the week of Nov. 15, following an extensive power-down period during which Return to Flight modifications are being performed. These include the wiring for the Orbiter Boom Sensor System and installation of the wing leading edge sensors. All four right-hand and left-hand radiators on Atlantis have been installed for flight. Closeout of the chin panel, the semi-circle-shaped section of Reinforced Carbon-Carbon under the nose cap, is ongoing. Space Shuttle Endeavour is in its Orbiter Major Modification period, which began in December. Electrical modifications continue in the crew module. Three-String Global Positioning System wire routing in the avionics bay and flight deck continues. Technicians are beginning elevon actuator inspections. Removal of the left outboard elevon actuator is complete. Once the actuator was removed, leak and flow checks were performed. [“Robotic arm part on Discovery being replaced after testing,” **KSC Countdown,** October 26, 2004.]

**October 27:** The Air Force is sticking with a policy that subsidizes two of the country's biggest defense contractors to keep two fleets of rockets flying, but skyrocketing costs prompted internal studies into financially backing just one of the launchers. Visiting Cape Canaveral Air Force Station for a practice countdown for the first launch of the heavy-lift version of The Boeing Company's Delta 4 rocket, an Air Force project manager said Wednesday the Pentagon's position is two rockets are needed for national security reasons. However, Lt. Col. James Planeaux said the Defense Department should receive a study by the end of the year examining the advantages and disadvantages of supporting only one company, either Boeing or Lockheed Martin Corp. and its new Atlas 5. The idea is being pushed by some in Congress because the estimated cost of fielding the new rocket fleets, over the next two decades, has risen from $17 billion to $32 billion. The almost $15 billion cost overrun has Congressional leaders asking whether the United States can afford the luxury of two separate launch vehicles if taxpayers have to pay extra to keep the rocket companies in business. [“Air Force: 2 rocket fleets vital,” **Florida Today**, October 28, 2004, p 1B.]

◆ NASA has been named the 2004 Agency of the Year by a federal organization honoring excellence in financial management. NASA was honored for its implementation of the Web Time and Attendance Distribution System (WebTADS), a Web- based system that collects employee time and attendance information. The Federal Financial Managers Council, Western Region award recognizes federal organizations that show skilled economic administration and cost-saving practices. The council is an independent committee of the San Francisco Bay Area Federal Executive Board. [“NASA Named Agency Of The Year By Federal Financial Group,” **NASA News Release #04-358**, October 27, 2004.]

**October 28:** NASA and Orbital Sciences Corp. have postponed today's launch of the Demonstration of Autonomous Rendezvous Technology (DART) spacecraft due to the discovery of particulate contamination found inside the fairing of the Pegasus launch vehicle. The launch team does not expect to launch before Nov. 4, 2004. During the final

flight preparations for the DART/Pegasus launch, closeout team members discovered pieces of aluminum foil from the launch vehicle's fairing. As a result, the vehicle will be de-mated from the carrier aircraft and returned to the vehicle assembly building, where it will be inspected. The DART mission was postponed twice this week. The first postponement was due to a dropout of Global Positioning Satellite data of the target vehicle, which was resolved. [“DART Launch Postponed,” **NASA News Release #04-362**, October 28, 2004.]

**October 29:** NASA is studying the possibility of reducing the number of missions it will fly before retiring its three-orbiter space shuttle fleet, agency officials said Friday. But it appears that 28 flights will be needed to complete construction of the International Space Station and fulfill U.S. commitments to 15 global partners. "We've been asked to look at a variety of excursions from that," said William Readdy, NASA's associate administrator for space operations. "But each and every time we assess those, it doesn't give us the capability that we need onboard the station to meet our international commitments." Also on Friday, NASA managers reaffirmed their goal of returning the shuttle to flight between mid-May and early June of 2005. NASA and its partners in 1998 signed agreements that call for the U.S. to launch science laboratories for the European Space Agency and the Japanese Aerospace Exploration Agency. The labs both represent multibillion-dollar investments. The nation also committed to launching two Italian-built modules designed to connect different parts of the outpost, a centrifuge module the Japanese are building for the U.S., and a Russian electrical power tower, among other things. NASA's shuttle fleet has been grounded since the Columbia disaster, which destroyed a $2 billion spaceship and killed seven astronauts. The agency on Friday firmed up plans to target a window that extends from May 12 to June 3 for launch of NASA's first post-Columbia shuttle mission. [“NASA looks at fewer flights,” **Florida Today**, October 30, 2004, p 1A & 8A.]

◆ A $100 million NASA mission to test a new autopilot system is being delayed until at least next Thursday so technicians can clean up debris discovered in a rocket nosecone, officials said. NASA's DART spacecraft had been scheduled to launch Thursday aboard an Orbital Sciences Corp. Pegasus XL rocket. The air-launched rocket was to have been carried by an L-1011 aircraft from Vandenberg Air Force Base in California to a drop zone over the Pacific Ocean. The mission was postponed after technicians found pieces of aluminum foil had broken off a thermal liner inside the rocket's nosecone, exposing the DART spacecraft to contaminants. The aluminum foil broke free from the liner after a nitrogen purge line hooked up to the nosecone inadvertently disconnected, NASA spokeswoman Kim Newton said. Technicians now plan to remove the Pegasus rocket from its carrier aircraft. The rocket's nosecone then will be removed, cleaned and inspected. The postponement was the second for DART, which stands for Demonstration of Autonomous Rendezvous Technology. An initial launch attempt was canceled Tuesday because of bad weather and technical problems with a spacecraft it is to rendezvous with in orbit. [“Debris delays launch,” **Florida Today**, October 29, 2004, p 1B.]

**October 31:** NASA's plan to send robotic scouts to the moon in advance of astronauts is starting to take shape, but politics and the presidential election are stalling progress. Congress appears poised to ax most if not all start-up money for an initial lunar mapping mission in 2008 but won't finalize the agency's budget before the election Tuesday. Outside analysts say NASA is hesitant to draft detailed plans for follow-on flights -- missions key to President Bush's plan to return astronauts to the moon -- until the election is over. Bush in January outlined a plan to complete the International Space Station and retire NASA's shuttle fleet by 2010. Robotic spacecraft would be sent to the moon to pave the way for astronauts, who would return to the lunar surface between 2015 and 2020. NASA now plans to spend $5 billion between 2005 and 2020 to launch a dozen robotic missions to the moon, or one per year, beginning in 2008. The idea is to have robots map the moon, search for water ice, survey potential landing sites, and test prototypes for oxygen production and electrical power plants, among other things. The robotic craft also would help determine how to protect human explorers from deadly cosmic and solar radiation they would be exposed to outside Earth's magnetic field. "When we go back to the moon with humans, we want to be able to do it in the right way," said Richard Vondrak, director of the lunar robotic explorer program at NASA Headquarters in Washington. "And the robotic missions will provide information and test beds that will prepare us for the return to the moon in the best possible way." NASA already is designing the first of the robotic explorers. The Lunar Reconnaissance Orbiter would return a global topographical map of the moon, measure deep space radiation in lunar orbit and attempt to find water ice at the lunar poles. NASA's plans for a second robotic spacecraft, which would launch in 2009, are much less mature. Vondrak said the spacecraft likely would be a lander with instruments that would verify the existence of water ice and measure radiation. The 10 missions that would follow have yet to be defined. The fledgling program is facing severe cuts in Congress. The House Appropriations Committee cut NASA's entire $70 million request for start-up money in 2005. In the Senate, the appropriations committee slashed all but $20 million. A House-Senate conference committee won't take up the issue until after the election. Vondrak said NASA is pleased the Senate approved enough money to initiate the program. But he added that the impending budget cut likely would force NASA to either scale back plans for the Lunar Reconnaissance Orbiter or delay its launch until 2009. In any case, Vondrak said, the robotic missions remain key not only to preparing for human expeditions to the moon but also to future missions to Mars or other places. "Going to the moon is an important first step in that journey that leads us to further destinations," Vondrak said. "We want to use it as a way to prepare for human exploration beyond the moon." [“NASA’s robotic moon missions spin wheels,” **Florida Today**, October 31, 2004, p 1A & 3A.]

STS-114 Pilot James Kelly (left) and Mission Specialist Andrew Thomas (center), along with NASA Systems Engineer Robert Rokobauer (right), look closely at the shoes of one of the tracks used on a Crawler-Transporter. The 10-foot-high track on a crawler contains 278 “shoes,” weighing 2,200 pounds each. The crawlers are guided by four trucks, one on each corner. The crawlers had recent modifications to the cab and muffler system. The STS-114 mission is Logistics Flight 1, which is scheduled to deliver supplies and equipment plus the external stowage platform to the International Space Station.

## NOVEMBER

**November 1:** The space shuttle Enterprise is the star attraction at Monday's opening of a new wing at the National Air and Space Museum annex in northern Virginia. The 53,000-square-foot James S. McDonnell Space Hangar also includes spacesuits, Mars explorer modules, gadgets from the Apollo and Gemini missions and Soviet rockets. The Enterprise flew five missions but never into orbit. Instead, it was used to test ideas during the development of NASA shuttle program. The new wing is part of the Udvar-Hazy Center, which opened last December near Dulles Airport. Web posted. (2004). [Air and Space Museum Opens Shuttle Display [Online]. Available WWW: http://www.wjla.com/ [2004, November 1].]

**November 2:** The station's 10th crew, Commander Leroy Chiao and Flight Engineer Salizhan Sharipov, marked the four-year milestone on election day. The 11th crew may be able to greet space shuttles, which aim to return to flight in May. ["Station marks four years of human space residence," **Florida Today**, November 7, 2004, p 1A & 7A. International Space Station Status Report SS04-038, November 5, 2004.]

**November 3:** The launch of NASA's DART spacecraft aboard an Orbital Sciences Pegasus XL rocket, targeted for Thursday, Nov. 4, is being postponed. Availability of the Western Range and the lingering effects of solar activity are the primary reasons for the postponement. A new launch date is under review. ["NASA's DART Launch to be Rescheduled," **NASA News Release #M04-174,** November 3, 2004.]

◆ George W. Bush won re-election to the office of the President of the United States. The 43rd President and Vice President Richard Cheney will be inaugurated on January 20, 2005.

**November 4:** NASA has rescheduled the Demonstration of Autonomous Rendezvous Technology (DART) spacecraft launch for Tuesday, Nov. 9, 2004, from Vandenberg Air Force Base (VAFB), Calif. The seven-minute launch window opens at 1:07:40 p.m. EST. DART, launched onboard an Orbital Sciences Pegasus XL rocket, provides a key step in establishing autonomous rendezvous capabilities in support of the U.S. space program's Vision for Space Exploration. While astronauts have piloted previous rendezvous and docking efforts, the unmanned DART spacecraft has only computers and sensors to perform all of its rendezvous functions. ["NASA Reschedules Dart Spacecraft Launch," **NASA News Release #M04-176,** November 4, 2004.]

◆ SPACEHAB, Incorporated, a leading provider of commercial space services, today announced that its Astrotech Space Operations subsidiary was presented with the distinguished title of NASA/Kennedy Space Center (KSC) Small Business Contractor of the Year by officials from the Center. Astrotech has been providing payload processing services at their company-owned facilities in Titusville, Florida and at Vandenberg Air Force Base (VAFB), California in support of multiple NASA missions over the past six years. Web posted. (2004). [SPACEHAB Subsidiary Named NASA/Kennedy Space

Center Small Business Contractor of the Year [Online]. Available WWW: http://biz.yahoo.com/ [2004, November 4].]

**November 5:** Space Shuttle Processing Status Report S04-037: **Discovery** (OV-103); As Discovery continues to be processed for its launch planning window of May 12 to June 3, 2005, technicians are progressing with important orbiter power-up system testing. This testing is required prior to the vehicle rolling over to the Vehicle Assembly Building (VAB). Once in the VAB, the orbiter will be mated to its twin Solid Rocket Boosters and External Tank. Checkout of the new Multi-functional Electronic Display System, or "glass cockpit," was successfully completed. Orbiter drag chute door instrumentation testing is complete. Closeout inspections and photos of the drag chute door continue. Main landing gear tire pressure strain gauge installation and monitoring system checkout are complete. **Atlantis** (OV-104); Final power-down work continues in the Orbiter Processing Facility prior to Atlantis' scheduled power up the week of Nov. 15. During the power-down period, technicians performed the Return to Flight modifications, that included wiring installation for the External Tank separation camera, wing leading edge sensors and relay units and the Orbiter Boom Sensor System. Freon coolant loop servicing continues. Freon is scheduled to be added to the loop today. Leak checks were successfully completed on Water Spray Boiler No. 3 and it has been reinstalled on the vehicle. Each Water Spray Boiler cools a corresponding Auxiliary Power Unit's lube oil system and hydraulic system by spraying water on its lines. Thermal Protection System blanket installation continues in the payload bay. **Endeavour** (OV-105); Space Shuttle Endeavour is in its Orbiter Major Modification period, that began in December 2003. Electrical modifications continue in the crew module. Three-String Global Positioning System wire routing in the avionics bay and flight deck continues. Installation of the left outboard elevon is underway. Left- and right-hand forward payload bay doors No. 1 and 2 closeout inspections continue. Orbiter electrical wire harness and connector closeouts are progressing well. Owner-press-release. (2004). **Space Shuttle Processing Status Report** [Online]. Available E-mail: owner-press-release@spinoza.public.hq.nasa.gov [2004, November 5].]

**November 6:** A Boeing Delta 2 rocket thundered into space today where it successfully deployed a Global Positioning System satellite to aid U.S. military forces around the world. The 126-foot tall blue and white rocket departed pad 17B at 12:39 a.m. EST (0539 GMT), briefly turning the Florida nighttime into day with a blinding light. Twenty-five minutes later, the Lockheed Martin-built GPS 2R-13 spacecraft was released from the rocket's third stage, marking the 61st consecutive successful Delta 2 mission in seven years. Web posted. (2004). [Delta rocket puts on late-night show with GPS launch [Online]. Available WWW: http://www.spaceflightnow.com/ [2004, November 6].]

◆ Marking the end of a years-long quest, the team behind the SpaceShipOne rocket plane accepted the $10 million Ansari X Prize for advancements in private space travel and tourism. Web posted. (2004). [Spaceship team gets its $10 million prize [Online]. Available WWW: http://www.msnbc.com/ [2004, November 6].]

**November 8:** NASA announced late Monday that is has delayed Tuesday's scheduled launch of a technology demonstration satellite to review engineering data about the spacecraft. The DART spacecraft was scheduled to launch Tuesday on a Pegasus XL off the coast from Vandenberg Air Force Base, California. In a brief statement NASA said that the launch had been delayed to reevaluate a review of the "projected loads data", the effect the g-forces of launch will have on the spacecraft. No new launch date has been announced. DART was scheduled to launch two weeks ago, only to be delayed by weather and a glitch with an orbiting spacecraft that will be used in DART's mission; a launch attempt last week was postponed because of solar activity and a launch range conflict. DART (Demonstration of Autonomous Rendezvous Technology) is designed to rendezvous with an existing low Earth orbit satellite, MUBLCOM, using only the sensors and computers on the spacecraft itself. Web posted. (2004). [DART launch delayed again [Online]. Available WWW: http://www.spacetoday.net/ [2004, November 8].]

◆ SPACEHAB, Incorporated, a leading provider of commercial space services, today announced that it has filed a formal claim against NASA under the Federal Tort Claims Act seeking restitution of its losses totaling in excess of $79.7 million resulting from the tragic destruction of the Space Shuttle Columbia on February 1, 2003. In January 2004 the Company filed a formal proceeding with NASA seeking indemnification under the Company's ReALMS contract in the amount of $87.7 million for the value of the Company's Research Double Module (RDM) and related equipment that was destroyed during the STS-107 Space Shuttle Columbia tragedy. NASA responded to this contract claim on October 5, 2004. NASA's determination states that its liability is limited under the ReALMS contract to $8.0 million. The Company received payment of $8.2 million, which included $0.2 million of interest, from NASA in October 2004. The Company has the right to appeal NASA's decision to deny its claim for indemnification in excess of $8.0 million. The appeal can be filed with either the Armed Services Board of Contract Appeals or the U.S. Court of Federal Claims. SPACEHAB is evaluating its options in appealing NASA's determination. The claim now made under the Federal Tort Claims Act is separate and in addition to the previously filed claim under SPACEHAB's contract with NASA for which the RDM was provided. Under the Federal Tort Claims Act, SPACEHAB is claiming that NASA's negligence led to the space shuttle accident and the destruction of the RDM and, accordingly, the Company seeks restitution of the loss it suffered regardless of contractual arrangements between NASA and the Company. Under federal tort claim procedures, NASA has statutory deadlines for responding to such claims. In the event that the Company's administrative claim is denied, the Company would have the right to pursue the claim in the Federal district court. SPACEHAB's claim specifies the following four areas of negligence by NASA that led to the destruction of the Space Shuttle Columbia and the Company's RDM: (i) NASA personnel negligently provided NASA decision-makers with false information that obscured the risks to STS-107 and the RDM, (ii) NASA negligently violated its own rules on foam shedding when compliance with those rules would have prevented the accident, (iii) NASA created organizational barriers that prevented effective communication and analysis of critical safety information and thereby caused the accident, and (iv) NASA negligently failed to comply with accepted engineering standards and thereby caused the destruction of the RDM. These acts and their implicit negligence are documented in the Columbia Accident

Investigation Board (CAIB) report which represents the findings of the post-accident investigation. NASA has "embraced the CAIB report and its recommendations" and "fully accepts the Board's findings." Web posted. (2004). [Spacehab Files Tort Claim For Losses on Space Shuttle Mission [Online]. Available WWW: http://www.spaceref.com/ [2004, November 8].]

◆ The launch of the Swift observatory, a NASA spacecraft to pinpoint the location of gamma-ray bursts, is scheduled for Wednesday, Nov. 17. Liftoff aboard a Boeing Delta II rocket is targeted to occur at the opening of a one-hour launch window that opens at 12:09 p.m. EST. The mission will begin with a liftoff from Pad 17-A on Cape Canaveral Air Force Station in Florida. Should launch be postponed for any reason, the next launch opportunity is on Nov. 18, also at 12:09 p.m. EST. ["SWIFT Spacecraft Launching Aboard Delta II Nov. 17," **KSC News Release #84-04,** November 8, 2004.]

◆ Federal employees at Kennedy Space Center contributed more than $389,000 in donations to the Combined Federal Campaign (CFC) in their recent annual fund-raising drive surpassing the campaign goal of $294,000, making this year's donations the largest in history. More than 82 percent of employees participated in the campaign. ["NASA greatly exceeds federal campaign donation goal," **KSC News Release #85-04,** November 8, 2004.]

**November 9:** NASA's two massive crawler-transporters, which carried moon rockets and now haul space shuttles to the launch pads, have been shoe-shopping after cracks found last year in the treads proved too extensive to repair. Workers at Kennedy Space Center are installing the new shoes, some of which will replace equipment that is almost 40 years old. While NASA hopes to get the old shoes recycled, some found a use during the hurricanes when people at the center used the heavy hunks of metal as trailer tie downs. ME Global, a company in Minnesota acquired in 2001 by Chile's Compania Electro Metalurgica, manufactures the new shoes and is improving them. The new shoes should last a hundred years, perhaps to serve the shuttles' successors. There are 57 shoes per belt, with eight belts per crawler. NASA's also buying spares for the $10 million job. Web posted. (2004). [Crawlers' shoes to last 100 years [Online]. Available WWW: http://www.floridatoday.com/ [2004, November 9].]

**November 10:** Expendable Launch Vehicles Status Report: Mission: Swift , Launch vehicle: Delta II, Launch pad: SLC 17-A/Cape Canaveral Air Force Station, Launch date: November 17, 2004, Launch window: 12:09 p.m. - 1:09 p.m. (EST). Swift, riding atop its spacecraft transporter, departed NASA's Hangar AE at Kennedy Space Center in Florida at 3:15 a.m. Monday, Nov. 8. It arrived at Pad 17-A on Cape Canaveral Air Force Station at 4:15 a.m. and was hoisted atop the Boeing Delta II rocket at 6:30 p.m. The Flight Program Verification, an integrated test of the spacecraft/launch vehicle combination and the last major test before launch, is under way today. Fairing installation is scheduled for Friday, Nov. 12. The Flight Readiness Review is set for Saturday, Nov. 13. Loading of liquid oxygen aboard the Delta first stage was performed on Oct. 21 to check for leaks. This also serves as a "minus count" crew certification exercise for the launch team. On Oct. 22, a Flight Simulation was conducted. This is a

"plus count" flight events test verifying the operation of the vehicle's systems during powered flight. Testing of the guidance system aboard the Boeing Delta II rocket was completed on Oct. 20. Swift is a medium-class Explorer mission managed by NASA's Goddard Space Flight Center in Greenbelt, Md. The observatory was built for NASA by Spectrum Astro, a division of General Dynamics. The Kennedy Space Center in Florida is responsible for Swift's integration with the Boeing Delta II rocket and the countdown management on launch day. Mission: Deep Impact, Launch vehicle: Delta II, Launch pad: SLC 17-B/Cape Canaveral Air Force Station, Launch date: December 30, 2004, Launch window: 2:39:42 p.m. (EST) instantaneous. NASA's Deep Impact spacecraft arrived in Florida on Oct. 23 to begin final preparations for launch on Dec. 30. The spacecraft was shipped from Ball Aerospace & Technologies in Boulder, Colo., to the Astrotech Space Operations facility located near the Kennedy Space Center. Deep Impact was removed from its shipping container and is undergoing its Functional and Mission Readiness testing, scheduled for completion on Nov. 23. These tests involve the entire spacecraft flight system (including the flyby and impactor, associated science instruments and the spacecraft's basic subsystems), along with loading updated flight software. The high gain antenna used for spacecraft communications will be installed on Nov. 29. The solar array will then be stowed and an illumination test performed as a final check of its performance on Nov. 30. Deep Impact will then be ready to begin preparation for fueling on Dec. 6 and is scheduled to be completed on Dec. 9. The stacking of the Boeing Delta II launch vehicle on Pad 17-B will begin on Nov. 22 with the hoisting of the first stage into the launcher. Hoisting of the nine strap-on solid rocket boosters, in sets of three, is scheduled for Nov. 23, Nov. 29, and Dec. 1. The second stage will be hoisted into position atop the first stage on Dec. 3. Mission: Demonstration of Autonomous Rendezvous Technology (DART), Launch vehicle: Pegasus-XL, Launch pad: Vandenberg Air Force Base (VAFB), Launch date: Under review, Launch window: Under review. The launch of NASA's DART spacecraft aboard an Orbital Sciences Pegasus XL, scheduled for Tuesday, Nov. 9, has been postponed indefinitely. A review of projected loads data, or the G-forces that the DART payload will experience upon ignition of the Pegasus second stage, are being re-evaluated to assure mission success. The Pegasus rocket is being demated today, Nov. 10, from the L-1011 carrier aircraft and returned to its hangar for the present time. A new launch date will be determined once the loads analysis concern has been resolved. DART was designed and built for NASA by Orbital Sciences Corporation as an advanced flight demonstrator to locate and maneuver near an orbiting satellite. The DART spacecraft weighs about 800 pounds and is nearly 6 feet long and 3 feet in diameter. The Orbital Sciences Pegasus XL vehicle will launch DART into a circular polar orbit of approximately 475 miles. KSC News Center (2004). **Expendable Launch Vehicles Status Report** [Online]. Available E-mail: ksc@newsletters.nasa.gov [2004, November 10].]

**November 12:** A device invented by NASA experts is helping technicians detect wiring problems dramatically faster on aircraft, including those used by the U.S. military in Afghanistan. The portable Standing Wave Reflectometer (SWR) was created by engineers at Kennedy Space Center in Florida. The device, developed in 1997 to better identify cable and wire malfunctions in aircraft and spacecraft, finds suspected problems to verify conditions of electrical power and signal distribution. This includes locating

problems inside Space Shuttle orbiters. “One of its first applications at KSC was detecting intermittent wire failures in a cable used in the Space Shuttle’s Solid Rocket Boosters,” said Pedro Medelius, who helped to invent the SWR. “It has also been used in the orbiter to locate electrical shorts in cables.” By identifying and locating the malfunction, technicians hope the SWR will reduce the time it takes to detect wiring problems by 85 percent. Currently, the SWR accurately locates faults 75 percent of the time. Currently, the U.S. Navy, Marines and Air Force are evaluating the technology in Afghanistan to test its ruggedness. The country is known for a fine grade of sand and dusty conditions, a taxing combination rarely found in the United States. Eclypse International Corp. in Corona, Calif., obtained exclusive patent rights in 1999 to further develop the technology. They anticipate completing enhancements within two years. [“NASA Technology Helping Military Aircraft Remain In Top Condition,” **KSC News Release #87-04,** November 12, 2004.]

◆ Space Shuttle Processing Status Report, Vol. 1 No. 35: **Discovery** (OV-103)**;** Technicians have completed more than 50 percent of Discovery’s powered-up system testing for its Return to Flight mission, designated STS-114, to the International Space Station. System testing is continuing with the new Multi-functional Electronic Display System, or “glass cockpit,” closed circuit television system heater checks and orbiter docking system voltage tests. The end effector, or grappling end, of the Space Shuttle robotic arm saw an unexpected temperature increase during previous testing and has been removed and replaced. The retest is scheduled for today. Main Propulsion System flow liner slot polishing is complete on all three engines. The polishing was performed to decrease the likelihood of microscopic cracks initiating in the flow liner. **Atlantis** (OV-104)**;** Final power-down work continues in the Orbiter Processing Facility prior to Atlantis’ scheduled power up. During the extensive power-down period, technicians performed Return to Flight modifications including wiring installation for the External Tank separation camera, wing leading edge sensors and relay units, and the Orbiter Boom Sensor System. Preparations for fuel cell installations are under way. Fuel cells No. 1, 2 and 3 are out of the shipping containers and fuel cell No. 1 has been inspected and is scheduled to be installed today. Fuel cells use oxygen and hydrogen to provide electrical power during a mission. **Endeavour** (OV-105); Space Shuttle Endeavour is in its Orbiter Major Modification period, which began in December 2003. Electrical modifications continue in the crew module. Three-String Global Positioning System wire routing in the avionics bay and flight deck continues. The left outboard elevon actuator is installed. With the Reinforced Carbon-Carbon panels off the vehicle, work continues on removing the miniscule corrosion on the wing leading edge. Left-hand wing leading edge eddy current tests continue. Eddy current is a form of non-destructive evaluation that would reveal any microscopic flaws or cracks on the wing surface. Owner-press-release. (2004). **Space Shuttle Processing Status Report** [Online]. Available E-mail: owner-press-release@spinoza.public.hq.nasa.gov [2004, November 12].]

◆ NASA Administrator Sean O'Keefe today appointed astronaut C. Michael Foale as Deputy Associate Administrator for Exploration Operations reporting to both NASA's Associate Administrators for Exploration Systems and Space Operations. Foale will advise the mission directorate senior leadership on immediate, near term opportunities to

refocus and realign training, operations, engineering support and life sciences research towards accomplishing the Vision for Space Exploration. ["NASA Names Space Veteran As Deputy For Exploration Operations," **NASA News Release #04-371**, November 12, 2004.]

**November 16:** NASA's X-43A aircraft set a world speed record, flying at more than 6,600 mph in a test flight that eventually could revolutionize air travel and space exploration. The record setting flight began as a NASA B-52 airplane took off from Edwards Air Force Base in California, carrying a Pegasus rocket tipped with an X-43A aircraft. Flying about 40,000 feet above the Pacific Ocean, the B-52 dropped the Pegasus from beneath its right wing. Then five seconds later, the Pegasus ignited its rocket engine, propelling the unpiloted X-43A to an altitude of 110,000 feet before separating. The X-43A ignited its air-breathing engine for about 10 seconds, flying at Mach 9.6 for a short burst, proving a jet-powered aircraft can operate at those speeds. ["X-43 sets speed record," **Florida Today**, November 17, 2004, p 1A & 3A.]

◆ The fate of President Bush's plan to send astronauts back to the moon and eventually to Mars is in the hands of a skeptical and cash-strapped Congress. Lawmakers, back on Capitol Hill for a lame-duck session this week, hope to quickly stitch together a $388 billion spending bill to fund almost everything the federal government does that is not defense-related. NASA is one of dozens of agencies waiting to see what lawmakers will come up with. Initially, prospects don't look good for the moon-Mars missions. Earlier this year, the House and Senate adopted very different spending plans for NASA. Under the House plan, NASA would get a total budget of $15.1 billion, about $1.1 billion less than Bush requested. The spending blueprint calls for a one-year delay in the start of work on the planned Crew Exploration Vehicle, the centerpiece of Bush's vision of sending humans beyond the moon. The Senate plan would go a little further, but offers only $268 million for the multipurpose spaceship, about half what the administration requested. Working behind closed doors this week, lawmakers will have to reach some sort of compromise or Bush's space vision will falter before it even gets started. Sen. George Allen, R-Va., said many of his colleagues support Bush's proposal but are also skeptical. "They still have to be convinced (NASA officials) have a plan to spend money wisely," said Allen, who sits on a Senate committee that oversees NASA policy. In the funding bill senators approved, they said NASA's proposal for a new space vehicle for moon and Mars missions "resembles a work in progress rather than a firm definition of what is necessary." House lawmakers were less skeptical but could not come up with the necessary funds, given spending restrictions placed on the non-defense legislation. ["Moon, Mars funds at risk," **Florida Today**, November 16, 2004, p 1A.]

**November 17:** The National Space Club Florida Committee is honoring Kennedy Space Center Public Information Officer George Diller with the Harry Kolcum Memorial News and Communications Award for his excellence in "communicating the space story" along Florida's Space Coast and throughout the world. "When you work with George Diller, you understand what a true communications professional is," said Jim Banke, vice chairman of the Florida Space Club Florida Committee. "George is a strong, steady and reliable voice for NASA, especially in unmanned launches and operations at KSC that

usually don't get a lot of attention." Diller has served at KSC in the Office of Public Affairs for 24 years. His primary responsibility is serving as the NASA spokesman for Expendable Launch Vehicles, and he has tremendous expertise in the areas of deployable spacecraft, tracking and telemetry, and weather. As a launch commentator for both Space Shuttle and ELV missions, Diller has provided the countdown for such historic missions as Cassini, Gallileo, the Hubble Space Telescope, Magellan and the recent launch of the two Mars rovers. "George's voice is a national treasure," said Banke. The award is named in honor of Harry Kolcum, the former managing editor of *Aviation Week and Space Technology*, who was the Cape Canaveral area bureau chief from 1980 to 1993 prior to his death in 1994. Kolcum was a founding member of the National Space Club Florida Committee. ["NASA Spokesman George Diller Earns National Space Club Award," **KSC News Release #89-04**, November 17, 2004.]

◆ Launch of NASA's Swift spacecraft aboard a Boeing Delta II rocket has been delayed at least 24 hours due to a concern with Range Command-Receiver Decoder equipment on the launch vehicle. The concern arose over night after the "Safe and Arm" devices were connected on the launch vehicle. The decision to postpone the launch occurred as engineers were making final checks prior to launch tower roll back at complex 17 on Cape Canaveral Air Force Station in Florida. Launch is expected to occur no earlier than Thursday Nov. 18 at 12:09 p.m. EST. ["SWIFT launch delayed," **KSC News Release #90-04**, November 17, 2004.]

◆ Launch of NASA's Swift spacecraft aboard a Boeing Delta II rocket has been delayed again due to continued concerns with Range Command-Receiver Decoder equipment on the launch vehicle. Earlier today launch had been set for no earlier than Thursday. Following a Wednesday evening management meeting, it was determined a launch on Thursday was no longer viable due to the additional time required to continue assessments of the problem with the command receiver on the Delta vehicle. The launch team will continue analysis through the night, leaving open the possibility of a launch as early as Friday, Nov. 19. ["SWIFT Launch Further Postponed," **KSC News Release #91-04**, November 17, 2004.]

**November 18:** Launch of NASA's Swift spacecraft aboard a Boeing Delta II rocket has been set for no earlier than Saturday Nov. 20. The one hour launch window opens at 12:10 p.m. EST. Mission managers will meet again this afternoon to confirm the work necessary for a Saturday launch attempt is on schedule and no additional issues have arisen. Overnight, workers determined the Range Command-Receiver Decoder equipment on the launch vehicle is the likely reason for the voltage variance seen earlier in the week. Workers will gain access to the equipment today and replace the necessary parts. The system will be retested on Friday. Air Force weather forecasters are indicating only a 10 percent chance of launch weather constraint violations on Saturday. ["SWIFT launch set for NET Saturday Nov. 20," **KSC News Release #92-04**, November 17, 2004.]

◆ Expendable Launch Vehicles Status Report: Mission: Swift , Launch vehicle: Delta II, Launch pad: SLC 17-A/Cape Canaveral Air Force Station, Launch Date: NET

November 20, 2004, Launch Window: 12:10 p.m. – 1:10 p.m. (EST). NASA has set the launch of the Swift spacecraft for no earlier than Saturday, Nov. 20. The one-hour launch window opens at 12:10 p.m. EST. Mission managers met this afternoon to confirm the work necessary for a Saturday launch attempt is on schedule. Since the team was not able to repeat the anomalous condition that was seen earlier on the Command Receiver Decoder system, the suspect components are being replaced. The system will be retested Friday, Nov. 19. Retraction of the mobile service tower, the gantry surrounding the Delta II, is scheduled to occur at 3 a.m. on Saturday. Loading of RP-1, a highly refined kerosene fuel, aboard the first stage, is scheduled to begin at approximately 9:40 a.m. on Saturday. Loading of the cryogenic liquid oxygen into the first stage will begin approximately one hour later. Mission: Deep Impact, Launch vehicle: Delta II, Launch pad: SLC 17-B/Cape Canaveral Air Force Station, Launch date: December 30, 2004, Launch window: 2:39:42 p.m. (EST) instantaneous. NASA's Deep Impact spacecraft arrived in Florida on Oct. 23 to begin final preparations for launch on Dec. 30. The spacecraft was shipped from Ball Aerospace & Technologies in Boulder, Colo., to the Astrotech Space Operations facility located near the Kennedy Space Center. Deep Impact was removed from its shipping container and is undergoing its Functional and Mission Readiness testing, scheduled for completion on Nov. 23. These tests involve the entire spacecraft flight system (including the flyby and impactor, associated science instruments and the spacecraft's basic subsystems), along with loading updated flight software. The high gain antenna used for spacecraft communications will be installed on Nov. 29. The solar array will then be stowed and an illumination test performed as a final check of its performance on Nov. 30. Deep Impact will then be ready to begin preparation for fueling on Dec. 6 and is scheduled to be completed on Dec. 9. The stacking of the Boeing Delta II launch vehicle on Pad 17-B will begin on Nov. 22 with the hoisting of the first stage into the launcher. Hoisting of the nine strap-on solid rocket boosters, in sets of three, is scheduled for Nov. 23, Nov. 29, and Dec. 1. The second stage will be hoisted into position atop the first stage on Dec. 3. KSC News Center (2004). **Expendable Launch Vehicles Status Report** [Online]. Available E-mail: ksc@newsletters.nasa.gov [2004, November 18].]

**November 19:** Space Shuttle Processing Status Report Vol. 1 No. 25: **Discovery** (OV-103); Testing of the end effector, or grappling end, of the Space Shuttle robotic arm successfully concluded this week. Installation of the wing leading edge instrumentation is 50 percent complete. Closeout work was completed in the orbiter midbody in bay 1 and in left-hand bay 9. Those areas will be covered and closed out for flight. Also accomplished this week were the flow liner cleaning and inspection of Main Propulsion System Engine 2. Checkout of the computer complex portion of the Data Processing System, which is part of the orbiter's control system, was completed. **Atlantis** (OV-104); Final power-down work continues in the Orbiter Processing Facility prior to the scheduled power up of Atlantis in December. During the extensive power-down period, technicians performed Return to Flight modifications including wiring installation for the External Tank separation camera, wing leading edge sensors and relay units, and the Orbiter Boom Sensor System. Fuel cell No. 1 was installed this week. Fuel cells use oxygen and hydrogen to provide electrical power and water during a mission. In the mid-body of the orbiter, the left side Manipulator Pedestal Mounts (MPMs) installations

continue for the Shuttle robotic arm. These posts will support the arm when it's not in use. Freon Coolant Loop No. 1, which cools electrical components during flight, was serviced this week. **Endeavour** (OV-105); Space Shuttle Endeavour is in its Orbiter Major Modification period, which began in December 2003. Electrical modifications continue in the crew module. Three-String Global Positioning System wire routing in the avionics bay and flight deck continues. Tent build-up for painting of the body flap and the right hand wing leading edge is under way. Engine 1 dome heat shield painting began this week. The right main landing gear was extended to support recession and compression tests on the thermal barriers. Owner-press-release. (2004). **Space Shuttle Processing Status Report** [Online]. Available E-mail: owner-press-release@spinoza.public.hq.nasa.gov [2004, November 19].]

◆ Launch of NASA's Swift spacecraft aboard a Boeing Delta II rocket is scheduled for Saturday Nov. 20 from Cape Canaveral Air Force Station complex 17. The one hour launch window opens at 12:10 p.m. EST. Mission managers met this afternoon and confirmed the work involving the replacement and retest of the rocket's Command-Receiver Decoder equipment was complete and successful. Air Force weather forecasters are indicating only a 10 percent chance of launch weather constraint violations on Saturday. ["NASA sets SWIFT launch Saturday Nov. 20," **KSC News Release #93-04**, November 19, 2004.]

◆ The deputy manager of the space shuttle program said Friday there are no immediate plans to lay off workers at Kennedy Space Center. Layoffs were raised as one extreme option in a budget review earlier this year, but Wayne Hale said managers rejected the idea of cutting back the workforce at the shuttle's home port. "We have to continually deal with 'do we have the right workforce in the right place at the right time?' That's part of what good management is about," Hale told reporters on Friday. "But we're not looking to have any layoffs in the near term." He added, however, that it would be foolish for him to pledge there would never be layoffs in the shuttle program. Hale's comments back up similar ones made by spokespeople at the Kennedy Space Center and the prime shuttle contractor, United Space Alliance. About 14,000 people work at the space center, not just on the space shuttles. Concerns over layoffs have arisen because of fears that NASA might not get all the money it requested from Congress for the shuttles and other space exploration programs. The tight budget situation is made worse by the continuing rise in the cost of safety changes mandated by Columbia accident investigators. ["No current plans for shuttle layoffs," **Florida Today**, November 20, 2004, p 8A.]

**November 20:** NASA's Swift satellite successfully launched today aboard a Boeing Delta 2 rocket at 12:16 p.m. EST from Launch Complex 17A at the Cape Canaveral Air Force Station, Fla. The satellite will pinpoint the location of distant yet fleeting explosions that appear to signal the births of black holes. About 80 minutes after launch, the spacecraft was successfully separated from the Delta second stage. It has also been confirmed that the solar arrays are properly deployed. "It's a thrill that Swift is in orbit. We expect to detect and analyze more than 100 gamma-ray bursts a year. These are the most powerful explosions in the universe, and I can't wait to learn more about them," said Swift Principal Investigator Dr. Neil Gehrels, at NASA's Goddard Space Flight Center,

Greenbelt, Md. Each gamma-ray burst is a short-lived event, lasting only a few milliseconds to a few minutes, never to appear again. They occur several times daily somewhere in the universe, and Swift should detect several weekly. Swift, a mission with international participation, was designed to solve the 35-year-old mystery of the origin of gamma-ray bursts. Scientists believe the bursts are related to the formation of black holes throughout the universe - the birth cries of black holes. ["NASA Successfully Launches Swift Satellite," **KSC News Release #94-04**, November 20, 2004.]

◆ Sending people to the moon and Mars is no longer just President Bush's vision. It's officially the United States' new mission in space. Congress voted Saturday to give NASA all of the $16.2 billion it sought for 2005, money not only to return the space shuttles to flight but also to start designing a replacement spaceship and planning moon missions. "This is a great day for NASA, and a great day for the Space Coast," said U.S. Rep. David Weldon, R-Melbourne, who sits on the powerful House Appropriations Committee that controls the federal budget. The NASA budget got lumped in with everything else in a two-foot thick budget document that left some members of Congress complaining they did not have enough time to read it before they had to vote on it. Still, the House voted 344-51 to approve it Saturday afternoon. Senate approval was expected hours later. The 6 percent increase for NASA was remarkable in many ways. First, tight budgets forced the president and Congress to all but freeze spending for projects unrelated to fighting terrorism or national defense. Bush said nothing about NASA during the presidential campaign, although his top budget aides threatened to veto any spending bill that did not include full funding for his space plan. Congress didn't seem interested, and the House even passed a budget that slashed almost a billion dollars from the NASA request. The Senate was more generous, but the budget did not pass before Congress went on break for the November elections. That left NASA's fate to behind-the-scenes negotiations. Luckily for the agency, it has friends in high places. Sen. Bill Nelson, who flew on the shuttle, is an ardent NASA supporter with influence among Democrats. Weldon's seat on the appropriations committee helps. ["Congress bankrolls NASA," **Florida Today**, November 21, 2004, p 1A & 4A.]

**November 22:** The first segment of one of the solid rocket boosters that will put the next shuttle into orbit rolled into Kennedy Space Center's Vehicle Assembly Building on Monday. "We're finally seeing some hardware move out of the design phase into the manufacturing phase," said NASA's Tom Williams, deputy project manager for the solid rocket boosters and a Marshall Space Flight Center employee who has been based at KSC since July. "This is the initiation of return-to-flight stacking activities, and it's huge," he said. "We're seeing the fruits of our labor." Shuttles are expected to fly again in May at the earliest. Among the steps that lead up to every flight is the stacking of the two solid rocket boosters that flank the external fuel tank. That mighty combination puts orbiters in space. The solid rocket boosters were redesigned after they were blamed for the 1986 Challenger accident. An important change is in store for the first shuttle flight since last year's Columbia accident. The Columbia Accident Investigation Board was concerned that explosive bolts that release the boosters at 150,000 feet could inadvertently damage the orbiter. Redesigned bolt-catchers near the top of the external tank will grab the top

half of the bolts. Each half weighs 31 pounds, and they fly apart at about 65 mph. The other half of the bolts is caught by the solid rocket booster thrust post. The first thing engineers wanted to do was eliminate a weld in the dome-shaped bolt-catcher. "That is the weak point in the design," said David Martin, NASA's manager for the solid rocket booster project. Now, the metal is twice as thick, and it's one piece of aluminum. It has an improved energy absorber inside that cushions the blow of the explosive bolt. There's also new heat protection for the bolt catcher: a cover made of machined cork. Before, insulation was sprayed on at the external tank manufacturing facility near New Orleans. "That was a long way around to get hardware to KSC," Martin said. Simplifying the process takes away risk, he suggested. The new booster segment -- the right aft -- was to be placed on the mobile launcher platform Monday night. Workers will finish stacking both boosters by the time the redesigned external tank arrives, perhaps in early January. They will take more time than usual to do the job, said Tom Schaefer, launch ground operations planning chief for shuttle contractor United Space Alliance. ["Boosters ready for assembly," **Florida Today**, November 23, 2004, p 1B & 5B.]

**November 23:** Veteran NASA astronaut John Phillips and seasoned Russian Cosmonaut Sergei Krikalev are the next crew of the International Space Station. Their six-month mission is set for launch in April 2005. Phillips and Krikalev are the eleventh crew for the orbiting research complex. Krikalev will serve as Station Commander, and Phillips is Flight Engineer and NASA International Space Station Science Officer. Designated Expedition 11, they will be on board the Station when the Space Shuttle makes its first Return to Flight mission. The Shuttle is scheduled to dock with the Space Station in May 2005. ["Next International Space Station Crew Named," **NASA News Release #04-383**, November 23, 2004.]

◆ NASA is preparing to eliminate 100 contractor processing jobs at Kennedy Space Center starting Dec. 1 under a 2005 operating plan approved by the shuttle program's manager last week. The decision, outlined in internal NASA budget documents obtained by the *Orlando Sentinel* and interviews with agency managers, is expected to save the program $8.6 million next year. An unspecified number of jobs also are likely to be eliminated in shuttle departments at the Johnson Space Center in Houston. Most of the job cuts will be done through attrition, retirement and leaving vacant positions unfilled. Few, if any, current employees are expected to be laid off. The probability of lost jobs comes at a time when the shuttle program's workload is increasing as NASA prepared to return the fleet's three remaining orbiters to flight after the 2003 Columbia accident. Some managers have privately questioned whether cost cutting and pressure to resume launches are jeopardizing crucial reforms recommended in the disaster's wake. The job cuts are part of an ongoing effort by the shuttle program to shave about $760 million from next year's spending. A June review by the program manager's office identified about $5 billion in shuttle costs for 2005. The program is budgeted at $4.32 billion for the fiscal year that began Oct 1. To help close the gap, program manager Bill Parsons challenged each shuttle department to reduce its budget by 5 percent. ["NASA will phase out 100 shuttle jobs at KSC," **Orlando Sentinel**, November 23, 2004, p A1 & A17.]

◆ The $16.2 billion budget Congress approved for NASA next year is a "watershed" moment for the agency, its administrator said Tuesday. The 5 percent, one-year increase was a vote of confidence in the agency and a powerful endorsement of President Bush's plan to send astronauts back to the moon and on to Mars, Administrator Sean O'Keefe said. "We can't ask for any stronger measure of support," he said. The budget sets NASA on a new trajectory that grew from the 2003 Columbia tragedy, which O'Keefe described as "one of the lowest, darkest periods in the agency's history." It was the landmark report from the Columbia Accident Investigation Board that prompted the Bush administration to adopt a new national space strategy that emphasizes human exploration beyond Earth orbit, including the moon and Mars. In a morning appearance beamed to all NASA employees on the agency's in-house TV network and again in an hour-long meeting with reporters, O'Keefe clearly savored the moment. Days ago, it appeared that funding for Bush's space agenda would not make it into the$388 billion spending bill Congress approved over the weekend. The $822 million increase makes NASA one of the few non-defense and non-Homeland Security agencies to receive a substantial budget bump. [“O’Keefe relishes budget victory for moon-Mars plan,” **Florida Today**, November 24, 2004, p 7A.]

**November 24:** Major hardware for the Space Shuttle's Return to Flight mission, STS-114, is coming together at NASA's Kennedy Space Center, Fla. An important milestone was achieved Monday, when technicians began stacking Space Shuttle Discovery's right Solid Rocket Booster in the Vehicle Assembly Building. This signifies the beginning of assembly for the flight, which is planned for launch next spring. Stacking the Shuttle's Boosters on the Mobile Launch Platform is a significant step to prepare Discovery for launch. The Mobile Launch Platform, a two-story tall, nine-million-pound steel structure, is the launch base for the Space Shuttle. Once the Shuttle vehicle is assembled, the platform is transported to the launch pad. The Shuttle vehicle consists of the obiter, Solid Rocket Boosters and the External Tank. "In our Return to Flight planning, we have systematically emphasized that our preparations for launch would be milestone driven," said Michael Kostelnik, deputy associate administrator, International Space Station and Space Shuttle Programs. "Stacking of the Shuttle's Boosters is clearly one of those key milestones and indicative of the progress the program continues to make." Assembly will continue this week until both the right and left Solid Rocket Boosters are stacked and ready to be connected with the External Tank and the Orbiter. The next step will be to join the External Tank to the Boosters. [“NASA Reaches Space Shuttle Solid Rocket Booster Milestone,” **NASA News Release #04-384**, November 24, 2004.]

**November 27:** NASA's plan to launch a remote-controlled, two-armed android to repair the Hubble Space Telescope may cost almost as much as taxpayers paid to build the vaunted observatory in the first place. The estimated price tag of a robotic rescue mission -- between $1 billion and $2 billion -- is raising eyebrows and questions about whether Hubble is worth the investment amid tight budgets and periodic reports of technical woes that could cripple the spacecraft before the robot gets there. Nicknamed "Dextre," the robot would blast off from Cape Canaveral -- hopefully by 2007 -- and install fresh batteries and gyroscopes as well as a pair of $100 million science instruments. NASA needs to decide by next year whether the robot, controlled from the ground by an

astronaut as if he were playing a video game, will work. If not, NASA will have to launch a propulsion module that would hook itself to Hubble and drive it to a watery end in a remote stretch of the Pacific Ocean. NASA does not pretend the technology is foolproof. If it works, it provides the agency another inspirational victory -- perhaps as amazing as the astronauts' first flight to repair Hubble's flawed mirror in the early 1990s, opening the way to an endless stream of science breakthroughs. It could mean Hubble gets to fly through at least 2013, another decade or so of discovery. ["Expense may sink Hubble mission," **Florida Today**, November 28, 2004, p 1A & 12A.]

◆ Because of a plutonium shortage, ambitions might have to be curtailed for NASA's New Horizons mission to Pluto. With a planned January 2006 launch from Cape Canaveral, the earliest New Horizons would arrive at Pluto is 2015. ["Plutonium shortage limits mission," **Florida Today**, November 27, 2004, p 12A.]

**November 29:** NASA Administrator Sean O'Keefe envisions no layoffs at Kennedy Space Center in Florida, although he expects the space shuttle work force to shrink naturally by attrition after the orbiter returns to flight. "I know of no specific plans ... to target a drawdown anywhere," he says, responding to recent press reports that job cuts might be imminent. However, current work force levels are not expected to last. "This is the first time in anybody's memory ... that we've done, really, the equivalent of three orbiter major modification programs simultaneously," he says. "That's very personnel-intensive." However, "once you've completed those efforts, [it's] not necessarily a sustaining effort over time." **Aviation Week BIS**. (2004). O'Keefe envisions no layoffs of shuttle workers at KSC [Online]. Available E-mail: intelligence@aviationnow.com [2004, November 29].]

**During November:** NASA/KSC is hereby soliciting information about potential sources for Safety and Mission Assurance Support at Kennedy Space Center. The effort will consist of non-personal technical services support the Safety and Mission Assurance Directorate at Kennedy Space Center. The objective is to provide support for NASA/KSC programs and institutions, specifically related to following NASA applications; Shuttle Processing, International Space Station Processing, Payload Processing, Expendable Launch Vehicles (Heritage and Evolved), Design, engineering and technology processes, Laboratories and Facilities. ["NASA solicits potential sources," **Brevard Technical Journal**, November 2004, p 9.]

◆ NASA's Spaceflight Leadership Council has confirmed a May 2005 return-to-flight date for the grounded space shuttle fleet. The panel concluded that the work remaining to get the shuttle Discovery off the ground for the first of two flight tests of post-Columbia safety upgrades can be completed by that time. An earlier launch window opening in March 2005 was dropped after Kennedy Space Center was repeatedly battered by hurricanes, slowing work and exhausting KSC personnel. The new window remains open from May 12 until June 3. ["It's Official," **Aviation Week & Space Technology**, November 8, 2004, p 21.]

Clouds of exhaust form around a Boeing Delta II expendable launch vehicle as it blasts NASA's Swift spacecraft on its mission from Complex 17-A, Cape Canaveral Air Force Station, at 12:16:00.611 p.m. EST Nov. 20 . Swift is a first-of-its-kind multi-wavelength observatory dedicated to the study of gamma-ray burst science. Its three instruments will work together to observe GRBs and afterglows in the gamma ray, X-ray, ultraviolet and optical wavebands. [Photo courtesy of Scott Andrews]

## DECEMBER

**December 1:** NASA staged a dramatic rescue at Kennedy Space Center Wednesday, evacuating seven astronauts and seven workers from a shuttle launch tower before flying four to area hospitals in helicopters. Rescuers riding in armored personnel carriers raced to Launch Pad 39A, rushed up stairs to the 195-foot level of the tower and found four workers and two astronauts who appeared to be injured or incapacitated. Amid a deluge of water from the pad's fire control system, the squad cleared the 36-story gantry of all personnel in a mere 14 minutes. It was only a training exercise. But fires, fuel leaks and even explosions always are a possibility during volatile shuttle launch operations. NASA officials said the disaster drill was crucial to keeping teams sharp during the ongoing effort to return shuttles to flight in the wake of the February 2003 Columbia accident. NASA launch controllers talked with the pad workers and the would-be astronauts over radio communications loops just as if there were a real emergency. ["NASA drills for astronaut rescue," **Florida Today**, December 2, 2004, p 1B & 5B.]

◆ Expendable Launch Vehicles Status Report 120104: Mission: Deep Impact, Launch vehicle: Delta II, Launch pad: Pad 17-B Cape Canaveral Air Force Station, Launch date: Jan. 8, 2005, Launch window: 1:39:50 and 2:19:12 p.m. EST instantaneous. The NASA Launch Services Program conducted the Launch Vehicle Readiness Review on Nov. 30. At the conclusion, Jan. 8 was firmly established as the launch date for Deep Impact and this date has been set on the Eastern Range. In processing activities at the Astrotech Space Operations facility located near Kennedy Space Center, the Deep Impact solar array panels will undergo an illumination test as a final check of performance on Dec. 8. The high-gain antenna used for spacecraft communications will be installed on Dec. 9 and the flight battery will be installed on Dec. 10. Deep Impact will then be ready to begin preparations for fueling, which is scheduled to start on Dec. 16 and be completed on Dec. 19. Mating to the payload attach fitting and upper stage booster occurs Dec. 22 - 23. The spacecraft is currently scheduled to be transported to Pad 17-B on Dec. 28 and mated to the Boeing Delta II rocket. The Flight Program Verification, the major integrated test with the Delta II, occurs on Dec. 30. The Delta II payload fairing will be installed around the Deep Impact spacecraft on Jan. 4. NASA's Deep Impact spacecraft arrived in Florida on Oct. 23 to begin final preparations for launch. The spacecraft was shipped from Ball Aerospace & Technologies in Boulder, Colo., to Astrotech. The stacking of the Boeing Delta II launch vehicle on Pad 17-B began on Nov. 22 with the hoisting of the first stage into the launcher. Hoisting of the nine strap-on solid rocket boosters, in sets of three, began with the first set on Nov. 23 and the second on Nov 29. The last set is being installed on the vehicle today. The second stage will be hoisted into position atop the first stage on Friday, Dec. 3. The payload fairing will be hoisted and stowed in the mobile service tower on Dec. 6. KSC News Center (2004). **Expendable Launch Vehicles Status Report** [Online]. Available E-mail: ksc@newsletters.nasa.gov [2004, December 1].]

**December 2:** At approximately 1 p.m. today, a small fire was reported and quickly extinguished inside the Vehicle Assembly Building at Launch Complex 39 here. No injuries are reported and at this time there are no reports of damage to space flight

hardware. KSC fire and rescue personnel quickly responded to the scene. As a precautionary measure, employees were evacuated from the building. The cause of the incident is under investigation and more information will be released as it becomes available. ["Small fire extinguished inside Vehicle Assembly Building," **KSC News Release #96-04**, December 2, 2004.]

**December 3:** Space Shuttle Processing Status Report S04-040: **Discovery** (OV-103); Critical path work continues progressing well in the Orbiter Processing Facility (OPF) for Discovery's Return to Flight mission, designated STS-114, to the International Space Station. The three Space Shuttle Main Engines will be moved from the Main Engine Shop into the OPF for installation on Discovery early next week. Installation of the new wing leading edge sensors and cable continues on both the right and left wings. The sensors and relay boxes are being added for Return to Flight on the back side of the Reinforced Carbon-Carbon panels, and should detect any temperature increase or impact data during the launch. **Atlantis** (OV-104); Final power-down work on the wiring for the Return to Flight modifications is almost complete in the Orbiter Processing Facility, in preparation for the scheduled power up of Atlantis early next week. The payload bay doors of Atlantis were closed last week in support of scheduled maintenance work to be performed in the bay. Following the successful completion of the maintenance, the doors were reopened and processing work began. Fuel cells No. 1 and 3 were installed for flight, with No. 2 scheduled to be installed today. Fuel cells use oxygen and hydrogen to provide electrical power during a mission. All four Rudder Speed Brake (RSB) actuators were inspected and installed on Atlantis. Technicians are currently beginning to install the RSB panels and seals. **Endeavour** (OV-105); Space Shuttle Endeavour is in its Orbiter Major Modification period, which began in December 2003. Electrical modifications continue in the crew module. Three-String Global Positioning System wire routing in the avionics bay and flight deck continues. While the Reinforced Carbon-Carbon panels are removed from the vehicle for inspections, technicians are preparing the wing leading edge for their reinstallation. Following the removal of miniscule corrosion, the right-hand wing leading edge is being prepared for painting. The External Tank doors are being installed in preparation for Endeavour's roll-over for a temporary stay in the Vehicle Assembly Building. Endeavour will be moved so maintenance can be performed in the bay. Owner-press-release. (2004). **Space Shuttle Processing Status Report** [Online]. Available E-mail: owner-press-release@spinoza.public.hq.nasa.gov [2004, December 3].]

**December 5:** Space shuttle launches are 100 times more dangerous to people on the ground than any other U.S. missiles or rockets, and NASA fails to meet a national standard for protecting workers and spectators from falling wreckage in a disaster. The U.S. Air Force — responsible for public safety at and around federal space launch complexes — says NASA for years has taken unacceptable risks by allowing too many people to flock to Kennedy Space Center viewing sites for up-close looks at shuttle launches. In the wake of the 2003 Columbia accident, which showered 40 tons of shuttle parts on Texas and Louisiana, NASA says it will limit the number of VIPs, tourists, journalists and even space workers who get prime seating for future shuttle launches. The change, which could bar some workers from KSC until after liftoff, would reduce the

number of people exposed to deadly debris if a shuttle blows up or veers so far off course that Air Force safety officers must deliberately destroy it. NASA officials say they intend to make shuttles comply with the same safety rule that all other U.S. rockets, missiles and spaceships must meet. If the agency fails, some suggest shuttles should remain grounded. "If I was the range commander, I would just say, 'You guys don't get to fly,' " said Larry Gooch, former commander of the Air Force's 45th Space Wing. The danger primarily applies to workers and invited NASA guests on KSC property. They include members of Congress, foreign heads of state, scientists, movie stars and friends and relatives of shuttle astronauts, among others. The hundreds of thousands of people who crowd Brevard County roads, causeways and beaches outside KSC gates are not at undue risk. That includes people in the nearby communities of Titusville, Merritt Island, Cape Canaveral and Cocoa Beach. Still, the numbers of those at risk are significant. NASA has hosted up to 60,000 people for launches at KSC, some at viewing sites just outside a blast zone that stretches about 3.5 miles from twin shuttle launch pads. NASA and the Air Force clear everyone but essential launch workers from the blast zone. Yet, even outside that zone, people on KSC property still could be exposed to fast-flying wreckage, toxic fumes and secondary explosions from chunks of solid rocket fuel smashing into the ground, government documents show. The danger led the Air Force and NASA to agree after the 1986 Challenger explosion to restrict the number of people at KSC on launch days to 15,000. That included 10,000 workers and 1,800 journalists at Launch Complex 39. The rest were at viewing sites almost 7 miles away. NASA is looking at similar limits when shuttles return to flight next year. [“Danger to limit KSC spectators,” **Florida Today**, December 5, 2004, p 1A & 6A.]

**December 6:** Six months before NASA plans to return the shuttle to space, officials think they've essentially solved the problem that doomed Columbia in 2003 -- debris coming off its fuel tank -- but still can't fix an orbiter damaged on launch. And the space agency said it may not have a guaranteed way to make emergency in-flight repairs to damaged tiles that shield the shuttle's belly from heat or the carbon panels that cloak its wings before the planned launch of Discovery in May or June. That mission will include a test of repair techniques still being developed. Shuttle program manager William Parsons said a redesign of the shuttle's massive external fuel tank should ensure that it won't shed debris large enough to seriously damage the shuttle during launch. "I'm feeling very confident that we have our arms around this," Parsons said at a news briefing at NASA headquarters. Wayne Hale, the deputy shuttle program manager, said the new tank should keep any debris that breaks away on launch to smaller than 0.03 pounds, the threshold for significant damage. The piece of foam that punched a hole in Columbia's wing and doomed its return weighed about 1.67 pounds. Reducing the size of the debris has been the National Aeronautics and Space Administration's top priority for making the shuttle safer. "Does that mean we won't see a chip in a tile here or there? I would say we'd be optimistic if we said that," Hale said. "But we're clearly moving toward an area where we expect to see much less damage in the tile, and no critical damage that would require a repair. That's our goal, and it's beginning to look very positive that we can reach that level of control." [“NASA confident of debris solution,” **Orlando Sentinel**, December 7, 2004, p A1 & A13.]

NASA will launch its first post-Columbia shuttle mission next May or June even if the agency cannot provide astronauts with a viable way to repair the ship's heat shield in orbit, officials said Monday. Nearly two years after punctured thermal armor doomed Columbia's crew, NASA still is struggling to develop a way to repair fragile silica tiles and wing panels made of reinforced carbon-carbon, or RCC. And it is increasingly unlikely NASA will be able to put in place certified repair techniques before Discovery takes off on a demonstration mission to the International Space Station. "I would be very, very surprised," said NASA shuttle program manager William Parsons, adding repair techniques likely will be "years in the making." NASA instead is focusing on making certain foam insulation no longer can break free from a shuttle's external tank and damage tiles or wing panels, which protect astronauts from temperatures that can exceed 3,000 degrees Fahrenheit during atmospheric re-entry. The agency also intends to have a second shuttle ready to launch on a rescue mission should shuttle damage strand Discovery's crew on the international outpost. In addition, repair techniques still in development would be available for use, if need be. [“Shuttle will fly without fix,” **Florida Today**, December 7, 2004, p 1A.]

**December 7:** Space pioneer John W. Young, a man who flew twice to the moon, walked on its surface and commanded the first Space Shuttle mission, is retiring. Young's achievements during his 42-year career at NASA are unmatched. He was the first human to fly in space six times and launch seven times, six times from Earth and once from the moon. He is the only astronaut to pilot four different types of spacecraft, flying in the Gemini, Apollo and Space Shuttle programs. Young is the longest serving astronaut in history. His retirement from NASA is effective Dec. 31. "John's tenacity and dedication are matched only by his humility," said NASA Administrator Sean O'Keefe. "He's never sought fame and often goes out of his way to avoid the limelight. However, when you need a job done and you want it done right, John's the person to go to. He's a true American treasure, and his exemplary legacy will inspire generations of new explorers for years to come." Young, a native of Orlando, Fla., retired U.S. Navy Captain and test pilot, joined NASA in 1962. His first mission was as pilot of the maiden manned flight of the Gemini Program, Gemini 3 in 1965. With Young and Commander Virgil Grissom on board, Gemini 3 was the first American space flight with more than one person. He next flew in 1966, commanding Gemini 10. Along with Mike Collins, he performed the first dual rendezvous maneuvers during a single mission. In 1969, two months before man's first landing on the moon, Young orbited Earth's satellite. Young orbited the moon in the Apollo Command Module, while his fellow crewmembers, Thomas Stafford and Eugene Cernan, descended to within 50,000 feet of its surface in the Lunar Module. Apollo 10 was a full rehearsal for the first lunar landing. Young returned to the moon in 1972 as commander of Apollo 16. He piloted the Lunar Module to a landing on the surface, along with Charlie Duke. Young and Duke drove more than 16 miles across the lunar surface in the Lunar Rover Vehicle, collecting more than 200 pounds of samples. It was the most extensive lunar exploration mission to date. "You run out of superlatives when you talk about Captain John Young as a test pilot, astronaut and engineer," said former Space Shuttle astronaut and Associate Administrator for Space Operations William Readdy. "John has an incredible engineering mind, and he sets the gold standard when it comes to asking the really tough questions. When he talks, everybody listens. It's impossible to

overstate the positive impact John has had on human space flight operations and safety. Beyond that, he has set a standard for excellence for all those who have served with him and those who will follow. He's truly an inspiration," Readdy said. Young was at the helm of Columbia for the first Space Shuttle mission, STS-1 in 1981, with Robert Crippen as pilot. It was the world's first flight of a reusable, winged spacecraft; the first landing of a spacecraft on a runway; and the largest, heaviest craft to launch and land to date. It was the first time a manned spacecraft was launched without previous unmanned test flights. Young guided the 96-ton Columbia to a perfect touchdown at Edwards Air Force Base, Calif., after a two-day mission. Young's sixth and final space mission was again in command of Columbia on the ninth Shuttle flight, STS-9 in 1983. It was the first launch of the Spacelab laboratory in the Shuttle's cargo bay. It was the longest Shuttle flight to date, with the first international crew working around the clock for 10 days to conduct more than 70 experiments. When he was not in flight, Young's extensive contributions continued on the ground. He served as chief of NASA's Astronaut Office for 13 years. He also served eight years as an assistant and associate director of NASA's Johnson Space Center, providing advice and counsel on technical, operational and safety matters. "John Young has no equal in his service to our country and to humanity's quest for space," said the Director of NASA's Johnson Space Center, Jefferson D. Howell Jr. "He is the astronaut's astronaut, a hero among heroes who fly in space. His achievements have taken space from an unknown environment to the expanding frontier we explore today. His steady hand and unflinching eyes have served our cause of space exploration well, expanding our horizons with unshakable dedication and calm courage. He will be missed," Howell said. . [“NASA space pioneer John Young, Astronaut without equal retires,” **NASA News Release #04-388**, December 7, 2004.]

**December 8:** A shuttle mission has a better chance of repairing the Hubble Space Telescope than a proposed robotic attempt and would not greatly increase the risk to astronauts, an independent panel said Wednesday. The likelihood of a successful robotic mission by the end of 2007, when the Hubble's gyroscopes are expected to fail, is "remote," the National Academy of Sciences panel said. Waiting until a robot is ready could result in a 29-month interruption of observations by the telescope, the report says, while adding the new instruments now waiting to be installed would make the groundbreaking observatory better than ever. The committee also strongly challenged the chief rationale for NASA's decision earlier this year to cancel a planned shuttle mission: that the risk to astronauts would be too great. The group said such a trip would be only marginally more dangerous than a flight to the international space station. "Given the intrinsic value of a serviced Hubble, and the high likelihood of success for a shuttle servicing mission," the report reads, "the committee judges that such a mission is worth the risk." The committee, an arm of the National Research Council's Space Studies Board, studied the problem at the request of NASA, under pressure from Congress. The report is likely to refocus the debate on how to save the Hubble, which has raged since NASA chief Sean O'Keefe in January scrapped plans for a shuttle servicing mission. Then and since, he has said the potential risk to astronauts -- in light of the dangers exposed by the February 2003 Columbia disaster -- were too great. The telescope needs three gyroscopes to keep it stable and help point it. Currently, four are working, including a spare, but it's projected that only two will be operational by the end of 2006. Without

servicing, the Hubble will be left with only one gyroscope by mid- to late 2007 -- if not sooner -- rendering it useless. The Hubble also will need new batteries, with one of the three operating units expected to fail between late 2007 and 2009, and the second between 2010 and 2012. Once the batteries fail, the Hubble will be beyond repair. [“Let shuttle fix Hubble, expert panel tells NASA,” **Orlando Sentinel**, December 9, 2004, p A20.]

**December 9:** Expendable Launch Vehicles Status Report 120904: Mission: Deep Impact, Launch vehicle: Delta II, Launch pad: Pad 17-B Cape Canaveral Air Force Station, Launch date: Jan. 8, 2005, Launch window: 1:39:50 and 2:19:12 p.m. EST instantaneous. In processing activities at the Astrotech Space Operations facility located near Kennedy Space Center, the high-gain antenna used for Deep Impact communications with Earth is being installed today. The solar array panels successfully completed an illumination test on Wednesday as a final check of their performance. On Friday, Dec. 10, the flight battery will be installed. The solar arrays stowed for flight on Dec. 13. Deep Impact will then be ready to begin preparations for fueling, which is scheduled to start on Dec. 16 and be completed on Dec. 19. Mating to the payload attach fitting and upper stage booster occurs Dec. 22 - 23. The spacecraft is currently scheduled to be transported to Pad 17-B on Dec. 28 and mated to the Boeing Delta II rocket. The Flight Program Verification, the major integrated test with the Delta II, occurs on Dec. 30. The Delta II payload fairing will be installed around the Deep Impact spacecraft on Jan. 4. NASA's Deep Impact spacecraft arrived in Florida on Oct. 23 to begin final preparations for launch. The spacecraft was shipped from Ball Aerospace & Technologies in Boulder, Colo., to Astrotech in Titusville. Meanwhile, the stacking of the Boeing Delta II launch vehicle on Pad 17-B began on Nov. 22 with the hoisting of the first stage into the launcher. Hoisting of the nine strap-on solid rocket boosters, in sets of three, began with the first set on Nov. 23 and the second on Nov 29. The last set was installed on the vehicle on Dec. 1. The second stage was hoisted into position atop the first stage on Dec. 3. The payload fairing was hoisted and stowed in the mobile service tower on Dec. 6. The first power-on test occurred Dec. 7. The next event is the vehicle guidance and control system check, which occurs on Dec. 13. The loading of liquid oxygen aboard the first stage for a leak check and a countdown launch team certification exercise is scheduled to occur on Dec. 14. The Flight Simulation, a plus count that exercises all of the systems on the vehicle as they will occur during powered flight, is scheduled for Dec. 15. KSC News Center (2004). **Expendable Launch Vehicles Status Report** [Online]. Available E-mail: ksc@newsletters.nasa.gov [2004, December 9].]

**December 10:** Space Shuttle Processing Status Report S04-041: **Discovery** (OV-103); In the Orbiter Processing Facility (OPF), orbiter powered- system testing continues for Discovery's Return to Flight mission, designated STS-114, to the International Space Station. Auxiliary Power Unit water servicing and leak check sample results are complete. The three Space Shuttle Main Engines were moved from the Main Engine Shop and installed on Discovery for flight. Engines were installed in positions No. 1 and 3 on Wednesday, with No. 2 completed on Thursday.Engine installation was scheduled to begin on Monday, but was delayed due to an issue with the vehicle used to install the

engines. During the installation of Space Shuttle Main Engine 2057 into engine position No. 1 on Discovery, the engine shifted to the right, allowing the low-pressure fuel duct on the engine to touch a Thermal Protection System tile on the right Orbiter Maneuvering System (OMS) pod. There was no damage to the engine or the OMS pod and the tile will be repaired in place. There is no impact to the milestone for Return to Flight. **Atlantis** (OV-104); Technicians continue to process Atlantis in the Orbiter Processing Facility for its mission to the International Space Station. The orbiter continues to remain in a power-down period to complete the final wiring for the Return to Flight modifications, including the new Orbiter Boom Sensor System, wing leading edge sensors and the External Tank separation camera. Following the installation of all four Rudder Speed Brake actuators last week, technicians installed the panels and right-hand shafts, with the left-hand shafts being installed today. **Endeavour** (OV-105); Space Shuttle Endeavour is in its Orbiter Major Modification period, which began in December 2003. Electrical modifications continue in the crew module. Three-String Global Positioning System wire routing in the avionics bay and flight deck continues. Following the removal of miniscule corrosion, the right-hand wing leading edge was painted and the left wing is scheduled for painting this weekend. The External Tank door installation is complete in preparation for rollover to the Vehicle Assembly Building next week, clearing the bay for a scheduled maintenance period. Owner-press-release. (2004). **Space Shuttle Processing Status Report** [Online]. Available E-mail: owner-press-release@spinoza.public.hq.nasa.gov [2004, December 14].]

**December 11:** NASA Administrator Sean O'Keefe will resign this week, and the retired director of the Pentagon's Missile Defense Agency tops a list of five men that President Bush is considering to take over the space agency, FLORIDA TODAY has learned. Louisiana State University is aggressively recruiting O'Keefe to become the Baton Rouge, La., school's next chancellor. O'Keefe said he is interested in the job, and school officials told FLORIDA TODAY a deal could be made this week. Meanwhile, a White House team is weighing five candidates and plans to announce O'Keefe's departure and pick a new NASA administrator by Thursday, according to a source familiar with the selection process. Leading the president's list: Air Force Lt. Gen. Ronald Kadish, who retired in September after three years as the director of the United States' effort to develop a system to shield the country and its troops from a missile attack. The other four men under consideration are former Congressman Robert Walker and former shuttle astronauts Ron Sega, Charles Bolden and Robert Crippen. The change of command at NASA comes as the agency struggles to return its shuttles to space after a two-year grounding prompted by the loss of Columbia and its seven astronauts, and just as it starts on a new mission to send human explorers to the moon and Mars. O'Keefe, a native of New Orleans, acknowledged the university's overtures late Friday night during a brief telephone interview with FLORIDA TODAY. He declined to discuss when or why he might leave the space agency. O'Keefe is expected to be in Louisiana later this week to go through a state-mandated formal interview process and meet with university leaders, faculty and students. O'Keefe became Secretary of the Navy in the wake of the Tailhook sexual harassment scandal and led a cultural reformation there under the first President Bush. After a stint at Syracuse University, he returned to Washington to work at OMB. Almost a year after taking office, the current President Bush asked O'Keefe to take over a

troubled NASA. The agency had overspent on the International Space Station by more than $5 billion, a surprise revelation that angered Congress and forced Bush to place the agency on a sort of financial probation and downsize the space station. Just as O'Keefe was getting the station project back on track and winning financial credibility for the space agency, Columbia disintegrated on its way back to Earth from a 16-day science mission. The loss of seven astronauts and the $2 billion spaceship prompted intense scrutiny and investigators ultimately placed part of the blame on pressure from top managers to finish the station on time and under budget. Two years later, shuttle managers and engineers still are struggling to fulfill that promise. The first post-Columbia mission is tentatively planned for May or June. It now appears that return to flight will happen under a new administrator's watch. Among the other candidates, Sega is perhaps next closest to the White House staffers advising the president. The former shuttle astronaut is serving as a director of research and engineering for Pentagon and was involved in drafting Bush's moon-Mars policy. Crippen, retired and living in Florida, piloted Columbia on the first shuttle mission in 1981 and once was director of the Kennedy Space Center. Bolden also recently served on a National Academy of Sciences panel that recommended reversing O'Keefe's January decision to cancel a shuttle repair mission to the Hubble Space Telescope. Without O'Keefe's opposition, the shuttle mission to Hubble would be easier to reinstate. Walker retired in 1997 after two decades in the House of Representatives, where he had become one of Congress' leading experts on aerospace and space exploration. Web posted. (2004). [O'Keefe to quit this week [Online]. Available WWW: http://www.floridatoday.com/ [2004, December 11].]

**December 12:** The maiden flight of Boeing's new Delta 4 heavy-lift rocket is expected to be delayed until the week of Dec. 19. Sunday, for the second day in a row, the booster's planned liftoff from Cape Canaveral Air Force Station was scrubbed by technical problems, this time because of a malfunctioning environmental-control system at the launch pad. The Air Force wants to make sure the problem is completely understood and fixed before proceeding with the mission. As a result, the Delta 4 flight likely will slip behind this week's planned launch of an Atlas 5 rocket carrying a television satellite. The Atlas 5 has booked the Air Force's Eastern Range, which provides communications, tracking and safety support for all Cape Canaveral launches, for tries Friday and Saturday. The next opportunity for the Delta 4 will depend on when the Atlas 5 lifts off. The first flight of the so-called Delta 4 Heavy will attempt to place a dummy payload in orbit to demonstrate the booster is ready to lift some of the heaviest satellites to space for the Department of Defense. Web posted. (2004). [Maiden flight scrubbed again for Delta 4 [Online]. Available WWW: http://www.orlandosentinel.com/ [2004, December 13].]

◆ Measures to sharply curtail and document potentially fatal launch debris similar to that which doomed Columbia and her crew should allow the space shuttle to resume flights as early as May. But it could take up to two years before a fully certified thermal protection system and wing leading edge in-orbit repair capability is ready, shuttle managers say. The overall positive safety tradeoffs, however, are enabling return-to-flight preparations to accelerate this month toward making a serious run at launching the shuttle back to space by spring. "We are getting far along the path to return-to-flight," says

astronaut USAF Col. (ret.) John H. Casper, manager of Shuttle Management, Integration and Planning at the Johnson Space Center and a veteran of four shuttle missions. Major U.S. and international space operations increasingly depend on the resumption of shuttle operations as rapidly as can be done safely. But the program will not succumb to schedule pressure. "The date will be when the date is," says Wayne Hale, deputy space shuttle program manager at Johnson. The importance of renewed shuttle resupply is illustrated by the situation with the International Space Station (ISS). The planned Dec. 23 launch from the Baikonur Cosmodrome of the Russian Progress 16 unmanned resupply spacecraft and its docking with the ISS Dec. 25 will be critical to restocking food and water supplies on the outpost, says William Gerstenmaier, ISS program manager. If the new Progress fails to reach the ISS or is significantly delayed, the station's two-man U.S./Russian crew would be so low on food they would be forced to land by late December or early January, leaving the ISS temporarily unmanned. The station is designed to fly unmanned if necessary, but this would increase the overall risk to the 200-ton facility. In addition to basic resupply, return-to-flight is also essential for the resumption of launch to the ISS of about 400,000 lb. of remaining U.S., Japanese, Canadian and European hardware in checkout here. Hundreds of aerospace personnel at 11 contractors, six NASA centers and U.S. Air Force laboratories are working on in-orbit repair technology for shuttle reinforced carbon-carbon (RCC) leading-edge material. But that development is proving to be a major technological challenge, as is a repair capability for the silica thermal protection system (TPS) black belly tiles. Progress in broader safety improvements means the lag in developing an in-orbit repair capability is now less likely to affect return-to-flight (RTF) timing, but it reinforces the need for an International Space Station (ISS) safe haven capability, NASA managers believe. The orbiter Discovery is currently planned for liftoff on the STS-114 mission to the ISS between May 14 and June 3 carrying the best repair technology available for use in connection with ISS support. A fully certified capability for RCC leading edge panels and TPS tiles, however, will not be ready until after at least another 1-2 years of development, says William Parsons, shuttle program manager at Johnson. "In a state of emergency we would have a technique we would be ready to perform," he says. "But right [now] we are still working through technical details" on how to do good tile and RCC repair. Web posted. (2004). [Shuttle Pace Accelerates Toward Return to Flight [Online]. Available WWW: http://www.aviationnow.com/ [2004, December 12].]

**December 13:** The space program Sean O'Keefe is leaving behind – probably before the second anniversary of the shuttle accident that will define his tenure – is far different from the agency he stepped into three years ago. But the next person to sit in the top spot at NASA probably won't preside over as much change, aside from a possible reprieve for the Hubble Space Telescope. O'Keefe formally resigned Monday in a handwritten letter to President Bush and is applying for the job of chancellor at Louisiana State University. In his five-page letter, O'Keefe thanked Bush for the opportunity but said he has decided to leave public service in order to pay for college for his three children. O'Keefe, 48, said he would stay on at NASA until a successor is named by Bush and confirmed by the Senate. No timetable has been set for naming a successor. O'Keefe, is NASA's tenth administrator. Nominated by President George W. Bush and confirmed by the U.S.

Senate, he was sworn into office Dec. 21, 2001. [“Search for new NASA chief begins,” **Orlando Sentinel**, December 14, 2004, p A8.]

◆ Kennedy Space Center Director Jim Kennedy stated the following for public release regarding NASA Administrator Sean O'Keefe's announcement. "Sean O'Keefe's tenure as our administrator is defined by brilliant leadership and bold action and NASA is a better agency now than prior to his arrival. He courageously led us through both the Columbia tragedy and the investigation that followed. Sean's leadership transformed our structure and culture, paving the way for our Space Shuttle's successful return to flight in 2005. But without a doubt, his greatest legacy is America's new Vision for Space Exploration. Working with the President, his administration and Congress, it's now the official space policy of the United States that will take NASA back to the Moon, then to Mars and beyond. It was evident from the very beginning he cares about the NASA and contractor family and it inspired us all to achieve greatness. The entire KSC family wishes Sean, Laura and their family the very best in their future!" [“KSC Director Statement Concerning Adm. O’Keefe Announcement,” **KSC News Release #98-04,** December 13, 2004.]

**December 14:** President Bush is going to appoint someone to run NASA who is behind his proposal to send astronauts to the moon and Mars, and that bodes well for the Cape Canaveral spaceport, Kennedy Space Center Director James Kennedy said. The consensus throughout the space agency, and its contractor community, since the announcement of NASA's new mission is that KSC and Cape Canaveral Air Force Station will remain the prime launch site for human and robotic missions to explore the solar system. This is where the launch pads are. This is where the support buildings are. This is where the human experience and expertise is concentrated. None of that changes simply because there will be a new person working out of the administrator's office in Washington. "This is not just the president's vision anymore," Kennedy said, noting that Congress' approval of a record $16.2 billion budget for NASA came with a strong vote of support for the agency to get started on the moon-Mars plan. "KSC is going to be right in the middle of the vision for space exploration. We are going to be the operations center for the future." Kennedy Space Center's 14,000 government and private sector employees -- most of whom currently work on the space shuttle and International Space Station projects -- should fear nothing about a change in administrator. The vision is gaining momentum, and a new administrator is arriving with a head start, because O'Keefe's team did the political heavy lifting, Kennedy said. "There's a rigorous process in place now," Kennedy said. "The president will be picking someone, and a key part of that selection will be support of the vision. The status of the shuttle and station are assured for at least six years or so, so change is not something that's upon us next week," Kennedy said. "There is a transformation coming, but we have time to adjust. But we don't want to take the future for granted." Most people inside the agency, and among the private companies that do NASA work here, say they believe the shuttle replacement and other moon-Mars hardware will be launched aboard future versions of the Atlas 5 or Delta 4 rockets or some modified version of the space shuttle. All those scenarios, as well as the presence of launch pads and other infrastructure, make Kennedy Space Center the logical choice going forward as long as NASA can continue to get the support it needs for slow, but

steady progress toward the moon and Mars missions. "We will have some transformation, but the future looks good," Kennedy said. Web posted. (2004). [KSC director: Leadership change benefits spaceport [Online]. Available WWW: http://www.floridatoday.com/ [2004, December 14].]

◆ A NASA B-52 that has played a pivotal role in key national aerospace programs -- including the development of the space shuttle -- is being retired after a service life that spanned six decades. Known by the tail number 008, the venerable aircraft recently completed its final research flight, landing at Edwards Air Force Base in California after serving as the "mothership" for a NASA X-43A mission that set a world speed record. [“NASA’s workhorse ends run,” **Florida Today**, December 15, 2004, p 3B.]

◆ Expendable Launch Vehicles Status Report: Mission: Deep Impact, launch vehicle: Delta II, launch pad: 17-B, Cape Canaveral Air Force Station, launch date: NET Jan. 12, 2005, launch window: 1:08:20 p.m. and 1:48:04 p.m. EST instantaneous. The launch of the Deep Impact spacecraft has been rescheduled for no earlier than Jan. 12. During a review of launch vehicle hardware, it was discovered that some components of the inter-stage adapter did not receive proper heat treatment and must be removed and replaced. The inter-stage adapter is located between the first and second stage of the rocket. A Boeing engineer reviewing an "as-built" drawing of the vehicle discovered the inter-stage had not been heat treated to a revised higher specification. The second stage will be removed from the vehicle on Dec. 15, the inter-stage adapter removed on Dec. 16, a new inter-stage adapter installed on Dec. 17, and the second stage re-installed on Dec. 18. In processing activities at the Astrotech Space Operations facility located near Kennedy Space Center, the high-gain antenna used for Deep Impact communications with Earth has been installed. The solar array panels have successfully completed an illumination test as a final check of their performance. The flight battery associated with the solar array panels has been installed. Fueling of the spacecraft is scheduled to start on Dec. 19 and be completed on Dec. 22. Mating to the payload attach fitting and upper stage booster occurs Dec. 29 - 30. At Launch Pad 17-B, the loading of liquid oxygen aboard the first stage for a leak check and a countdown launch team certification exercise occurred Dec. 13. The vehicle guidance and control system check occurs on Dec. 28. The Flight Simulation, a plus count that exercises all of the systems on the vehicle as they will occur during powered flight, is scheduled for Dec. 29. The Deep Impact spacecraft is now scheduled to be transported to Pad 17-B on Jan. 3 and mated to the Boeing Delta II rocket. The Flight Program Verification, the major integrated test with the Delta II, occurs on Dec. 30. The Delta II payload fairing will be installed around the Deep Impact spacecraft on Jan. 7. KSC News Center (2004). **Expendable Launch Vehicles Status Report** [Online]. Available E-mail: ksc@newsletters.nasa.gov [2004, December 14].]

**December 15:** NASA announced Wednesday that it has pushed back the launch of its Deep Impact comet mission, but the agency remains confident that the spacecraft can lift off before its launch window closes next month. Deep Impact is now scheduled to launch on a Delta 2 on January 12, four days later than previously planned. Project officials said the Delta's interstage, a component between the booster's first and second stages, had not been properly heat-treated and will have to be replaced. The launch had previously been

delayed from December 30 because of software problems. The spacecraft's launch window extends through January 28; if the spacecraft does not launch by then it will not be able to reach its destination, comet Tempel 1, as planned in July. Deep Impact is designed to fly past the comet's nucleus as an impactor probe, ejected from the spacecraft prior to the flyby, crashes into the nucleus and exposes fresh material from below the surface. Web posted. (2004). [Deep Impact launch delayed again [Online]. Available WWW: http://www.spacetoday.net/ [2004, December 15].]

**December 16:** Louisiana State University (LSU) has selected outgoing NASA Administrator Sean O'Keefe to be the school's next chancellor. The LSU Board of Supervisors unanimously approved the nomination of O'Keefe to run the university Thursday night after a search committee recommended him earlier in the day. O'Keefe, who announced his resignation from NASA on Monday two days after work leaked out that he was under consideration for the LSU job, will start work there in February, assuming his replacement at the space agency has been selected and confirmed by then. O'Keefe and the Board of Supervisors will first negotiate his salary, which is expected to be "in the neighborhood" of, but not as high as, the $500,000 his predecessor received. According to one news report, O'Keefe had been in informal discussions with William Jenkins, president of the state university system, about the job for five months. Web posted. (2004). [O'Keefe wins LSU job [Online]. Available WWW: http://www.spacetoday.net/ [2004, December 17].]

◆ An independent panel reviewing NASA's shuttle return-to-flight efforts said Thursday that the agency has closed out about half of the recommendations of the Columbia Accident Investigation Board (CAIB). The Stafford-Covey Return to Flight Task Group said Thursday that NASA had complied with six of the CAIB's 15 recommendations, and has "conditionally closed" two more. NASA has previously stated that the agency will comply with all 15 recommendations before the shuttle returns to flight. The panel was optimistic that the shuttle can launch in May or June of 2005, as currently scheduled, based on the progress NASA has made to date. One concern, though, is that efforts to develop an on-orbit repair capability for the shuttle's tiles and panels has proved difficult. Web posted. (2004). [Panel: NASA making progress on Shuttle [Online]. Available WWW: http://www.spacetoday.net/ [2004, December 17].]

◆ NASA has submitted documents to the Stafford-Covey Return To Flight Task Group indicating it is making progress to meet all of the Columbia Accident Investigation Board's 15 recommendations for returning the shuttles to flight.

| Finished/Approved | Plan Approved/Not Finished | Still Under Review |
|---|---|---|
| Making imaging of shuttle by spy satellites a standard requirement for every mission. | Set realistic flight schedule considering money and resources; do not let deadlines override safety. | Improve training, rules and processes for Mission Management Team that oversees shuttle flights |
| Kennedy Space Center – improve scrutiny of foreign | Improve ground-based cameras to get engineers | Create independent technical authority to |

| | | |
|---|---|---|
| object debris during shuttle processing. | better, more reliable imagery of shuttle launches. | review waivers and safety issues; make safety workers independent. |
| Create digitized database of final pre-launch photographs of shuttle systems for engineers. | Beam back to Earth digital images of external tank so engineers can see whether major debris came free. | Determine what impacts the orbiter can withstand and begin program to "harden" orbiter against launch debris hits. |
| Redesign catchers that stop giant solid rocket booster bolts from hitting orbiter during launch. | Do non-destructive inspections of reinforced carbon carbon wing panels and nose cap to spot defects or wear that could weaken them during re-entry. | Prevent debris from coming off the external fuel tank and striking the orbiter, especially the critical heat shield, during launch. |
| Ensure two people are present for final closeout of external tank foam insulation application. | | Develop ways to inspect and repair heat shield damage in orbit. |

["Status of shuttle recommendations," **Florida Today**, December 17, 2004, p 8A.]

◆ NASA's two Mars rovers, Opportunity and Spirit, landed on the red planet early in 2004 and have since found clear and conclusive evidence that Mars was drenched with water at some time in its history. The editors of *Science*, one of the world's leading publishers of peer-reviewed, original research, judged the robotic accomplishment as the top scientific "Breakthrough of the Year." ["Mars missions yield top science findings," **Florida Today**, December 17, 2004, p 9A.]

**December 17:** A multimillion-dollar direct broadcast television satellite is circling high above Earth today, proof positive that U.S. Atlas rockets can claim partial ownership of a world-record for consecutive launch successes. Set by the now-retired European Ariane 4 rocket in 2003, the record – 74 straight mission successes – was matched this morning when a Lockheed Martin Atlas 5 lofted the 9,000-pound spacecraft into orbit after launch from Cape Canaveral Air Force Station. The string of Atlas launches without failure dates back to July 1993, a remarkable achievement in the high-risk business of spaceflight. ["Atlas matches success record," **Florida Today**, December 18, 2004, p 1B.]

◆ Space Shuttle Processing Status Report S1-38: **Discovery** (OV-103); Technicians continue to perform orbiter powered-system testing on Discovery for its Return to Flight mission, designated STS-114, to the International Space Station. Final closeouts and seal installations continue on the Rudder Speed Brake. The new Orbiter Boom Sensor System (OBSS) is scheduled to arrive at Kennedy Space Center as early as next week. Once at KSC, it will be taken to the Remote Manipulator System lab in the Vehicle Assembly Building for final checkout and testing prior to moving over to the Orbiter Processing Facility (OPF) for installation into Discovery. The 50-foot long OBSS will attach to the Remote Manipulator System, or Shuttle arm, and is one of the new safety measures for Return to Flight, equipping the orbiter with cameras and laser systems to inspect the

Shuttle's Thermal Protection System while in space. **Atlantis** (OV-104); In OPF Bay 1, processing is continuing to go well for Atlantis' mission to the International Space Station. The orbiter remains in a power-down period to complete the final wiring for the Return to Flight modifications, including the new OBSS, wing leading edge sensors and the External Tank separation camera. The vehicle is scheduled to be powered up next week. The body flap is scheduled to be installed on Atlantis in early January. The body flap actuators were removed and inspected prior to being reinstalled on the vehicle. The fuel cells and external airlock are scheduled to be installed following the holidays. **Endeavour** (OV-105); Space Shuttle Endeavour is in its Orbiter Major Modification period, which began in December 2003. Endeavour was rolled over to the Vehicle Assembly Building yesterday for a temporary stay, clearing OPF Bay 2 for a scheduled maintenance period. The orbiter is scheduled to be rolled back into the bay on Jan. 12. Both the right- and left-hand wing leading edges were painted following the removal of miniscule corrosion on the wing. This prepares the surface of the wing for the reinstallation of the Reinforced Carbon-Carbon panels. Owner-press-release. (2004). **Space Shuttle Processing Status Report** [Online]. Available E-mail: owner-press-release@spinoza.public.hq.nasa.gov [2004, December 17].]

◆ Departing NASA chief Sean O'Keefe said Friday that while he has mixed emotions about leaving the agency, he has no regrets about his three-year tenure. O'Keefe, who is leaving to become chancellor at Louisiana State University, said the years have been filled with "tragedy, triumph and transformation," including the loss of the space shuttle Columbia last year. But "the future is as bright as the sun and as expansive as the universe itself," O'Keefe told agency employees. He said his proudest accomplishment is the space agenda, outlined by President Bush last January, which calls for astronauts to return to the moon and, eventually, go to Mars. And he recommended his successor "take the president's vision for space exploration, support it and implement it . . . I'm just confident they can pull it off, given the extraordinary capabilities of the folks in this agency." O'Keefe defended his controversial decision to scrap planning for a space-shuttle mission to service the ailing Hubble Space Telescope. "I have no reticence or regrets about that. I think that's exactly what the conditions were at the time," O'Keefe said. "There were a set of challenges that had to be confronted." O'Keefe announced the Hubble decision two days after Bush outlined his vision for space, raising suspicions the mission was the victim of budget cutting. But the NASA administrator maintained that sending astronauts to repair the space telescope would be too risky. However, last week, a National Academy of Sciences panel said a shuttle mission has a much greater chance of success than a robotic mission. The news of O'Keefe's departure has sparked optimism among Hubble supporters. O'Keefe said that before NASA kills the idea of robotic servicing, agency officials should wait for two internal reviews, set for the spring and summer. [“No regrets, NASA chief says,” **Orlando Sentinel**, December 18, 2004, p A20.]

**December 20:** The first Delta 4 Heavy rocket is ready to lift off from Cape Canaveral Air Force Station sometime between 2:36 p.m. and 5:32 p.m. Mission managers gave the go-ahead Monday to try to launch the triple-sized rocket today after scrubbing three straight days earlier this month and then standing down for nine days so Lockheed Martin

Corp. could launch its Atlas 5 rocket last week. [“Weather outside is delightful for Delta launch,” **Florida Today**, December 21, 2004, p 1A & 8A.]

◆ Ames Research Center celebrated its 65th Anniversary. KSC NASA_INC Message Center (2004). **Ames Research Center 65th Anniversary** [Online]. Available E-mail: KSCNASA_INCMessageCenter@kscems.ksc.nasa.gov [2004, December 20].]

**December 21:** The maiden flight of Boeing’s new Delta 4 heavy-lift rocket stranded a dummy satellite in the wrong orbit Tuesdsay when the booster’s first stage failed to perform as expected. The giant 23-story rocket rumbled off the Cape’s seaside Launch Pad 37B at 4:50 p.m. and began a spectacular climb through clear blue skies. About six hours later, however, Air Force officials confirmed the mission fell short of delivering its 6.7-ton payload into the proper orbit 22,000 miles above Earth. [“Boeing’s new Delta rocket fails to deliver,” **Orlando Sentinel**, December 22, 2004, p A1 & A8.]

◆ Kennedy Space Center, and the rest of America's space forces, stand ready to lend Santa Claus any help he might need Friday. That includes once again providing the annual clearance for Santa to use the super-sized runway at the Shuttle Landing Facility should he run into technical trouble or need a break when his Christmas Eve travels bring him across the Atlantic. KSC is almost a ghost town on Christmas Eve and Christmas, but the agency always leaves the landing facility available for Santa's use, though the agency carefully points out the help is given at "no cost to taxpayers." The 15,000-foot-long, 300-foot-wide runway is longer than those at most commercial airports. Super-powerful xenon lights typically illuminate the facility. NASA and the military also carefully tracks Santa's vehicle as it zips around the Earth. In recent years, NASA said Santa has been able to help out Kennedy Space Center. This year, Santa's sleigh is outfitted with a tracking system called the Holiday Hovering Homing device, or HOHOHO for short. KSC officials said they've been sharing top-secret details of the system with North Pole engineers. "NASA hopes to learn from the great skills of Mr. Clause to make our Vision for Space Exploration a reality," said shuttle test director Pete Nickolenko of Titusville. [“KSC, NORAD trackers aid Santa,” **Florida Today**, December 22, 2004, p 3B.]

**December 23:** The biggest telescope ever flown to deep space is easy to see as Deep Impact undergoes final checks at Astrotech in Titusville. The spacecraft, a joined "mothership" and "impactor," is on track for a Jan. 12 launch. Workers have to stow the solar panels and wrap up details. The launch team has its mission readiness review Monday, and the spacecraft probably will be mated to the Boeing Delta 2 rocket at the start of the year. Deep Impact must launch by Jan. 28 to rendezvous with Comet Tempel 1 on July 4, when the mothership releases the impactor to slam into the icy body. The comet strayed from the Kuiper Belt of bodies on the outer edge of the planets. Studying material ejected by the collision may help scientists understand these building blocks of the solar system. [“Comet probe in final check,” **Florida Today**, December 24, 2004, p 1A.]

**December 24:** Europe's Huygens probe successfully separated from NASA's Cassini spacecraft Friday night, on its way to a mid-January rendezvous with Saturn's mysterious moon Titan. ["Probe en route to Saturn's moon," **Florida Today**, December 26, 2004, p 5A.]

**December 25:** Powerful new radars might enable NASA to stage shuttle liftoffs at night again, freeing the agency of post-Columbia lighting restrictions that severely limit launch opportunities. Strategically placed north and south of NASA's twin shuttle launch pads and aboard a solid rocket booster retrieval ship at sea, the radars will be able to peer through darkness or cloud cover on future flights. That capability will make it possible to launch at night and still capture detailed images of any debris that might break free from redesigned external tanks or any other part of a shuttle. A 1.7-pound piece of external tank foam insulation punched a deadly hole in Columbia's left wing, and NASA plans to launch its next two flights during daylight so tracking cameras can spot any debris coming off modified fuel reservoirs. But the new radar imaging system is expected to play a key role in returning to nighttime launches, a move that would open up far more opportunities to fly. "We're counting on the cameras to show us things during daylight," said Sue Gaines, a lead engineer in NASA's Comprehensive Master Planning Office at Kennedy Space Center. "But we feel like this will really enhance our capability to do night launches." Accident investigators found that NASA's flawed analysis of the fatal Columbia debris-hit was hampered by a lack of high-speed, high-resolution tracking cameras. Among other things, they recommended NASA upgrade its launch imaging system to provide "a minimum of three useful views" of the shuttle from liftoff through separation of its rocket boosters two minutes into flight. They also urged NASA to consider using ships or aircraft to provide additional views. NASA now is upgrading ground cameras as well as those that fly aboard orbiters. The agency also plans to fly new cameras on shuttle boosters and external tanks. In addition, two camera-toting NASA WB-57F aircraft will chase shuttles in flight to image the forward portion of the vehicles. Bright exhaust plumes during night launches obscure ground camera views of that area, which is susceptible to debris strikes in flight. The new radar system will go even a step further, enabling NASA to monitor the critical area between an external tank and the belly of a shuttle orbiter -- a region where thermal tiles and composite carbon wing panels are exposed to debris strikes. Comprising both C-Band and X-Band instruments, the system will paint three-dimensional radar pictures that also show the relative velocity between the shuttle and any type of debris. ["Shuttle may see launch at night," **Florida Today**, December 25, 2004, p 1A & 8A.]

◆ A Russian Progress ship arrived at the International Space Station ending a food crisis that prompted NASA and its international partners to draft plans to evacuate the station as early as next week. The two men living on the station were down to their last nine days of food before the resupply freighter docked at 6:58 p.m. Saturday. ["Station's cupboards no longer are bare," **Florida Today**, December 26, 2004, p 1A & 5A.]

**December 26:** As NASA works to return the space shuttle to flight, it is also facing a growing dilemma: when, and how, to stop upgrading a fleet that is headed for mothballs. In the aftermath of the February 2003 accident that destroyed the shuttle Columbia and

killed seven astronauts, the space agency got a new agenda -- and a firm deadline to retire the remaining three orbiters when construction of the international space station is complete, sometime around the end of the decade. That settled a question that had lingered for years. But it also meant NASA had to rethink its plans to add a number of improvements to the orbiters, even as it spends an estimated $1.19 billion to fix safety issues exposed by the Columbia tragedy. Michael Kostelnik, who oversees the shuttle and station program at NASA headquarters in Washington, said the problem is deciding just how to invest in the vehicle while limiting that investment. NASA expects to fly the shuttle more than two-dozen times before retiring the fleet. So far, only three programs have been canceled, which will save roughly $177 million and potentially affect 470 jobs, mostly NASA contractors. Beutel said that all of the civil servants affected by the decision will be reassigned to other jobs; most work at Johnson Space Center in Houston. Shuttle contractors are trying to make sure that the positions affected by the cancellations are folded into other operations. Jeff Carr, a spokesman for United Space Alliance, the joint venture between Boeing and Lockheed Martin that manages much of the shuttle's operations, said his company hopes to accommodate anyone threatened by the cancellations. "We think that the number of USA employees that could be affected is less than 150," he said. "But we hope not to lay anybody off if we can avoid it. We're looking for placement options and transfer opportunities." Deciding which programs to keep and which to throw out is not the only problem facing Kostelnik and his team. NASA also has to decide how to deal with the infrastructure -- such as the launch pads at Kennedy Space Center -- and the thousands of people who work on the shuttle. As the process continues to evolve, he said, there is one goal that is not in question: Make the last shuttle flight as safe as the trip that Discovery will take in May or June, the first mission since the loss of Columbia. "It's a tough job to balance all of these things. It takes a steady hand and a lot of good management expertise to get it right," Kostelnik said. But the top priority, he said, is to "return to flight safely." [“NASA juggles shuttle plans,” **Orlando Sentinel**, December 27, 2004, p A1 & A4.]

◆ The definition of "supercomputer" slides all the time, but NASA's Columbia computer might well have its picture next to the word in the dictionary. The computer -- named for the lost shuttle crew that included Kalpana Chawla, who used to work with the computing team at Ames -- is what one might call the ultimate hive brain. NASA saw a need to do more complex simulations in the wake of the Columbia accident, and this computer can handle them. It also does sophisticated scientific research. "It's really 20 supercomputers," said Walt Brooks, chief of NASA's Advanced Supercomputing Division. The speed of the computer, built in just four months and unveiled in October, would allow experts to respond to a shuttle emergency in real time for the first time, he said. By taking over half the supercomputer's capacity, engineers might simulate the effects of shuttle damage in 24 hours. The Columbia computer cost about $50 million to build and about $50 million a year to run, Brooks said. [“NASA supercomputer tackles shuttle problems,” **Florida Today**, December 27, 2004, p 1A & 5A.]

**December 28:** The redesigned external fuel tank that will help propel Discovery on the first shuttle mission since the 2003 Columbia accident is set to leave New Orleans on Friday, beginning a five-day sea cruise to the Kennedy Space Center. NASA and tank-

builder Lockheed Martin Corp. have spent almost two years overhauling the 15-story fuel tank and its spray-on foam insulation. It was the failure of the foam that caused damage that led to the destruction of the shuttle Columbia on its way home from space and the deaths of all seven astronauts aboard. Its arrival at Kennedy Space Center, most likely on Jan. 5, marks a major accomplishment in NASA's bid to return the shuttles to space as planned in May or June of next year. The most notable change: the elimination of two large wedges of foam near the place where a metal strut connects the nose of the orbiter to the big orange fuel tank. A hunk of one of the ramps broke free as Columbia blasted off, blowing a big hole in a heat-shield panel on the left wing. The tank being prepared for shipment to the Florida spaceport features dozens of changes in how it's built and how foam is applied. The tank also is outfitted with cameras that will snap photos engineers can review to see if the design changes worked and reduced the chance of debris hitting the orbiter. [“New shuttle tank ready to sail to KSC,” **Florida Today**, December 29, 2004, p 1A & 3A.]

**December 30:** American Leroy Chiao and Russian Salizhan Sharipov wished the world a happy New Year from space Wednesday as they worked to unpack more than 2 tons of food, water and supplies from a supply ship that arrived Christmas Day. The work is slow-going. The men will unpack between science experiments, repair work and preparations for two upcoming spacewalks, among other tasks. "It's like unpacking a big truck," Chiao said during the International Space Station crew's first news conference since arriving in space in October. The first items pulled from the Progress supply ship: Christmas presents and badly needed food. The men got snapshots of their wives and families, special snacks and candies and other holiday treats. [“Thinner crew unpacks station food supplies,” **Florida Today**, December 30, 2004, p 3A.]

# Appendix A

## 2004 NASA Expendable Launch Vehicle Missions

| Mission | Launch Date | Vehicle | Launch Site |
|---|---|---|---|
| Gravity Probe B | 4-20-2004 | Delta | VAFB |
| Aura | 7-15-2004 | Delta II | VAFB |
| MESSSENGER | 8-03-2004 | Delta II Heavy | CCAFS |
| Swift | 11-20-2004 | Delta II | CCAFS |

Web posted. (2004). [2004 Expendable Launch Vehicle Missions [Online]. Available WWW: http://www.nasa.gov/centers/kennedy/launchingrockets/archives/2004.html [2005, January 13].]

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